MOTOROLA

Field Service Guide

Field Service Guide

(MFSG/D2)

(MFSG/D2A1)

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Preface

The *Field Service Guide* describes and illustrates a broad range of Motorola systems, boards, peripherals, and products. While Motorola publishes detailed and extensive manuals specific to each product, this document is intended to serve as a portable reference for Field Engineers and other support personnel who require certain basic service and configuration information.

This guide complements other technical publications and educational courses:

- ❑ Refer to the Computer Group Technical Information Library for a complete listing of all the documentation that is available to you.
- ❑ Refer to the Training and Education Course Schedule Registration Information (Part Number: CAT2H95) for a listing of the training courses that are available to you or call 1-800-551-0535.

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WARNING

Some equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the documentation for the product, may cause interference to radio communications. Motorola equipment has been tested and found to comply with the limits for a Class A Computing Device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user, at the user's own expense, will be required to take whatever measures necessary to correct the interference.

Safety Summary
Safety Depends On You

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. Motorola, Inc. assumes no liability for failure to comply with these requirements.

The safety precautions listed below represent warnings of certain dangers of which Motorola is aware. You should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

Ground the Instrument.

To minimize shock hazard, the equipment chassis and enclosure must be connected to an electrical ground. The equipment is supplied with a three-conductor ac power cable. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter, with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards.

Do Not Operate in an Explosive Atmosphere.

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Keep Away From Live Circuits.

Operating personnel must not remove equipment covers. Only Factory Authorized Service Personnel or other qualified maintenance personnel may remove equipment covers for internal subassembly or component replacement or any internal adjustment. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

Do Not Service or Adjust Alone.

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

Use Caution When Exposing or Handling the CRT.

Breakage of the Cathode-Ray Tube (CRT) causes a high-velocity scattering of glass fragments (implosion). To prevent CRT implosion, avoid rough handling or jarring of the equipment. Handling of the CRT should be done only by qualified maintenance personnel using approved safety mask and gloves.

Do Not Substitute Parts or Modify Equipment.

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of the equipment.

Dangerous Procedure Warnings.

Warnings, such as the example below, precede potentially dangerous procedures throughout Motorola documentation. Instructions contained in the warnings must be followed. You should also employ all other safety precautions which you deem necessary for the operation of the equipment in your operating environment.

WARNING **Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing, and adjusting.**

Contents

Systems

System Components

System Configurations

Overview

This section contains information on the following systems:

- ❑ Motorola Delta Series 3000, 4000, and 8000
- ❑ Series 900
- ❑ SeriesFT
- ❑ XR Series
- ❑ PowerStack Systems
  - RISC PC
  - Series E
  - Series I Server
  - Series MP Deskside
  - Series MP Rack

Reference Documentation

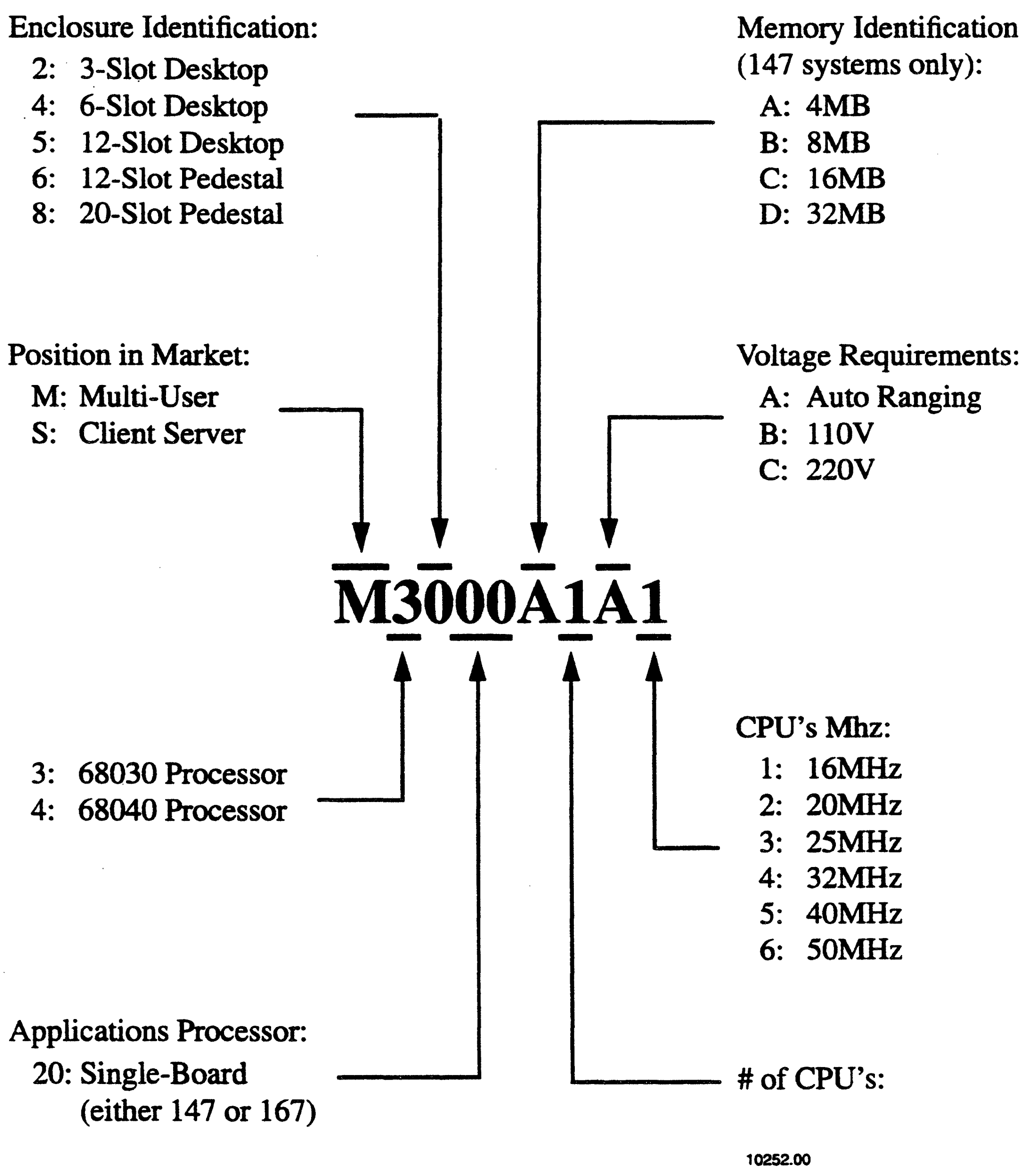
Standard equipment and configurations supported by Motorola are documented in Configuration Guides, Price Books, Product Marketing brochures, and hardware installation manuals.

The information in this document is only a small subset of the information that is available about Motorola components. Refer to the Computer Group Technical Information Library for a complete listing of all the documentation that is available to you.

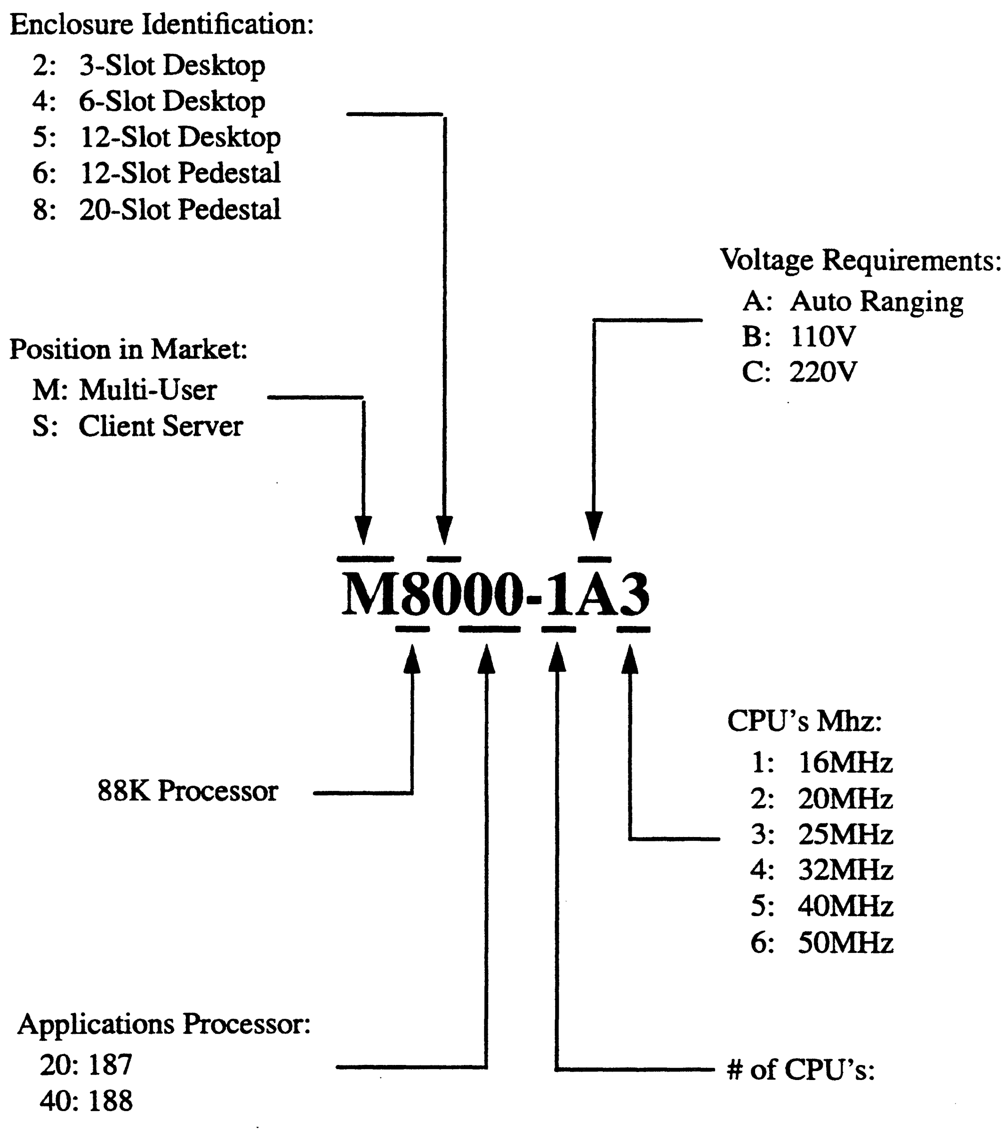
System Model Numbers

Motorola uses a specific product numbering scheme for system configurations. Familiarity with this scheme will help you identify and troubleshoot Motorola equipment. Refer to the diagrams on the pages that follow.

Delta Series 3000/4000 Product Numbering



Delta Series 8000 Product Numbering



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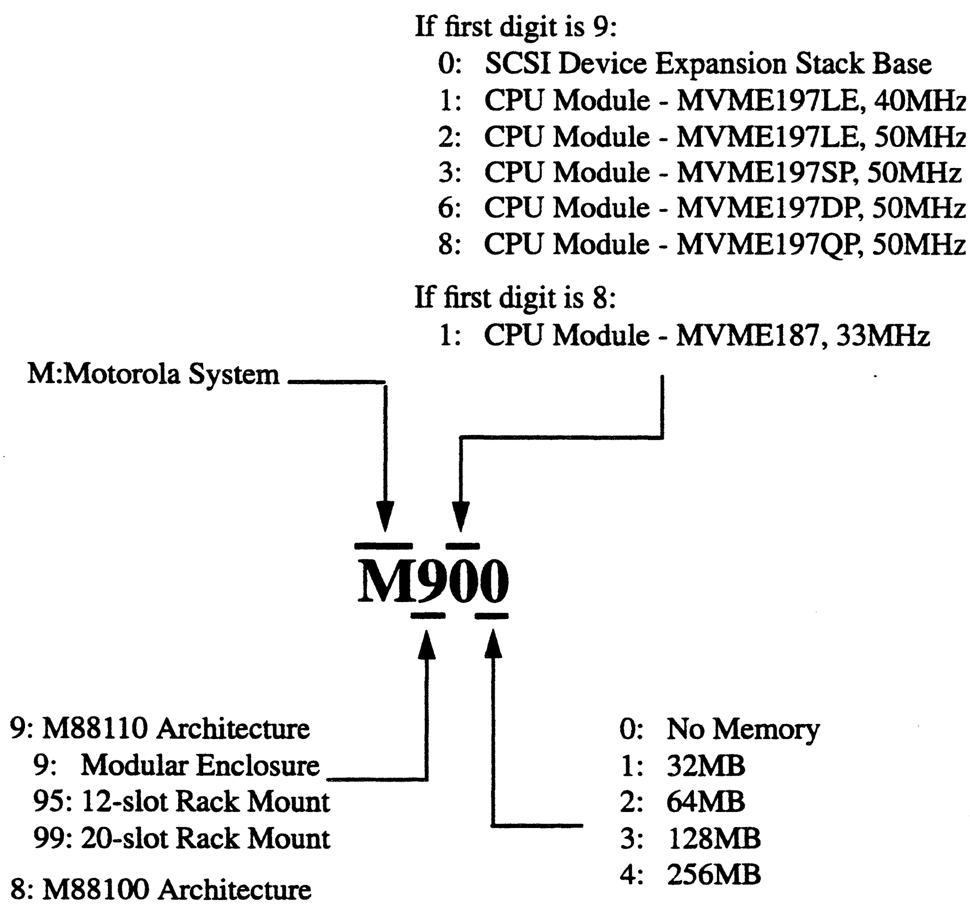
Series 900 Product Numbering



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PowerStack RISC PC Model Numbering

XX XXX-XXX M

Modifier:

NTW: Windows NT Workstation Bundle
ANT: Windows NT Workstation Bundle,without L2cache
BNT: Windows NT Workstatin Bundle, with L2 cache
AX: Workstation Bundle, 128MB Parity
BX: Workstation Bundle, 256MB Parity
CX: Workstation Bundle, 128MB ECC

Power PC Architecture:
603-66: 66Mhz Power PC 603™
603E-100: 100Mhz Power PC 603e™
604-100: 100Mhz Power PC 604™
604-133: 133Mhz Power PC 604™

Motorola PowerStack RISC PC
DT: Desk-Top enclosure
MT: Mini-Tower enclosure

System Configurations

PowerStack Series E Model Numbering

E XXX-XXX M

Modifier:

P: Parity Memory
NTW: Windows NT Workstation Bundle, Parity Memory

Bundled Configurations: (include)

A: No Cache, No SCSI Dev. Exp. Module
B: 256K Cache, No SDEM.
C: No Cache, SDEM
D: 256K Cache, SDEM
G: PCI Graphics Card

Power PC Architecture:

603-66: 66Mhz Power PC 603™
603E-100: 100Mhz Power PC 603e™
604-100: 100Mhz Power PC 604™
604-132: 132Mhz Power PC 604™

Motorola PowerStack Series E

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Model 8120

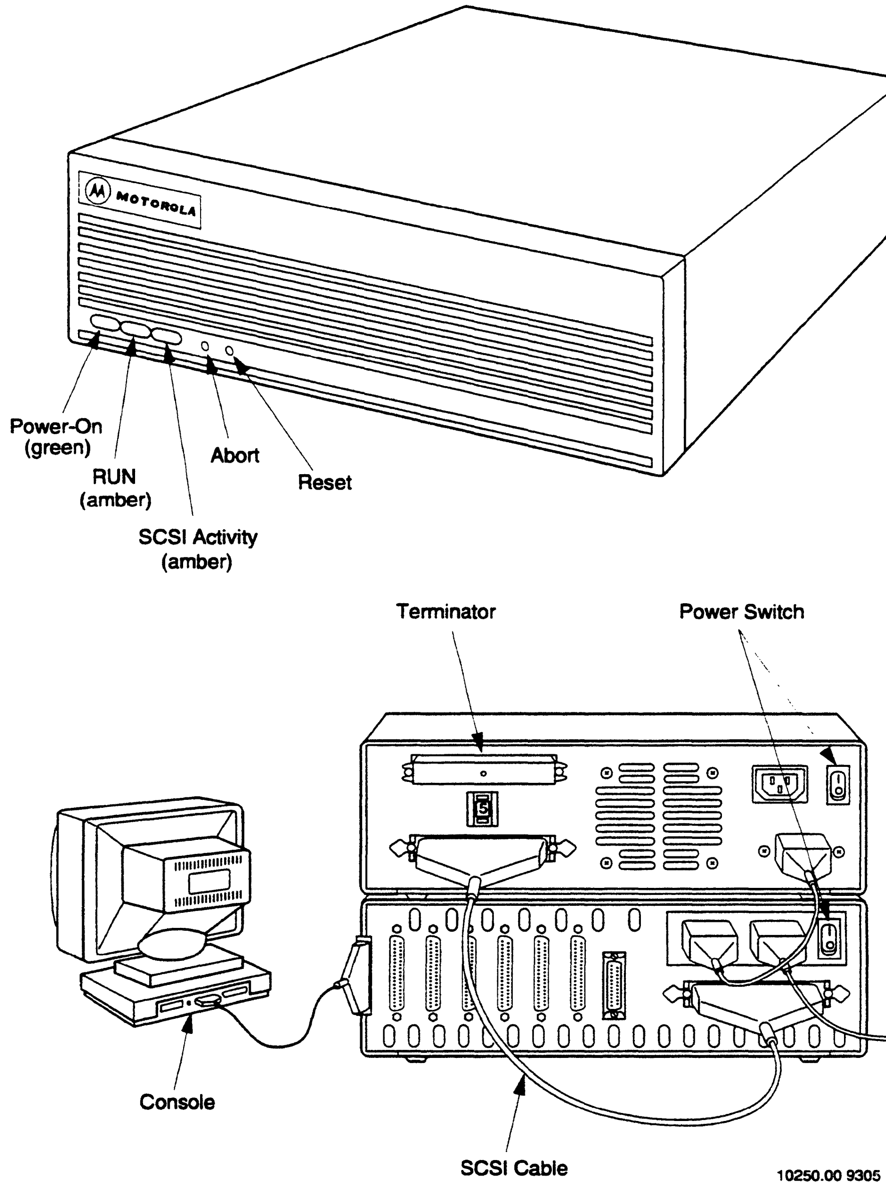
Slotless Desktop Computer System

The **Model 8120** is an 88k RISC-based desktop computer system.

The 8120 has no VME backplane and all SCSI peripherals are attached via External SCSI Enclosures.

Specifications

Height	3.3 in. (84 mm)
Width	10.0 in. (254 mm)
Depth	11.2 in. (284 mm)
Weight	5 lbs. (2.3 kg)
Input Voltages	115 Vac/230 Vac, 50Hz/60Hz (autoranging)
Acoustic Noise Level	43 dBA
Temperature	
Operating	+5°C to +40°C
Nonoperating	-40°C to +65°C
Altitude	
Operating	10,000 ft (3048 m)
Nonoperating	30,000 ft (9144 m)
Relative Humidity	
Operating	20% to 80% (with removable media) 10% to 90% (without removable media)
Nonoperating	5% to 95%



Power-On
(green)
RUN
(amber)
SCSI Activity
(amber)
Abort
Reset
Terminator
Power Switch
Console
SCSI Cable
10250.00 9305

Models 3220, 4220, & 8220

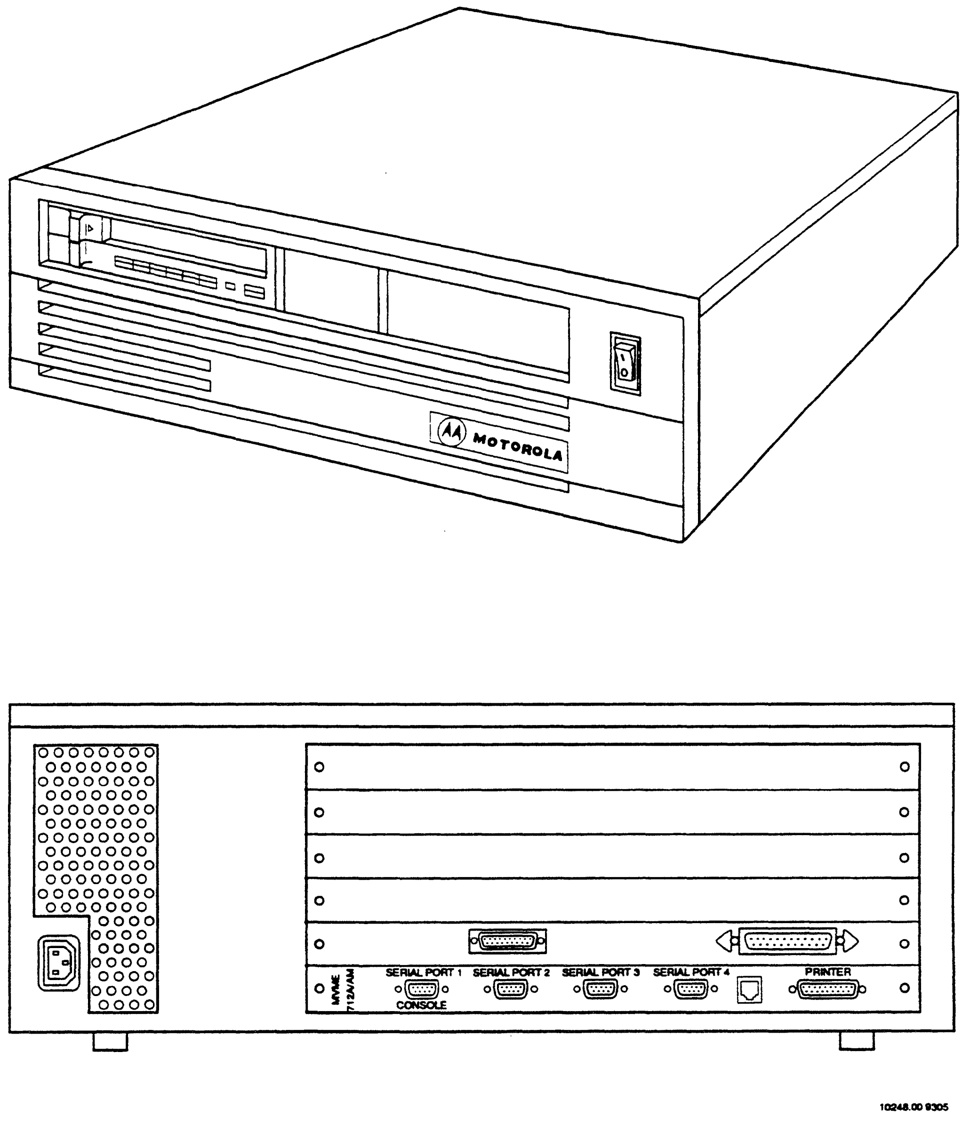
3-Slot Desktop Computer Systems

- The **Model 3220** is a 68030-based system.
- The **Model 4220** is a 68040-based system.
- The **Model 8220** is an 88k RISC-based system.

The chassis for these three systems has a total of three VME slots, six transition slots (T/M), and three 3.5 in. device bays.

Specifications

Height	6.4 in. (16.26 cm)
Width	17.0 in. (43.18 cm)
Depth	17.0 in. (43.18 cm)
Weight (fully loaded)	45 lbs. (20.4 kg)
Acoustic Noise Level	46 dBA
Temperature	
Operating	+5°C to +35°C
Nonoperating	-40°C to +60°C
ESD	5,000 volts: no observable effects 12,000 volts: no operator intervention required 20,000 volts: no permanent equipment damage
Relative Humidity	
Operating	20% to 80% (noncondensing)
Nonoperating	10% to 90% (noncondensing)



MVME952 Chassis

Models 3420, 4420, 8420, & 8440

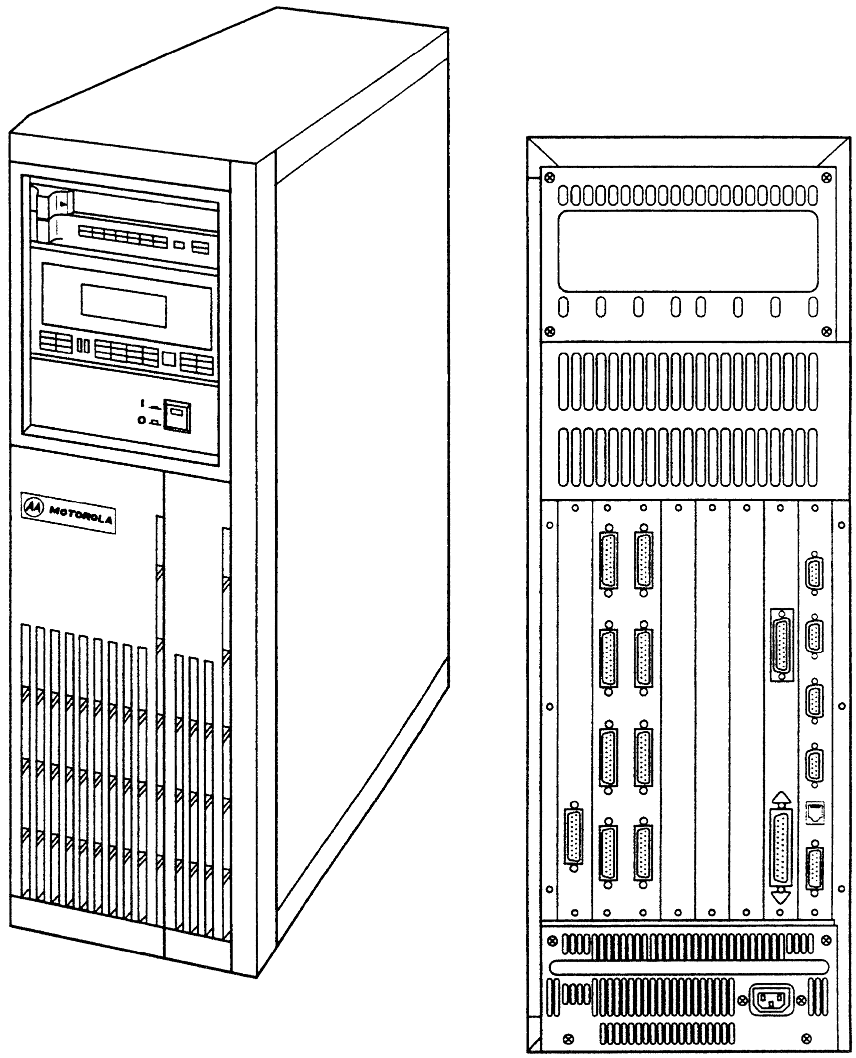
6-Slot Deskside Computer Systems

- The **Model 3420** is a 68030-based system.
- The **Model 4420** is a 68040-based system.
- The **Model 8420** is an 88k RISC-based system.
- The **Model 8440** is an 88k RISC-based system.

The chassis for these four systems has a total of six VME slots and eight transition slots (T/M). The 3420 has two full-height peripheral bays, and one half-height peripheral bay. The 4420, 8420, and 8440 have five half-height peripheral bays, three of which may be used for removable devices.

Specifications

Height	22.6 in. (57.4 cm)
Width	8.0 in. (20.3 cm)
Depth	19.0 in. (48.3 cm)
Weight (fully loaded)	58 lbs. (26.3 kg)
Acoustic Noise Level	50 dBA
Temperature Operating Nonoperating	 +5°C to +35°C -40°C to +60°C
ESD	5,000 volts: no observable effects 12,000 volts: no operator intervention required 20,000 volts: no permanent equipment damage
Relative Humidity Operating Nonoperating	 20% to 80% (noncondensing) 10% to 90% (noncondensing)



10249.00 9305

MVME954A Chassis

3420, 4420, 8420, & 8440

Models 3520, 4520, 8520/40, & 95*xx*

12-Slot Computer Systems

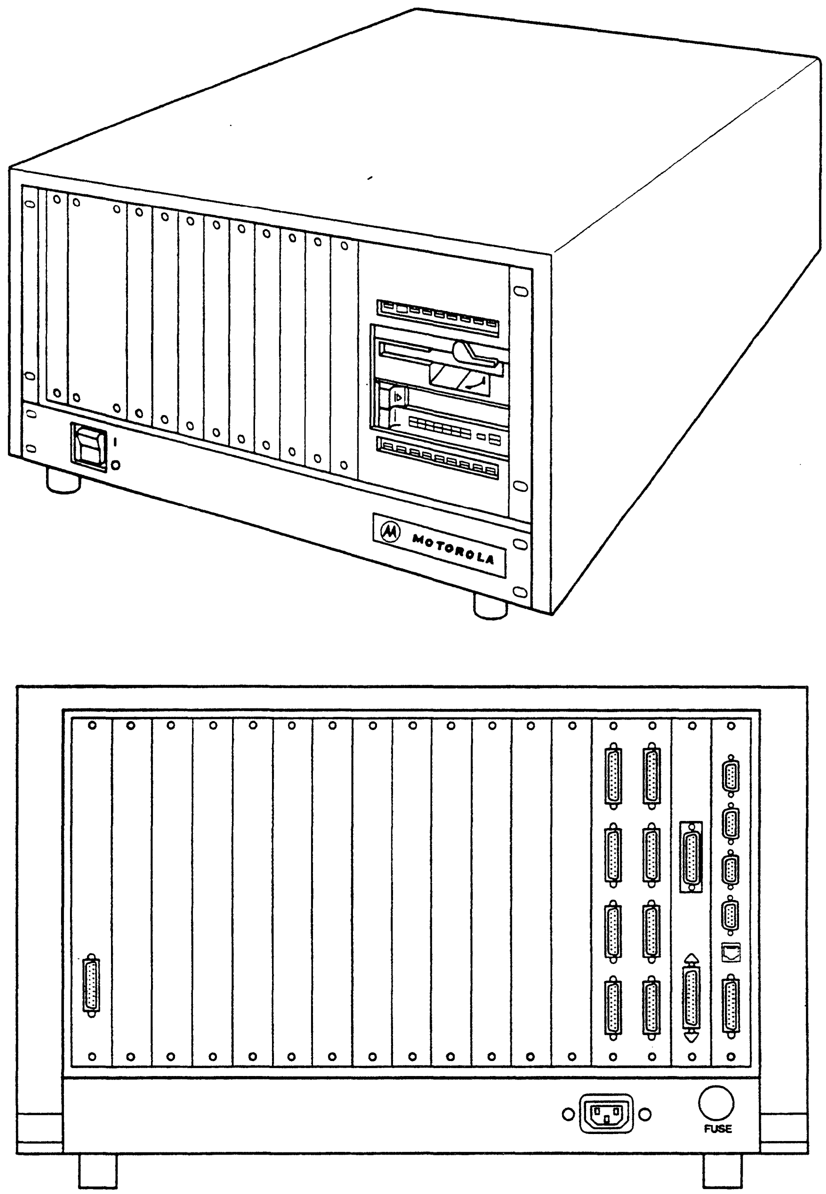
- The **Model 3520** is a 68030-based system.
- The **Model 4520** is a 68040-based system.
- The **Model 8520** is an 88k RISC-based system.
- The **Model 8540** is an 88k RISC-based system.
- The **Model 95*xx*** is an 88110 RISC-based system.

The chassis for these systems is suitable for rack or benchtop operation and has a total of 12 VME slots and 17 transition slots (T/M). The 3520 and 4520 have five half-height peripheral bays. The 8520, 8540, and 95xx also has five half-height peripheral bays, four of which may be used for removable devices.

Specifications

Height	12.2 in. (31.0 cm)
Width	19.0 in. (48.3 cm)
Depth	19.75 in. (50.2 cm)
Weight (fully loaded)	61.5 lbs. (27.9 kg)
Acoustic Noise Level	55 dBA
Temperature Operating Nonoperating	 +5°C to +35°C -40°C to +60°C
ESD	5,000 volts: no observable effects 12,000 volts: no operator intervention required 20,000 volts: no permanent equipment damage
Relative Humidity Operating Nonoperating	 20% to 80% (noncondensing) 10% to 90% (noncondensing)

3520, 4520, 8520/40, & 95xx



10245.00 9305

MVME946 Chassis

Models 3620, 4620, 8620, & 8640

12-Slot Pedestal Computer Systems

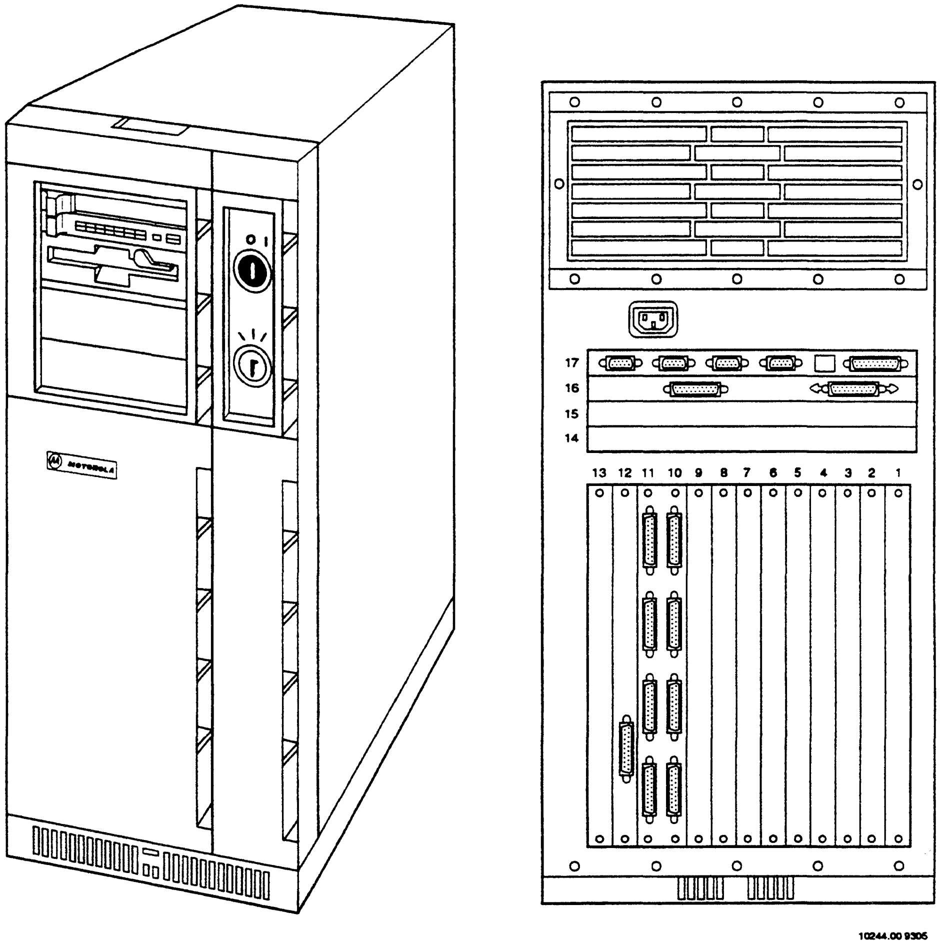
- The **Model 3620** is a 68030-based system.
- The **Model 4620** is a 68040-based system.
- The **Model 8620** is an 88k RISC-based system.
- The **Model 8640** is an 88k RISC-based system.

The chassis for these four systems has a total of 12 VME slots and 13 transition slots (T/M). The 3620 and 4620 have five full-height peripheral bays, two of which may be used for removable devices. The 8620 and 8640 have 4 additional horizontal T/M slots (reserved for the CPU and External SCSIs) and 10 half-height peripheral bays, four of which may be used for removable devices.

3620, 4620, 8620, & 8640

Specifications

Height	25.6 in. (65.0 cm)
Width	12.5 in. (31.8 cm)
Depth	28.0 in. (71.1 cm)
Weight (fully loaded)	135 lbs. (61.2 kg)
Acoustic Noise Level	55 dBA
Temperature	
Operating	+5°C to +35°C
Nonoperating	-40°C to +60°C
ESD	5,000 volts: no observable effects 12,000 volts: no operator intervention required 20,000 volts: no permanent equipment damage
Relative Humidity	
Operating	20% to 80% (noncondensing)
Nonoperating	10% to 90% (noncondensing)



MVME955C Chassis

3620, 4620, 8620, & 8640

Models 3820, 4820, 8820, & 8840

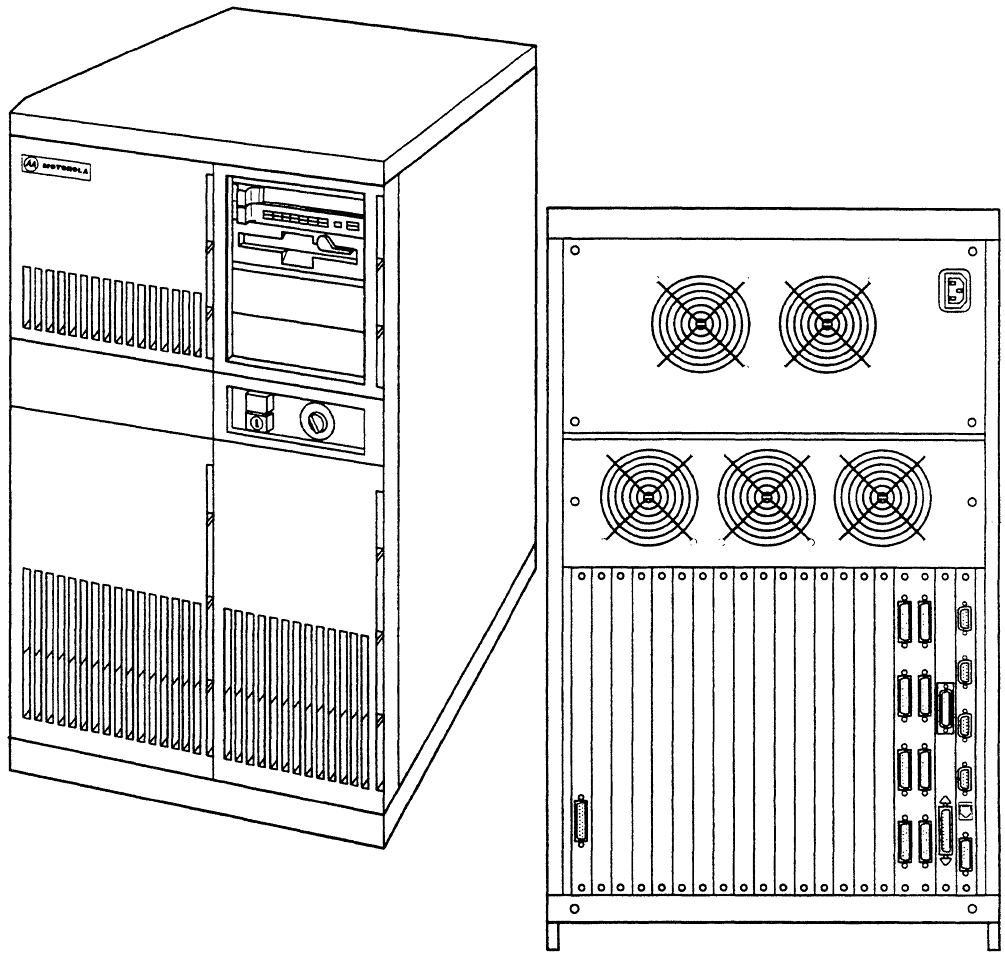
20-Slot Pedestal Computer Systems

- The **Model 3820** is a 68040-based system.
- The **Model 4820** is a 68040-based system.
- The **Model 8820** is an 88k RISC-based system.
- The **Model 8840** is an 88k RISC-based system.

The chassis for these four systems has a total of 20 VME slots and 20 transition slots (T/M). The 3820 and 4820 have five full-height peripheral bays, two of which may be used for removable devices. The 8820 and 8840 have 12 half-height peripheral bays, four of which may be used for removable devices.

Specifications

Height	28.1 in. (71.37 cm)
Width	19.0 in. (48.26 cm)
Depth	23.2 in. (58.92 cm)
Weight (fully loaded)	220 lbs. (99 kg)
Acoustic Noise Level	55 dBA
Temperature	
Operating	+5°C to +35°C
Nonoperating	-40°C to +60°C
ESD	5,000 volts: no observable effects 12,000 volts: no operator intervention required 20,000 volts: no permanent equipment damage
Relative Humidity	
Operating	20% to 80% (noncondensing)
Nonoperating	10% to 90% (noncondensing)



MVME985-1 Chassis

3820, 4820, 8820, & 8840

Models 8940 & 99*xx*

20-Slot Rack-Mounted Computer System

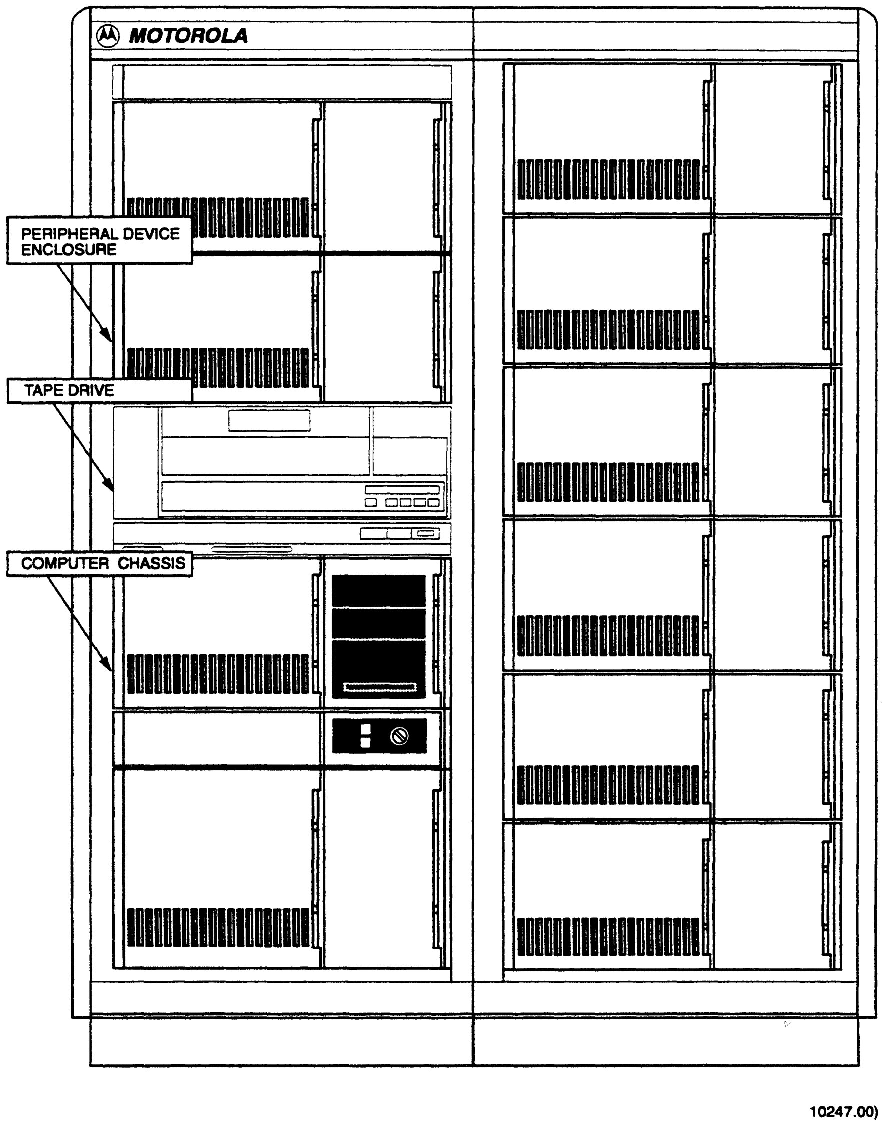
- The **Model 8940** is an 88k RISC-based rack-mounted system.
- The **Model 99*xx*** is an 88110 RISC-based rack-mounted system.

The chassis has a total of 20 VME slots, 20 transition slots (T/M), and 12 half-height peripheral bays, four of which may be used for removable devices. Each main bay has three rack bays that can accommodate Peripheral Device Enclosures (DS985PIORMA's) or 1/2-inchTape Drives (MVME859xRM-2's).

The system may consist of up to four bays; one main bay and up to three auxiliary bays, or two main bays and two auxiliary bays. Each auxiliary bay contains six rack bays for up to five additional peripheral device enclosures and/or two 1/2-inch tape drives.

Specifications

Characteristics	Specifications
Physical characteristics	
Height	27.75 in. (705 mm)
Width	19.0 in. (483 mm)
Depth	23.0 in. (584 mm)
Weight (fully loaded)	130-210 lb (59.1-95.5 kg)
Temperature	(dependent on peripherals installed)
Operating	5° to 30° C (41° to 85° F)
Storage and transit	-40° to 60°C (-40° to 140° F)
Relative humidity	(dependent on peripherals installed)
Operating	10% to 80% noncondensing
Storage and transit	10% to 90% noncondensing
Altitude	
Operating	0 to 10,000 feet
Storage and transit	0 to 30,000 feet
Shock	
Operating	0.5 g
Non-operating	15 g



Model 8940/99*xx* Main Bay and Auxiliary Bay

MVME990 Chassis

Series 900

Series 900 Computers

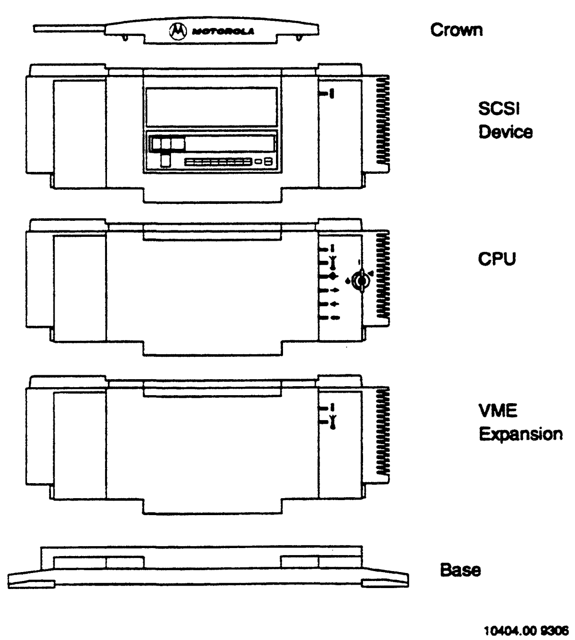
The Series 900 family of servers and multi-user computers is based on the Motorola M88000 family of microprocessors and the VMEbus standard. The system consists of three types of modules:

- SCSI Device Expansion Module contains four half-height peripheral bays. Two bays accommodate 3.5-inch hard disk drives and two bays accommodate either 3.5-inch hard disk drives or half-height removable media devices.
- CPU Module contains the single board computer, the I/O Distribution board, and the optional modem. This module has four slots. The top or first slot is reserved for the I/O Distribution board. The single board computer is normally installed in the second slot. The remaining slots may be used for memory expansion or VME options.
- VME Expansion Module houses additional VME options such as the Serial I/O Controller, SCSI-2 controller, Ethernet LAN controller, and SNA, BSC, X.25 Communications controllers. Each VME Expansion Module contains four VME expansion slots.

Specifications

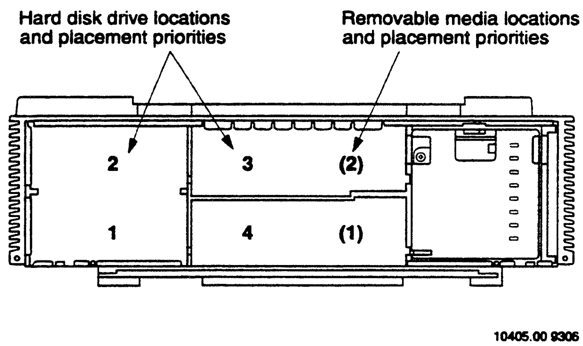
Characteristics	Specifications
Physical characteristics	
Height (CPU+ one SCSI Expansion Module)	12.6 in. (320 mm)
Height added by each additional Module	5.0 in. (127 mm)
Maximum stack height	27.6 in. (701 mm)
Width of each Module	15.9 in. (403 mm)
Width of Base	17.8 in. (452 mm)
Depth of each Module	11.3 in. (286 mm)
Depth of Base	13.3 in. (338 mm)
Weight (maximum stack fully loaded)	100 lbs (45 kg)
Temperature	
Operating	5° C to 35° C
Non-operating	-25° to 65°C
Altitude	
Operating	0 to 10,000 feet
Non-operating	0 to 30,000 feet

Characteristics	Specifications
Relative humidity Operating Non-operating	 20% to 80% noncondensing 10% to 90% noncondensing
Transportation	Packaging and shipping containers comply with ASTM 4169 Level 3.
Cooling	Fan forced ambient air with optional 30 PPI washable foam air filter
Acoustic Noise Level	50 dBA maximum
Electrical Service Requirements	One maximum payload enclosure requires a 15 amp 115 volt or 7.5 amp 230 volt service.
AC Power Ratings	Power Factor of 0.6 (Use for derating UPS.)
Enclosure Rating	12 amps at 115 VAC, 50/60 Hz 6 amps at 230 VAC, 50/60 Hz

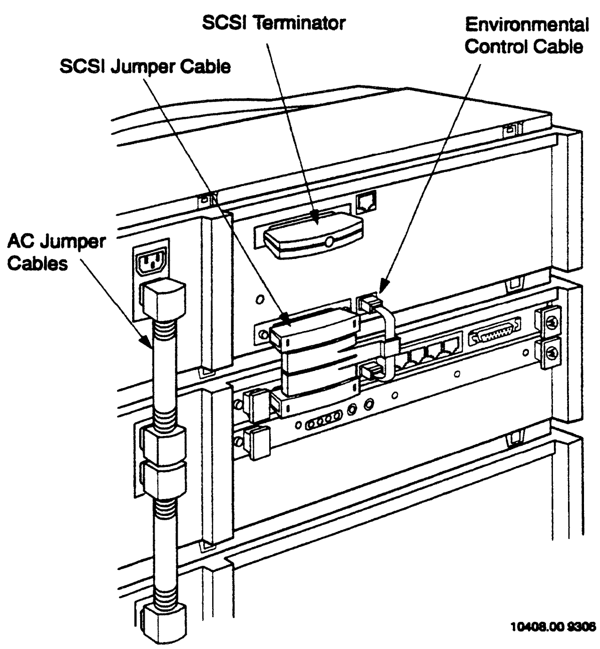


Series 900

SCSI Device Expansion Module



Cabling



Series 900 Troubleshooting

Use this table to solve some basic problems that may occur after installing the Series 900 computer system.

Troubleshooting Guide

IF this occurs . . .	THEN . . .
Green "power-on" LEDs fail to light on any module.	Ensure that AC jumper cables and SCSI and environmental control cables are connected tightly. Check that the I/O Distribution board is firmly seated.
System does not boot when key is turned to the **RUN** position. Amber cooling failure LED is lit on any of the modules.	Check the air filter and available air flow to the module. If the air filter is filled with dust, remove it from its carrier, wash it in a mild detergent, and let it dry completely before reinserting.
Disk drive does not respond.	Ensure that disk drive is firmly connected into the SCSI backplane connector.
Heat problems.	Check the air filters at least once a month. Depending on your environment, it may be necessary to check more often. If the air filter is filled with dust, remove it from its carrier, wash it in a mild detergent, and let it dry completely before reinserting.

SeriesFT

SeriesFT Computers

The SeriesFT is a fault-tolerant UNIX-based computer system based on the M88110 microprocessor and runs the UNIXTM SYSTEM V/88 Release 4.0 operating system with FT additions. The modular construction of the system means that a variety of configurations are available. The basic configuration (the minimum amount of hardware to run the operating system and achieve fault-tolerance) includes the following:

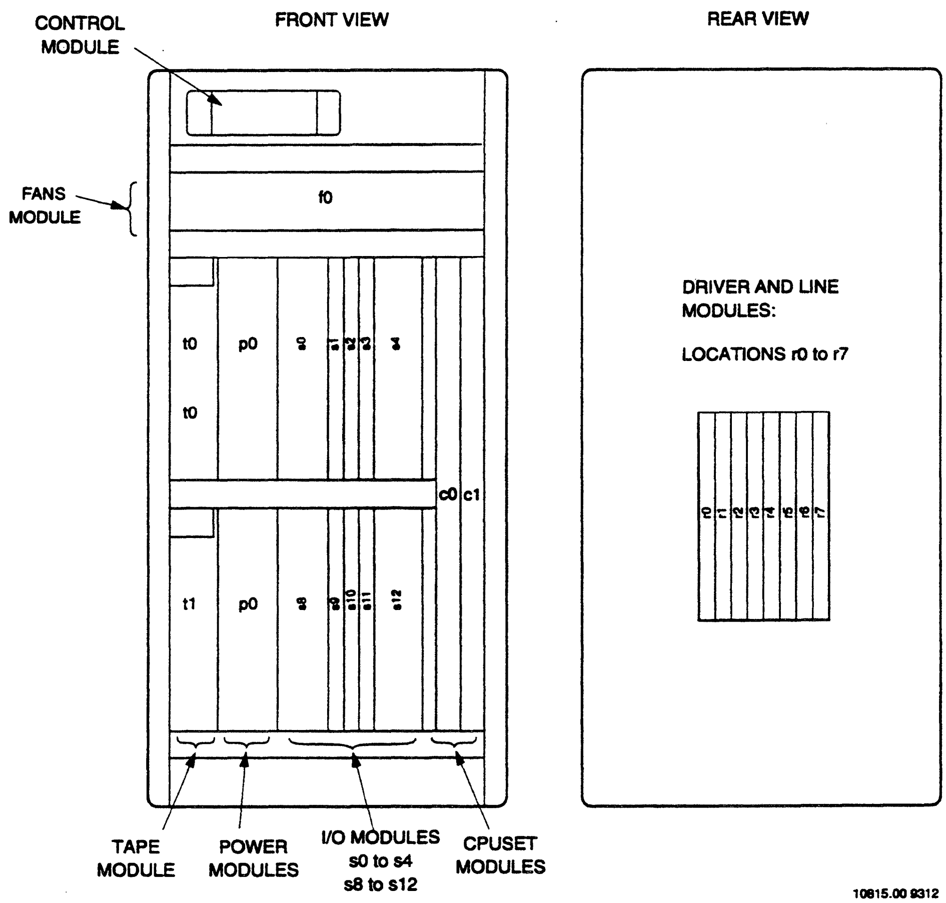
- Two CPUset modules that provide (in duplicate) the main processing power and memory of the system. There are several versions of the basic CPUset module. The differences among them include the numbers of 88110 microprocessors and memory capacities.
- A disk and tape subsystem made of the following:
  - On the Model 520, two disk and Ethernet modules. Each is a SCSI disk controller and one or two hard disk drives integrated into a single module. Together, these modules form a mirror pair.
  - On the Model 820/30, two disk controller modules and two hard disk drive modules, each controlled by one of the SeriesFT controllers; these disk modules form a mirror pair.

  Both models offer a quarter-inch tape cartridge drive module.

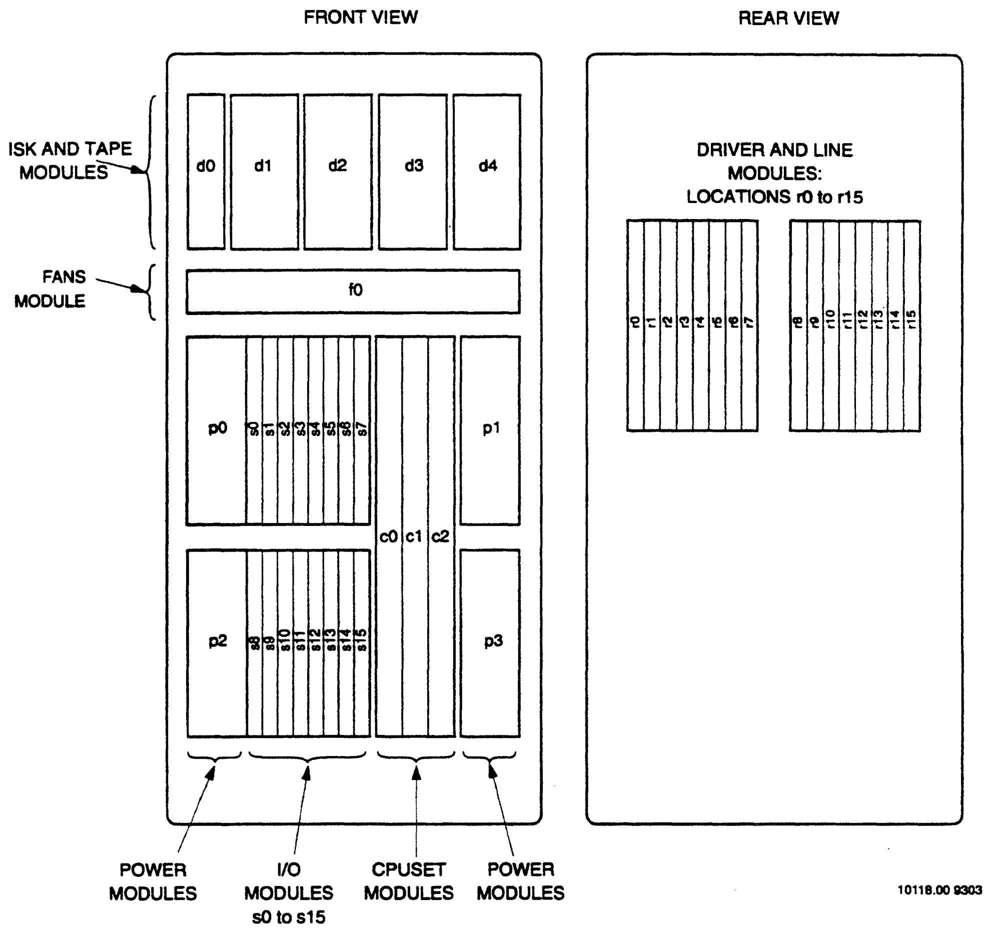
Specifications

Characteristics	Specifications	
	Model 520	**Model 820/30**
Physical characteristics		
Height	33 in. (841 mm)	38 in. (968 mm)
Width	19 in. (485 mm)	19 in. (485 mm)
Depth	25 in. (622 mm)	28 in. (708 mm)
Weight (typical configuration)	183 lbs (83 kg)	220 lbs (100 kg)
Temperature		
Operating	0° C to 35° C	
Non-operating	-40° to 60°C	
Altitude		
Operating	0 to 10,000 feet	
Non-operating	0 to 30,000 feet	

Characteristics	Specifications	
	Model 520	Model 820/30
Relative humidity Operating Non-operating Heat Dissipation	 20% to 80% noncondensing 10% to 90% noncondensing 2000W maximum	
Transportation	Packaging and shipping containers comply with ASTM 4169 Level 1.	
Acoustic Noise Level	55 dBA maximum	
Electrical Characteristics Input Voltages Input Frequency Rated AC Current Output Voltage Output Power	 90-132 VAC 190-279 VAC 48 to 62 Hz 13.7 amps at 95 VAC 7 amps at 185 VAC +28 Vdc at 21 amps 600 Watts (maximum)	



SeriesFT Model 520



SeriesFT Model 820

SeriesFT Troubleshooting

SeriesFT systems have built-in diagnostic procedures. Log in as super-user on one of the terminals connected to the system. Enter the following command and press Return:

```
fixit
```

SeriesFT Expansion Cabinets

An expansion cabinet is an accessory to the SeriesFT Model 820/30 and contains no power supplies or device controllers of its own. You attach each expansion cabinet to the side of the SeriesFT main cabinet, and connect cables for serial I/O, disk control, maintenance bus and power.

The SeriesFT Expansion Cabinet satisfies UL requirements as an accessory to the SeriesFT Model 820/30 system and satisfies the same FCC emissions requirements as the SeriesFT Model 820/30.

Modules

You can put the following modules inside each expansion cabinet:

- Up to ten drive modules
- Up to 32 serial (RS232) ports

In addition, each expansion cabinet must have a fan module.

Controllers

You must reserve space in the SeriesFT main cabinet for disk and I/O controller modules. Each cabinet fitted with disk and I/O modules requires two disk controllers and up to four asynchronous controllers.

SCSI Busses

The SCSI controllers control the additional disks in each expansion cabinet. The SCSI controllers are in the SeriesFT main cabinet. Each disk controller controls a SCSI bus in the expansion cabinet. Each of the two SCSI busses in an expansion cabinet can support up to five drive modules.

Disks

An expansion cabinet can contain up to ten full-height system drive modules, five on each of the two SCSI busses.The following tables provide example disk identification numbers. We recommend that you allocate the disk identification numbers so you do not confuse these numbers with the disk locations.

CAB1 Disk Locations

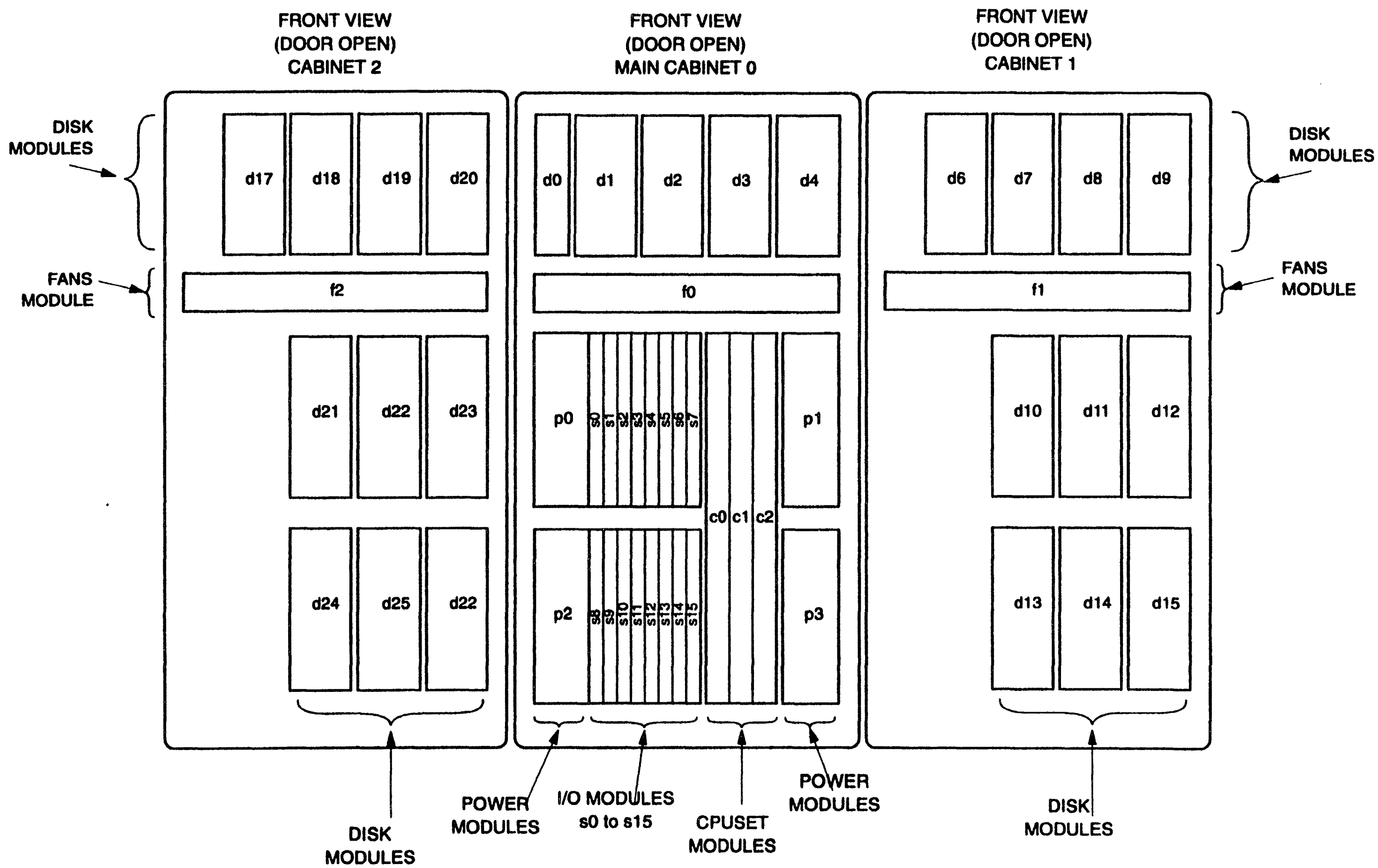
Bus 0		Bus 1	
Location	**Disk Number**	**Location**	**Disk Number**
d6	6	d8	7
d7	4	d9	5
d10	8	d13	9
d11	10	d14	11
d12	12	d15	13

CAB2 Disk Locations

Bus 0		Bus 1	
Location	**Disk Number**	**Location**	**Disk Number**
d17	16	d19	17
d18	14	d20	15
d21	18	d24	19
d22	20	d25	21
d23	22	d26	23

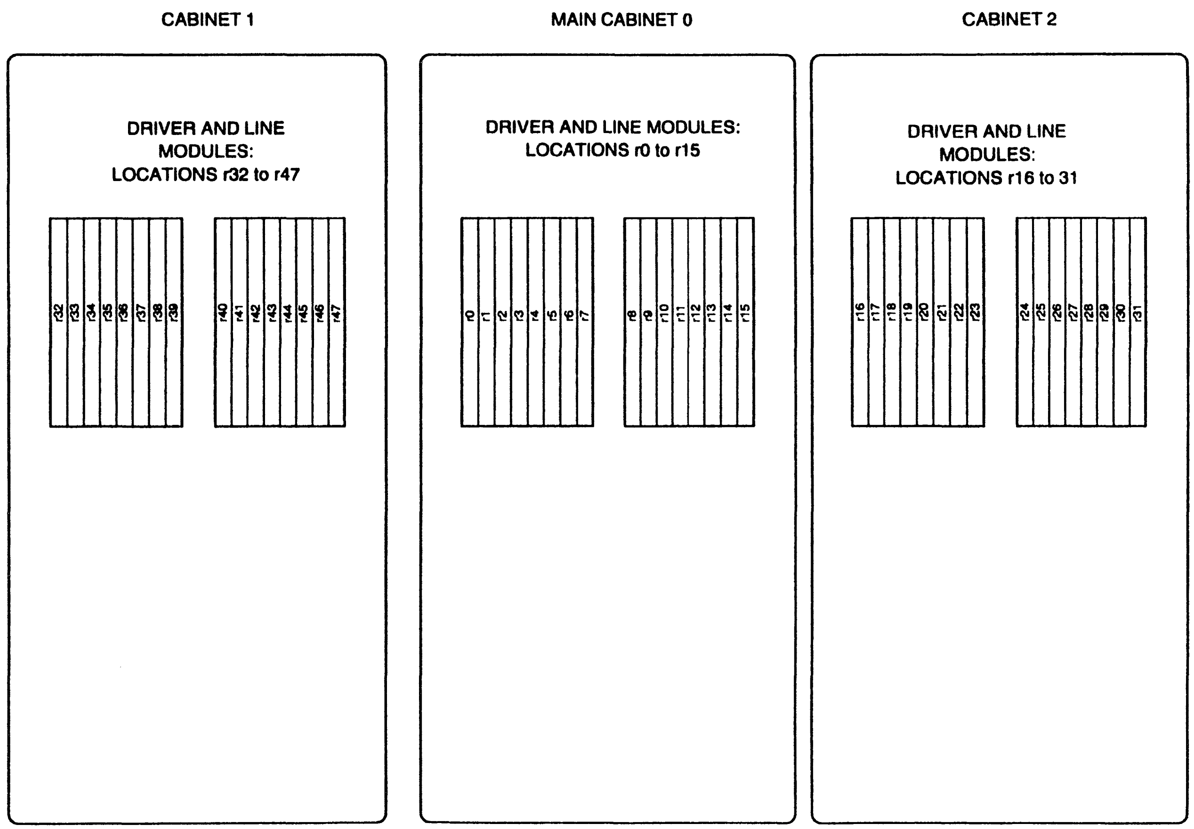
Each disk and its mirror pair appear in the same row in Table 1 and Table 2.

Note **There are no disk locations d5 or d16.**



SeriesFT Model 820/30 with Expansion Cabinet, Front Module locations

SeriesFT



Series FT Model 820/30 with Expansion Cabinet, Rear Module Locations

Communications Chassis

You can fit each expansion cabinet with up to two 32-port communications chassis. Each fully loaded communications chassis (four line and four driver modules) require one I/O controller for non-fault tolerant operation and two I/O controllers for fault tolerant operation.

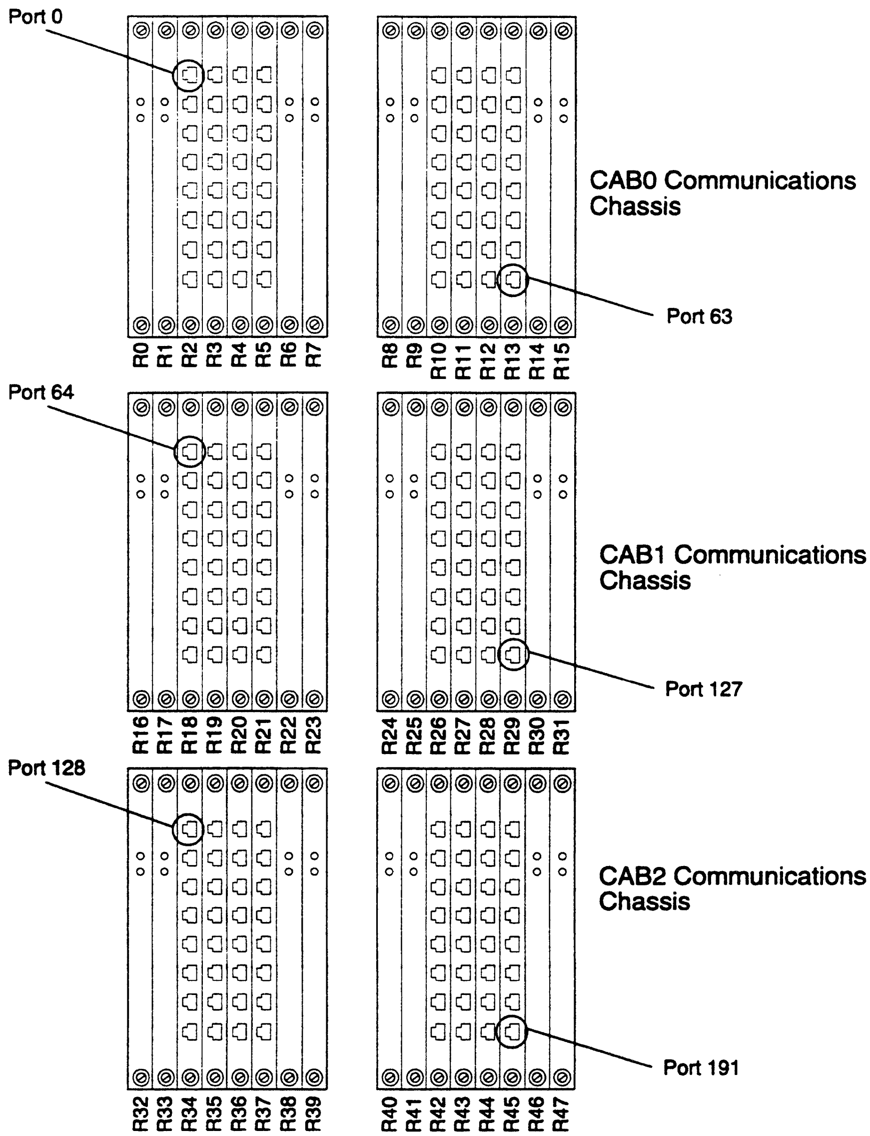
This figure shows the location of line driver modules. Port numbers ascend top to bottom, and left to right as viewed from the rear of the cabinet.

Power

Each expansion cabinet uses 28Vdc supplied from the SeriesFT, Model 820/30.

WARNING

The SeriesFT Expansion Cabinet has hazardous energy levels. Completely power down the SeriesFT system before installing or de-installing an expansion cabinet.



Series FT Communications Chassis

XR Series 900

XR Series 900 Computers

The XR Series 900 computer systems meet stringent telecom exchange office requirements. There are three XR Series 900 platforms,

- Dual 9-slot Network System Platform
- Simplex 12-slot Network System Platform
- Simplex 20-slot Network System Platform

Configurations

Features	Configurations				
Card Cage	Dual 9-slot	Dual 9-slot	Simplex 12-slot	Simplex 20-slot	Simplex 20-slot
Available VME slots	5 per system	8 per system	11	16	19
Single Board Computers	MVME167/187/197	MVME167/187/197	MVME167/187/197	MVME167/187/197	MVME167/187/197
Base Disk Storage Units	1 VME Drive Module per system	SCSI I/O Subsystem per system	1-5 SCSI Drive Modules	1 or 2 VME Drive Modules	SCSI I/O Subsystem
SCSI I/O Subsystems	1 per system	2 per system	13	1	26
Maximum Drives	6 per system	7 per system	49	7 per system	91

Card Cages

The front loading VME card cage supports three backplane options: 20-slot, 12- slot, and dual 9-slot. The VME backplanes accept standard 6U, 32 bit VME modules. The rear facing transition card cage provides for direct plug-in of the MVME700 series transition modules. P2 I/O signals route from the VME module to its corresponding transition module without additional cabling. Little cabling between the front and rear card cages is generally necessary, although cable pass-through areas linking the two are provided for applications that do require cabling. VME module to transition module keying prevents accidental mismatching of P2 interfaces.

Drives

Disk drives are installed three different ways. Up to two VME drive modules, with two 2 1/2-inch or 3 1/2-inch devices each, are plugged directly into the VME card cage. Each VME drive module occupies three VME slots. The 12-slot VME card cage option provides for the installation of a maximum of five half-high 5 1/4-inch drive modules. Also, a separate four drive SCSI I/O subsystem is available for connection through the external SCSI interface. The four drive enclosure is powered from its own power supply. Two of the SCSI I/O subsystems support SCSI bus chaining to support up to seven SCSI drives per SCSI bus.

Cooling

The VME card cage is cooled by a front plug-in fan module providing front to rear airflow. Dual fan modules are available for the dual 9-slot configuration. The individual fan modules are replaceable without interrupting power to the companion system.

Bezels

A dark tinted transparent window over the VME card cage allows for visibility of the status indicators but still provides an EMC barrier. The molded plastic bezel panels are easily removed by lockable push-button latches.

Simplex 12-slot System

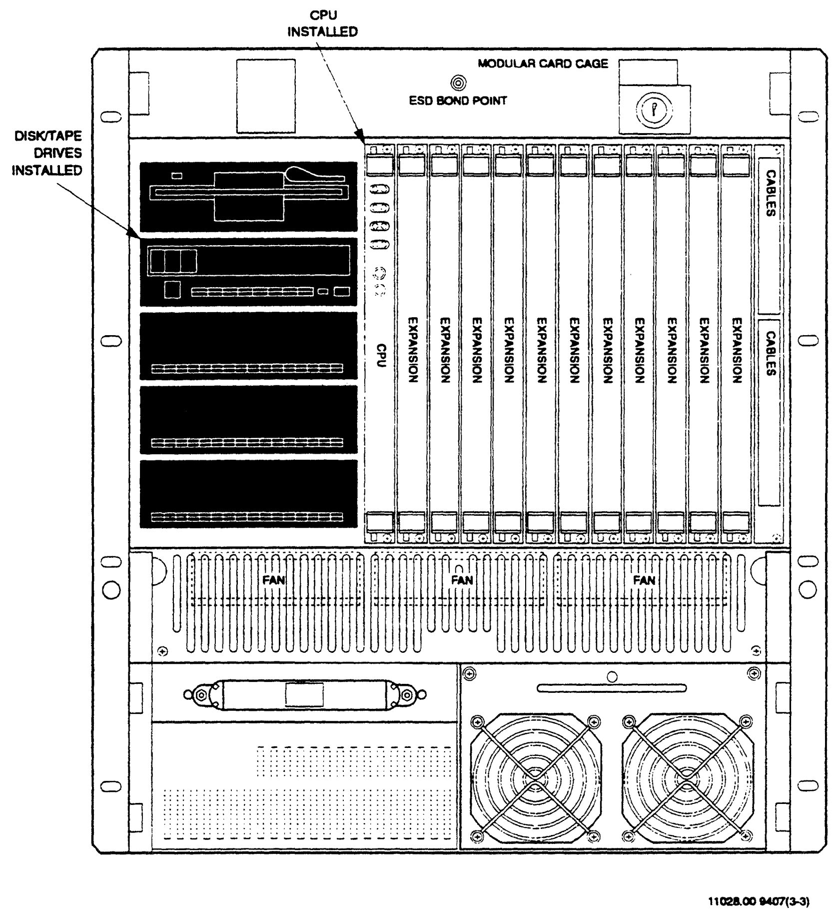
The Model XR9112 is designed for telecom applications requiring 12 VME slots and up to 72GB of disk storage capacity.

When support for more than five SCSI devices are required, up to eight SCSI Device Storage Modules can be added to the system. Each Storage Module contains up to four half-height drive bays. Two of these bays can contain removable media devices. The system can support up to 37 SCSI drives.

The XR Series 900 offers a -36 to -72 VDC power module for telecom exchange office applications as well as a 90 to 264 VAC autoranging power module for industrial and commercial environments. The XR9112 supports either single or dual power module configurations. When dual power modules are configured, they run in load sharing mode. In load sharing mode, the system will continue normal operation if a power module fails.

The XR9112 enclosure contains 12 transition module slots for supporting a variety of connectivity and expansion options such as additional Ethernet, SCSI, and communications interfaces.

The XR Series 900 includes a VME module and transition module pair keying feature which prevents potential module damage caused by the incorrect insertion of VME or transition modules.



12-Slot Card Cage (Front View, without bezel)

Simplex 20-slot System

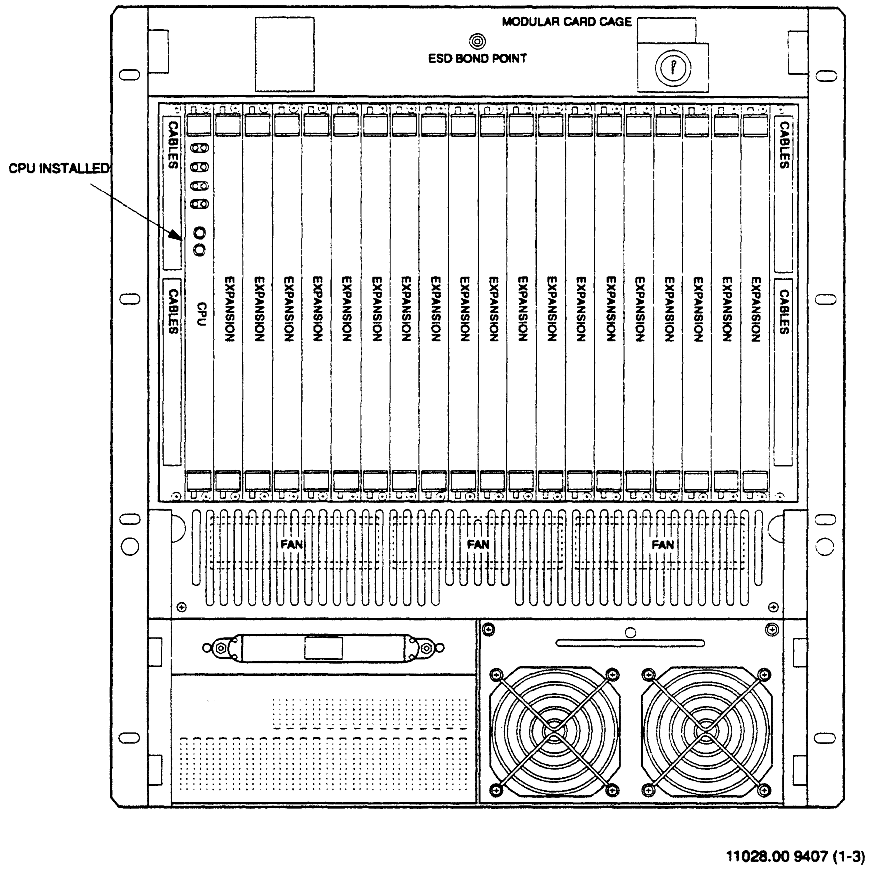
The Model XR9120 is designed for telecom applications requiring 20 VME slots and up to 100GB of disk storage capacity.

A Model XR9120 system typically uses a SCSI Device Storage Module for disk and tape I/O. Up to 13 Storage Modules can be added to the system. Each Storage Module contains up to four half-height drive bays. Two of these bays can contain removable media devices. The system can support up to 52 SCSI drives.

The XR Series 900 offers a -36 to -72 VDC power module for telecom exchange office applications as well as a 90 to 264 VAC autoranging power module for industrial and commercial environments. The XR9120 supports either single or dual power module configurations. When dual power modules are configured, they run in load sharing mode. In load sharing mode, the system will continue normal operation if a power module fails.

The XR9120 enclosure contains 20 transition module slots for supporting a variety of connectivity and expansion options such as additional Ethernet, SCSI, and communications interfaces.

The XR Series 900 includes a unique VME and transition module pair keying feature which prevents potential module damage caused by the incorrect insertion of VME or transition modules.



20-Slot Card Cage (Front View, without bezel)

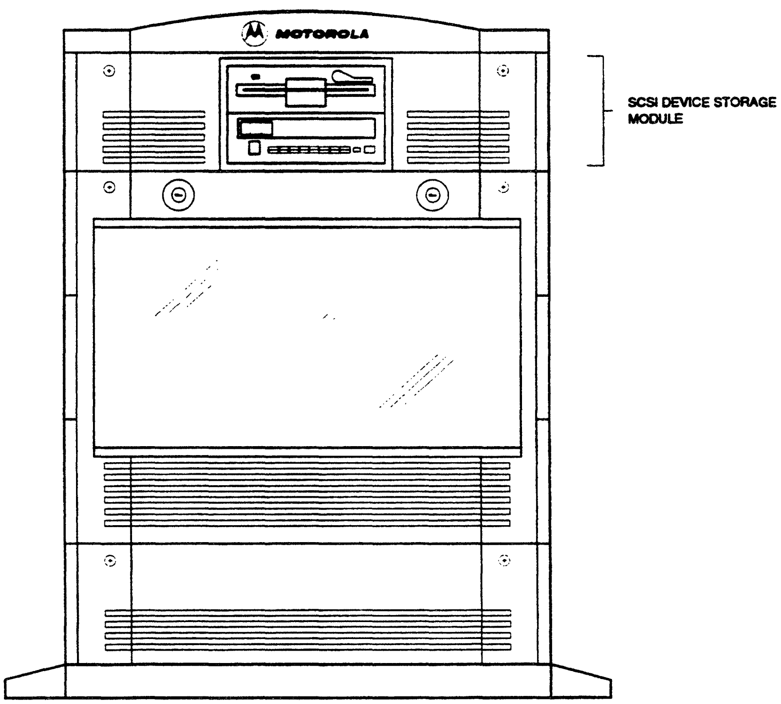
SCSI Device Storage Module

The SCSI device storage module contains four drive bays. Two house 3 1/2-inch or 5 1/4-inch half height fixed or removable media drives. The other two bays house 3 1/2-inch fixed media drives.

SCSI storage modules may be attached by:

- One or two SCSI storage modules to the processor's SCSI bus extension to support up to seven SCSI drives;
- Up to twelve first on bus SCSI storage modules connected to the system's MVME328XT controllers;

Up to twelve SCSI storage modules connected to first on bus subsystems to achieve up to seven device support per SCSI bus.



SCSI Device Storage Module

Chassis Specifications

Characteristics	Specifications
Physical Dimensions (with front bezel)	
– System Chassis	Width: 18.97 in. (481.8 mm) Depth: 13.5 in. (342.9 mm) Height: 20.94 in (531.9 mm) Weight: 60.0 lb. (27.3 kg) (fully loaded)
– SCSI Storage Module	Width: 18.97 in. (481.8 mm) Depth: 13.5 in. (342.9 mm) Height: 5.25 in (133.4 mm) Weight: 25.0 lb. (11.4 kg) (fully loaded)
Input Voltage	-48Vdc or 115 Vac/230 Vac, 50 Hz/60 Hz
Acoustic Noise Level	50 dBA maximum
Temperature	
Operating	0° to 50° C (32° to 122° F)
Non-operating	-40° to 70°C (-40° to 158° F)
Relative humidity	
Operating	20% to 80% noncondensing
Non-operating	10% to 95% noncondensing
Altitude	
Operating	0 to 10,000 feet (3048 m)
Non-operating	0 to 30,000 feet (9144 m)
Emissions	FCC Part 15, Sub-Part J, Class B VDE 0871/6.78, Class B
Electrostatic Discharge	5,000 volts: No observable effect 12,000 volts: No operator-perceived errors 24,000 volts: No permanent equipment damage
Equipment Grounding	NEBS 4.7
Earthquake	NEBS zone 4
Flammability and Flame Spread	NEBS 4.3.1
Office Vibration	NEBS Section 4.5.3 (5-200Hz @ 1G, 0.25G/octave)
Safety (Standards for safety of information technology equipment, including electrical business equipment)	UL1950 CSA C22.2/950 VDE 0805 IEC 950
Transportation	Packaging and shipping containers comply with ASTM 4169 Level 1. and NEBS 4.4.1/4.4.2.

XR Series 900

PowerStack RISC PC

PowerStack RISC PC Systems

The PowerStack RISC PC models are based on PowerPC RISC microprocessors, the Peripheral Component Interconnect (PCI) bus, the ISA bus, and a compact low-profile desk-top enclosure with a variety of memory, SCSI device and ISA or PCI expansion options.

System Features

The system supports:

- Four standard 72-pin SIMM memory slots
- Ethernet with built-in 10-BaseT (twisted pair, RJ-45) and 10-Base5 (thicknet/AUI, DB15) connectors
- Two asynchronous serial ports, EIA-232-D DCE, DB9 connectors
  Parallel port, DB25 female connector
- Graphics connector, SVGA 15-pin female
- I/O expansion: (DeskTop) three expansion slots: one PCI, one ISA, one shared slot
  I/O expansion: (MiniTower) five expansion slots: two PCI, two ISA, one shared slot
  Both short and long PCI form factor cards are supported.
- Floppy disk
- One internal 3.5-inch hard disk bay
- Externally accessed 5.25-inch bays for removable media devices
  - Two (DeskTop)
  - Three (MiniTower)

  One of these bays may be used for a hard disk.

Front Panel Features

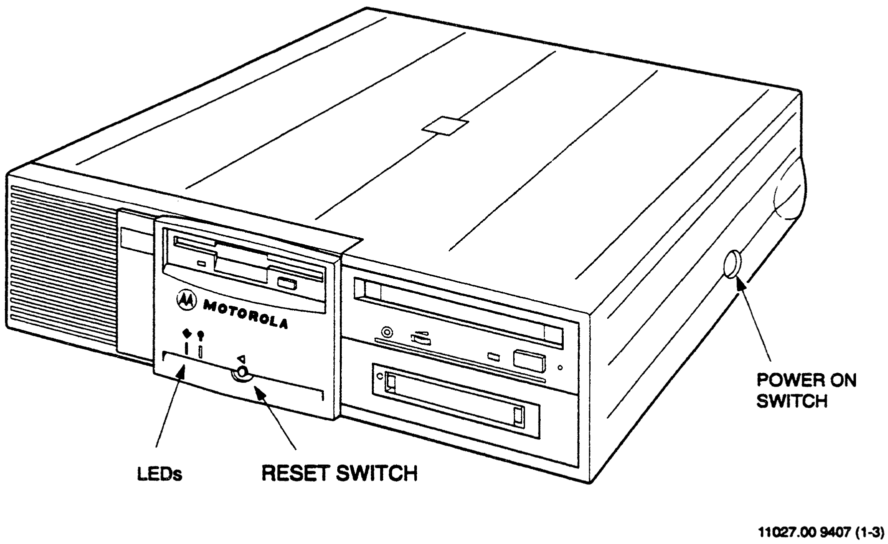
Status Lights

LEDs on the front panel of the system are power on and SCSI activity.

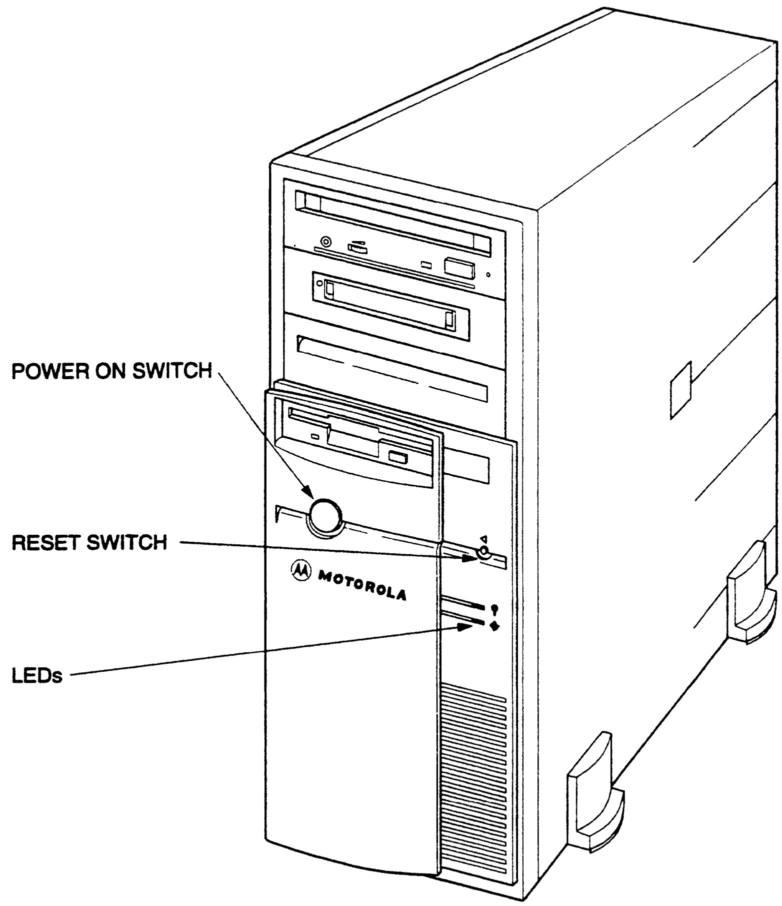
System Status LEDs

Front Panel

The DeskTop's power-on switch is located on the right side of the chassis. The MiniTower's power-on switch is located on the front of the chassis.



Front Panel, DeskTop System



Front Panel, MiniTower System

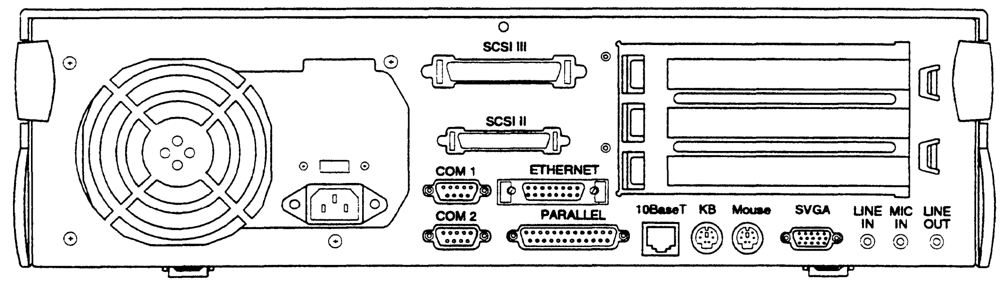
Rear Panel Connectors

On the rear panel of the enclosure, there are these connectors:

- Serial connectors:
  - Two DB9 connectors labeled COM1 and COM2 for asynchronous serial connections
    COM1 is for the (ASCII) system console terminal
  - In the MiniTower enclosure, a DB25 connector labeled COM3, also for asynchronous serial connections (not supported in this release)
- A DB25 connector (bi-directional) for parallel printers
- SCSI connectors:
  - A 50-pin SCSI-2 connector for standard cabling to external SCSI devices
  - A 68-pin SCSI-3 connector for cabling to devices supporting fast/wide SCSI data transfer (not supported in this release)
- Two Ethernet connectors for data exchanges with other systems on a local area network (LAN)
  One or the other may be used (depending on the nature of the network cabling), but not both.
  - A DB15 connector labeled ETHERNET for an AUI port
  - An RJ45 connector labeled 10BaseT for a twisted-pair Ethernet port

Note **RJ45 connectors are not suitable for Telco plugs. Do not connect Telco lines to RJ-45 connectors.**

- An SVGA 15-pin graphics connector for cabling to external video monitor
- Three 3.5mm audio jacks for headphone and microphone connections (LINE-OUT for headphones or self-powered speakers)
- Two 6-pin miniature DIN connectors that support a keyboard/mouse port



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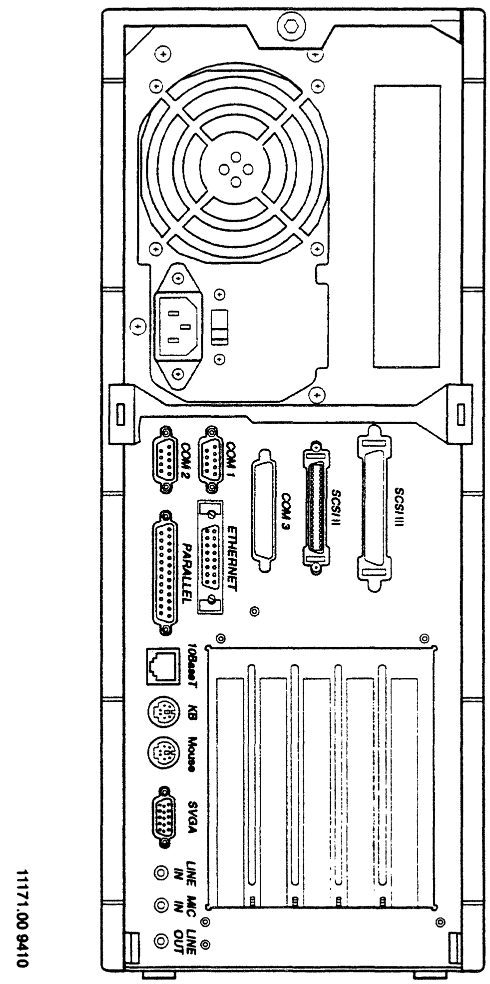
Rear Panel, DeskTop System



Rear Panel, DeskTop System

Installation Troubleshooting

Use this table to solve some basic problems that may occur after installing the system. See your operating system documentation for resolution of any problems occurring after system boot.

IF this occurs . . .	THEN . . .
Green "power-on" LEDs fail to light.	Ensure that AC cable is connected tightly.
Disk drive does not respond.	Ensure that disk drive cables are firmly seated into their connectors. If the SCSI connector is unused, ensure that you installed a SCSI terminator.
SVGA terminal: No output to terminal Split screen output Distorted display	You are using the wrong cable or are using unsupported monitor resolution.

PowerStack Series E

PowerStack Series E Systems

The Series E models are based on PowerPC microprocessors, the Peripheral Component Interconnect (PCI) bus, and a compact deskside enclosure with a variety of memory, SCSI devices and PCI-based expansion options.

The system supports:

- Four standard 72-pin SIMM memory slots
- Ethernet network controller
- Two asynchronous serial ports and two synchronous serial ports
- Parallel port (bidirectional)
- Three PCI expansion slots
- PS2 floppy disk drive and CD-ROM
- Three peripheral bays
- SCSI Device Expansion module for adding additional SCSI devices

Enclosure

The enclosure is a single module containing:

- Motherboard
- PCI-riser card supporting up to three PCI cards with connector access through the rear panel
- Floppy disk access from the front panel
- Bays for up to seven SCSI devices

The enclosure contains an auto-ranging switching power supply.

The base module can be expanded with a SCSI Device Expansion Module.

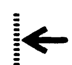
Motherboard

The Series E motherboard is a single-board computer containing the PowerPC microprocessor, main memory SIMM slots, interfaces for SCSI, Ethernet LAN, parallel and serial I/O, and keyboard and mouse ports. A PCI riser card on the motherboard supports up to three PCI (short form) cards. A connector for a floppy disk and 16-bit audio option (interfaced to the on-board ISA bus) is also provided.

Front Panel Features

Status Lights

LEDs on the front panel of the system indicate the status of system power, disk activity, network activity, and enclosure cooling. They are identified as shown below by raised icons molded into the cover.

Module	LED Icon	Meaning
CPU/SCSI		Power On
CPU[1]/SCSI[2]		Cooling Failure
CPU		SCSI Activity
CPU		Ethernet Activity

[1]LED lights when CPU and any other module experience cooling failure.
[2]Located on rear of SCSI Device Expansion Module.

Power Good (Green)

This indicator lights when AC power is applied to the system and the key is turned to the run position.

SCSI Activity (Green)

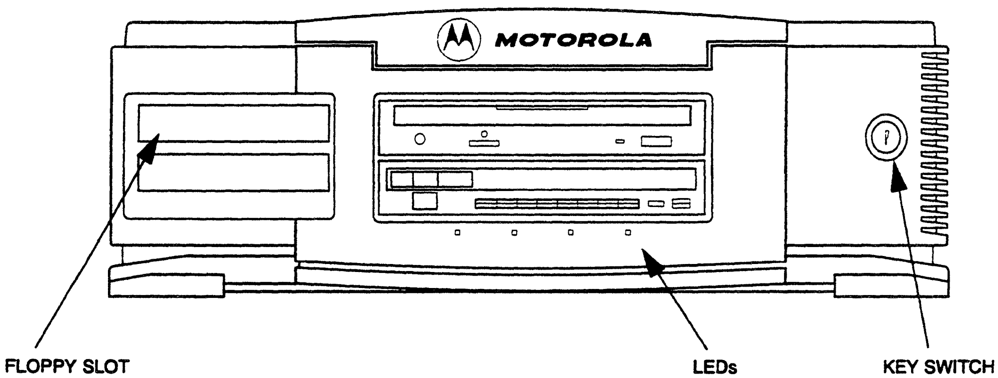
This LED gets its signal from traffic on the SCSI bus.

Ethernet Activity (Green)

This LED lights when local communication activity is detected.

Overtemperature Detection (Amber)

This LED lights when the lower temperature threshold is reached. If the second threshold is met, the power supply shuts down and this LED goes out.

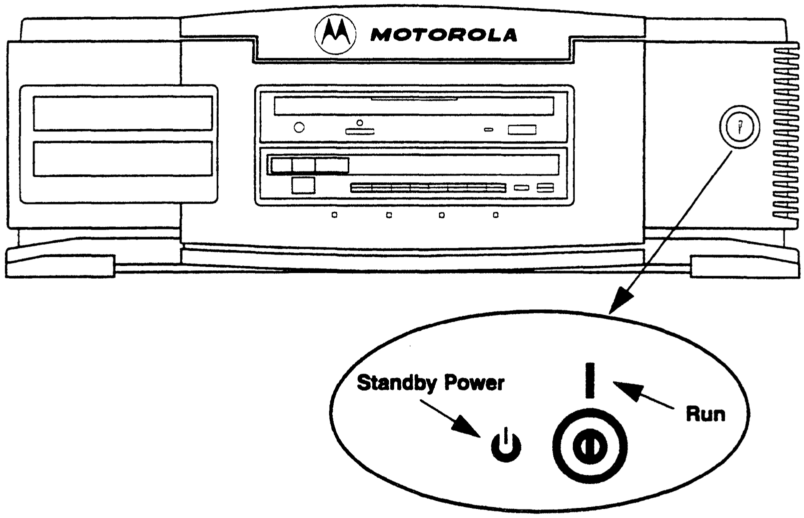


Front View of System

Key Switch

The key switch is located on the front of the system. Two keys are shipped with the system. The keys can be found under the crown.

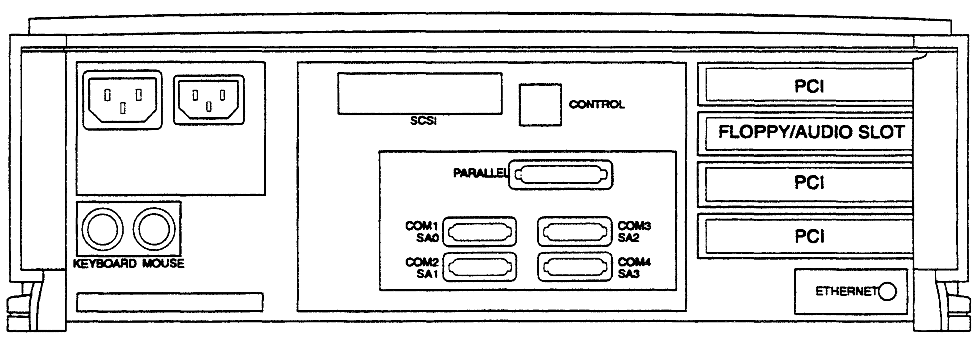
Key Position	Effect
⏻	System is not operational (standby power). DC power is off, but AC power is still available. Turn the key to this position for system shutdown.
I	System is in normal operating or run mode.



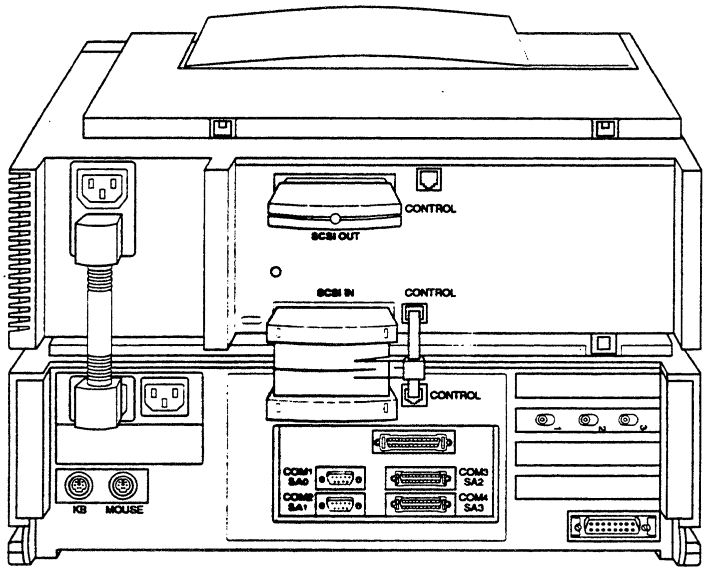
Key Switch Locations

Rear Panel Connectors

Connectors on the system's rear panel are illustrated below.



Rear View of System



Rear View of System with SCSI Module Installed

Ethernet Connector

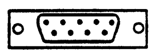
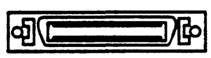
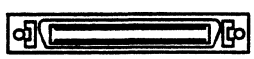
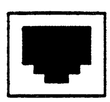
An Ethernet opening is located just below the PCI slots. This opening is available for a 10BaseT, 10Base2, or 10Base5 connector.

Expansion Slots

There are four expansion slots located on the rear panel. Three of the slots are reserved for PCI cards, and one slot is reserved for a floppy drive or floppy drive/audio card.

Rear Panel Connectors

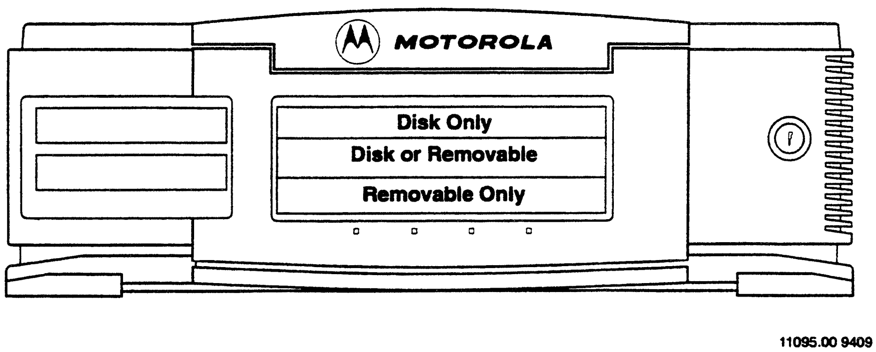
The next table describes the type and function of the rear panel connectors.

Connector	Function
6 Pin Miniature DIN 	These connectors are for the PS2 keyboard and mouse connections.
9 Pin D Shell 	These connectors (COM1/SA0 and COM2/SA1) are asynchronous ports. The pinouts are the standard "PC" type.
26 Pin High Density 	These connectors (COM3/SA2 and COM4/SA3) are synchronous ports.
36 Pin High Density 	This is the IEEE 1284-C parallel port connector.
RJ45 	This is the port that attaches to a SCSI Device Expansion Module and carries the overtemperature signals back to the motherboard.
68 Pin & Socket 	This is the wide SCSI port. Both this and the RJ45 are aligned to utilize the existing SCSI jumper cable from the Series 900.

Drive Placement in the Series E Enclosure

There are three SCSI bays in the Series E enclosure. One bay is dedicated for hard disks only, and two bays are for either a hard disk drive or removable media devices.

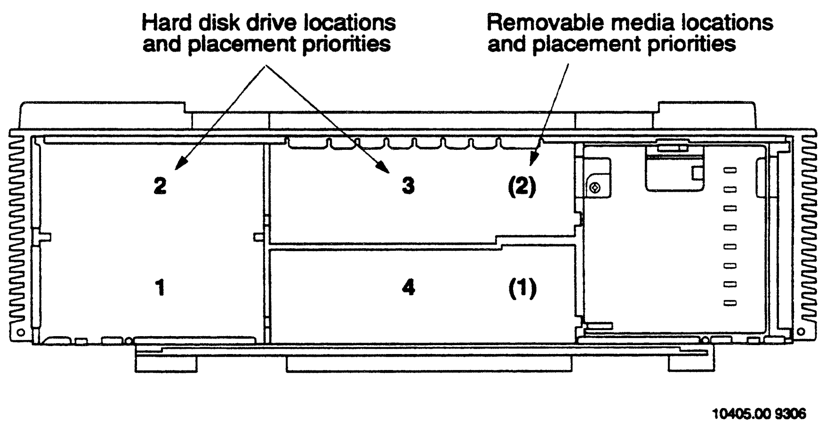
The CD-ROM device should be installed in the lower bay. If this is not possible, it can be placed in the center bay.



Drive Placement Priorities in the Series E Enclosure

Drive Placement in the SCSI Expansion Module

The SCSI device expansion module contains four half-height peripheral bays. Two bays accommodate 3.5-inch hard disk drives and two bays accommodate either 3.5-inch hard disk drives or half-height removable media devices. To ensure optimum cooling, use the figure below for determining placement.



Drive Placement Priorities in the SCSI Expansion Module

System Specifications

The system requires minimum maintenance and care to keep them operating properly. A proper environment for the computer means placing the unit within the appropriate temperature, humidity, and altitude ranges. For the best performance of the computer and for the comfort of the operator, it is better to place the computer in the middle of these environmental ranges. It is important that the environmental conditions not change abruptly.

Enclosure Dimensions	Height:	5.4 in. (137 mm)—Series E chassis 5.0 in. (127 mm)—SCSI module
	Width:	15.9 in. (403 mm)—Series E/SCSI module
	Depth:	11.3 in. (286 mm)—Series E/SCSI module
	Weight:	19 lb. (8.5 kg)—Series E chassis (typical) 20 lb. (9 kg)—SCSI module (fully loaded)
Input Voltage	115 Vac/230 Vac, 50 Hz/60 Hz	
Safety	UL1950 CSA C22.2/950 VDE EN 60 950 IEC 950	(Standards for safety of information technology equipment, including electrical business equipment)
Electrostatic Discharge	5,000 volts:	No observable effect
	12,000 volts:	No operator-perceived errors
	24,000 volts:	No permanent equipment damage
Altitude	Operating:	10,000 ft (3048 m)
	Non-operating:	30,000 ft (9144 m)
Acoustic Noise Level	50 dBA maximum	
Temperature	Operating:	5° C to 35° C (41° F to 95° F)
	Non-operating:	-25° C to 65° C (-13° F to 149° F)
Relative Humidity	Operating:	20% to 80%
	Non-operating:	10% to 90%
Shock	Operating:	0.5 G
	Non-operating:	15 G

Installation Troubleshooting

Use this table to solve some basic problems that may occur after installing the computer system.

IF this occurs . . .	THEN . . .
Green "power-on" LEDs fail to light on any module.	Check the AC cable connection in single module systems. For systems with multiple modules, ensure that AC jumper cables and SCSI and environmental control cables are connected tightly.
System does not boot when key is turned to the **RUN** position. Amber cooling failure LED is lit on any of the modules.	Check the air filter and available air flow to the module.
Disk drive does not respond.	Ensure that disk drive is firmly connected into the SCSI backplane connector.

PowerStack Series I Server

PowerStack Series I Server Systems

The Series I Server is a small machine suitable for deskside use. It contains a 1 - 4 Symmetric Multiprocessor (SMP) based on the PowerPC architecture.

The system contains several types of input and output adaptors, memory and media storage devices. The minimum memory capacity of 32 MB can be increased up to 512 MB.

A system planar, Entry Level Motherboard (ELM) provides the interface for the CPU daughter boards (up to 2), for one main memory board and six Micro Channel Adaptor (MCA) slots. The SCSI controller board is installed in one of the six available MCA slots. Mass storage capacity of the system can be increased by connecting one or more disk expansion units to the base unit.

Base Unit

The Operator Panel, two SCSI drives and one diskette drive are located behind the front door.

The system has the following external connections on the rear of the machine:

- One 9-pin RS232 serial port that provides the L3 which is usually the UPS connection.
- One 25-pin serial port. If you use a splitter cable, this port provides line L1 and L2 which you can reserve for maintenance diagnostics or can be addressed as normal tty lines.
- One parallel port.
- One port for the mouse (reserved for future use).
- One port for keyboard connection (reserved for future use).
- One RS485 port.

Disk Expansion Unit

The expansion unit has the following connections on the rear of the machine:

- Two RS485 ports.

Hardware Components

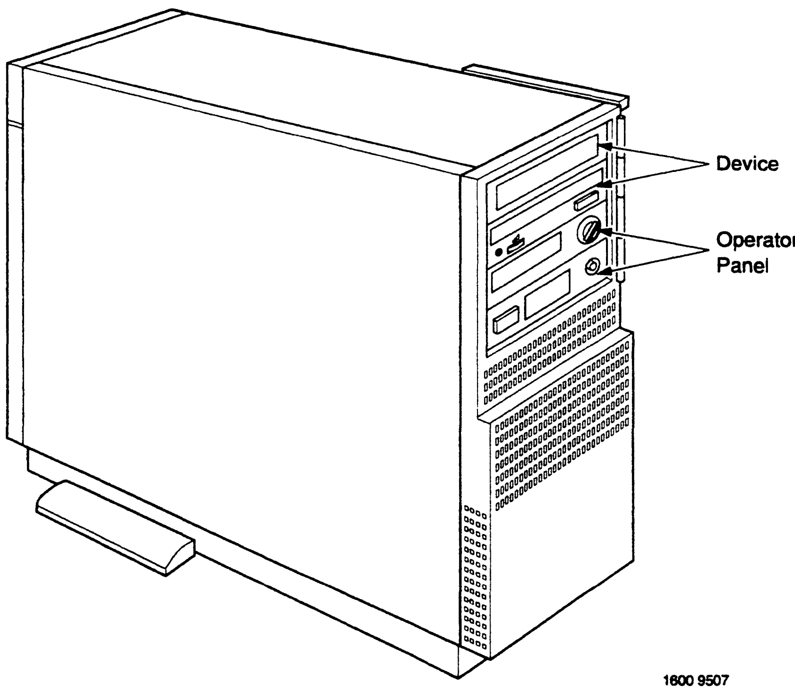
Base Unit

The base unit has the following required components:

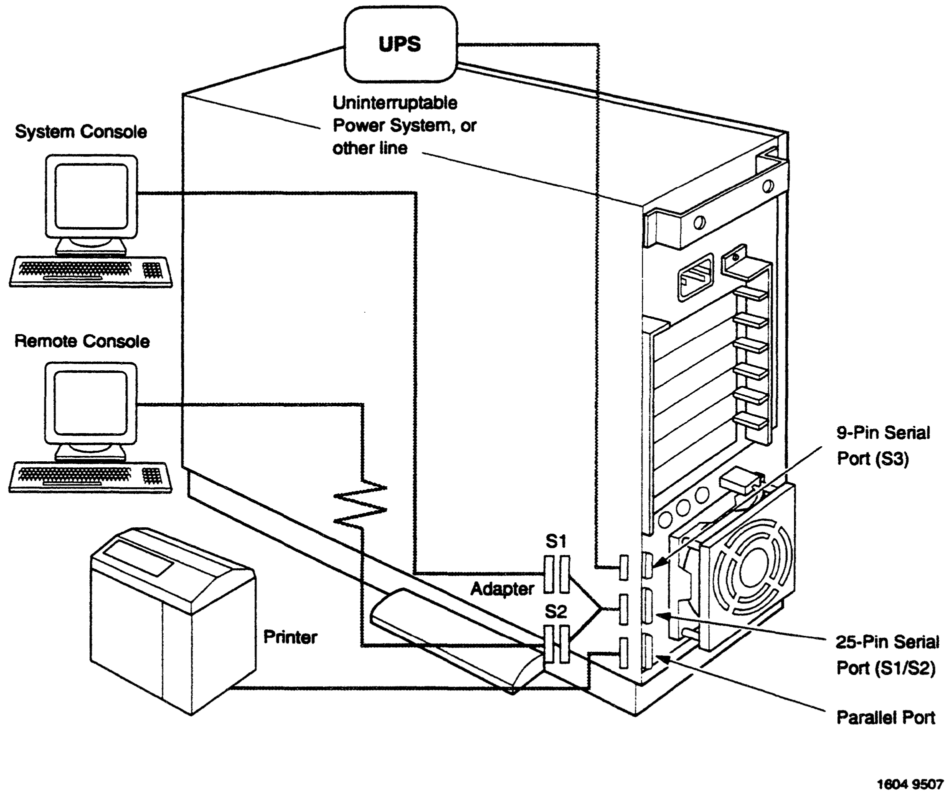
- One diskette drive and the Key Mode Switch
- Operator Panel
- Power Supply Module
- One SCSI adaptor
- One Ethernet adaptor
- One CPU board
- One disk devices
- One memory card
- One system planar (ELM)
- Three fan modules

The base unit may have the following optional components:

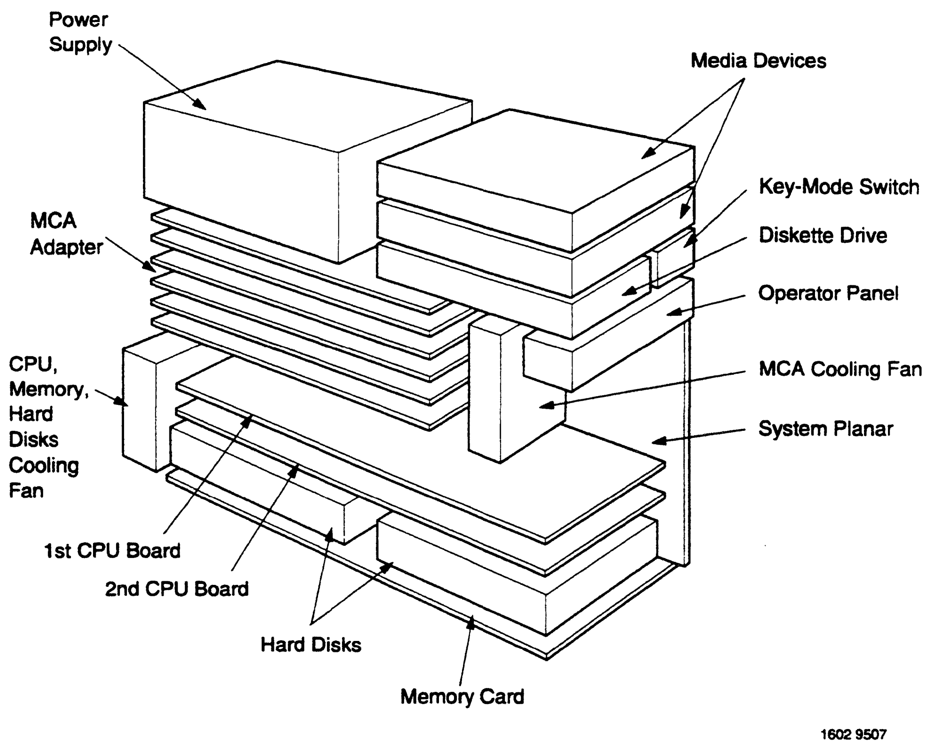
- Up to six MCA adaptors
- Up to two SCSI media devices (one CD-ROM drive and another device)
- One additional CPU module
- Three additional disk devices



Base Unit, Front View



Base Unit, Rear View



Base Unit, Components

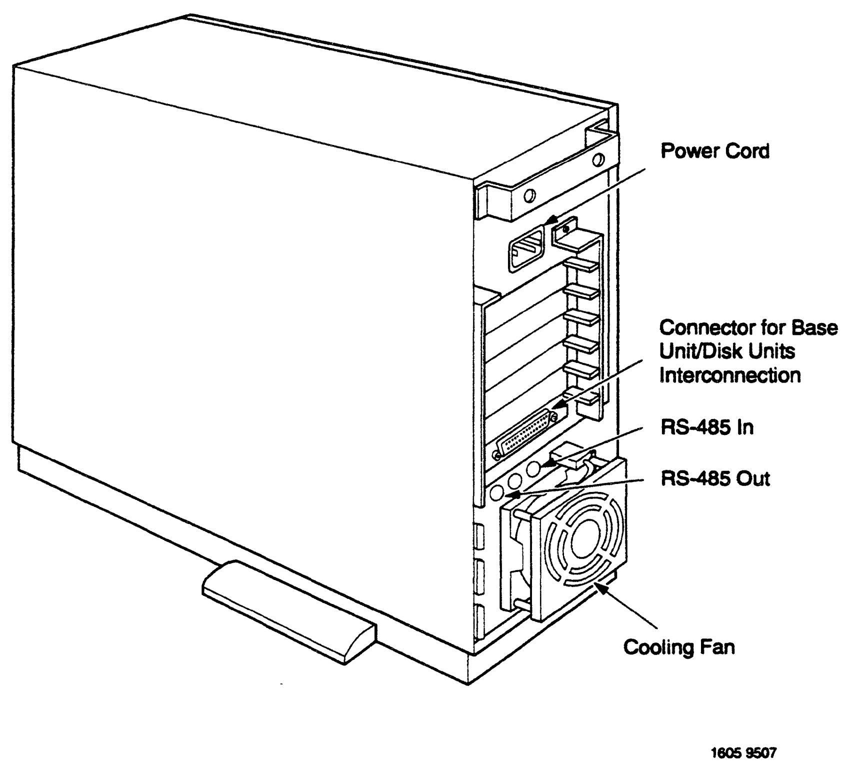
Disk Expansion Unit

Each disk expansion unit has the following required components:

- Key Mode Switch
- Operator Panel with the Power On/Off Button and the Power On Light
- ECB card
- Power Supply Module
- One disk device
- Two fan modules

In addition, the expansion unit may have the following optional components:

- Up to two SCSI devices
- Up to five additional disk devices



Expansion Unit, Rear View

Operator Controls

The operator panel, the 3.5-inch diskette drive and CD-ROM drive are behind the front door.

Refer to the Operating Controls information in PowerStack Series MP Deskside for a description of the operator controls. This section begins on page 80.

Specifications

Characteristics	Specifications
Physical Dimensions	Width: 6.8 inches (173 mm) Depth: 24.2 inches (614 mm) Height: 18.5 inches (470 mm) Weight: 42.2 lb (19 kg) (empty), 48.9 lb (22 kg) (fully loaded)
Input Voltage	90 Vac to 137 Vac or 180 Vac to 265 Vac (autoranging) 50Hz / 60Hz
Altitude	0 to 8202 feet (2500 m)
Acoustic Noise Level	
Operating	56 dBA
Non-operating	52 dBA
Temperature	
Operating	10° to 32° C (50° to 90° F)
Non-operating	5° to 50°C (41° to 122° F)
Relative humidity	
Operating	20% to 80% noncondensing
Non-operating	5% to 95% noncondensing
ECM/EMI Standards	
International standards	CISPR 22 Class A EN 55022 Class A + EN50082-1
National standards	FCC part 15 Class A CSA C108.8 Class A
Safety (Standards for safety of information technology equipment, including electrical business equipment)	EN 60950 IEC 950 UL 1950 CSA C22.2 N 950-M89

Series I Server

PowerStack Series MP Deskside

These multi-user systems are based on the PowerPC RISC chip set architecture. They contain several types of input and output adaptors, memory, disk and media devices.

The system consists of at least one base unit and one or more of the optional expansion units.

Base Unit

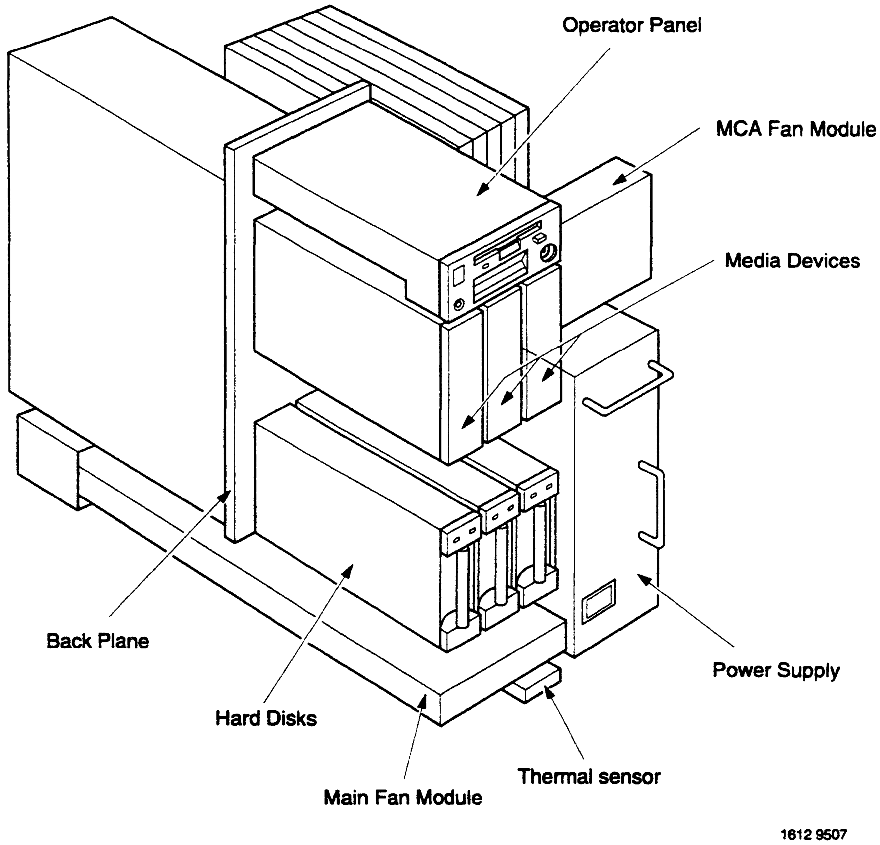
The base unit can house all modules required by the system to operate correctly.

You can access the following modules from the front of the unit:

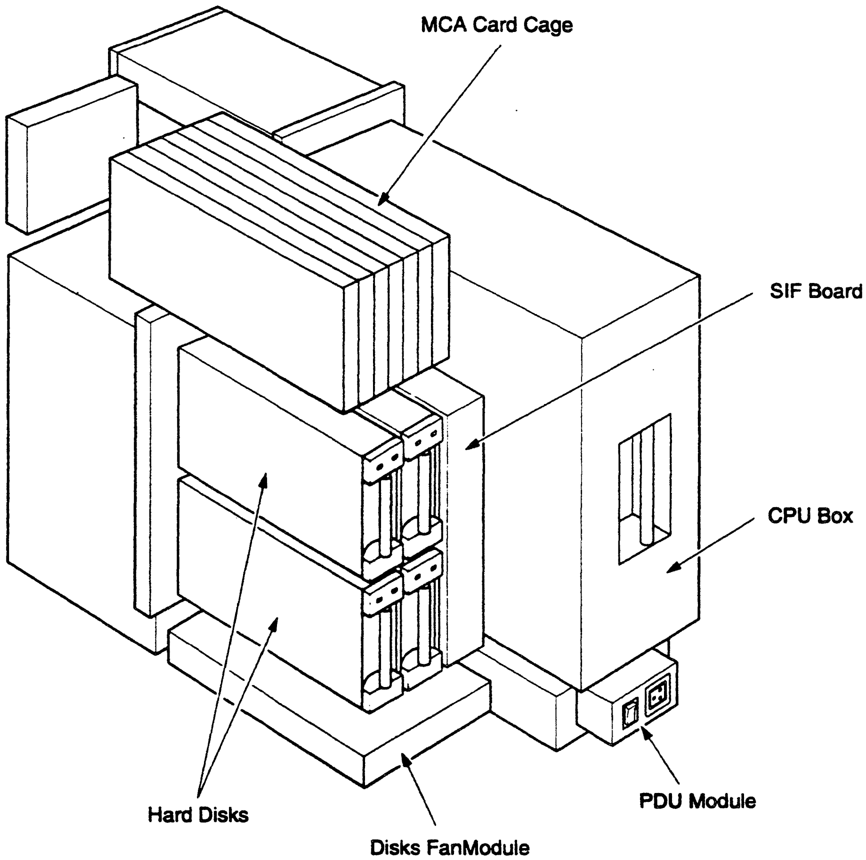
- Operator panel
- Removable media devices, including the CD-ROM drive
- Hard disks
- Fan module
- MCA fan module
- Power supply

You can access the following modules from the rear of the system:

- The MCA card cage
- Additional hard disks
- System interface board
- Disk fan module
- CPU box
- Power Distribution Unit (PDU)



Base Unit, Front View



Base Unit, Rear View

Expansion Unit

The first expansion unit increases the number of mass storage devices (hard disks or removable media) and/or communications lines (MCA adaptors).

The first expansion unit must be installed to the left of the base unit (as you face the unit). The subsequent units are installed to the left side of the first expansion unit.

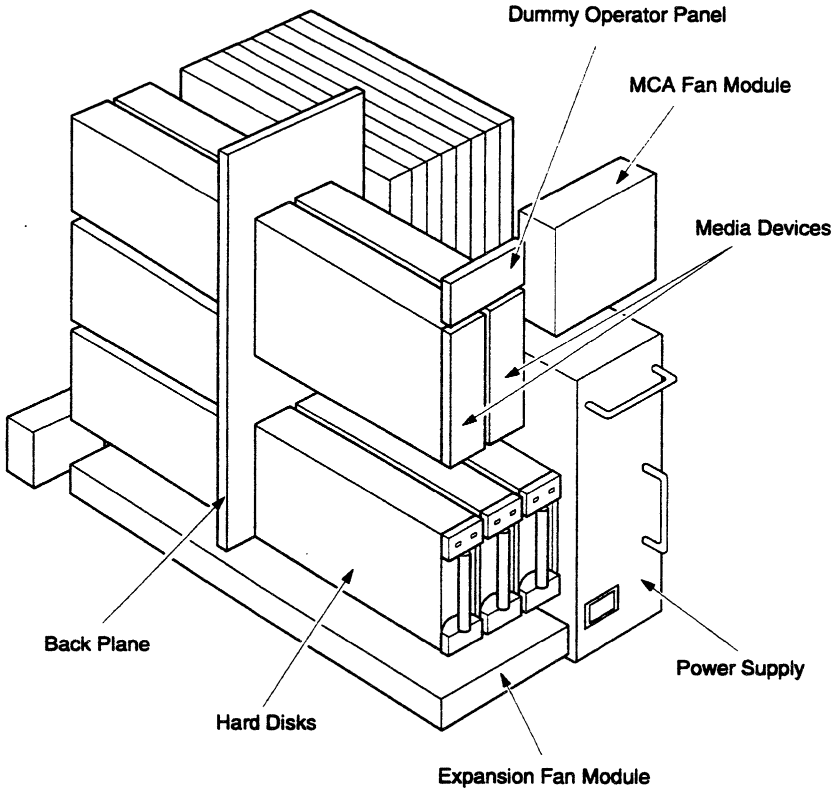
You can access the following modules from the front of the expansion unit:

- Removable media devices
- Hard disk units
- Expansion fan module
- MCA fan module
- Power supply

The operator panel on the expansion unit has only a green LED that illuminates when DC power is present.

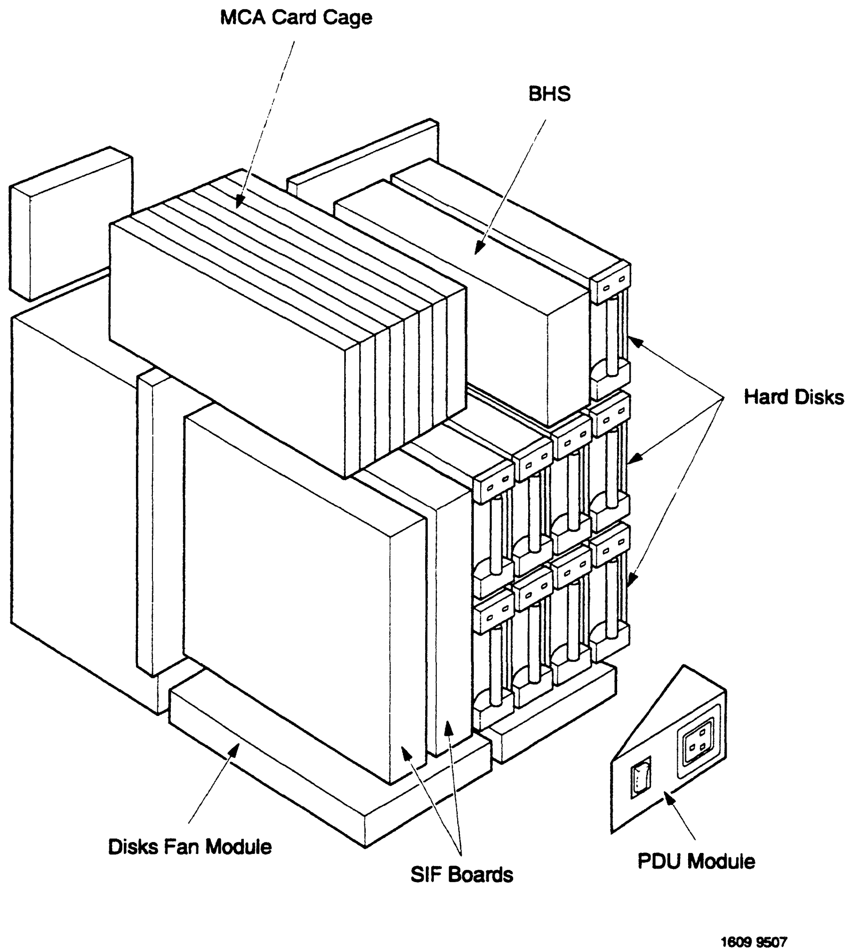
From the back of the expansion unit, you can access the following components:

- MCA card cage that contains up to eight adaptors on the first expansion unit, and no adaptors n the others.
- SCSI bulkhead module
- Hard disks
- System interface cards
- Disks fan module
- PDU module



Expansion Unit, Front View

Series MP Deskside



Expansion Unit, Rear View

Disk Unit

The disk unit is similar to the expansion unit, except it does not have an MCA card cage, so you cannot install any adaptors or SCSI controllers in a disk unit.

Install disk units on the left side of the first expansion unit or base unit.

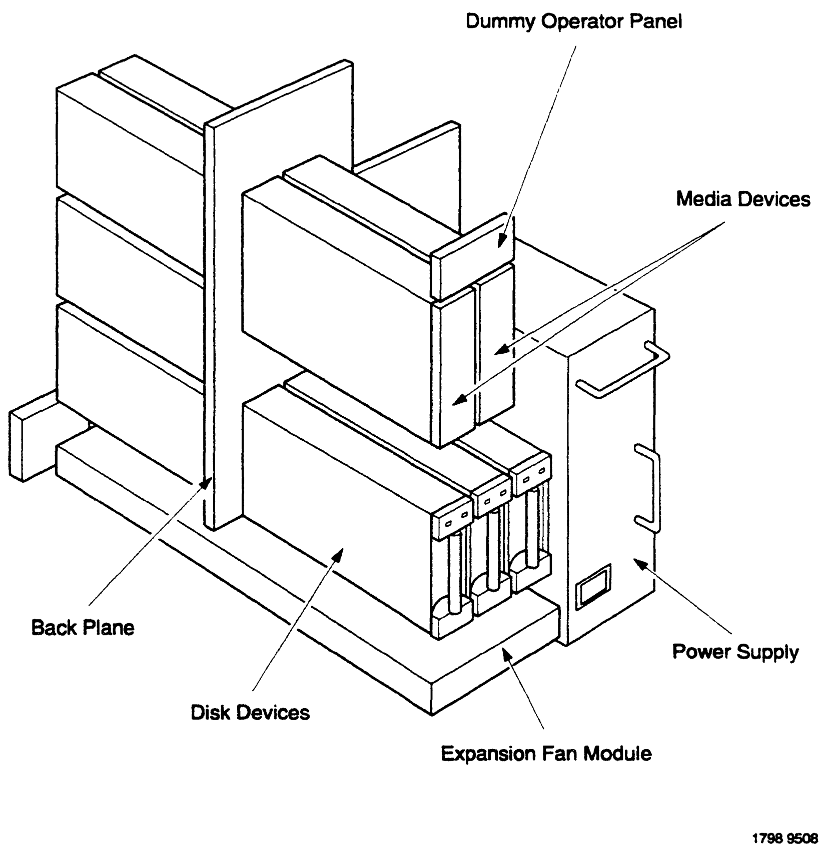
You can access the following devices from the front of each disk unit:

- Removable media devices
- Hard disks
- Expansion fan module
- Power supply

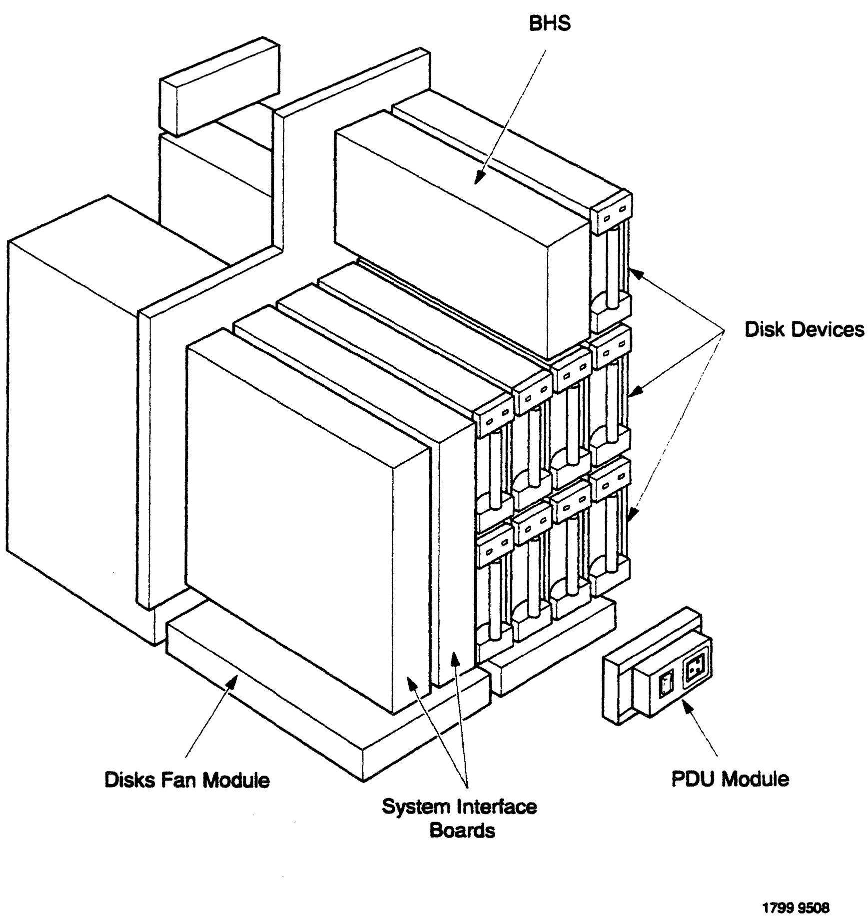
The operator panel on the unit has only one green LED that illuminates when DC power is present.

From the back of the unit you can access the following components:

- SCSI bulkhead module
- Hard disks
- System interface boards
- Disk fan module
- Power distribution module



Disk Unit, Front View



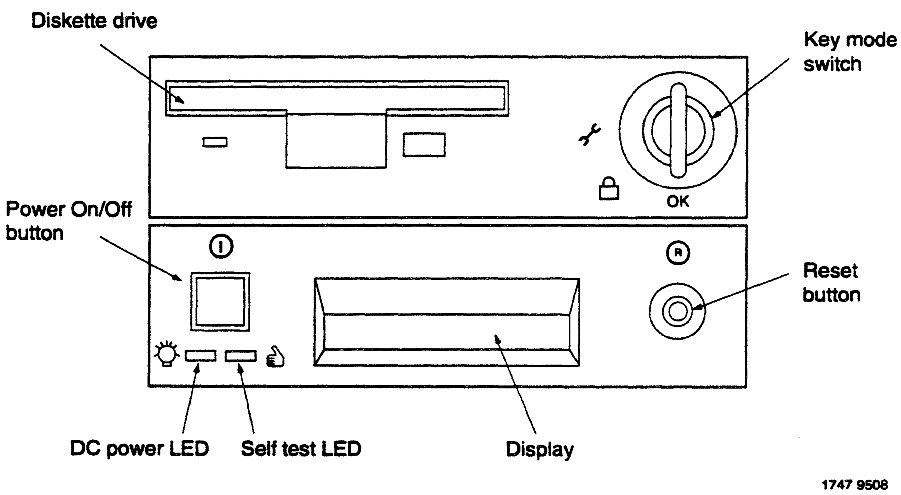
Disk Unit, Rear View

Specifications

Characteristics	Specifications
Physical Dimensions	Width: 14.2 inches (360 mm) Depth: 29.5 inches (750 mm) Height: 24 inches (610 mm) Weight: 148.9 lb (67 kg) (empty), 186.7 lb (84 kg) (fully loaded)
Input Voltage	90 Vac to 132 Vac or 180 Vac to 264 Vac (autoranging) 49Hz / 62Hz
Altitude	0 to 8202 feet (2500 m)
Acoustic Noise Level	56 dBA(Declared value)
Temperature	
Operating	10° to 32° C (50° to 90° F)
Non-operating	5° to 50°C (41° to 122° F)
Relative humidity	
Operating	20% to 80% noncondensing
Non-operating	5% to 95% noncondensing
ECM/EMI Standards	
International standards	CISPR 22 Class A EN 55022 Class A + EN50082-1
National standards	FCC part 15 Class A CSA C108.8 Class A
Safety (Standards for safety of information technology equipment, including electrical business equipment)	EN 60950 IEC 950 UL 1950 CSA C22.2 N 950-M89

Operator Controls

You have to open the upper door on the front of the base unit to access the Operator Panel. The panel is controlled by the CPU and a special microprocessor on the I/O card called BUMP (Bring Up MicroProcessor).



Operator Panel

The components of the operator panel are:

- Use the **Power On/Off Button** to switch the system on and off.
- The **Diskette Drive** accepts 3.5 inch diskettes.
- The **Key Mode Switch** has three settings, Normal, Secure and Service.
- System messages appear on the **LCD Display**.
- Use the **Reset Button** to reset the system unit, or to scroll configuration information in the standby state.
- The green **Power On Light** indicates that all voltages in the power supply are present and within specified limits and all fans are running. The power-on light is also used to help analyze power and cooling problems.
- The yellow **Self Test LED** indicates that the Power-on-Self-Test (POST) have completed without error.

Reading the Operator Panel Display

Caution **If 888 is flashing in the LCD Display, do not push the Reset Button. Read the *Problem Solving Guide and Reference* manual.**

The operator panel has two lines of sixteen position each. The display is used for:

- Event indications and problem reporting during Power-On-Self-Test (POST) and configuration methods.
- Event indications during diagnostics when a console display is not available.
- Problem reporting during diagnostics when a console display is not available.
- Problem reporting if a fault is detected at run time.
- Dump progress and command indications during dump.
- Problem reporting when there is a power fault.

During the POST, the displayed numbers indicate the progress of the testing. If an error is detected, the system unit stops and a number appears in the 16-character display to identify the error. When the self-test completes without error, the display is blank.

Please refer to the *Problem Solving Guide and Reference* for a detailed description of what appears on the LCD display.

Using the Reset Button

Caution **When the mode switch is in Normal or Service, pressing the Reset button causes the unit to reset and do an IPL (Initial Path Load). Pressing the Reset Button while the operating system is running can result in damaged or lost data.**

Use the Reset Button for,

- Reset the system unit and cause a boot when the mode switch is set to Normal or Service.
- Reset the system unit when the mode switch is set to Secure and the system displays a 200 or has not reached the point where 200 appears.
- Read out messages (scroll) after a flashing 888 appears.
- Start the dump program when a manual dump is needed.
- Sequentially read system configuration in Stand-By Mode and with the key mode switch in Service position.

When the mode switch is in the Secure position, the Reset Button is disabled.

Setting the Key Mode Switch

The Key Mode Switch establishes the initial program load (IPL) path. The IPL loads the system programs, checks the system hardware and prepares the system for user operation.

The key mode switch has three positions Normal, Secure and Service.

Normal

Before starting the system unit for normal operation, set the switch to the normal position. In this position,

- The operating system loads after the Power-On-Self-Tests are complete.
- The Reset button is active.
- The IPL proceeds according to this list of devices established during the configuration of the operating system.
- You can use a software command to shutdown the system automatically.

Caution **If you press the Reset button while the key mode switch is set to Normal, you may loose data or damage the operating system.**

Secure

The Secure position prevents the system from booting. If the system running, this position does not lock the system console or block system network communication. In this position,

- A 200 appears in the LCD display when you boot the system.
- The system will reset and re-boot when you press the Reset button, and display 200 again.
- The Reset button is disabled when the operating system is running.
- A passerby cannot accidently press the Reset button and cause a loss of data.

Service

Use the Service position to conduct hardware or software maintenance. In this position,

- The operating system console sequences are activated that support error determination (debug) and storage printout (dump).

- The system unit attempts to IPL from the diskette drive. if there is no diskette, or if there is no IPL record on the diskette, the system attempts to IPL from a predetermined list of devices.
- If the customer has enabled maintenance, the system displays a complete set of maintenance features called System Service Facilities.

Possible Operations

The next table summarizes the possible operations for each key switch position:

Operation	Key Mode Switch Position		
	Normal	**Secure**	**Service**
Reset	Yes	No	Yes
BUMP Console Active	Yes	Yes	Yes
Dump	No	No	Yes
Normal IPL	Yes	No	No
Service IPL	No	No	Yes

PowerStack Series MP Rack

PowerStack Series MP Rack Systems

These multi-user systems are based on the PowerPC RISC chip set architecture. They contain several types of input and output adaptors, memory, disk and media devices.

The Rack system consists of drawers. The following drawers can be installed into the rack:

- CPU Enclosure
- DAS2300
- DAS1000/1300
- UPS
- Power Distribution Board
- Removable Media
- STK9915 Tape Drive
- Data Wheel
- Modem

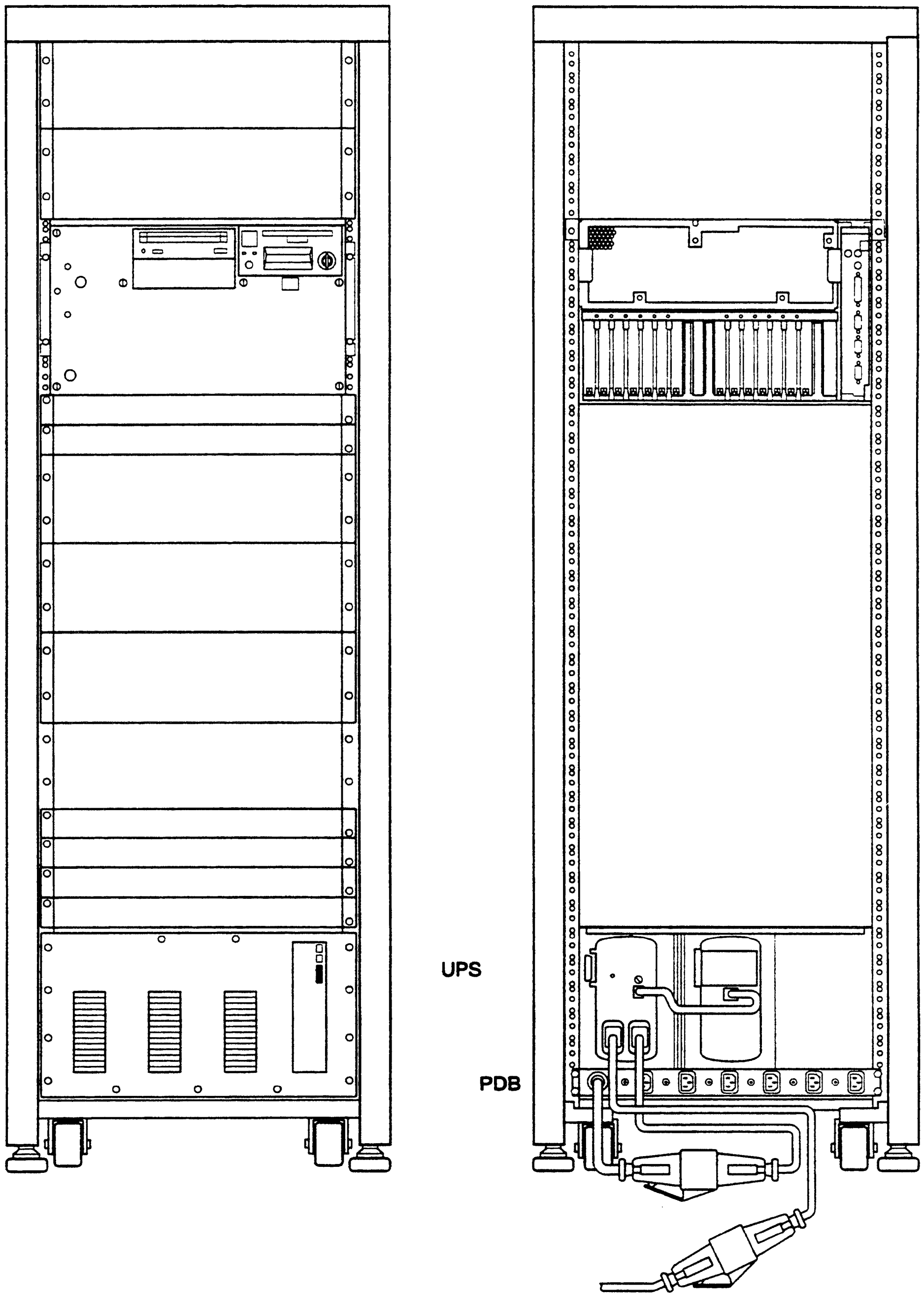
Configurations

The drawers and hardware components are combined to create the system configuration. The most basic configuration consists of a minimal set of hardware components necessary to run the system.

Minimum Configuration

The minimum configuration includes the following:

- One CPU enclosure including:
  - One dual CPU board
  - One free slot for and additional CPU board
  - One memory slot
  - Three free slots for additional memory cards
  - One 3.5-inch diskette drive
  - One SCSI-2 single-ended/differential port
  - One Ethernet port
  - Three asynchronous lines
  - One Centronics port
  - One 2 GB hard disk



Series MP Rack, Front and Rear View

- One CD-ROM drive
- Fourteen MCA slots
- One open bay for one additional hard disk or removable media device
- One power supply module

❑ One Power Distribution Bus

❑ One stability mass

Maximum Configuration

The maximum configuration includes the following:

❑ One fully configured CPU Enclosure

❑ Up to four other drawers between the ones supported by the system.

❑ Two Power Distribution Busses

❑ One UPS

Configuration Rules for Drawers

The system is divided into 36 units, grouped in eight areas. Characteristics for each area are as follows.

Area	Height	Beginning Unit	Ending Unit
1	6U	1U	6U
2	2U	7U	8U
3	2U	9U	10U
4	6U	11U	16U
5	6U	17U	22U
6	2U	23U	24U
7	6U	25U	30U
8	6U	31U	36U

An area can house only specific drawers. A drawer is always installed from the beginning unit of the area. A drawer installed in area n can partially or totally occupy areas n+1 and n+2. Plan the configuration taking into consideration the following:

❑ Locate the drawers starting with the one with higher priority. For example, the UPS can only be housed in area 1.

❑ If a drawer can be positioned in more than one area start with the area with higher priority (marked 1 in the table).

If this area is not free, position the drawer in the area marked with 2. For example, if a DAS2300 is in areas 3 and 4 and you want to install a DAS1300, position it in area 5.

The following table indicates the way to set drawers in the rack system.

Priority	Drawers	Area	1	2	3	4	5	6	7	8
			6U	2U	2U	6U	6U	2U	6U	6U
1	UPS	6U	1							
2	PDB	1U rear	1	2						
3	DAS2300	8U			1	1	2	2	3	3
4	CPU	6U				3	2		1	4
5	Media	4U	5			2	1		3	
6	STK9914	5U	4			2	1		3	
7	Data Wheel	4U	4			2	1		3	
8	DAS1000/1300	6U	5			1	2		3	4
9	Modem	1U rear	1	2	3			5		4

If the UPS is not present, install the power distribution bus and modem in area 1 just above the stability mass.

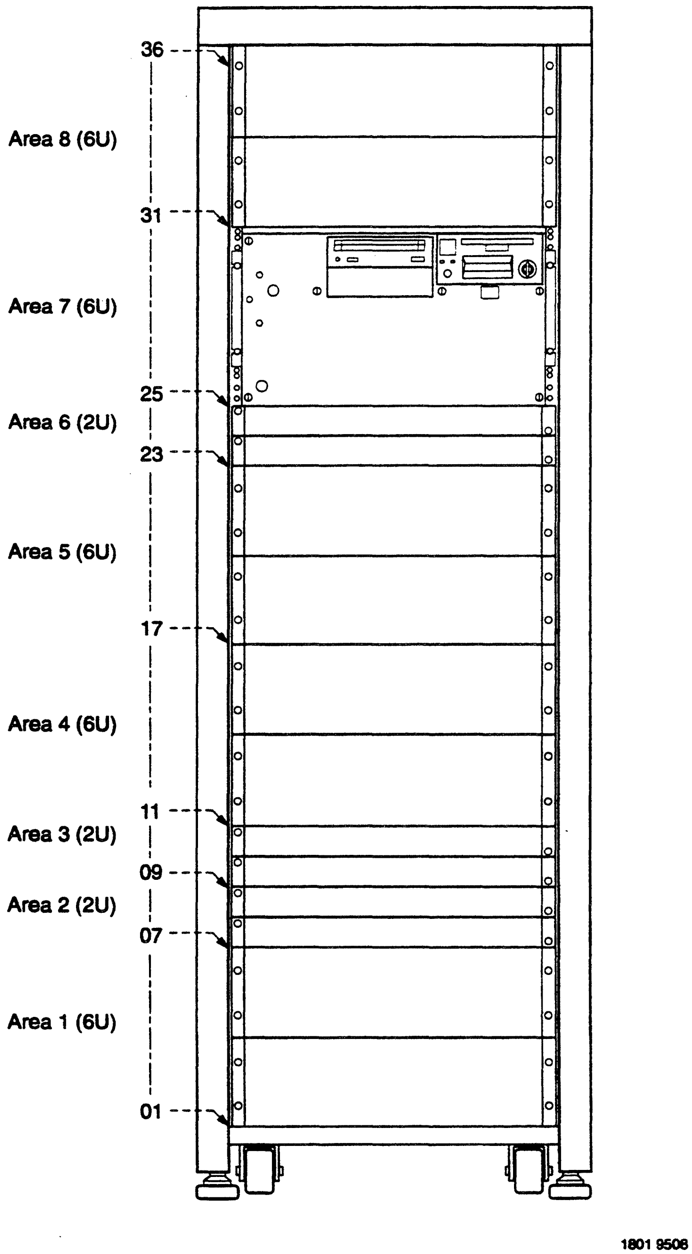
If the UPS is present, install the power distribution bus and modem in area 1 behind the UPS.

Operator Controls

The operator panel is behind the front bezel door. To access the operator panel, rotate the top of the front bezel door downward.

The operator panel is controlled by the CPU and a special microprocessor located on the I/O card called BUMP (Bring Up MicroProcessor).

Refer to the Operating Controls information in PowerStack Series MP Deskside for a description of the operator controls. This section begins on page 80.



Series MP Rack Drawers

Specifications

Characteristics	Specifications
Physical Dimensions	Width: 22.8 inches (580 mm) Depth: 42.5 inches (1080 mm) Height: 1775 inches (1775 mm) Weight: 400 lb (180 kg) (empty), 1088.9 lb (490 kg) (fully loaded)
Input Voltage	90 Vac to 137 Vac or 180 Vac to 253 Vac (autoranging) 50Hz / 60Hz
Altitude	0 to 8202 feet (2500 m)
Acoustic Noise Level	6.3 Bels (Declared value)
Temperature	
Operating	10° to 40° C (50° to 104° F)
Non-operating	5° to 50°C (41° to 122° F)
Relative humidity	
Operating	20% to 80% noncondensing
Non-operating	5% to 95% noncondensing
ECM/EMI Standards	
International standards	CISPR 22 Class A EN 55022 Class A + EN50082-1
National standards	FCC part 15 Class A CSA C108.8 Class A
Safety (Standards for safety of information technology equipment, including electrical business equipment)	EN 60950 IEC 950 UL 1950 CSA C22.2 N 950-M89

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System Components

Component Numbering Scheme

Motorola uses a specific numbering scheme for identifying various system components. Familiarity with this scheme will help you troubleshoot Motorola equipment:

Components numbers = MVMExyy

where

M =	Motorola component
VME =	VME-based system
x =	Series or type of component (more details below)
yy =	Specific component number

The numbering scheme for the series or type of component follows:

MVME100's	CPU Boards
MVME200's	Memory Boards
MVME300's	I/O Controller Boards
MVME500's	Industrial I/O Boards
MVME700's	Transition Modules & Modems
MVME800's	Peripheral Devices
MVME900's	Enclosures

PowerPC Components

System hardware components based on the PowerPC microprocessor are also included in this section. Look for them according the type of component, following the same scheme described above.

Within the subsections, the PowerPC components are included in alphabetical and then numerical order. For example, the MVME1603/MVME1604 Processor is described in the CPU Board Components subsection; it follows the MVME197LE. However, the Atlas 60*x* Processor is the first article in the same subsection.

Motorola Industry Packs

The Motorola IndustryPacks (MVIPs) are also included as the last subsection.

Reference Documentation

System components supported by Motorola are documented in hardware manuals.

The information in this document is only a small subset of the information that is available about Motorola components. Refer to the Computer Group Technical Information Library for a complete listing of all the documentation that is available to you.

Caution **Static electricity can damage electronic components on circuit boards. Always wear a grounding strap and use an antistatic mat when handling boards or other components.**

CPU Boards

Overview

This section contains information on boards that provide the main CPU function for the system. The CPU executes the UNIX operating system, the applications software, and provides VMEbus system controller functions.

Typically, the system only contains one of these boards, located in slot 1 (the leftmost slot).

Jumper locations and settings for the following CPU boards are illustrated in this section:

Module Number	Description	VME Slots Used
Atlas 603 / 603e / 604	PowerPC (MPC603-based) processor	1
MVME147	CISC (68030-based) processor	1
MVME147S	CISC (68030-based) processor	1
MVME162FX	CISC (68040-based) processor	1
MVME162LX	CISC (68040-based) processor	1
MVME165	CISC (68040-based) processor	1
MVME166	CISC (68040-based) processor	1
MVME167	CISC (68060-based) processor	1
MVME177	CISC (68040-based) processor	1
MVME187	RISC processor	1
MVME188A	RISC processor	Up to 6
MVME197LE	RISC processor	Up to 2
MVME197DP/SP	RISC processor	Up to 2
MVME1603 / MMVE1604	PowerPC (MPC603-based) processor	1
Ultra 603 / 604	PowerPC (MPC603-based) processor	1

Atlas 60*x* Processor

Atlas 603, 603e, and 604 Processors

The Atlas 603 (MPC603 microprocessor-based), Atlas 603e (MPC603e microprocessor-based), and the Atlas 604 (MPC604 microprocessor-based) are PowerPC™-based motherboards.

The Atlas 60x is an all-in-one motherboard implemented on an 8.6 inch by 13 inch single-plane printed circuit board. The Atlas motherboard platform accommodates either an MPC603, MPC603e, or MPC604 RISC processor for the MPU (factory-installed option) and an MPC105 PowerPC-to-PCI bridge as the memory controller between the processor (MPU) bus and the Peripheral Component Interconnect (PCI) bus. An Intel i82378ZB PCI-to-ISA bridge component (referred to as the PIB) allows Industry Standard Architecture (ISA) bus-compatible peripherals to be accessed by the MPC60*x* processor. The Atlas 60*x* also provides expansion slots which support PCI bus and/or ISA bus cards.

Control Switches

ABORT Switch (S1)

When pressed, the ABORT push-button switch generates an interrupt request (IRQ8) to the Super I/O device. The interrupt is then handled by software, usually to abort program execution.

This switch is optional and normally is not installed on the motherboard.

RESET Switch (S2)

The Internal RESET push-button switch resets all devices on the motherboard when asserted.

This switch is optional and normally is not installed on the motherboard.

LED Indicators

The three LED indicators located are DSK, BEAT, and PWR.

DSK LED (DS1)

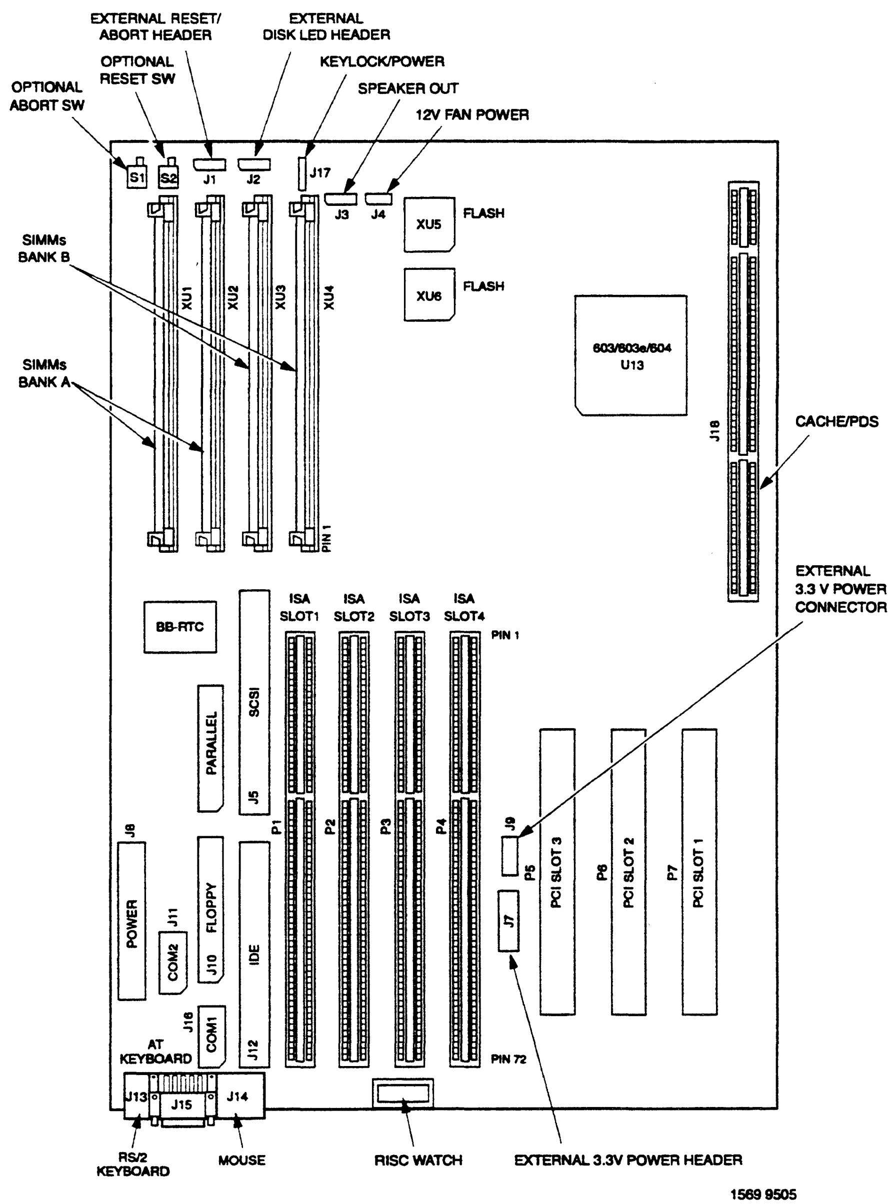
The green DiSK LED lights when either the SCSI master signal of the NCR SCSI device is asserted or the IDE LED signal on the IDE connector is asserted by the IDE device.

BEAT LED (DS2)

The yellow heartBEAT LED connects to the TS signal of the MPC60*x* processor and lights when the MPU is executing cycles on the MPU bus.

PWR LED (DS3)

The green PoWeR LED lights when +5V power is applied to the motherboard.



Atlas 60x Components Location

CPU

MVME147 Processor

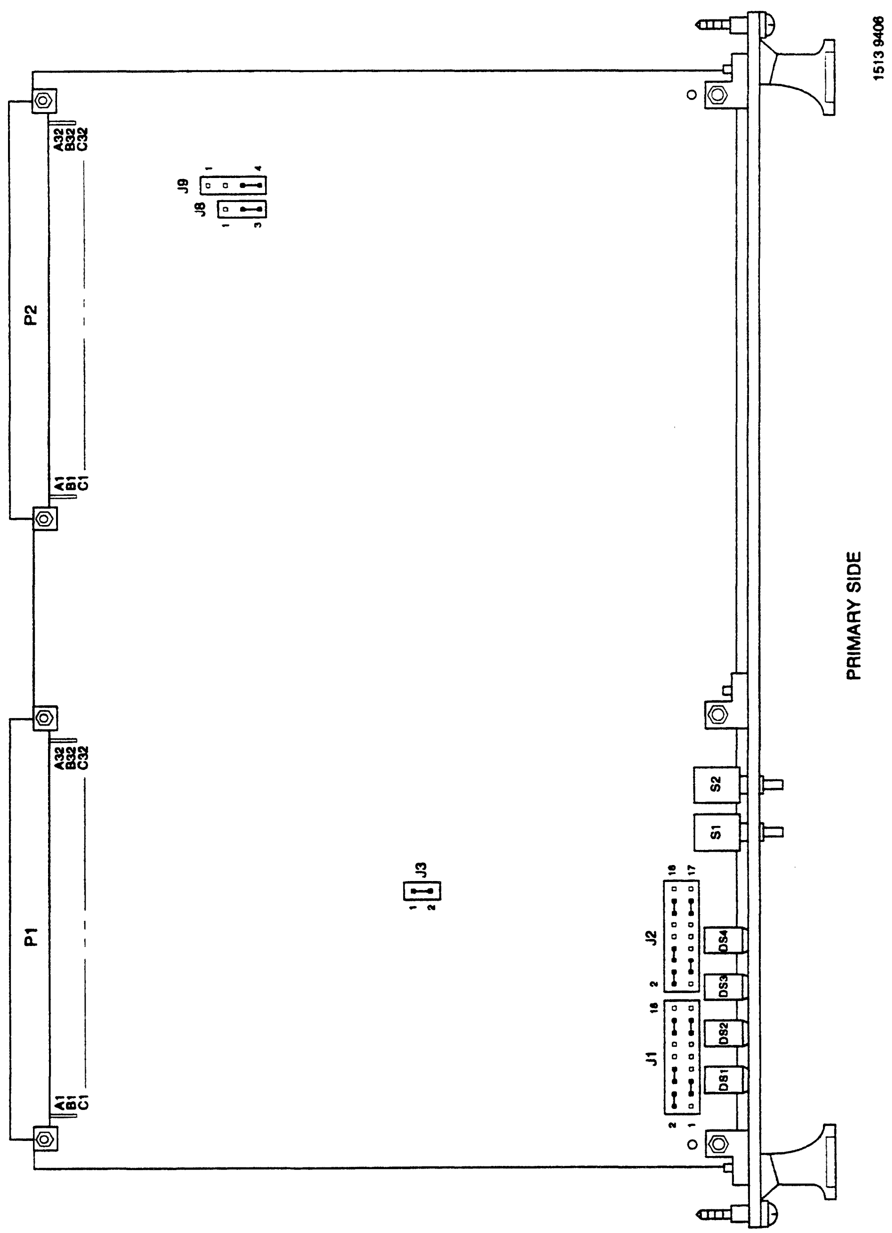
MVME147-0*xx* MPU VMEmodule

The MVME147 is a double-high VMEmodule and is best used in a 32-bit VMEbus system with both P1 and P2 backplanes. The module has high functionality with large onboard shared RAM, serial ports, and Centronics printer port. The module provides a SCSI bus controller with DMA, floating-point coprocessor, tick timer, watchdog timer, and time-of-day clock/calendar with battery backup, 2KB of static RAM with battery backup, four ROM sockets, and A32/D32 VMEbus interface with system controller functions.

The MVME147 can be operated as part of a VMEbus system with other VMEmodules such as RAM modules, CPU modules, graphics modules, and analog I/O modules. Transition boards that are compatible with the MVME147 are: MVME712M, MVME712A, MVME712AM, MVME712B, MVME712-12, and MVME712-13.

MVME147 Jumper Settings

Header	Description	Setting
J1	ROM Configuration Select 128K x 8 ROM/PROM/EPROM	2-4, 3-5, 6-8, 13-15, 14-16
J2	ROM Configuration Select	2-4, 3-5, 6-8, 13-15, 14-16
J3	System Controller Select, MVME147 selected	1-2
J8	Serial Port 4 Clock Configuration Select Receives RTXC4	2-3
J9	Serial Port 4 Clock Configuration Select Drives TRXC4	1-2



MVME147 Jumper and Switch Locations

MVME147S Processor

MVME147S Microcomputer Module

The MVME147S is a complete microcomputer system. The module (surface-mount technology) has high functionality with large onboard shared RAM, serial ports, and a Centronics printer port. The module provides a SCSI bus controller with DMA, floating point processor, tick timer, watchdog timer, and time-of-day clock/calendar with battery backup. There are 2KB of static RAM with battery backup, four ROM sockets, and A32/D32 VMEbus interface with system controller functions are also provided.

Front Panel Switches and Indicators

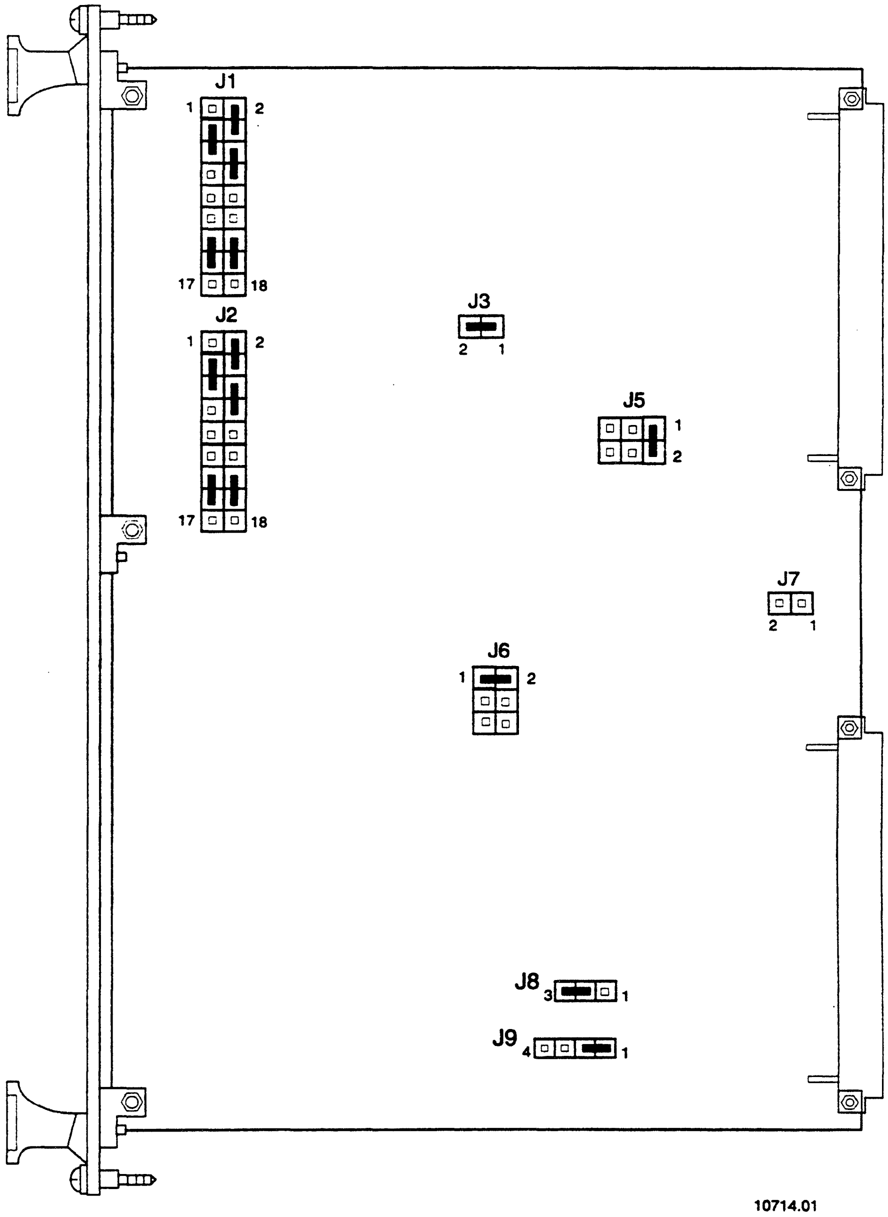
The MVME147S has RESET and ABORT switches, and RUN, STATUS, FAIL, and SCON indicators, all of which are located on the front panel of the module. A front panel RESET switch S2 (if enabled) generates a local reset and (if system controller) also generates a VMEbus system reset. A software ABORT switch S1 is normally used to abort program execution and return to the debugger.

The red LED FAIL indicator (DS1) indicates the status of the BRDFAIL bit in the VMEchip. The yellow LED STATUS indicator (DS2) is lit whenever the MC68030 STATUS* pin is low. When the yellow LED is full lit, the processor has halted.

The green LED RUN indicator (DS3) is connected to the MC68030 address strobe (AS*) signal and indicates that the MPU is executing a bus cycle. The green LED SCON indicator (DS4) is lit when the MVME147S is the VMEbus system controller.

MVME147S Jumper Settings

Header	Description	Setting
J1	ROM Configuration Select 128K x 8 ROM/PROM/EPROM	2-4, 3-5, 6-8, 13-15, 14-16
J2	ROM Configuration Select	2-4, 3-5, 6-8, 13-15, 14-16
J3	System Controller Select MVME147S selected	1-2
J5	Factory Use Only	1-2
J6	Factory Use Only 25 MHz	1-2
J8	Serial Port 4 Clock Configuration Select Receives RTXC4	2-3
J9	Serial Port 4 Clock Configuration Select Drives TRXC4 (Diagram illustrates newer boards that have an additional 4th pin location on J9—older versions have only 3 pin locations.)	1-2



MVME147S Jumper Locations

CPU

MVME162FX Processor

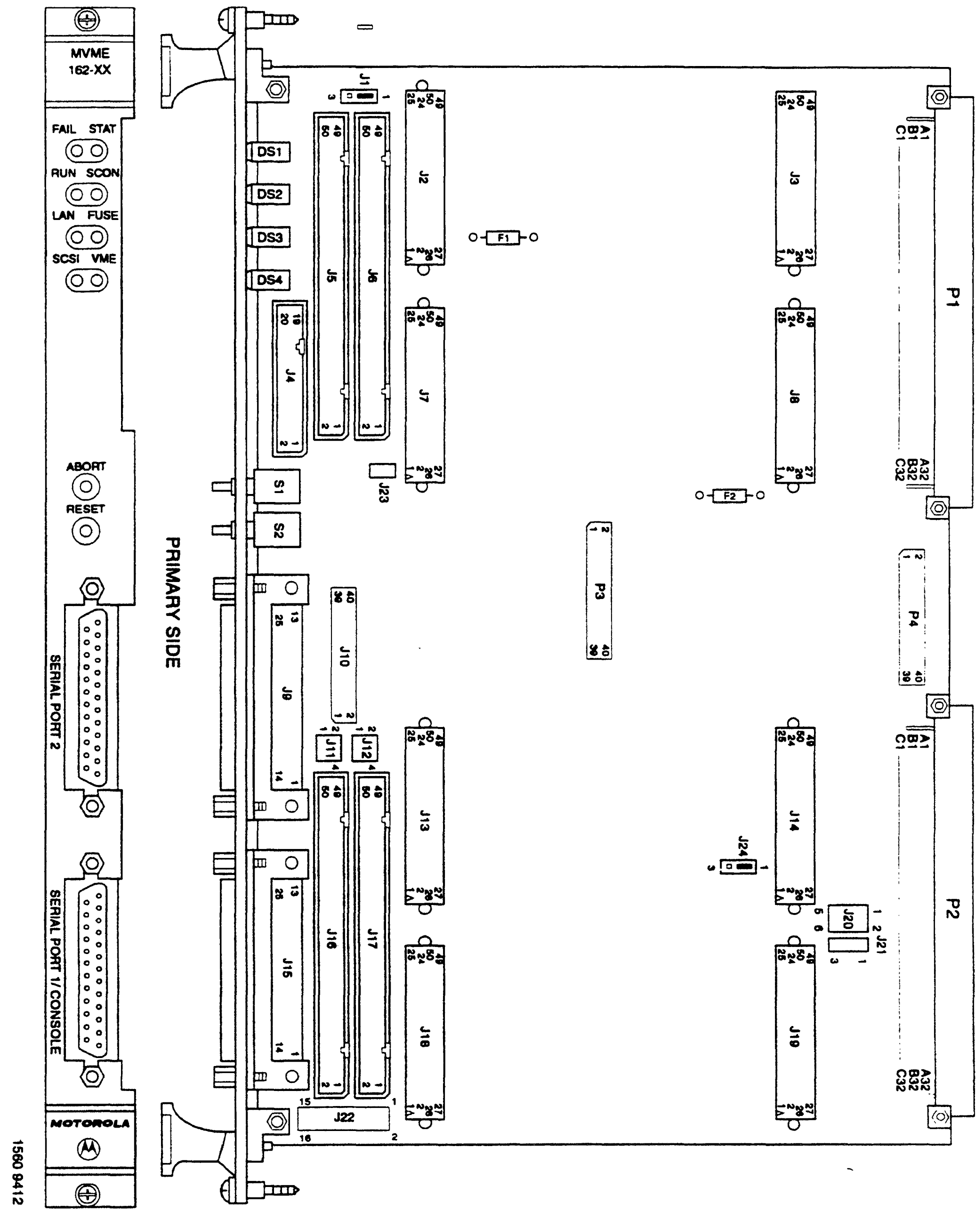
MVME162FX Embedded Controller

The MVME162FX is based on the MC68040 or MC68LC040 microprocessor. Various versions of the MVME162FX have 1MB, 4MB, 8MB, or 16MB of unprotected DRAM, 8KB of SRAM (with battery backup), time of day clock (with battery backup), Ethernet transceiver interface, two serial ports with EIA-232-D or EIA-530 or EIA-485/422 interface, six tick timers, watchdog timer, a PROM socket, 1MB Flash memory (one Flash device), four IndustryPack (IP) interfaces with DMA, SCSI bus interface with DMA, VMEbus controller, and 512 KB of SRAM with battery backup.

The I/O on the MVME162FX is connected to the VMEbus P2 connector. The main board is connected through a P2 transition board and cables to the transition boards. The MVME162FX supports the transition boards MVME712-12, MVME712-13, MVME712M, MVME712A, MVME712AM, and MVME712B (referred to in this manual as MVME712*x*, unless separately specified). The MVME712*x* transition boards provide configuration headers and provide industry standard connectors for the I/O devices.

MVME162FX Jumper Settings

Header	Description	Setting
J1	System Controller Select	1-2
J11	Synchronous Clock Select for Port 1/Console (configured for asynchronous communications)	No Jumper
J12	Clock Select for Serial Port 2 (configured for asynchronous communications)	No Jumper
J20	SRAM Battery Backup Source Select Header (configured to use VMEbus +5V Standby power as a backup power source)	1-3, 2-4
J21	EPROM Size Select Header (configured for 4Mbit PROM)	2-3
J22	General Purpose Readable Register Header	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16
J23	MPU Thermal Regulation Header	No Jumper
J24	IP Bus Clock Header	1-2



MVME162FX Switch, Header, Connector, Fuse, and LED Locations

MVME162LX Processor

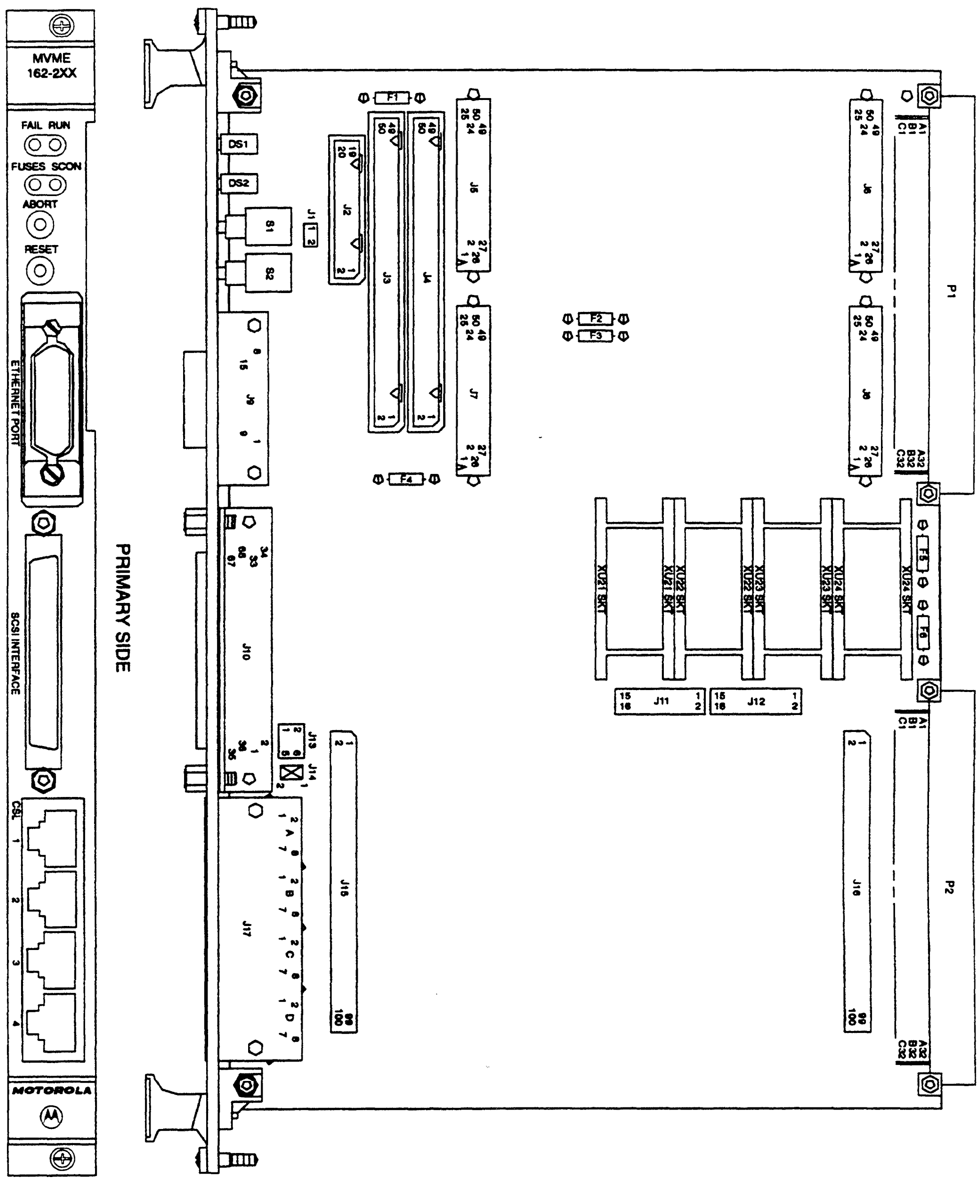
MVME162LX Embedded Controller

The MVME162LX is based on the MC68040 or MC68LC040 microprocessor. Various versions of the MVME162LX have 1 or 4 MB of parity-protected DRAM or 16 MB of ECC-protected DRAM,128 KB of SRAM (with battery backup) or 2 MB SRAM on a mezzanine board, time of day clock (with battery backup), an optional LAN Ethernet transceiver interface, four serial ports with EIA-232-D interface, six tick timers with watchdog timer(s), four EPROM sockets, 1 MB Flash memory (one Flash device), two IndustryPack (IP) interfaces, optional SCSI bus interface with DMA, optional VMEbus interface (local bus to VMEbus/VMEbus to local bus, with A16/A24/A32, D8/D16/D32 bus widths and a VMEbus system controller).

The I/O on the MVME162LX is connected to the front panel by connectors. The MVME162LX uses no transition boards.

MVME162LX Jumper Settings

Header	Description	Setting
J1	System Controller Select	1-2
J11	General Purpose Readable Register Header	1-2, 3-4, 5-6, 9-10, 11-12, 13-14, 15-16
J12	EPROM/FLASH Configuration Header	
J13	SRAM Backup Power Source Select Headers	1-3, 2-4
J14	SCSI Terminator Enable Header	1-2
J20	SRAM Battery Backup Source Select Header (configured to use VMEbus +5V Standby power as a backup power source)	1-3, 2-4
J21	PROM Size Select Header (configured for 4Mbit PROM)	2-3
J22	General Purpose Readable Register Header	1-2, 3-4, 5-6, 9-10, 11-12, 13-14, 15-16



MVME162LX Switch, Header, Connector, Fuse, and LED Locations

MVME165 Processor

MVME165 Microcomputer

The MVME165 microcomputer is a VME/VSB-based CPU engine, that uses the Motorola MC68040 microprocessor. The MC68040 features 8KB of internal cache, a floating point unit, and a memory management unit.

The MVME165 includes the MC68681 DUART for serial I/O and software timing, the Local Resource Controller (LRC) for local CSR, counter/timers, and local interrupt source; a full VMEbus 32-bit master/slave interface, a VMEbus interrupt handler, interrupter, system controller and a global register set (MVME6000); a full VSB bus master/slave interface (MVSB2400); two 32-pin JEDEC standard sockets for EPROM, one 28-pin JEDEC socket for Time-of-Day Clock/Non-Volatile RAM (TOD/NVRAM), and a 4/16MB DRAM.

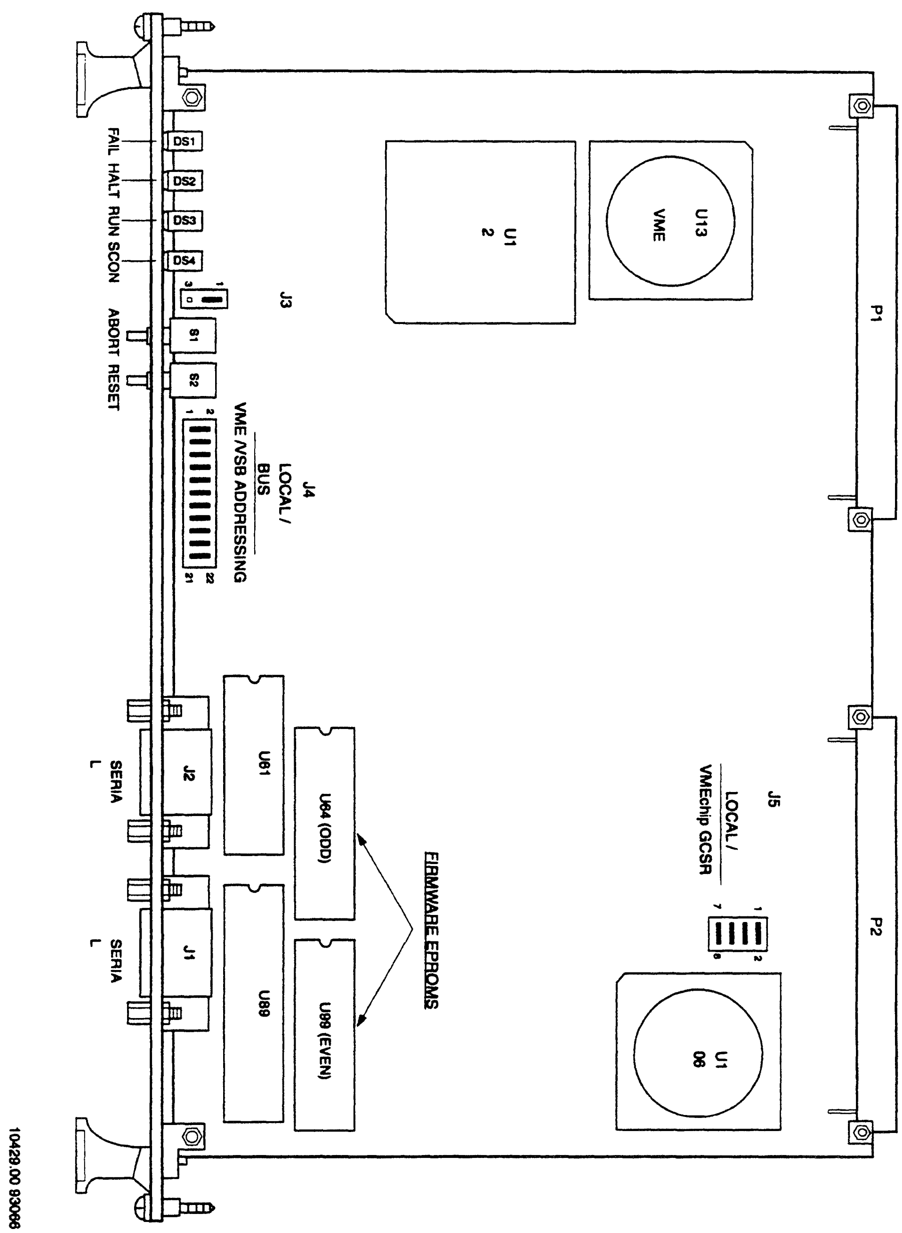
The optional MVME714 transition module with two DB-25 connectors is available to connect two RS-232C devices to the MVME165. A 2400 baud modem is also available with the MVME714M, which provides one console port and one port for terminal/printer/modem.

Front Panel

The MVME165 has one red, one yellow, and two green LED indicators (**FAIL**, **HALT**, **RUN**, and **SCON**, respectively) located on the top of the front panel. Located below the LED indicators are the two push-button switches S1 and S2 (**ABORT** and **RESET**, respectively). Below the push-button switches is a cutout for accessing the 22-pin jumper header J4. This is followed by the DB-9 connectors for Serial Ports 1 and 2.

MVME165 Jumper Settings

Header	Description	Setting
J1	Serial Port 1 Connect	Front panel terminal connector
J2	Serial Port 2 Connect	Front panel host connector
J3	LCR Timer Input	1-2
J4	Local/Bus Mapping	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18, 19-20, 21-22
J5	Local/Bus Mapping	1-2, 3-4, 5-6, 7-8



MVME165 Jumper and Switch Locations

MVME166 Processor

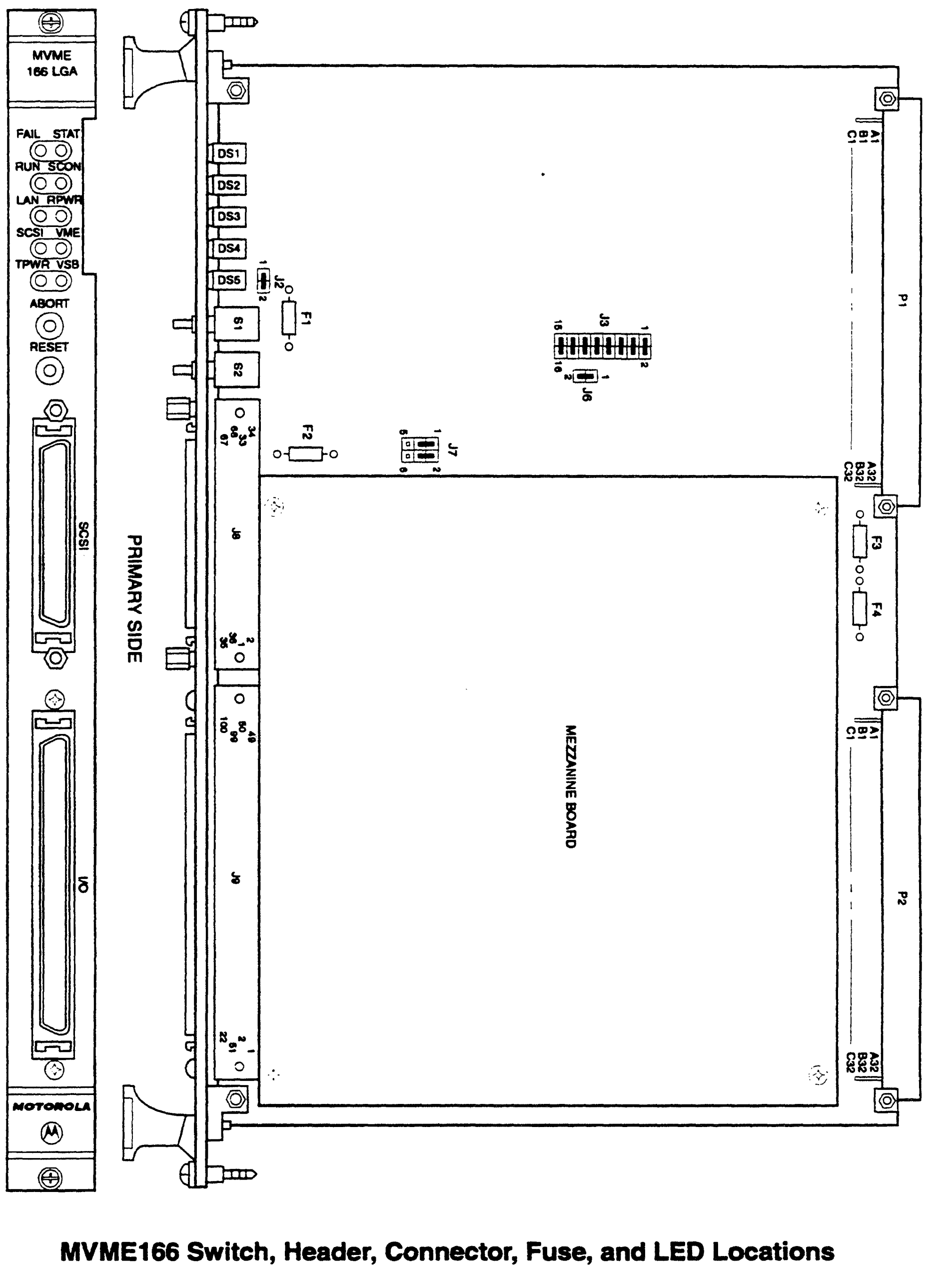
MVME166 VMEmodule

The MVME166 is based on the MC68040 microprocessor. The MVME166 has 4/8/16/32/64/128/256 MB of ECC-protected DRAM, 1 MB of Flash memory with download EPROM, 128KB of static RAM (with battery backup), 8KB of static RAM and time of day clock (with battery backup), Ethernet transceiver interface, four serial ports with TTL interface, four tick timers, watchdog timer, SCSI bus interface with DMA, Centronics printer port, A16/A24/A32/D8/D16/D32/D64 VMEbus master/slave interface, VMEbus system controller, and a VSB interface.

The I/O connection for the MVME166 is provided by two high density shielded front panel I/O connectors. The SCSI bus is connected through a 68 pin connector. The printer, four serial ports and Ethernet interface are connected through a 100 pin connector. The MVME712-10 transition module and the MVME712-06/07/09 I/O distribution board set were designed to support the MVME166 boards. These transition boards provide configuration headers, serial port drivers and industry standard connectors for the I/O devices.

MVME166 Jumper Settings

Header	Description	Setting
J2	SCSI Bus Terminated	1-2
J3	General Purpose Readable Jumpers	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16
J6	System Controller	1-2
J7	SRAM Backup Power Source Select	1-3, 2-4



MVME166 Switch, Header, Connector, Fuse, and LED Locations

MVME177 Processor

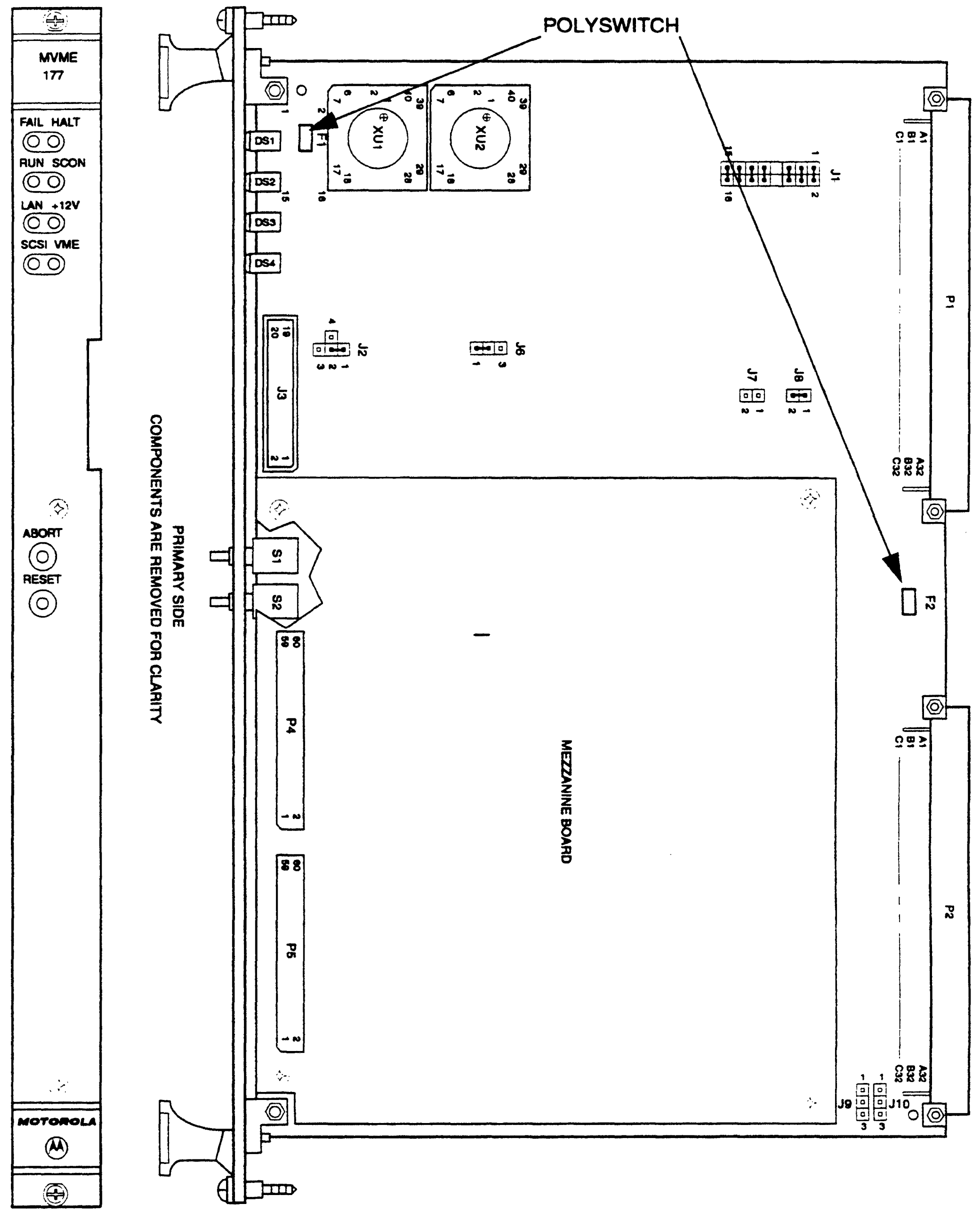
MVME177 VMEmodule

The MVME177 is a double-high VMEmodule based on the MC68060 microprocessor. The MVME177 has 4/8/16/32/64/128/256 MB of ECC-protected DRAM, 8KB of static RAM and time of day clock (with battery backup), Ethernet transceiver interface, Four serial ports with EIA-232-D interface, four tick timers, watchdog timer, 4 MB of Flash memory, two EPROM sockets, SCSI bus interface with DMA, one parallel port, A 16/A24/A32/D8/D16/D32/D64 VMEbus master/slave interface, 128KB of static RAM (with optional battery backup), and VMEbus system controller.

The I/O on the MVME177 is connected to the VMEbus P2 connector. The main board is connected through a P2 transition board and cables to the transition boards. The MVME712*x* transition boards provide configuration headers and industry standard connectors for the I/O devices.

MVME177 Jumper Settings

Header	Description	Setting
J1	General Purpose Software Readable Jumpers	1-2, 3-4, 5-6, 7-8. 9-10, 1-12, 13-14, 15-16
J2	SRAM Backup Power Source Select Header	2-1
J6	System Controller	1-2
J7	Thermal Sensing Pins	No jumpers
J8	EEPROM/Flash Configuration Jumper	1-2
J9 J10	Serial Port 4 Clock Configuration Select Headers	2-3



MVME177 Switch, Header, Connector, Polyswitch, and LED Locations

MVME187 Processor

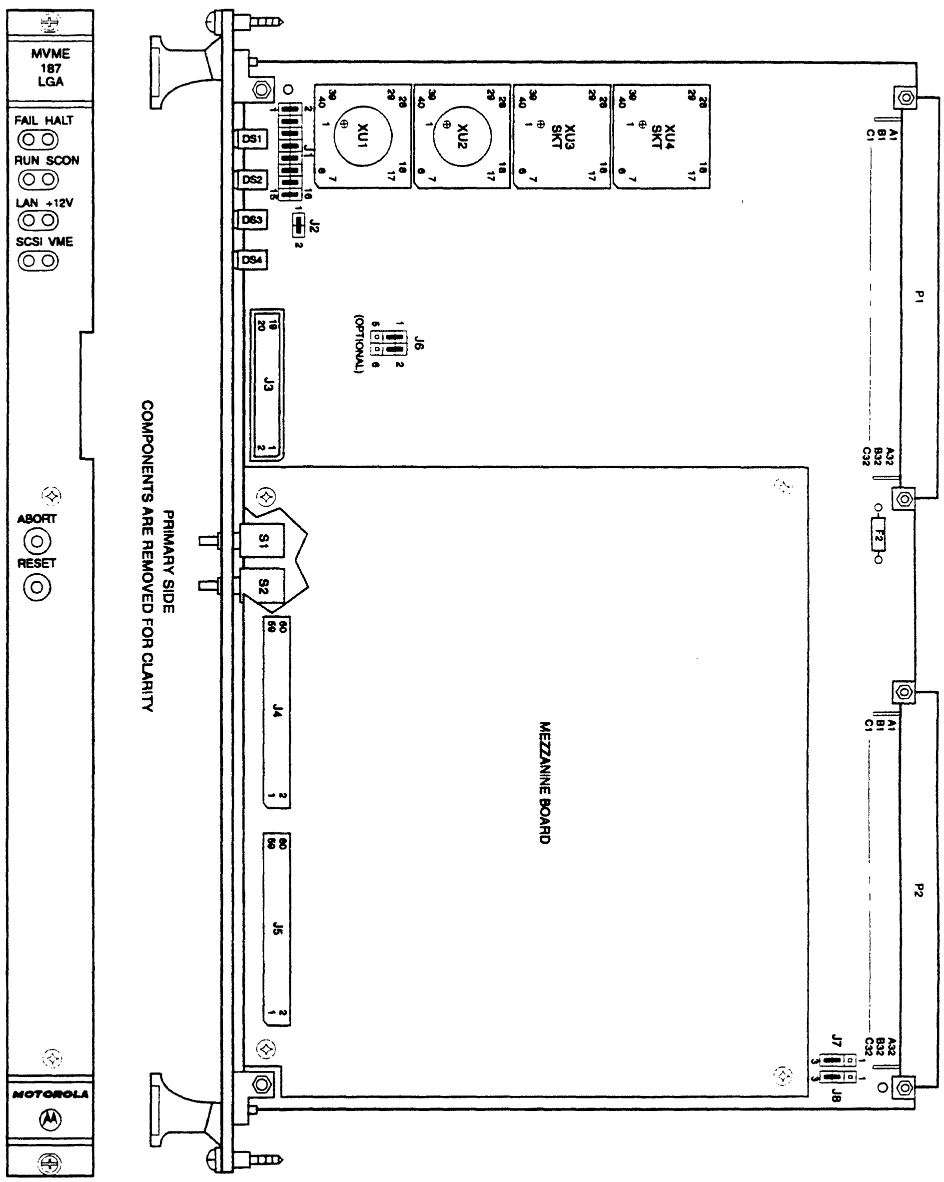
MVME187 VMEmodule

The MVME187 is based on the M88000 RISC microprocessor. The MVME187 has 4/8/16/32/64 MB of parity-protected DRAM or 4/8/16/32/64/128/256 MB of ECC-protected DRAM, 8KB of static RAM (with optional battery backup), time of day clock (with battery backup), Ethernet transceiver interface, four serial ports with EIA-232-D interface, four tick timers, watchdog timer, four ROM sockets, SCSI bus interface with DMA, Centronics printer port, A16/A24/A32/D8/D16/D32/D64 VMEbus master/slave interface, 128KB of static RAM, and VMEbus system controller.

The I/O on the MVME187 is connected to the VMEbus P2 connector. The main board is connected through a P2 transition board and cables to the transition boards. The MVME187 supports the transition boards MVME712-12, MVME712-13, MVME712M, MVME712A, MVME712AM, and MVME712B (referred to in this manual as MVME712X, unless separately specified). The MVME712X transition boards provide configuration headers and provide industry standard connectors for the I/O devices.

MVME187 Jumper Settings

Header	Description	Setting
J1	General Purpose Software Readable Jumpers	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16
J2	System Controller	1-2
J6	SRAM Backup Power Source Select	1-3, 2-4
J7	Serial Port 4 Clock Configuration Select	2-3
J8	Serial Port 4 Clock Configuration Select	2-3



MVME187 Switch, Header, Connector, Fuse, and LED Locations

MVME188A Processor

MVME188A Microcomputer Module

The MVME188A is an intelligent three-or-more-board set microcomputer module containing one or more MC88100 RISC microprocessor(s) and up to eight MC88200 or MC88204 RISC cache/memory management units (CMMUs). The boards are mechanically and electrically tightly connected to form a single unit, and the RISC chips are on a mezzanine module called the HYPERmodule.

The MVME188A board set consists of a system controller board (utility I/O RISC module), one, two, three, or four memory boards, and a main logic board (CPU processor) with a HYPERmodule (CPU cluster mezzanine module), all electrically and mechanically connected and with three or more single-wide front panels.

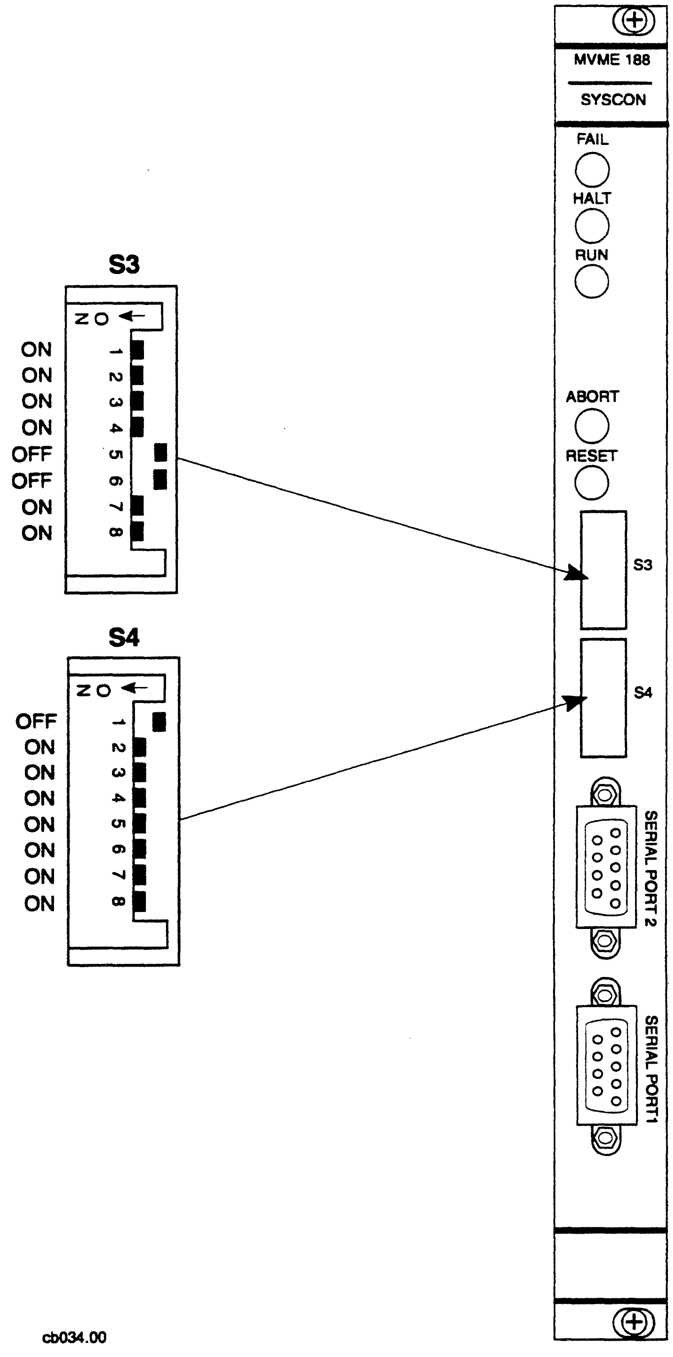
The system controller board contains a VMEbus A16 slave interface, ROM, static RAM, UARTs, and timing elements plus local and global control/ status registers.

On the memory board, the DRAM memory complement communicates with the CMMU devices on the HYPERmodule mezzanine over the high speed local bus or slave bus (S bus), a modified form of the M bus, the CMMU memory bus. (Because the S bus is a modified form of the M bus, descriptions of registers and other circuits sometimes describe it as the M bus.) Memory capacity can be increased by adding one to three MVME288 series memory boards.

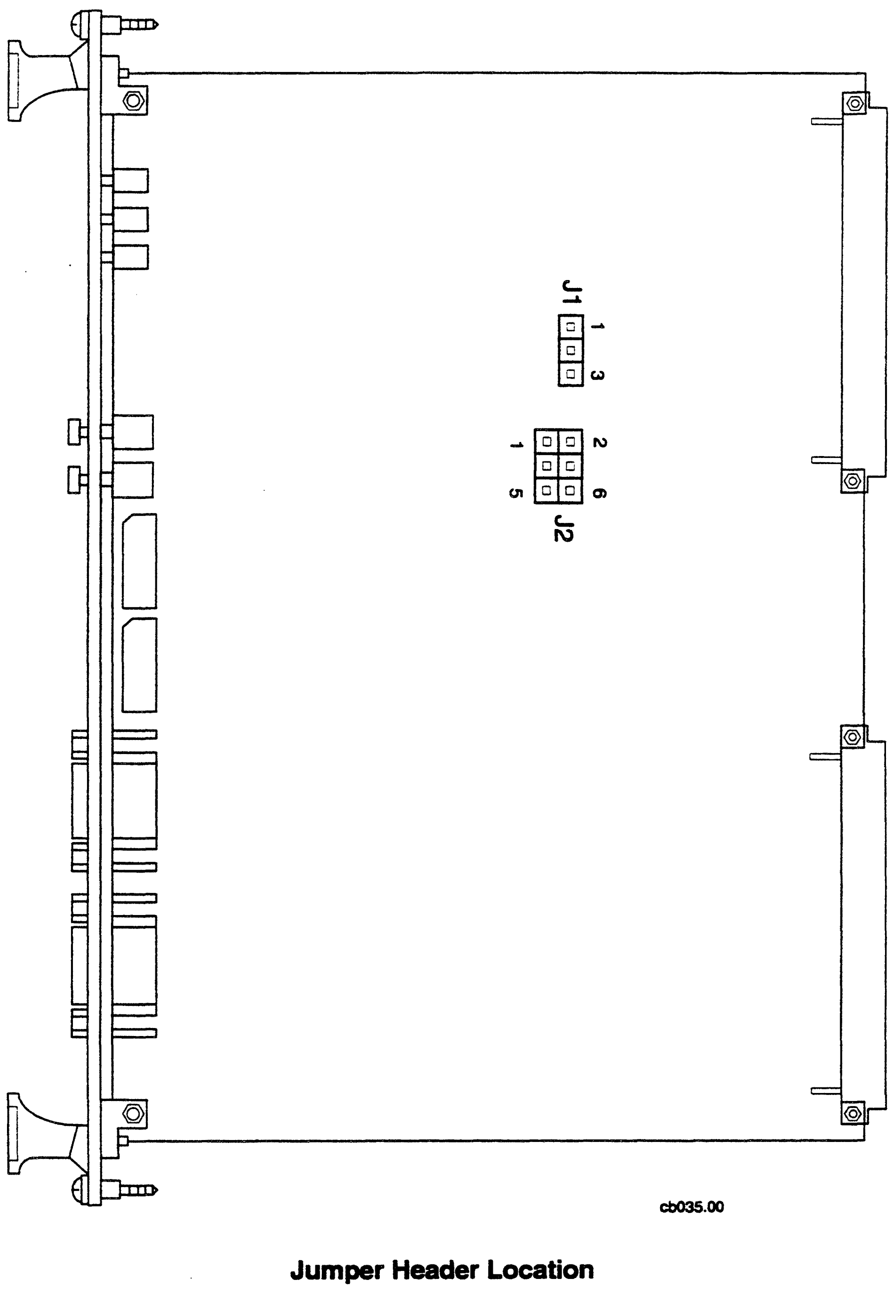
Up to four clusters of MC88100 RISC Microprocessors closely coupled with MC88200 or MC88204 Cache/Memory Management Units are contained on a HYPERmodule mezzanine module plugged into the main logic board. The main logic board contains a full 32-bit VMEbus interface, as well as address decode logic and S bus (MVME188A local Slave bus) interface logic.

MVME188A Configuration Switch and Jumper Settings

Header	Description	Setting
S3-1	Controller Enable Function	On
S3-2 to S3-4	ENV0*-ENV2* Functions	On
S3-5 to S4-4	GCSR Group Address Functions	S3-5, S3-6, and S4-1 are Off S3-7, S3-8, S4-2, S4-3, S4-4 are On
S4-5 to S4-8	GCSR Board Address Functions	On
J1	CIO External Timer Select	No Jumper
J2	CIO External Timer Select	No Jumper

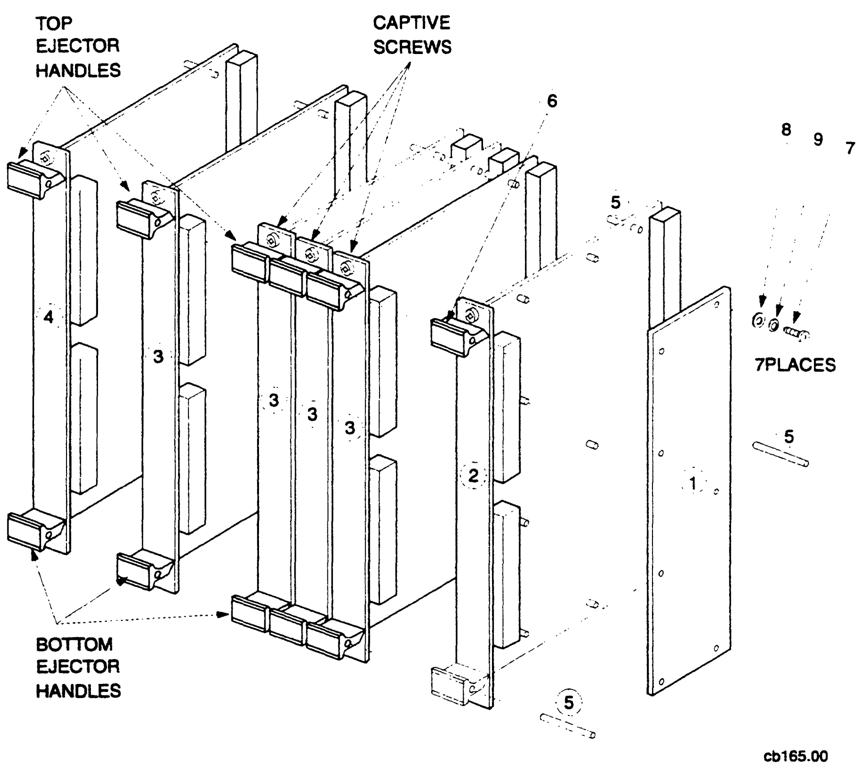


Front Panel Switch Settings



Jumper Header Location

The factory setting for J1 and J2 has a zero-ohm shunt R37 installed that connects J2 pins 4 and 6. This connects timer 2 output to timer 3 input for diagnostic purposes.



1	HYPERMODULE
2	CPU BOARD
3	MEMORY BOARDS
4	SYSCON BOARD
5	STEEL PINS
6	CPU NAME PLATE
7	SCREWS
8	FLAT WASHERS
9	LOCK WASHERS

MEMORY SWITCH CONFIGURATION TABLE			
1st MEMORY BRD	2nd MEMORY BRD	3rd MEMORY BRD	4th MEMORY BRD
S1	S1	S1	S1
S2	S2	S2	S2
SLOT 2	SLOT 3	SLOT4	SLOT 5

QUANTITY OF MEMORY BOARDS (ITEM 3) CAN RANGE FROM 1 TO 4 (1 TO 2 ON 6 SLOT CHASSIS) AND IS DETERMINED BY CONFIGURATION

LENGTH OF PIN (ITEM 5) IS DETERMINED BY QUANTITY OF MEMORY BOARD ASSEMBLIES (ITEM 3)

CONFIGURE MEMORY BOARD ASSEMBLIES (ITEM 3) PER SWITCH CONFIGURATION TABLE

188A MEMORY BOARDS ONLY HAVE S1 SWITCHES

MVME188 Board Set Assembly & Memory Switch Configuration

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MVME197DP/SP Processor

CPU

MVME197DP/SP Single Board Computer

The MVME197DP/SP module is a double-high VMEmodule based on the MC88110 RISC microprocessor. The MVME197DP/SP has

- 128/256MB of onboard DRAM with programmable ECC (Error Checking and Correction)
- 256KB of external cache memory for each MC88110/MC88410 microprocessor/cache controller combination (note that the MVME197SP version has only one MC88110/ MC88410 device combination)
- 1MB of flash memory, 8KB of static RAM (with battery backup), a time of day clock (with battery backup)
- an Ethernet transceiver interface, four serial ports with EIA-232-D interface, six tick timers, a watchdog timer, 128/256KB of BOOT ROM, a SCSI bus interface with DMA (Direct Memory Access), a Centronics printer port, an A16/A24/A32/D8/ D16/D32 VMEbus master/slave interface, and a VMEbus system controller.

Input/Output (I/O) signals are routed through the MVME197's backplane connector P2. A P2 Adapter Board or LCP2 Adapter board routes the signals and grounds from connector P2 to an MVME712 series transition module. The MVME197 supports the MVME712M, MVME712A, MVME712AM, and MVME712B transition boards (referred to here as the MVME712X, unless separately specified). The MVME197 also supports the MVME712-12 and MVME712-13 (referred to as the MVME712-XX, unless separately specified). These transition boards provide configuration headers, serial port drivers, and industry standard connectors for the I/O devices.

Front Panel Switches, Indicators, and Connectors

There are two push-button switches and six LEDs on the front panel of the MVME197SP/DP. The switches are RESET and ABORT.

Switch S3

The RESET switch (S3) resets all onboard devices and drive the SYSRESET* signal if the board **is** the system controller. The RESET switch (S3) will reset all onboard devices except the DCAM and ECDM if the board **is not** the system controller. The VMEchip2 generates the SYSREST* signal. The BusSwitch combines the VMEchip2 local reset, the power up reset, and the reset switch to generate a local board reset.

Switch S2

The ABORT switch (S2) can generate an interrupt to CPU0 via the NMI* signal. It is normally used to abort program execution and return to the debugger. This capability is controlled via the ABORT register in the BusSwitch.

Front Panel Indicators

The six LEDs on the MVME197SP/DP front panel are: FAIL, SCON, RUN, LAN, VME, and SCSI.

The yellow FAIL LED (DS1) is lit when the BRDFAIL signal line is active.

The green SCON LED (DS2) is lit when the VMEchip2 is the VMEbus system controller.

The green RUN LED (DS3) is lit when the MC88110 bus MC* pin is low.

The green LAN LED (DS4) lights when the LAN chip is the local peripheral bus master.

The green VME LED (DS5) lights when the board is using the VMEbus or when the board is accessed by the VMEbus.

The green SCSI LED (DS6) lights when the SCSI chip is the local peripheral bus master.

Connectors

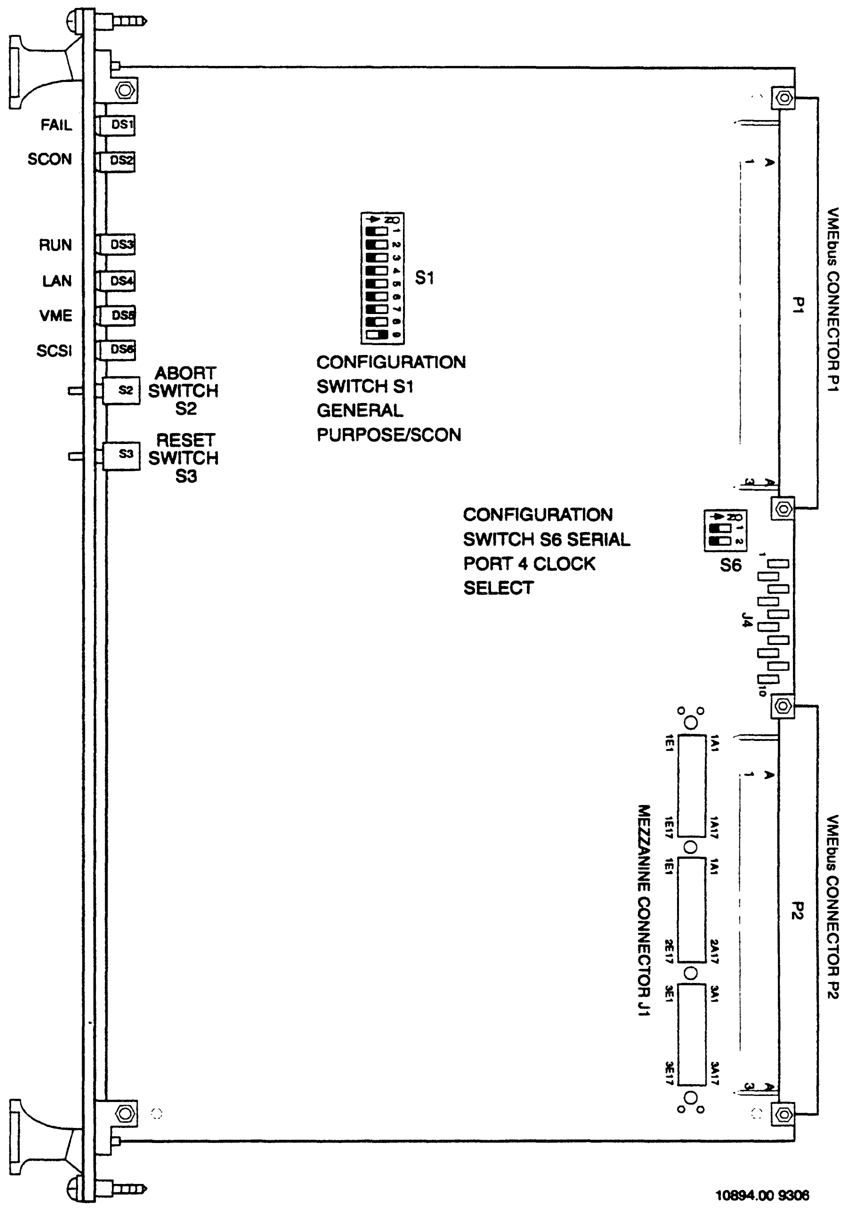
The P1 connector is a 96-pin connector which provides the interface to the VMEbus signals.The P2 connector is a 96-pin connector which provides the interface to the extended VMEbus signals and other I/O signals.

The J1 connector is a 249-pin connector which provides the interface to the MC88110 address, data, and control signals to and from the mezzanine memory expansion.

The J4 connector pins are not used; all ten pin sockets are soldered over.

MVME197DP/SP Configuration Switch Settings

Header	Description	Setting
S1-1 to S1-8	General Purpose Functions	Off
S1-9	System Controller Enable Function	On
S6-1	Serial Port 4 Clock Configuration Select Receives TRXC4	Off
S6-2	Serial Port 4 Clock Configuration Select Receives RTXC4	Off



MVME197DP / SP Switch, Header, Connector, Fuse and LED Locations

CPU

MVME197LE Processor

MVME197LE Single Board Computer

The MVME197LE module is a double-high VMEmodule based on the MC88110 RISC microprocessor. The MVME197LE has

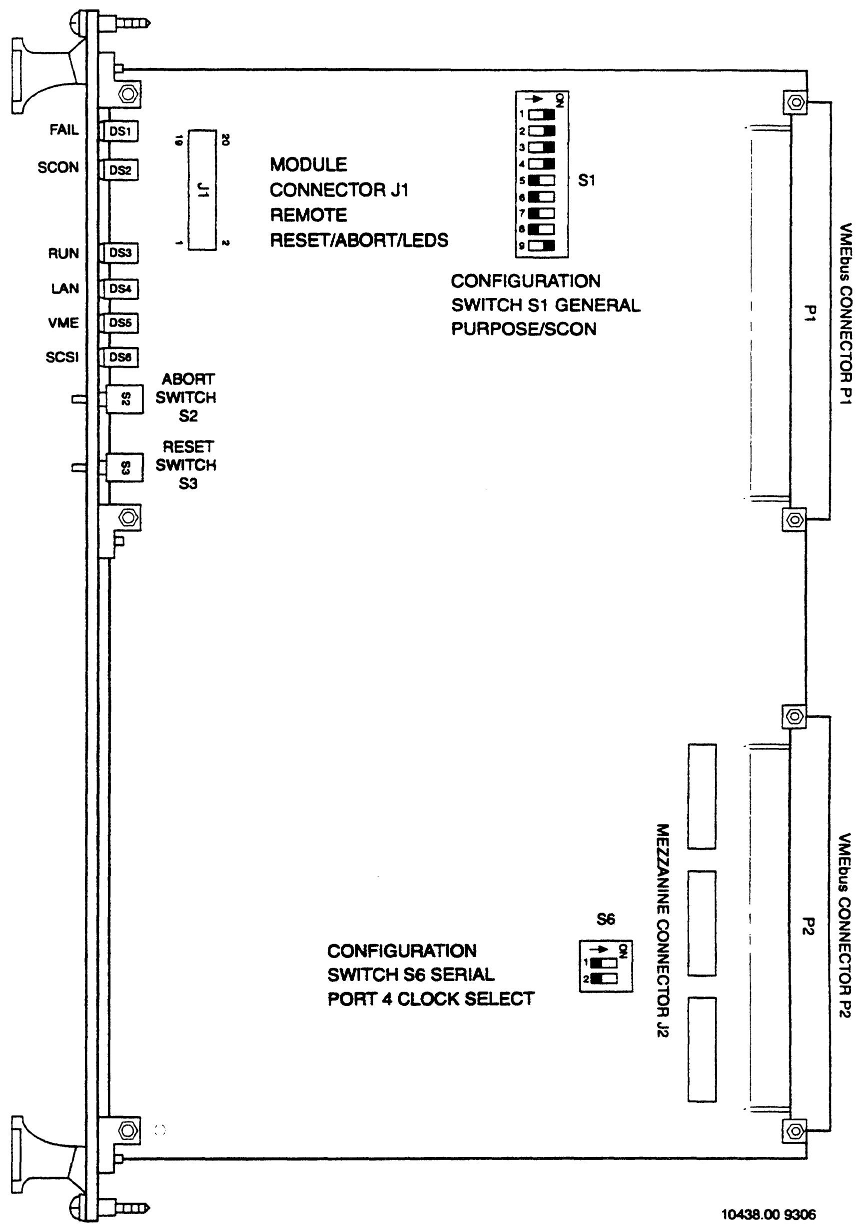
- 2/64MB of DRAM, 1MB of flash memory, 8Kb of static RAM (with battery backup)
- a time of day clock (with battery backup)
- an Ethernet transceiver interface, four serial ports with RS-232D interface, a SCSI bus interface with DMA, a Centronics printer port, and a VMEbus system controller.

The MVME197LE supports the transition boards MVME712M, MVME712A, MVME712AM, and MVME712B.

The I/O on the MVME197LE is connected to the VMEbus P2 connector. The MVME197LE board has I/O signals that exits from the 96-pin P2 connector rather than from the front panel.

MVME197LE Configuration Switch Settings

Header	Description	Setting
S1-1 to S1-4	General Purpose Functions	On
S1-5 to S1-8	General Purpose Functions	Off
S1-9	System Controller Enable Function	On
S6-1	Serial Port 4 Clock Configuration Select Receives RTXC4	Off
S6-2	Serial Port 4 Clock Configuration Select Receives TRXC4	Off



MVME197LE Switch, Header, Connector, Fuse, and LED Locations

Front Panel Switches and Indicators

Switch S1

The system controller function is enabled/disabled by configuring switch S1-9. When the MVME197LE is system controller, the SCON LED is turned on.

Switch S6

Switch S4 can be configured to use clock signals provided by the RTXC4 and TRXC4 signal lines. Switch S6 on the MVME197LE configures serial port 4 to receive RTXC4 and TRXC4.

The MVME197LE has ABORT and RESET switches, and six indicators on its front panel.

ABORT Switch S2

When enabled by software, the front panel ABORT switch generates an NMI type interrupt. It is normally used to abort program execution and return to the 197Bug debugger.

RESET Switch S3

The RESET switch resets all onboard devices and drives SYSRESET*.

Front Panel Indicators

The yellow FAIL LED (DS1) is lit when the BRDFAIL signal is active.

The green SCON LED (DS2) is lit when the BRDFAIL signal line is active.

The green RUN LED (DS3) is lit when the MC88110 bus MC* pin is low.

The green LAN LED (DS4) lights when the LAN chip is local bus master.

The green VME LED (DS5) lights when the board is using the VMEbus or when the board is accessed by the VMEbus.

The green SCSI LED (DS6) lights when the SCSI chip is local bus master.

The MVME197LE supplies +12V power to Ethernet transceiver interface through a fuse.

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MVME1603 / MVME1604 Processors

MVME1603 / MVME1604 Single Board Computers

The MVME1603/1604 is a double-high VMEmodule equipped with a PowerPC™ Series microprocessor. The MVME1603 is equipped with a PowerPC 603 microprocessor; the MVME604 has a PowerPC 604 microprocessor. The MVME1603/1604 family has two parallel branches based on two distinct versions (MVME1600-001 and MVME1600-011) of the base board. The differences between the MVME1600-001 and the MVME1600-011 lie mainly in the area of I/O handling; the logic design is the same for both versions.

In either case, the complete MVME1603/1604 consists of the base board plus:

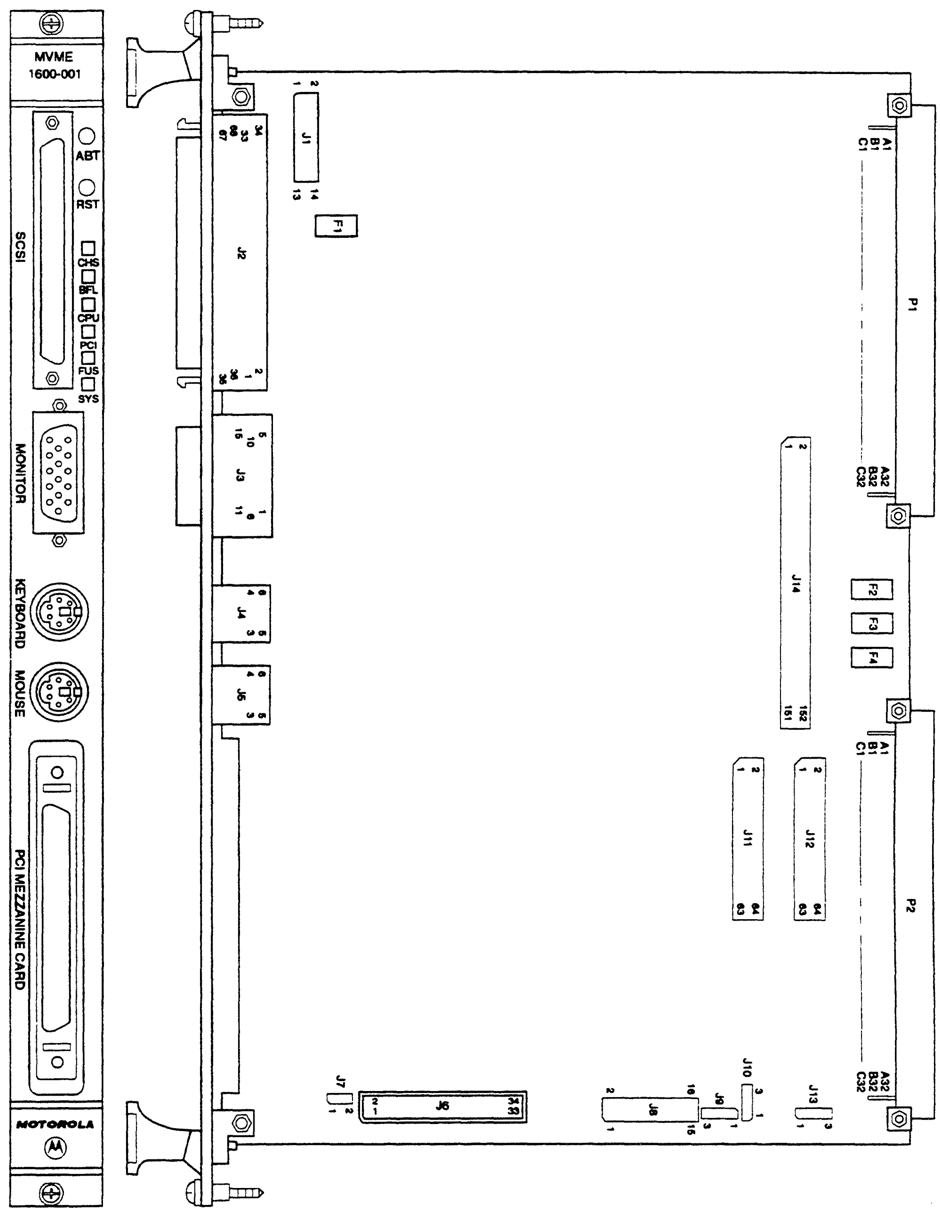
- A processor/memory module (PM603 or PM604)
- An LED mezzanine (MEZLED) to supply status indicators and Reset/Abort switches
- A DRAM module (RAM104) for additional memory
- An optional PCI mezzanine card (PMC) for additional versatility

MVME1600-001 Base Board

The MVME1600-001 base board furnishes +12Vdc, -12Vdc, and +5Vdc power to the MVME760 transition module through polyswitches (resettable fuses) F4, F2, and F3. The MVME760 uses these voltage sources to power the serial port drivers and any LAN transceivers connected to the transition module. The FUS LED (DS5) on the MVME1600-001 front panel illuminates when all three voltages are available.

MVME1600-001 Jumper Settings

Header	Description	Setting
J7	SCSI bus terminator	1-2
J8	General Purpose Software-Readable Register	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16
J9	VMEbus System Controller	1-2
J10	Serial Port 3 Clock Configuration Select	1-2
J13	Serial Port 4 Clock Configuration Select	1-2



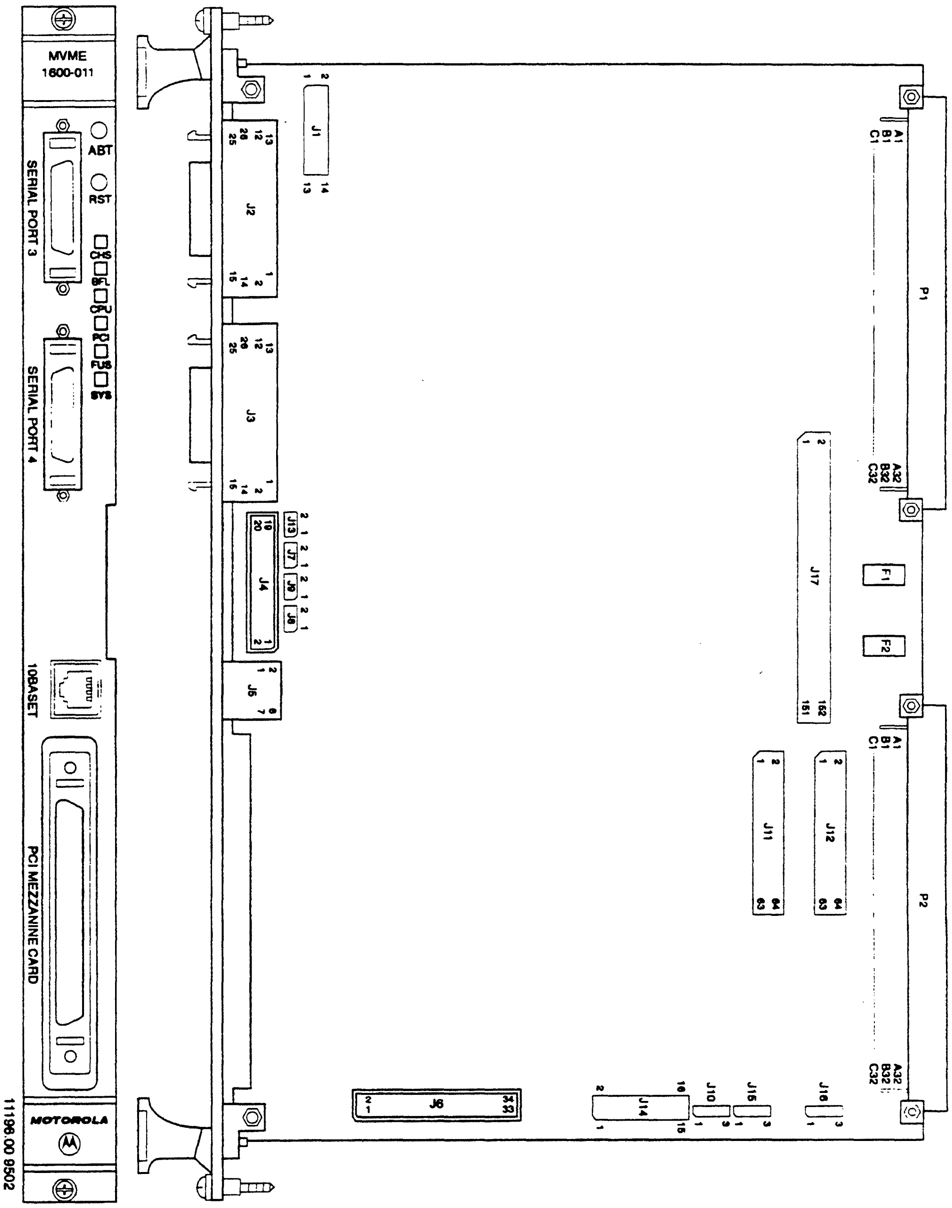
MVME1600-001 Switch, Header, Connector, Fuse, and LED Locations

MVME1600-011 Base Board

The MVME1600-011 base board provides +5Vdc power to the remote LED/switch connector (J4) through a 1A fuse (F1) located between P1 and P2. J4 provides a separate connection point for a remote control and indicator panel, making it unnecessary to share the LED mezzanine connector for that purpose. If none of the LEDs light and the ABORT and RESET switches do not operate, check fuse F1.

MVME1600-011 Jumper Settings

Header	Description	Setting
J7	Serial Port 4 DCE Selection (default)	No jumper
J8	Serial Port 4 Clock Selection	No jumpers
J15	Serial Port 4 Clock Selection	2-3
J16	Serial Port 4 Clock Selection	2-3
J9	Serial Port 4 I/O Path Selection	No jumpers
J10	VMEbus System Controller Selection	1-2
J13	Serial Port 3 I/O Path Selection	No jumpers
J14	General Purpose Software-Readable Register	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16



MVME1600-011 Switch, Header, Connector, Fuse, and LED Locations

Ultra 60*x* Processor

Ultra 603 and 604 Processors

The Ultra 603 (MPC 603™ microprocessor-based) and the Ultra 604 (MPC 604™ microprocessor-based) are PowerPC™ based low profile form-factor motherboards.

The board is an all-in-one motherboard implemented in a low profile form-factor, which is a nine inch by thirteen inch single-plane printed circuit board. The system board allows for either a MPC603 or MPC604 RISC processor for the MPU and a MPC105 PowerPC-to-PCI bridge as the memory controller between the processor bus (MPU) and the Peripheral Component Interconnect (PCI) bus. An Intel i87378ZB PCI-to-ISA bridge component (referred to as the PIB) allows Industry Standard Architecture (ISA) bus-compatible peripherals to be accessed by the MPC60X processor. The system board also provides for the addition of a riser card which supports PCI bus and/or ISA bus cards.

Control Switches

The system board has two push-button switches (RESET and DSK, ENET, and BEAT) all located on the left top of the motherboard, just above the SIMM memory modules.

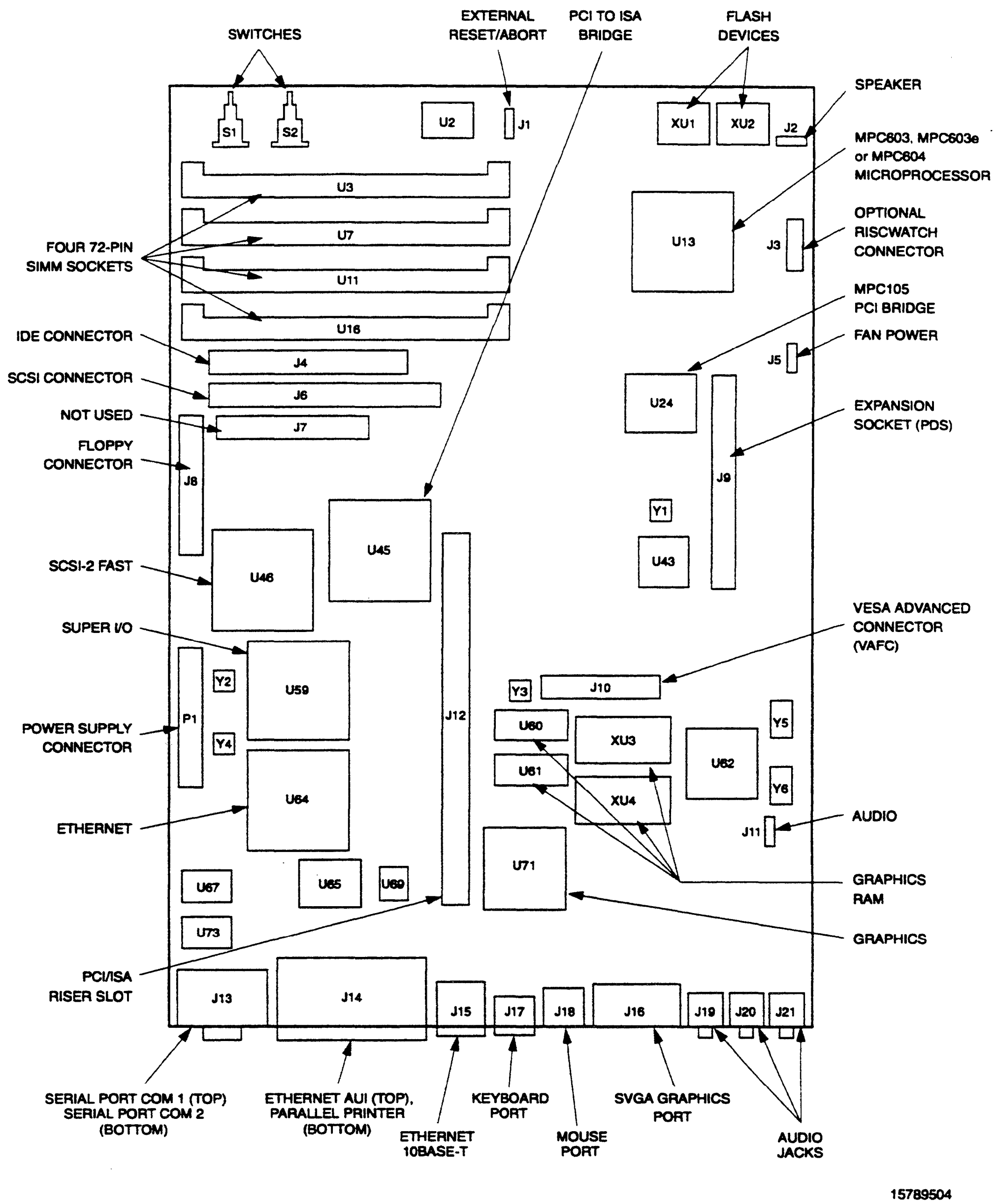
RESET Switch (S1)

The RESET push-button switch will reset all devices on the system board when asserted.

ABORT Switch (S2)

When asserted, the ABORT push-button switch will generate an interrupt request (IRQ8) to the Super I/O device. This can then be handled by software, usually to abort program execution.

The ABORT push-button switch is normally not installed on the system board.



Ultra Components Location Diagram

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Memory Boards

Overview

This section contains information on the MVME200 series of boards that provide memory for the system. These memory modules can be mezzanine boards added to the MVME167/MVME187/MVME197/MVME16x single-board computers or boards added to the MVME188A board set.

Some VMEbus memory modules are not compatible with certain CPU boards. For example, no VMEbus memory of any kind is supported with the MVME188A. You must add additional memory in the form of MVME288 boards.

Generally, Motorola does not support any add-on VMEbus memory boards in any standard system. For this reason, exercise caution when adding VMEbus memory boards to a Delta Series system.

The following memory boards are currently supported in Motorola systems:

Module Number	Description
MVME257	First parity memory module (4, 8, 16, or 32MB)
MVME258	Extender parity memory module (4, 8, 16, or 32MB - occupies additional slot)
MVME259	First ECC memory module (4, 8, 16, or 32MB)
MVME260	Extender ECC memory module (4, 8, 16, or 32MB - occupies additional slot)
MVME288D *	Parity memory module (16 or 64MB)
MVME288E **	ECC memory module for MVME188A (32MB)
MVME297	Mezzanine memory expansion modules for the MVME197 (eight models based on the size of the on-board memory array)
PM603 and PM604	Processor/Memory module mezzanine modules for the MVME160x Single Board Computer (8, 16, 32 or 64MB DRAM)
RAM104	DRAM memory module for the PM603 or PM604 (8, 16, 32, or 64MB DRAM)

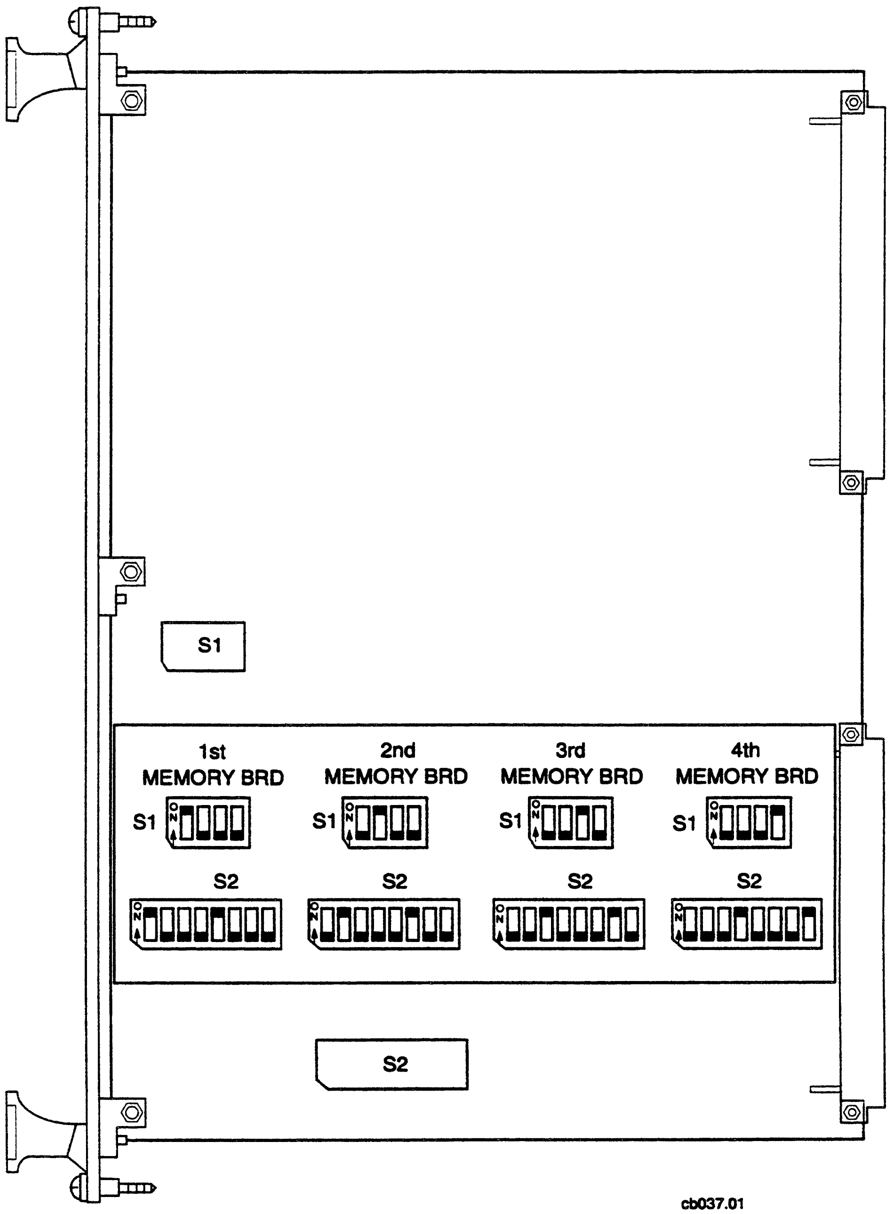
* Note that you can intermix MVME288-16 and MVME288-64 parity memory boards, as long as the total number of memory boards in the MVME188A board set does not exceed four.

** Note that you cannot intermix MVME288Eboards with parity memory boards.

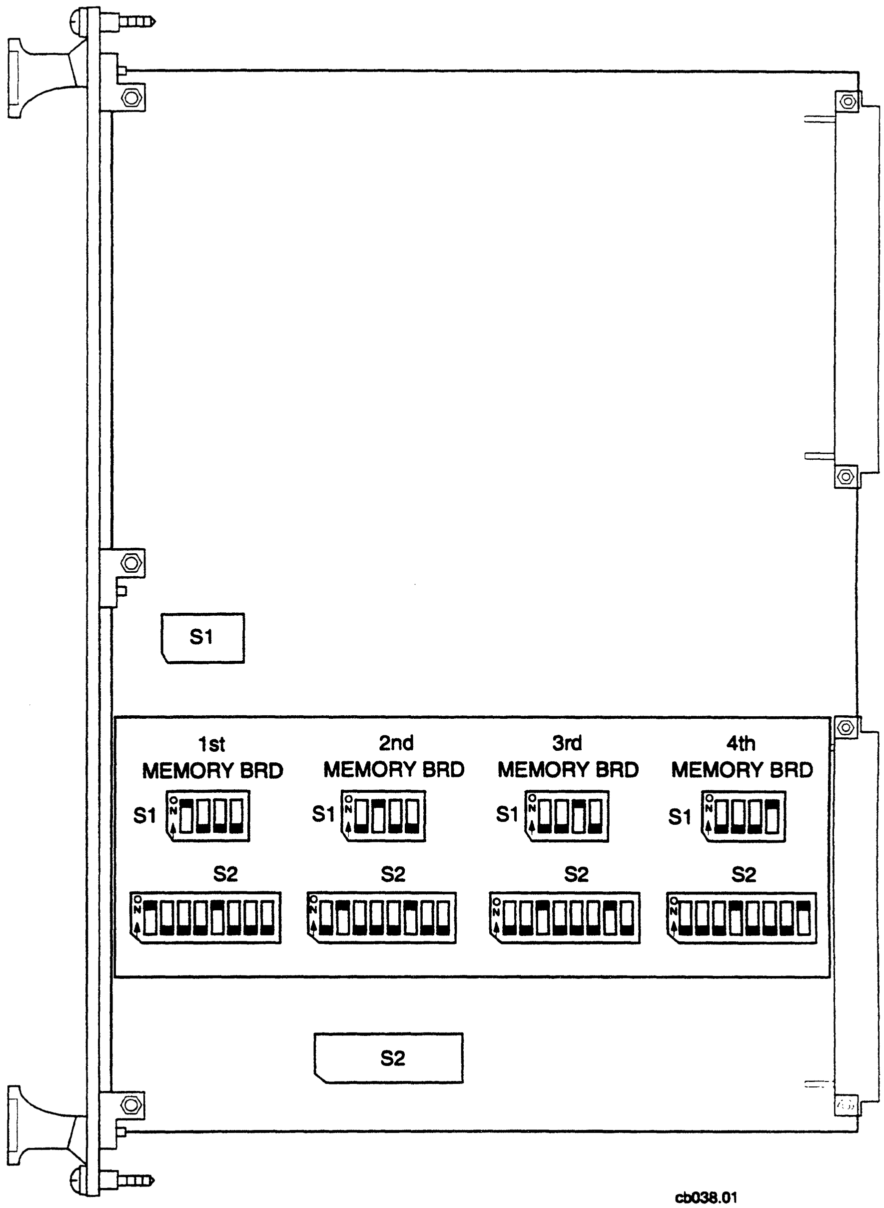
Only the MVME288D, MVME297, PM603/4 and RAM104 boards are illustrated in this section.

Memory

MVME288D Parity Memory Module

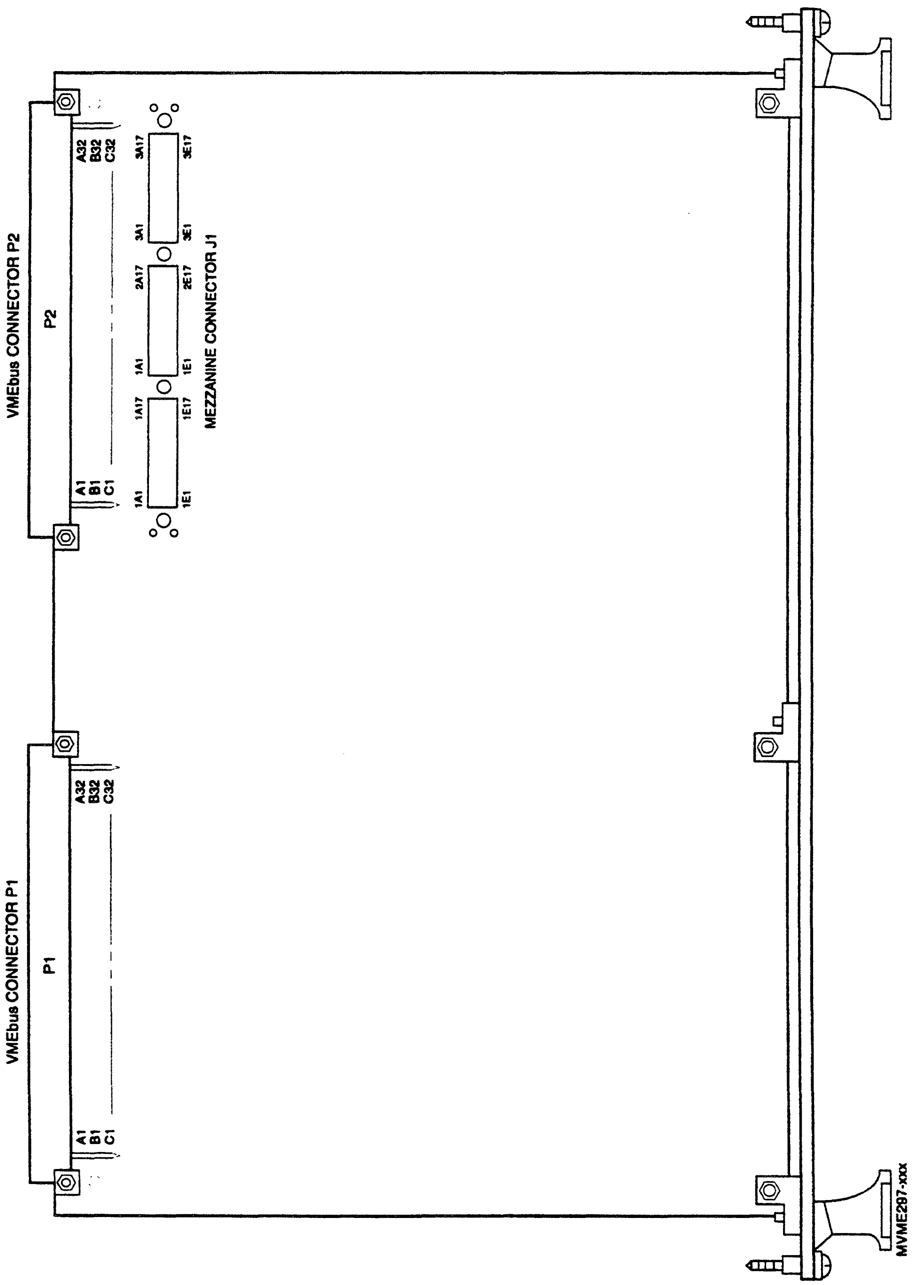


16MB Memory

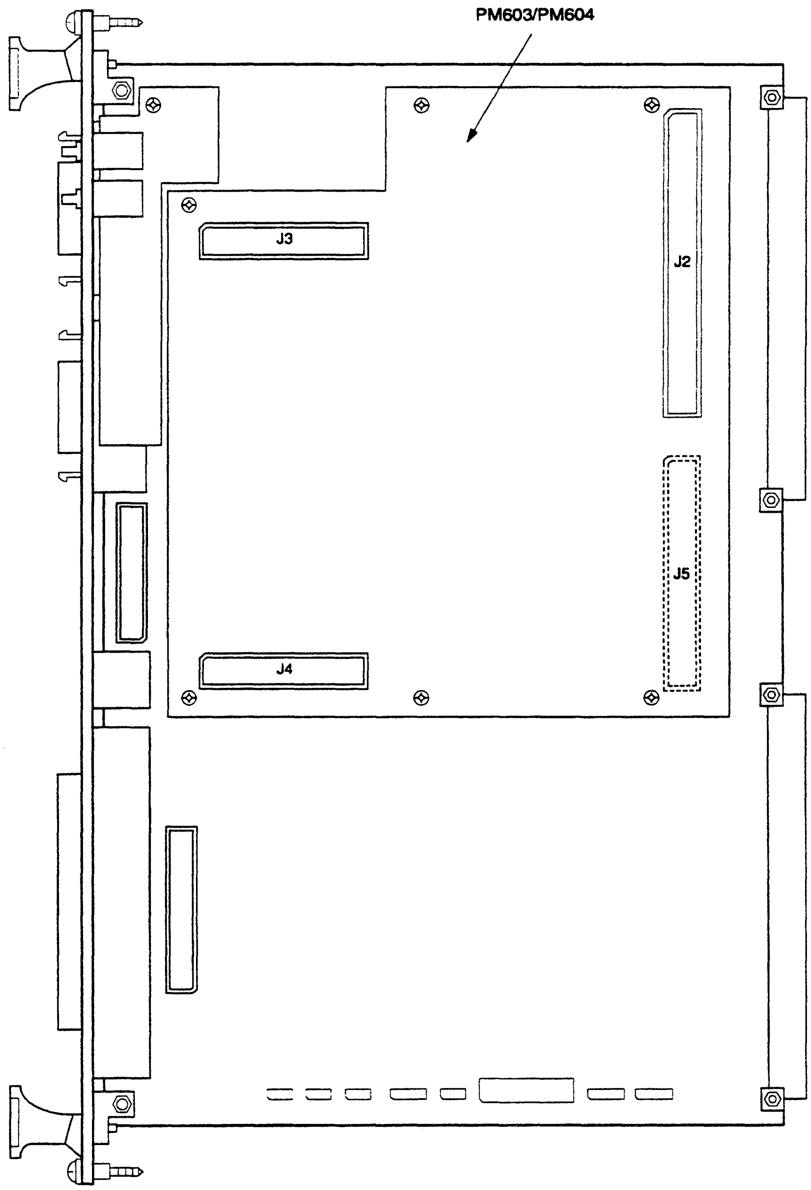

S1
1st
MEMORY BRD
S1
S2
2nd
MEMORY BRD
S1
S2
3rd
MEMORY BRD
S1
S2
4th
MEMORY BRD
S1
S2
S2
cb038.01

64MB Memory

MVME297 Mezzanine Memory Expansion Module

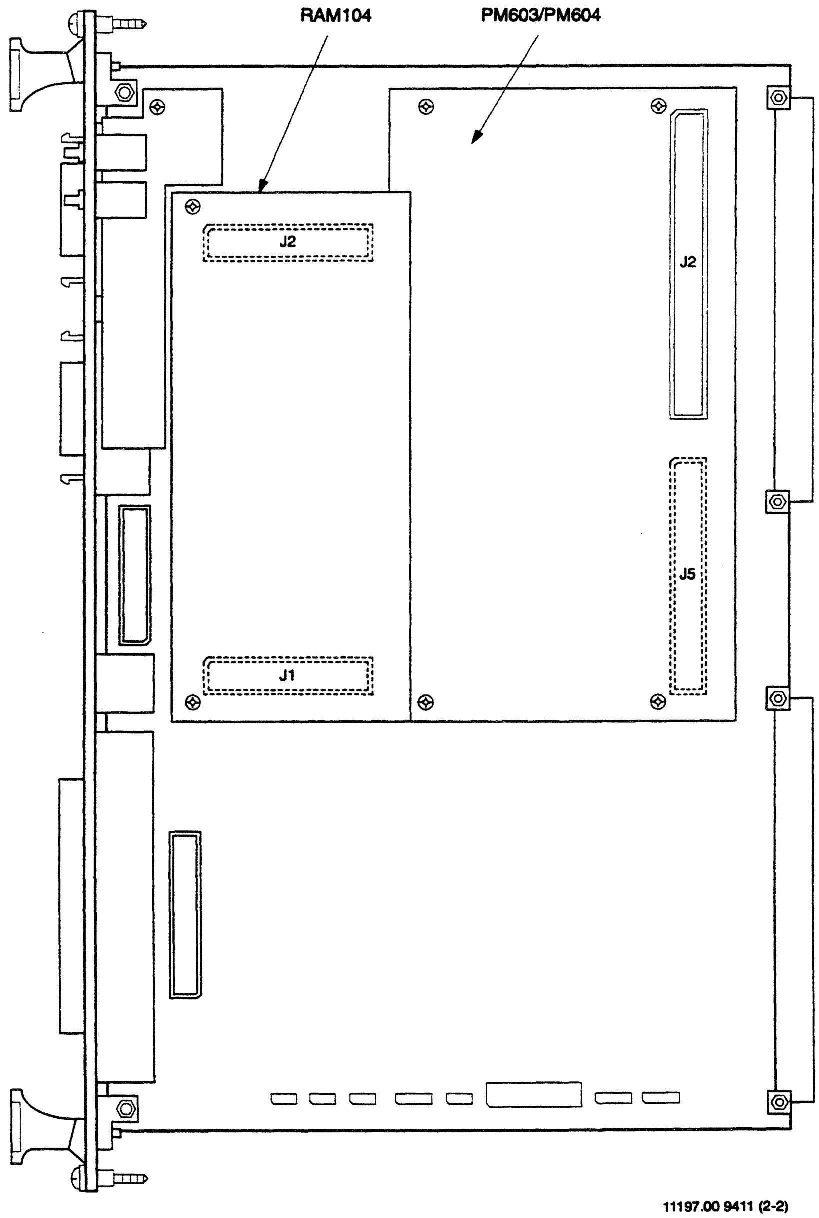


PM603 / 604 Processor/Memory Mezzanine Module



11197.00 9411 (1-2)

RAM104 DRAM Memory Module



I/O Controller Boards

Overview

This section contains information on the MVME300 series of boards that provide various input/output functions for the system.

Most MVME300 series boards are intelligent, meaning they have a microprocessor or a direct memory access (DMA) device on them. This feature allows for multiprocessing, or the distribution of intelligence, to several VME boards in a typical Delta Series configuration.

The following I/O Controllers are illustrated in this section:

Module Number	Description	VME Slots Used
MVME328S-1	High performance Single Channel SCSI Controller	1
MVME328S-2	High performance Dual Channel SCSI Controller	1
MVME328XT-1/-2	SCSI-II Controllers	1
MVME332XT/XTS	8-port Serial/Parallel Controllers	1
MVME333/S/P	Intelligent WAN Controllers	1
MVME333X25	X.25 Controller	1
MVME334A	Multiprotocol Communications Controller	1
MVME334AP	Multiprotocol Communications Controller	1
MVME335	Serial and Parallel I/O Module	1
MVME336	VME Hub Module (DeltaLINK Controller)	1
MVME337-1	I/O Engine	1
MVME338	Terminal I/O Subsystem Controller	1
MVME339	Etherplex Controller	1
MVME341	SS7 Controller	1
MVME374	Ethernet LAN Controller	1
MVME376	Ethernet LAN Controller	1

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MVME328S SCSI Controller

MVME328S High Performance SCSI Controller

The MVME328S is a VMEbus SCSI host adapter capable of controlling up to 14 SCSI devices. The host processor communicates with the MVME328S through 2KB of onboard RAM. All commands and responses pass through this 2K space, which is referred to as "short I/O," because it is mapped into the short I/O space of the VMEbus.

Each command to the MVME328S is specified using a host-generated software structure called an Input/Output Parameter Block (IOPB). IOPBs can be built in either the 2K short I/O space or offboard in system memory.

The system-level interface, referred to as "MACSI" (for Multiple Active Command Software Interface), is implemented in short I/O. In addition to supporting command queuing, MACSI enables multiple commands to be active simultaneously. As commands are completed, the host is notified of each command's completion, as well as its completion status.

Note

Ensure there is a terminator on both ends of the cable as specified by SCSI bus specification regardless of whether it is internally or externally configured. Internal configurations come off the P2 adapter board. External configurations always go through a transition board.

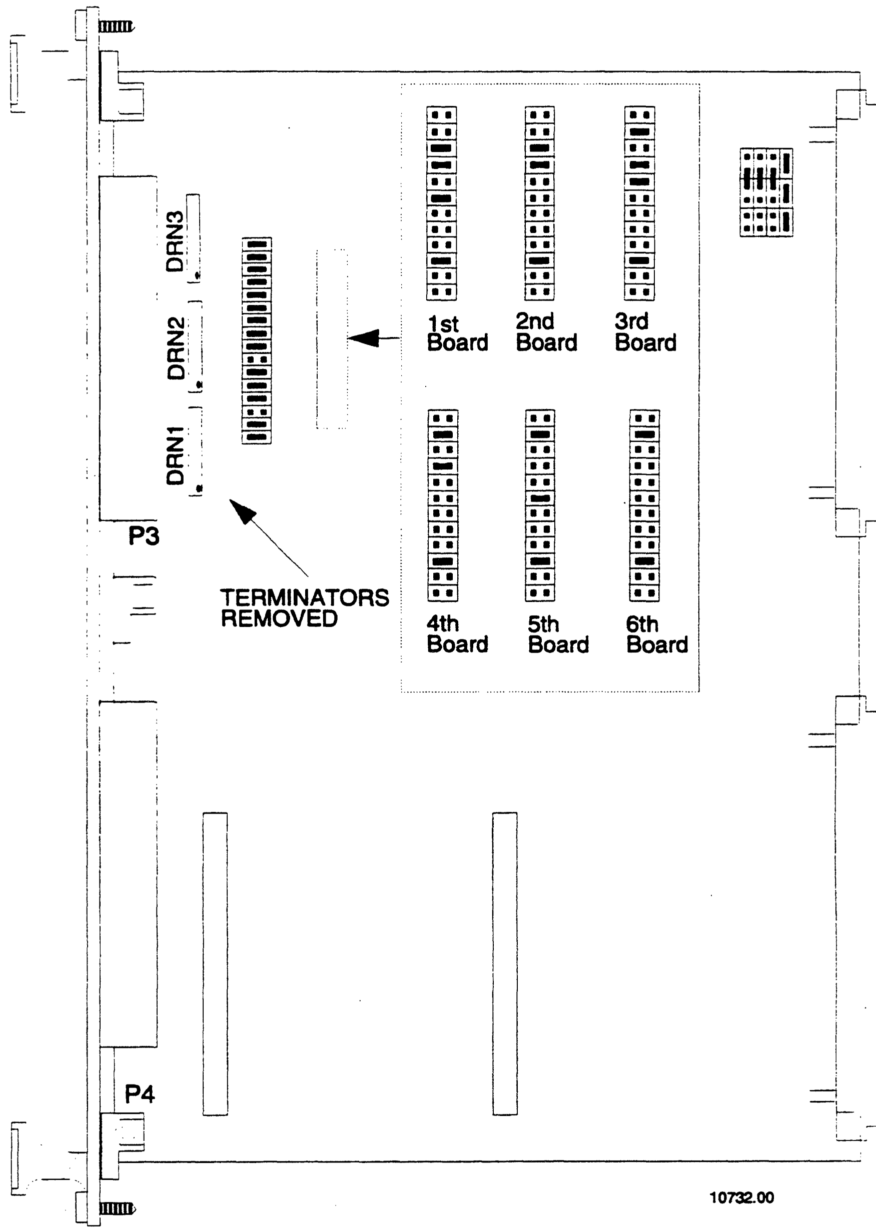
In the 6-slot chassis, the single-ended daughter board on an MVME328-2 can only be used for external devices, so it must be terminated.

RN1, RN2, and RN3 (motherboard) are installed only if port 0 is placed at one end of the SCSI cable.

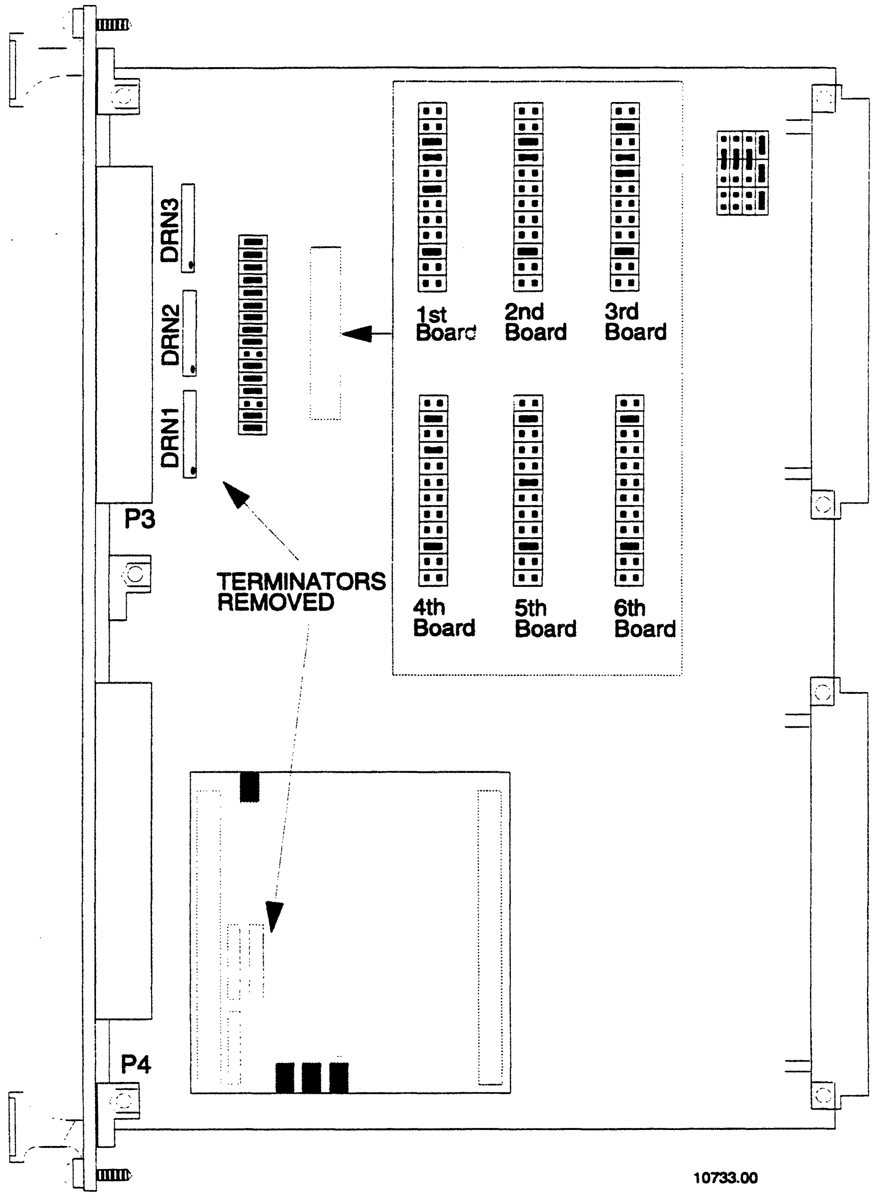
RN1, RN2, and RN3 (single-ended daughter board) are installed only if port 1 is at one end of the SCSI cable. Differential daughter board: RN3, RN4, and RN5 on the daughter board are installed only if port 1 is at one end of the SCSI cable.

MVME328S Jumper Settings

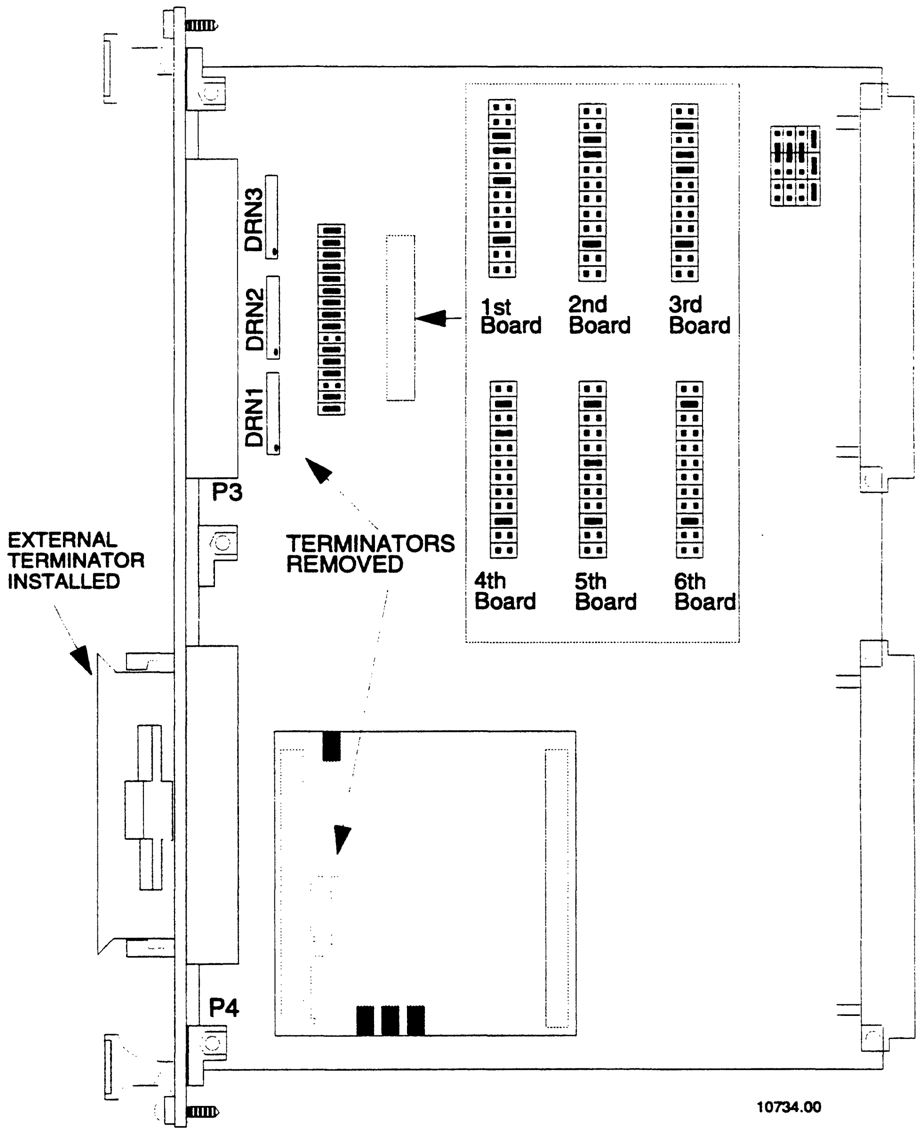
Header	Description	Setting
JA1	CPU and Oscillators speed	1-8, 2-7, 4-5
JA2		1-2
JA3	Terminator power to primary (port 0) SCSI bus	1-2
JA4	Early release of VMEbus BBSY*	No jumper
JA5	Software option 9 (reserved)	1-2
JA6	Software options 1 - 8	1-16, 2-15, 3-14, 4-13, 5-12, 6-11, 7-10, 8-9
JA7	Noise on DTACK (no noise)	No jumper
JA8	EPROM size selection	2-3
JA9	VMEbus request level	4-5
JA10	(level 3)	4-5, JA10 6-JA11 3, JA10 7-JA11 2, JA10 8-JA11 1
JA11		4-5
JB1	Base Address of short I/O space RAM (Models 4420 & 8420 only)	6-13, 7-12 4-15



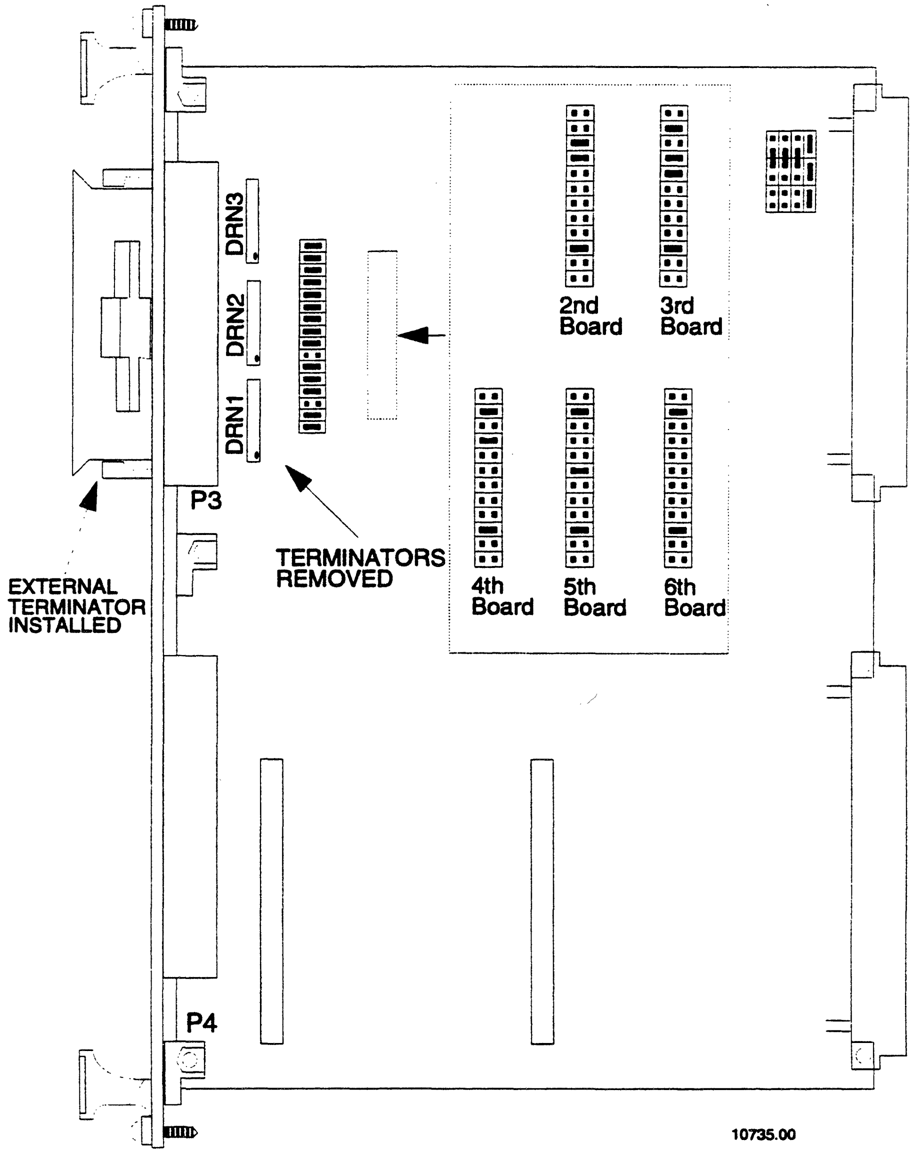
MVME328F-1-5 / 4 / 6 / 8 Single Channel SCSI INTERNAL / EXTERNAL Surface Mount Board



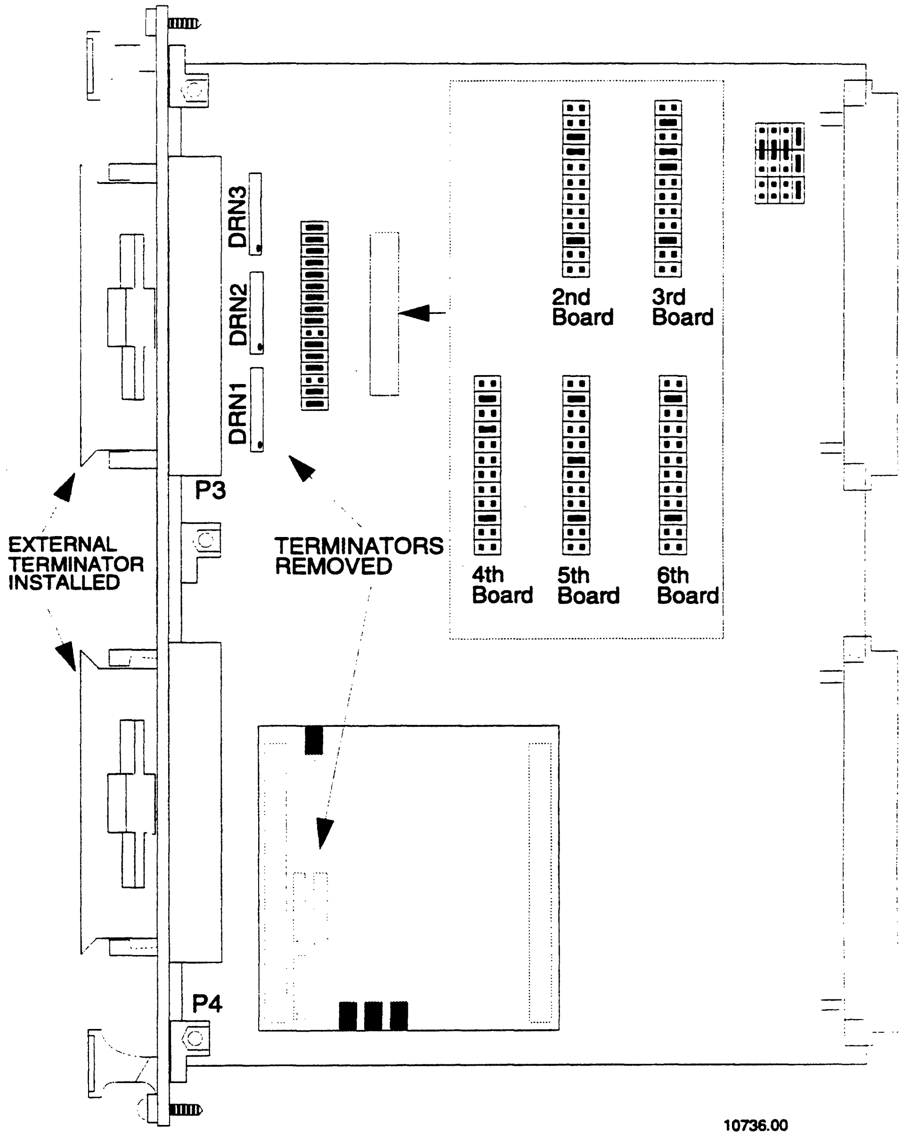
MVME328F-2- 6 / 8 Dual Channel SCSI INTERNAL / EXTERNAL Surface Mount Board



MVME328F-2-4 / 5 Dual Channel SCSI INTERNAL / EXTERNAL Surface Mount Board



MVME328F-1X- 5 / 6 / 8 Single Channel SCSI
EXTERNAL ONLY
Surface Mount Board



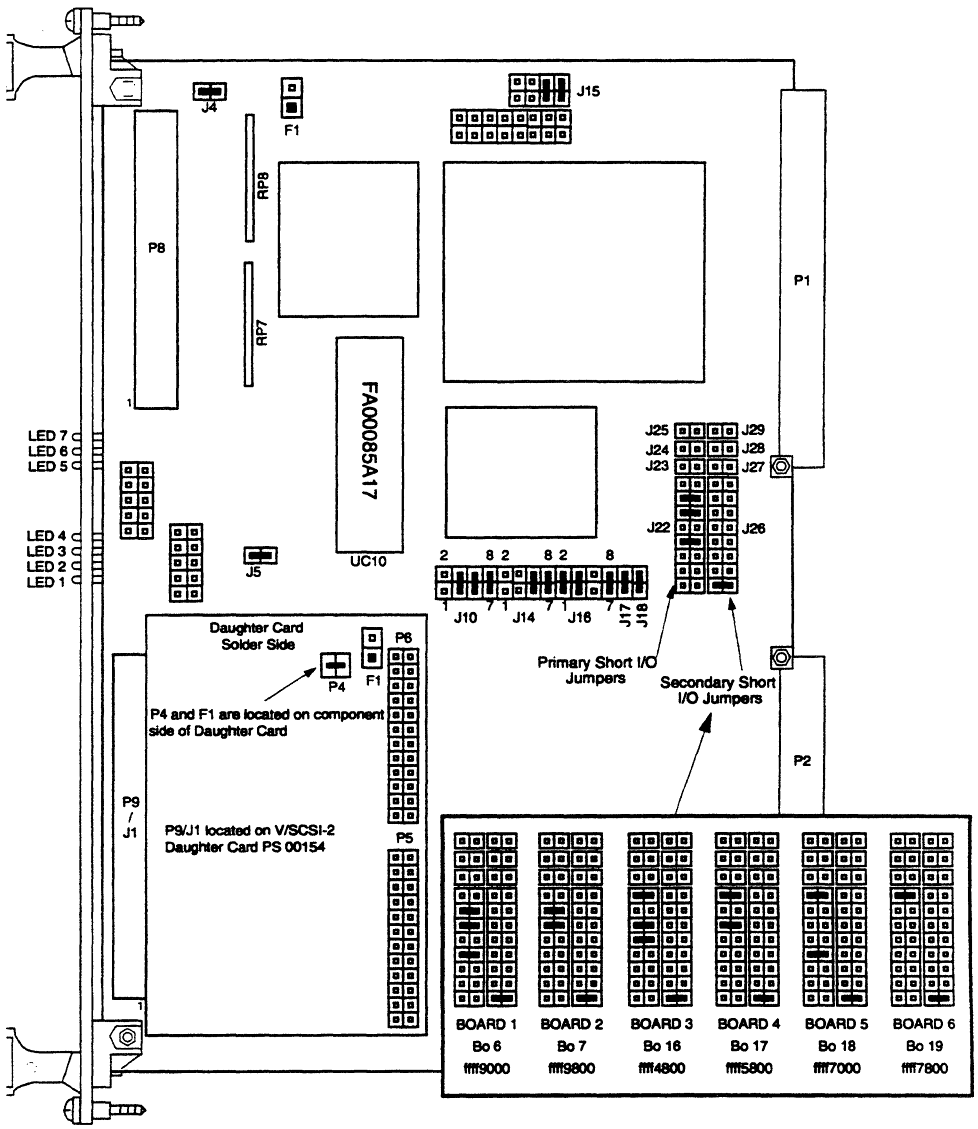
MVME328F-2X-5 / 6 / 8 Dual Channel SCSI
EXTERNAL ONLY
Surface Mount Board

MVME328XT-1/-2 SCSI-II Controller

The MVME328XT is a SCSI-II controller capable of controlling up to 14 SCSI devices, seven with the primary SCSI channel (channel 0), plus seven more with the secondary SCSI channel (channel 1).

MVME328XT Jumper Settings (revision D)

Header	Description	Setting
J4	Terminator power to primary SCSI bus (power connected)	1-2
J5	FLASH enabled	1-2
J10	16 bit block mode disabled, clear SysFail after passing diagnostics, reset disabled, debugger enable	3-4, 5-6, 7-8
J14	Load firmware from EPROM, normal run mode, 2K bytes of secondary short I/O space	5-6, 7-8
J15	Console Message disabled and GDB enabled (initialized on exit)	5-6, 7-8
J16	2K bytes of primary short I/O space, primary master control register reset enabled	1-2, 3-4, 7-8
J17	Secondary channel address modifiers 29 or 2D	1-2
J18	Primary channel address modifiers 29 or 2D	1-2
J22 J23 J24 J25	Primary short I/O Base address	See Figure
J26 J27 J88 J29	Secondary short I/O address	See Figure
P4	Terminator power to secondary SCSI bus is connected	Jumper In



MVME328XT Single and Dual Channel Jumper Settings (revision D)

MVME332XT & MVME332XTS Serial I/O Controllers

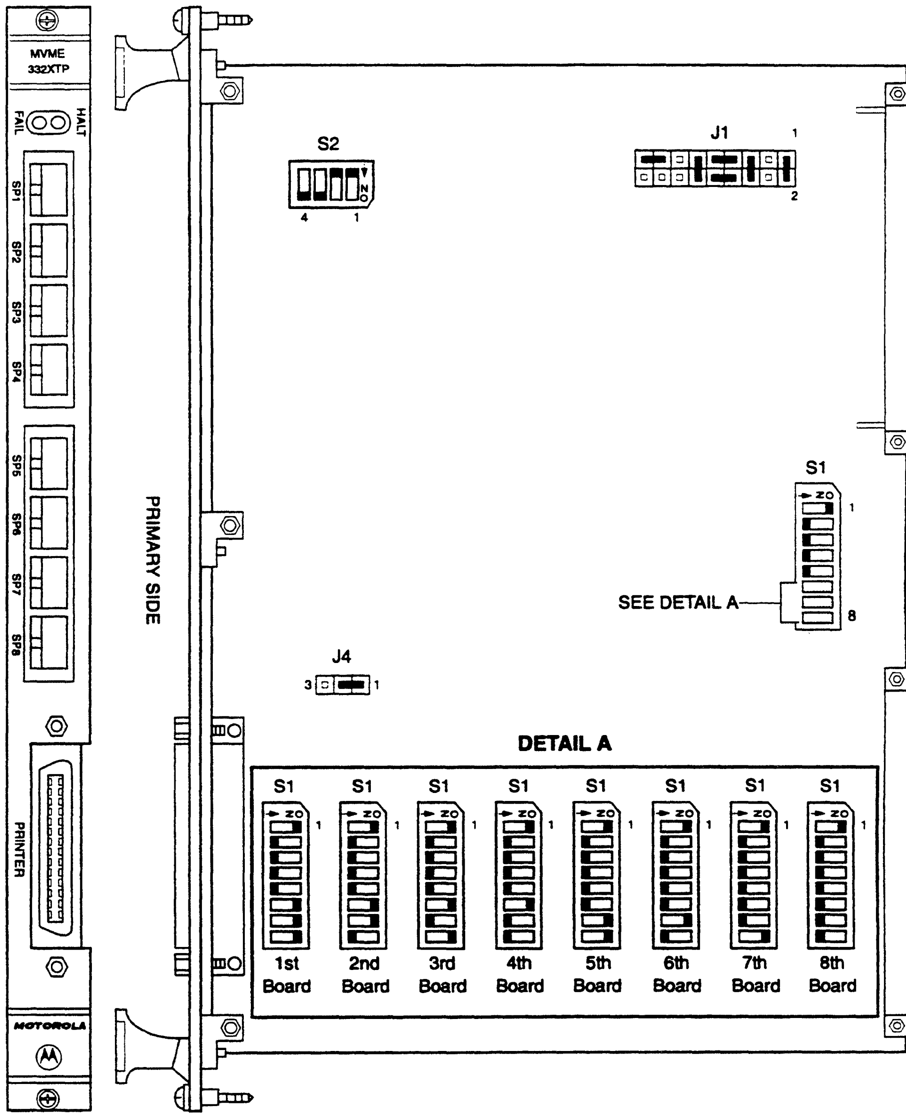
MVME332XT & 332XTS High Performance Serial I/O Controller

The MVME332XT Serial I/O Controller is a double-high VMEmodule used for serial and printer I/O. The MVME332XT has eight asynchronous serial I/O channels that support up to 38.4 Kbaud, full-duplex operation with either hardware or software handshaking. All the ports are EIA-232-D compatible.

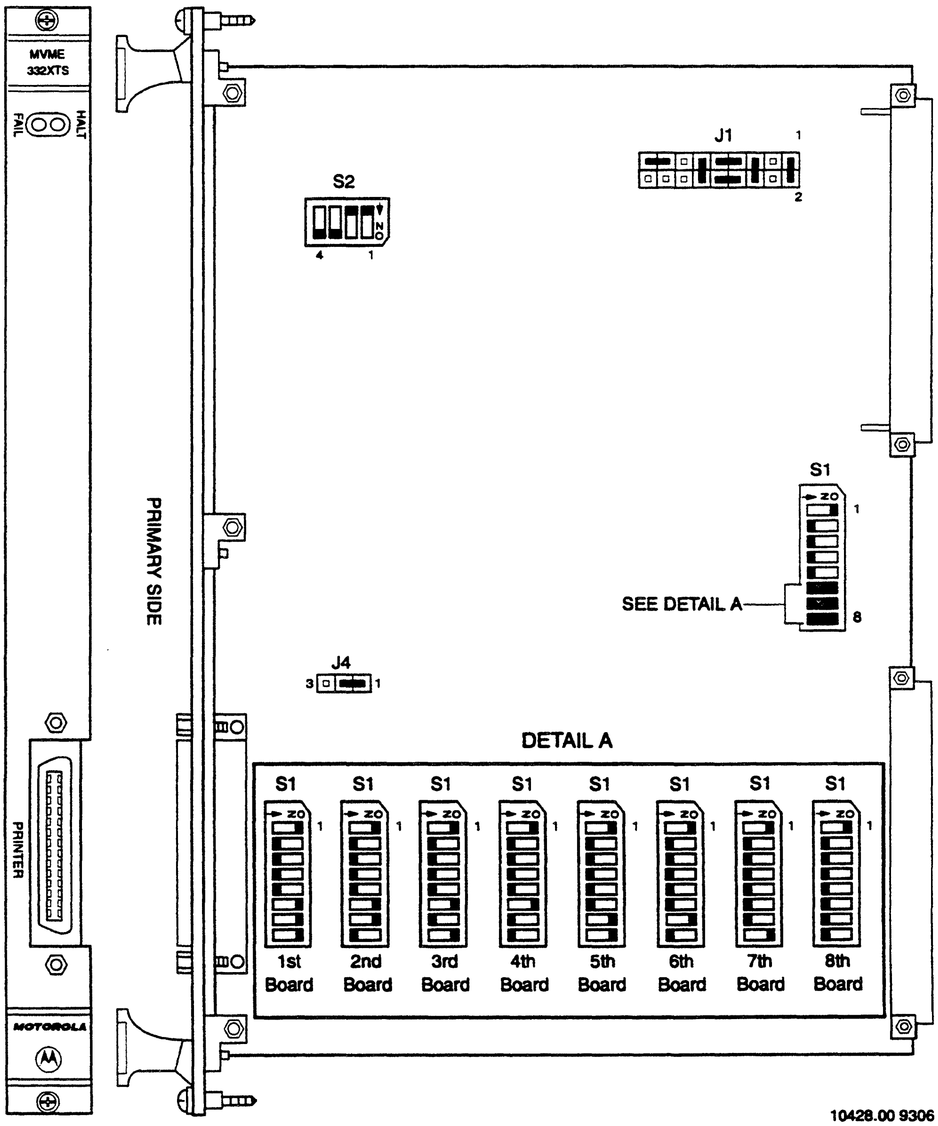
Modem and terminal interface selection is made via jumper arrays on the MVME710B Eight Channel Serial I/O Distribution Module. The MVME332XT supports one Centronics-compatible parallel printer port, accessible via a shielded front panel mounted connector that is extended to a similar connector at the backpanel.

MVME332XT and MVME332XTS Jumper Settings

Header	Description	Setting
J1	VMEbus Grant/Request Priority Level	1-2, 5-6, 7-9, 8-10, 11-12, 15-17
 J4 J5	ROM/EPROM Size Selection (64K x 8 devices) (MVME332XTS, Revision D and MVME332XT) (MVME332XTS)	1-2
 Switch S2 Switch S1	Firmware Mode (MVME332XTS, Revision D and MVME332XT) (MVME332XTS)	S2-1 OFF S2-2 OFF S2-3 ON S2-4 ON
Board Number	**S1 Switch Positions (MVME332XTS, Revision D and MVME332XT)** **S2 Switch Positions (MVME332XTS)**	**Base Address**
1	(See next Figures)	ff780000
2		ff790000
3		ff7a0000
4		ff7b0000
5		ff7c0000
6		ff7d0000
7		ff7e0000
8		ff7f0000



MVME332XT Jumper and Switch Settings (Revision D)



MVME332XTS Jumper and Switch Settings (Revision D)

MVME333 Intelligent WAN Controller

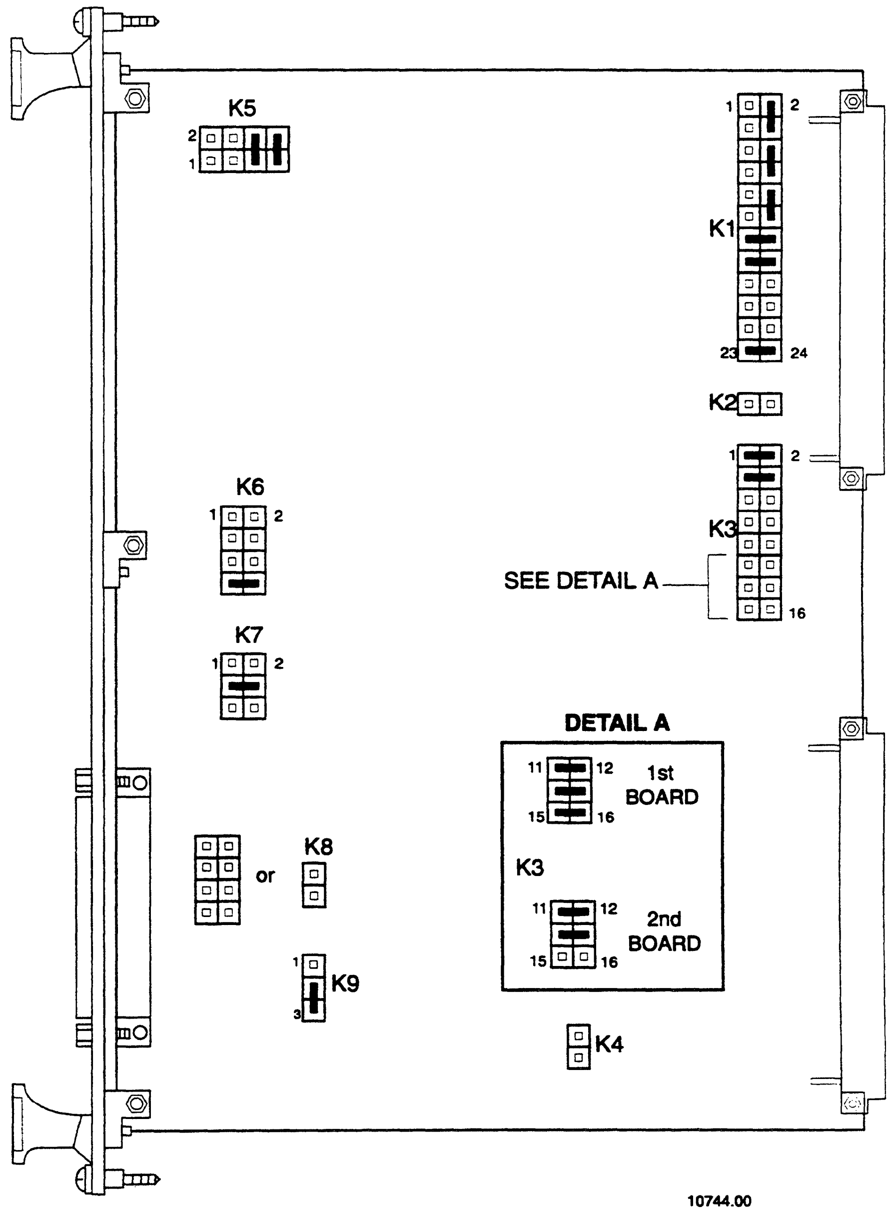
MVME333 Intelligent WAN Controller

The MVME333 Intelligent WAN Controller module supports six full-duplex serial communication channels with four channels of DMA control. The module contains a 10 MHz MC68010 microprocessor, a 10 MHz MC68450 Direct Memory Access Controller (DMAC), 512KB of memory, and 128KB ROM in firmware.

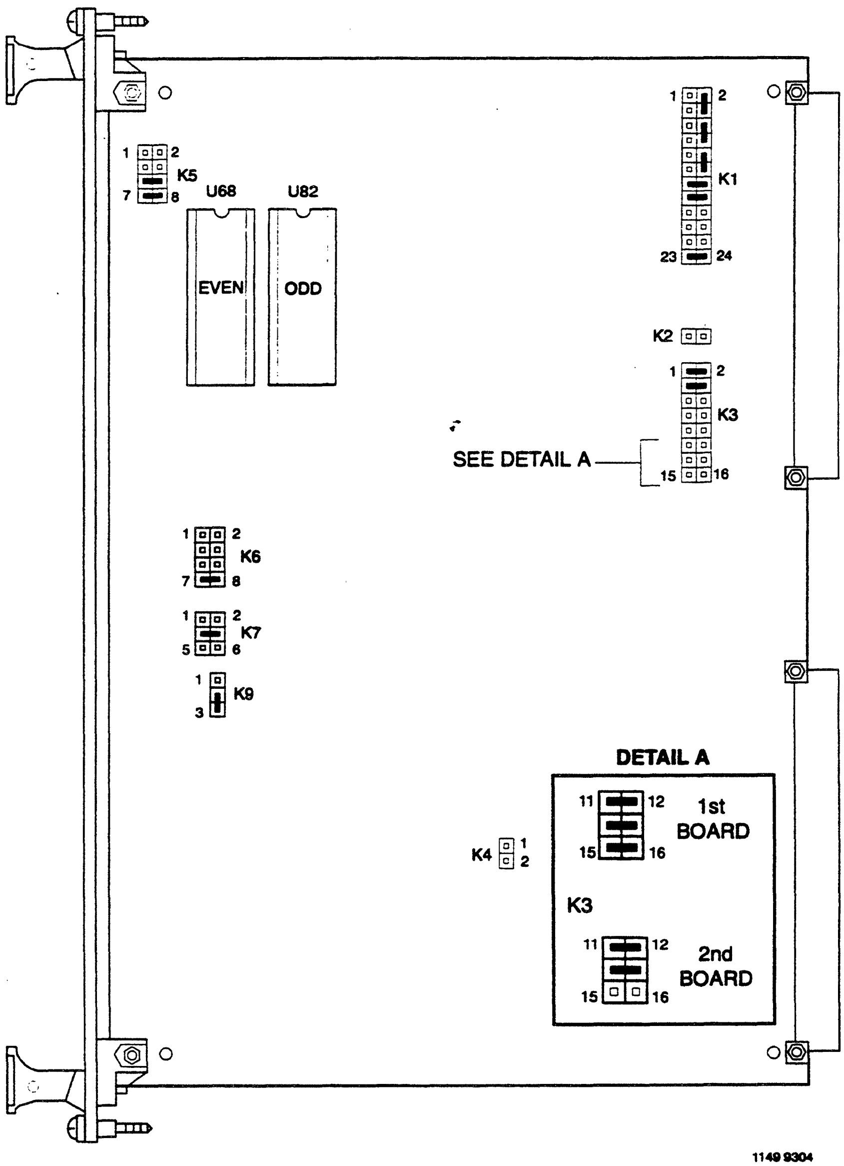
Each of the six serial channels can be configured to conform to the RS-232C standard at baud rates up to 9600. This is implemented on the MVME705A 6-Channel Serial Transceiver Module, which is connected via ribbon cable with the lower rear connector of the MVME333 module.

MVME333 Jumper Settings

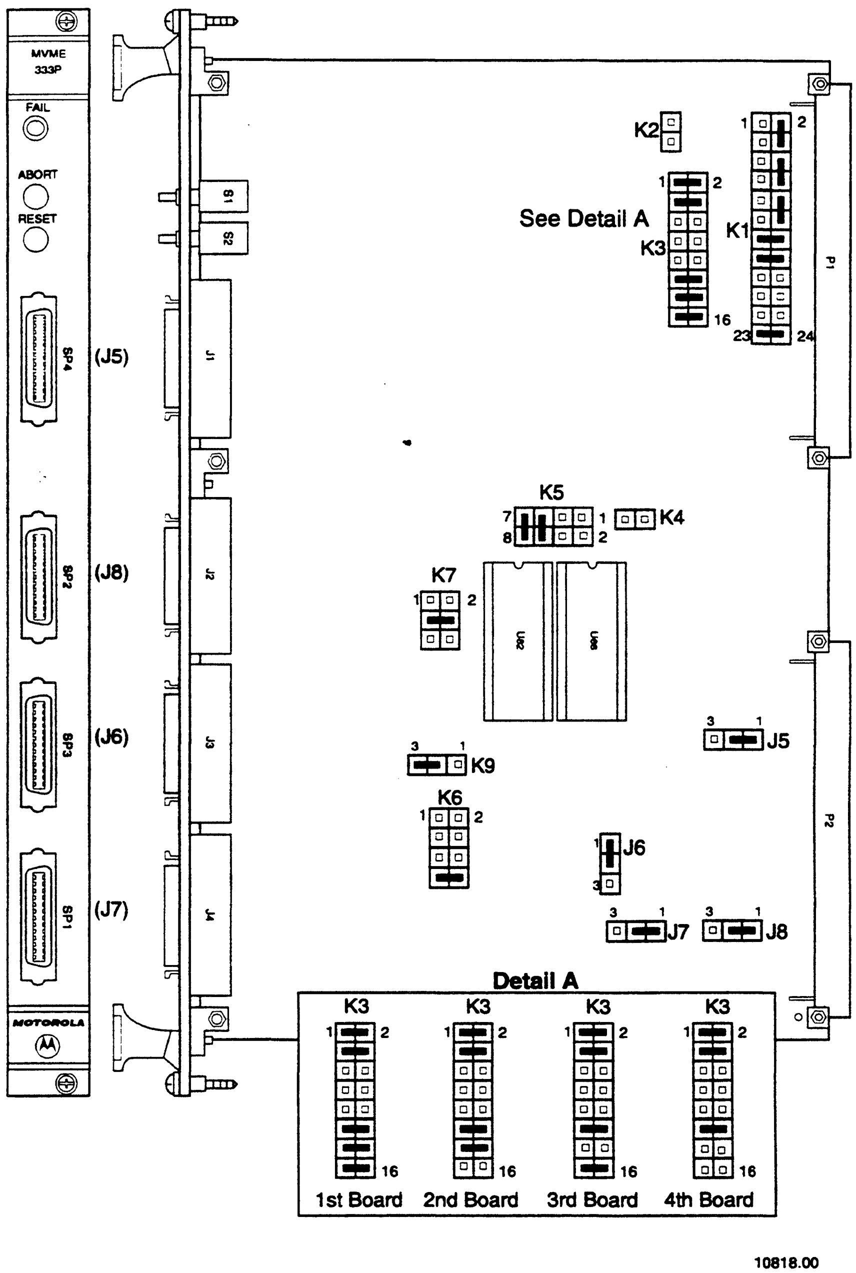
Header	Description	Setting
K1	VMEbus Request Priority Level (Level 3)	2-4, 6-8, 10-12, 13-14, 15-16, 23-24
K2	SYSFAIL* Output to VMEbus Disable/Enable (not enabled)	No Jumper
K3	VME Control and Status Register Address (1st 333 board) (2nd 333 board)	 1-2, 3-4, 11-12, 13-14, 15-16 1-2, 3-4, 11-12, 13-14
K4	Status Bit = 1	No Jumper
K5	ROM Configuration (EPROM type 27512)	5-6, 7-8
K6	VMEbus Time-Out Selection (infinity)	7-8
K7	ROM Access Time (350 nanoseconds)	3-4
K8	Test Facility (Not on MVME333S)	Factory Use Only
K9	Local Memory Addresses (RAM at $000000, ROM at $100000)	2-3
J5	333P only	1-2
J6	333P only	1-2
J7	333P only	1-2
J8	333P only	1-2



MVME333 Jumper Locations



MVME333S Jumper Locations



MVME333P Jumper Locations (Series 900 only)

MVME333X25 Communications Controller

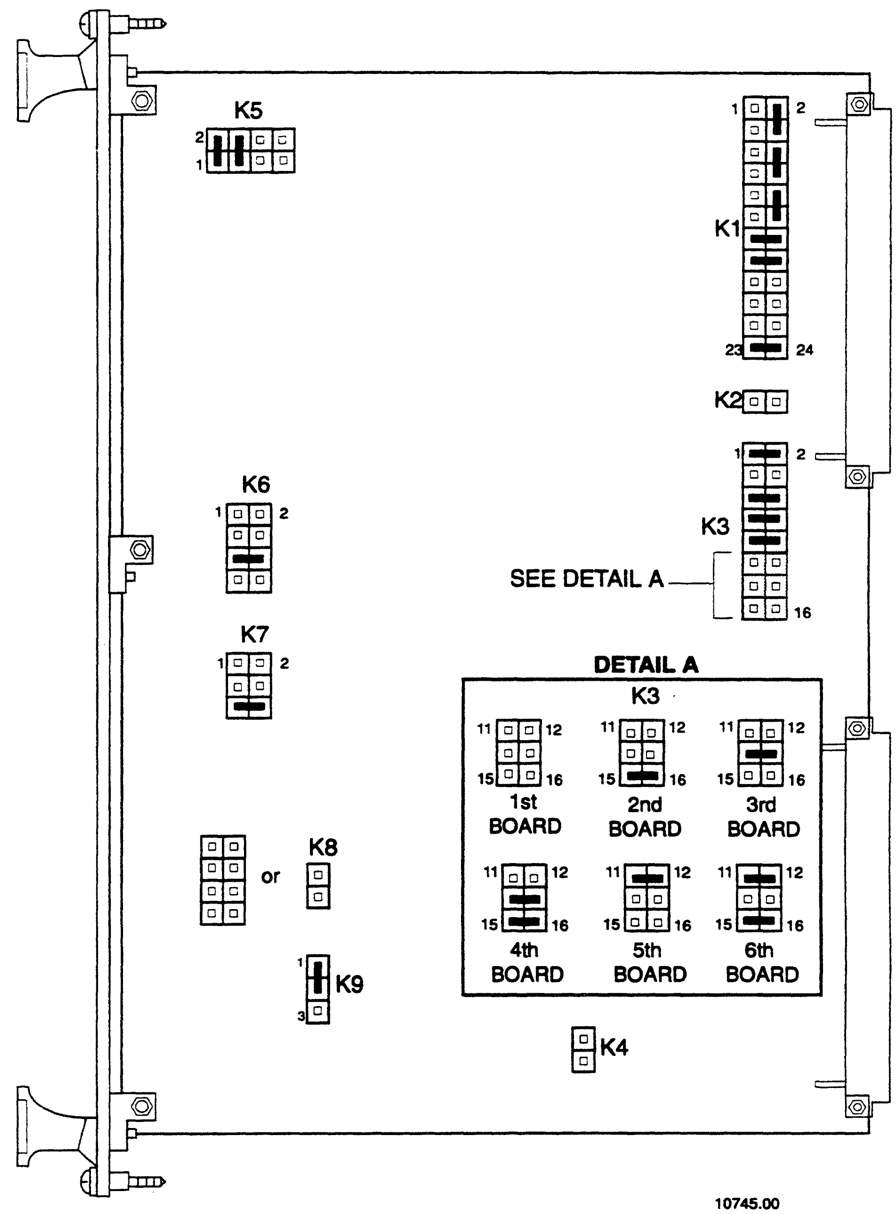
MVME333X25 X.25 Communications Controller

The MVME333X25 X.25 Communications Controller connects the system to packet-switched, Wide Area Networks (WAN). The module provides two independent X.25 connections.

The MVME333X25 uses the MC68010 16-bit Virtual Memory Microprocessor, 512KB local memory and 4-channel DMA controller. The MVME333X25 includes an MVME705B or MVME705-1 Serial Transceiver Module which provides three serial ports.

MVME333X25 Jumper Settings

Header	Description	Setting
K1	VMEbus Request Priority Level (Level 3)	2-4, 6-8, 10-12, 13-14, 15-16, 23-24
K2	SYSFAIL* Output to VMEbus Disable/Enable (not enabled)	No Jumper
K3	VME Control and Status Register Address (1st 333X25 board) (2nd 333X25 board) (3rd 333X25 board) (4th 333X25 board) (5th 333X25 board) (6th 333X25 board)	 1-2, 5-6, 7-8, 9-10 1-2, 5-6, 7-8, 9-10, 15-16 1-2, 5-6, 7-8, 9-10, 13-14 1-2, 5-6, 7-8, 9-10, 13-14, 15-16 1-2, 5-6, 7-8, 9-10, 11-12 1-2, 5-6, 7-8, 9-10, 11-12, 15-16
K4	Status Bit = 1	No Jumper
K5	ROM Configuration (EPROM type 27512)	1-2, 3-4
K6	VMEbus Time-Out Selection (infinity)	5-6
K7	ROM Access Time (350 nanoseconds)	5-6
K8	Test Facility (Not on MVME333S)	Factory Use Only
K9	Local Memory Addresses (RAM at $000000, ROM at $100000)	1-2



MVME333 X.25 Jumper Locations

MVME334A Communications Controller

MVME334A Multiprotocol Communications Controller

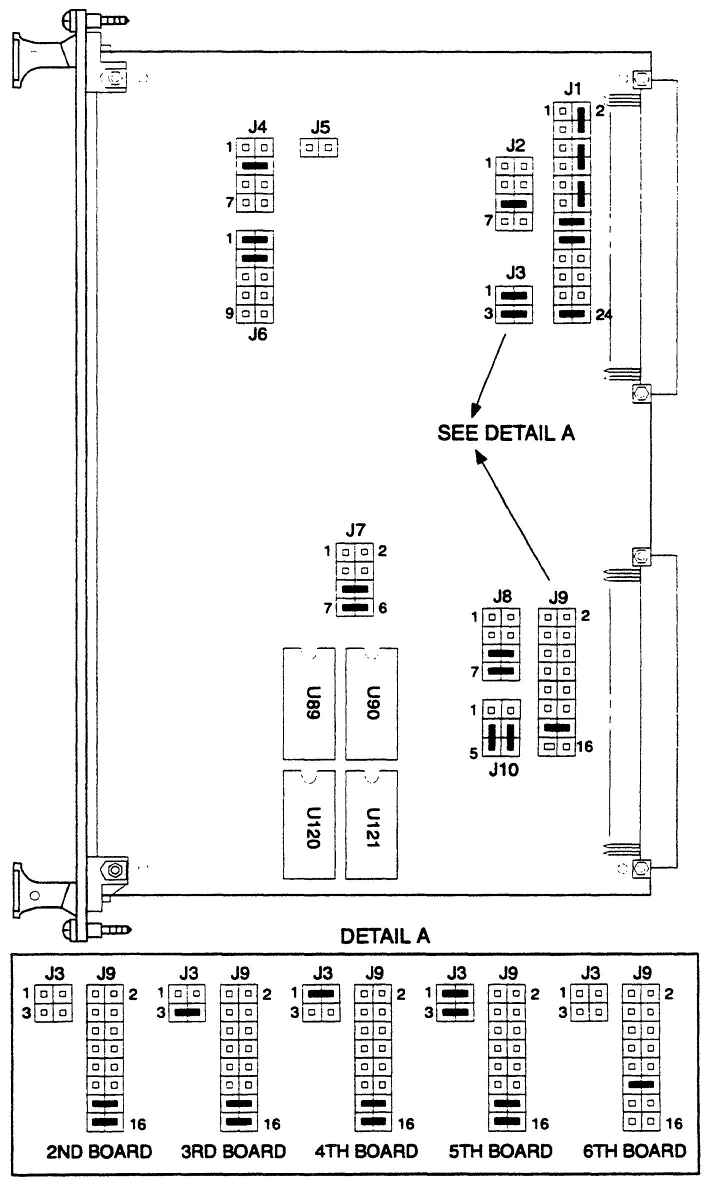
The MVME334A is a VMEmodule that provides all the hardware for a universal intelligent controller for serial data communications on six full duplex channels. Four of the channels are multiprotocol channels controlled by two SCN68562 Dual Channel Universal Communication Controllers (DUSCC). The other two channels are controlled by two MC68605 X.25 Protocol Controllers (XPC).

The MVME334A contains a complete 32-bit microcomputer consisting of an MC68020 MPU, 4MB of RAM, up to 256KB of user-supplied ROM, and 2KB of EEPROM.

I/O Controller

MVME334A Jumper Settings

Header	Description	Setting
J1	VMEbus requester priority level select (Level 3)	2-4, 6-8, 10-12, 13-14, 15-16, 23-24
J2	VMEbus functions select	5-6
J3	Module base address select ($FF800000-$FFBFFFFF)	1-2, 3-4
J4	Bus timeout select	3-4
J5	Module address mode select	No Jumper
J6	ABORT/RESET switches, status register select	1-2, 3-4
J7	ROM configuration select	5-6, 7-8
J8	XPC data clock select	5-6, 7-8
J9	Module base address select ($FF800000-$FFBFFFFF)	13-14
J10	DMAC request configuration select	3-5, 4-6



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MVME334A Jumper Locations

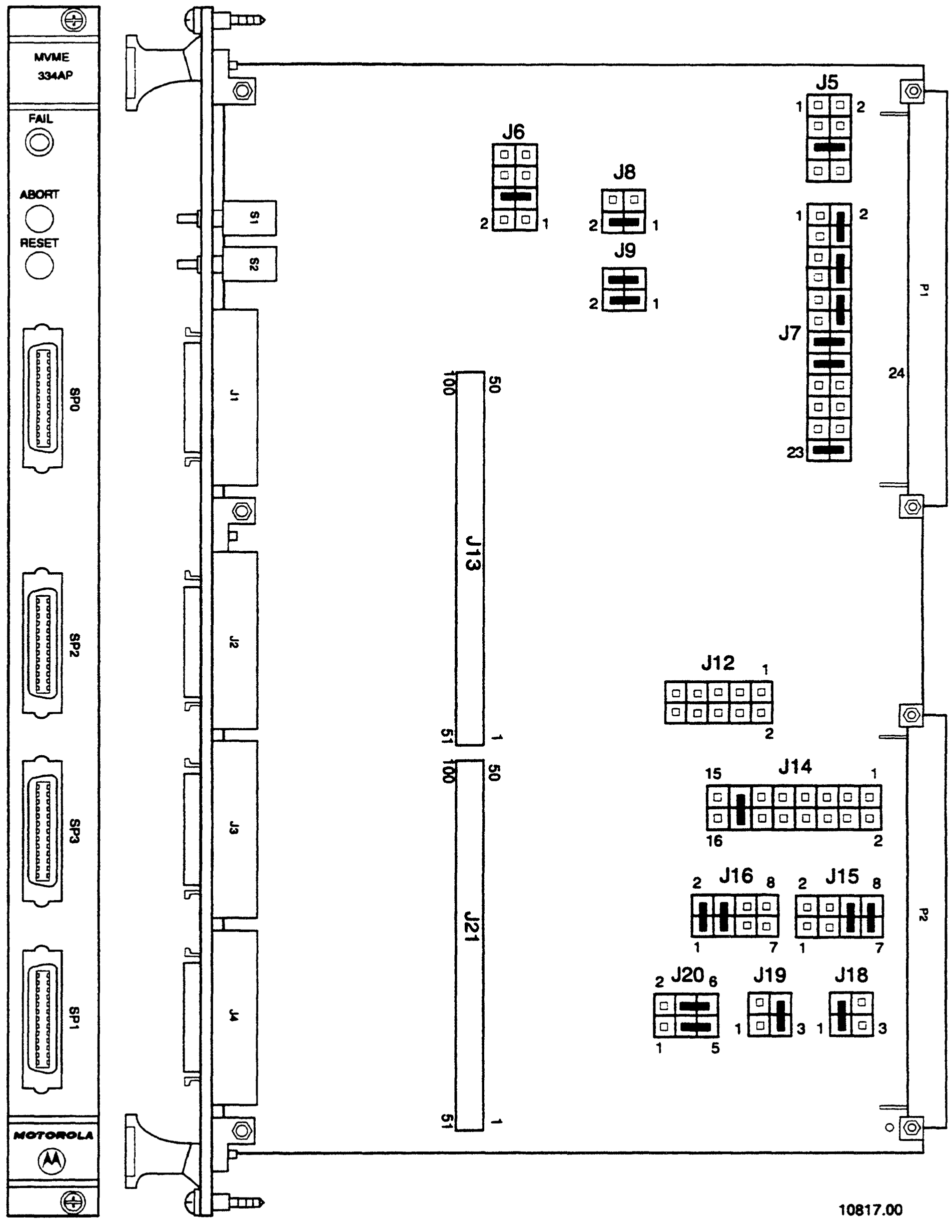
MVME334AP Communications Controller

MVME334AP Multiprotocol Communications Controller

The MVME334AP is a VMEmodule that provides all the hardware for a universal intelligent controller for serial data communications on six full duplex channels.

MVME334AP Jumper Settings

Header	Description	Setting
J5	VMEbus Functions Select	5-6
J6	Bus Timeout Select	3-4
J7	VMEbus Requester Priority Level Select	2-4, 6-8, 10-12, 13-14, 15-16, 23-24
J8	Module Address Mode Select	1-2
J9	Module Base Address Select	1-2, 3-4
J12	ABORT/RESET Switches, Status Register Select	No Jumper
J14	Module Base Address Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16
J15	Port SP0, DTE/DCE	5-6, 7-8
J16	Port SP1, DTE/DCE	1-2, 3-4
J18	Port SP3, DTE/DCE	1-2
J19	Port SP2, DTE/DCE	3-4
J20	DMAC Request Configuration Select	3-5, 4-6



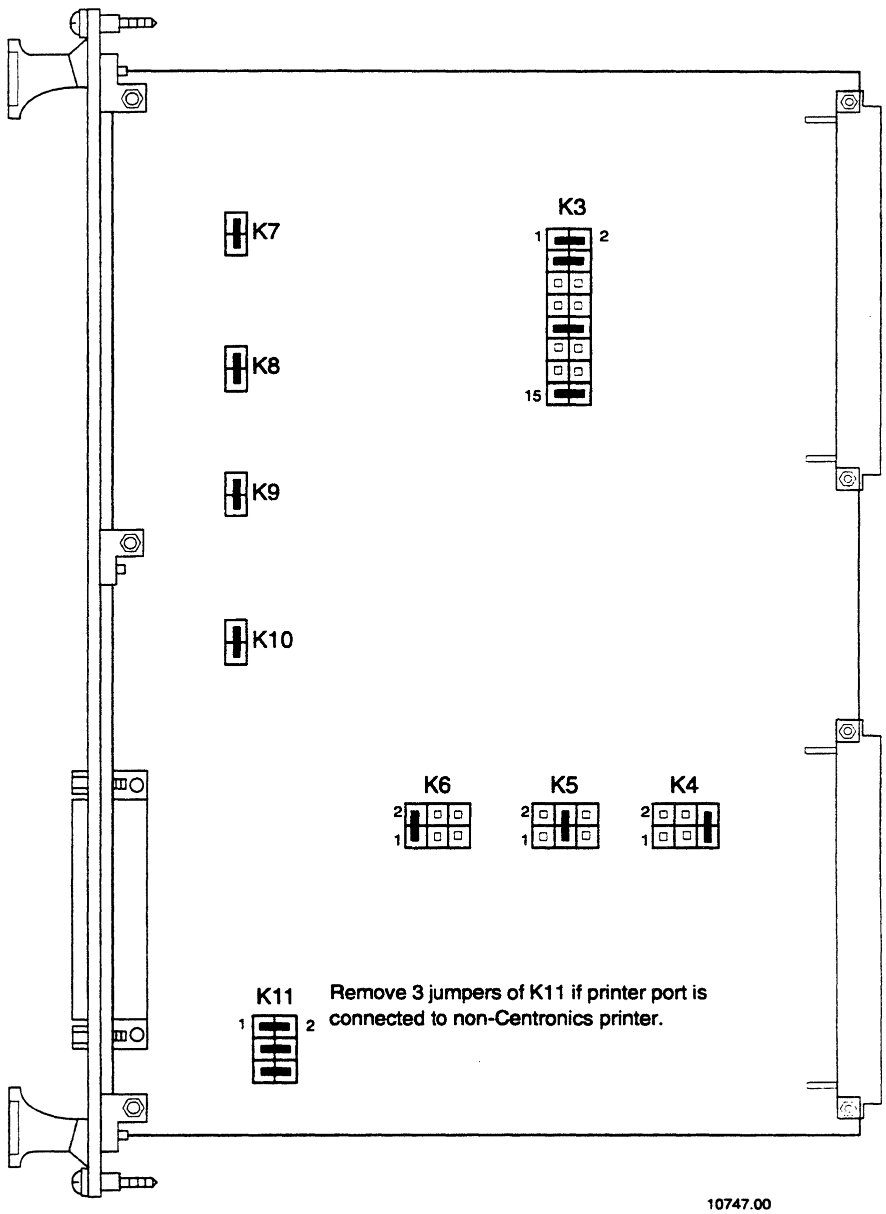
MVME334AP Jumper Locations (Series 900 only)

MVME335 Serial and Parallel I/O Module

The MVME335 provides the interface for four asynchronous serial communication devices and a parallel printer to the system. A 24-bit timer and two 16-bit timers support generation of periodic or single interrupts after elapsed periods of time. A Centronics type printer can be connected via the MVME715P transition board. The serial I/O signal lines are at RS-232C voltage levels and are available on the four connectors.

MVME335 Jumper Settings

Header	Description	Setting
K3	Base Address	1-2, 3-4, 9-10, 15-16
K4	DUART Interrupt level select (Level 3)	5-6
K5	PI/T Port Interrupt level select (Level 5)	3-4
K6	PI/T Timer Interrupt level select (Level 6)	1-2
K7	DSR Line Pull Up Select Header	1-2
K8	DSR as Constantly Activated Output	1-2
K9		1-2
K10		1-2
K11	P2, P7 GND Enable/Disable Select Header (see drawing)	1-2, 3-4, 5-6

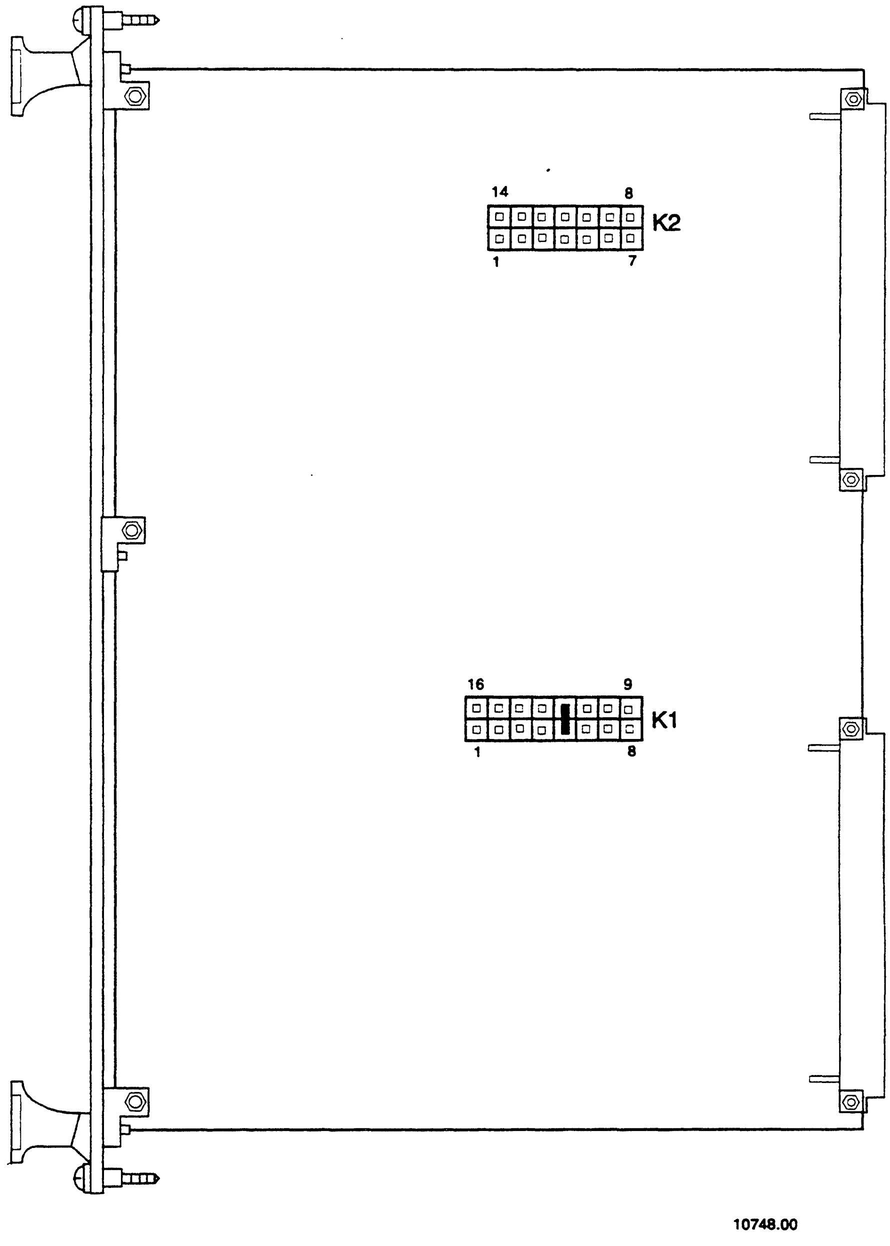


MVME335 Jumper Locations

MVME336 VME Hub Module

The MVME336 VME Hub Module is used to connect up to 96 asynchronous devices using one VME card slot. The MVME336 can support up to six Servers. The Server is a high performance multiplexer which provides connections for up to 16 RS-232C asynchronous interfaces running full duplex at up to 38.4 Kbps each. The link between the MVME336 (Hub) and Server operates synchronously at 1,000,000 bps in both directions concurrently using inexpensive two twisted pair unshielded telco wiring.

The MVME336 Hub module has a global memory area shared by the VMEbus and six data link ports. Data link control is accomplished with the MC68605 X.25 Protocol Controller (XPC) chip. There are six XPC chips on the module, one for each full-duplex path.



MVME336 Jumper Locations

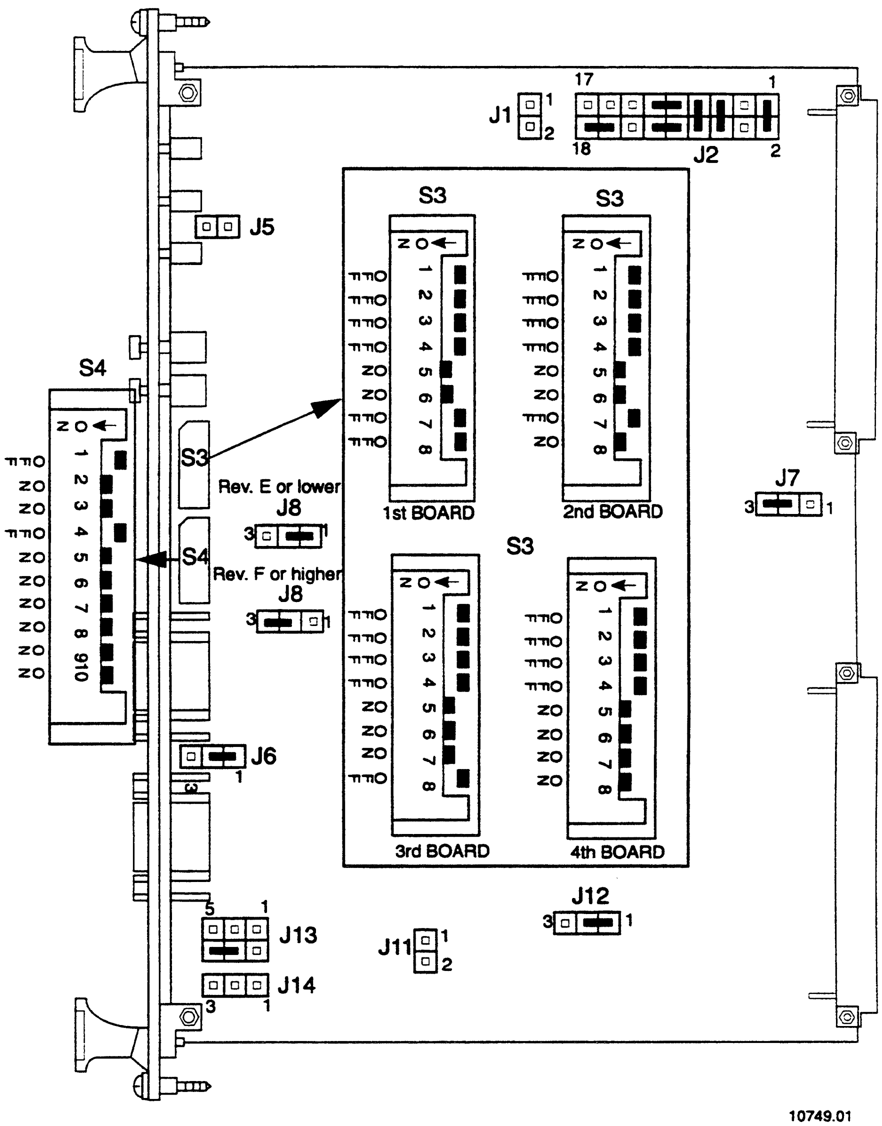
MVME337-1 I/O Engine

The MVME337-1 I/O engine interfaces with a series of Extensible VME Subsystem Bus (EVSB) modules to provide a wide variety of serial communication solutions. The MVME337 incorporates an MC68020, a 32-bit address and data microprocessor, a high level multiprocessor CSR, and 1MB of fast DRAM. Other main features provided include interfaces to the VMEbus and the VSBbus.

The MVME337 executes the communication protocol software required by each type of EVSB module. This communications software is downloaded from local EPROM and/or the host system.

MVME337 Jumper Settings

Header	Description	Setting
J1	VMEbus Lock for VSBbus Select (Lock Disabled)	No Jumper
J2	Bus Grant/Request Level Select (Level 3)	1-2, 5-6, 7-8, 9-11, 10-12, 16-18
J6	RAM Acknowledge Mode Select (No Wait-State Operation)	1-2
J7	ROM Size Select (27512 Devices, 128Kb)	2-3
J8	DRAM Address Multiplex Select (Revision E or lower) (Revision F or higher)	 1-2 2-3
J11	Local/VMEbus Timeout Disable Select (Timeout Enabled)	No Jumper
J12	DRAM Cycle Start Mode Select (Synchronous Mode)	1-2
J13	External Timer Select	4-6
J14		No Jumper
S3	Slave Resource Mapping Select Switch	See Figure



MVME337-1 Jumper Locations

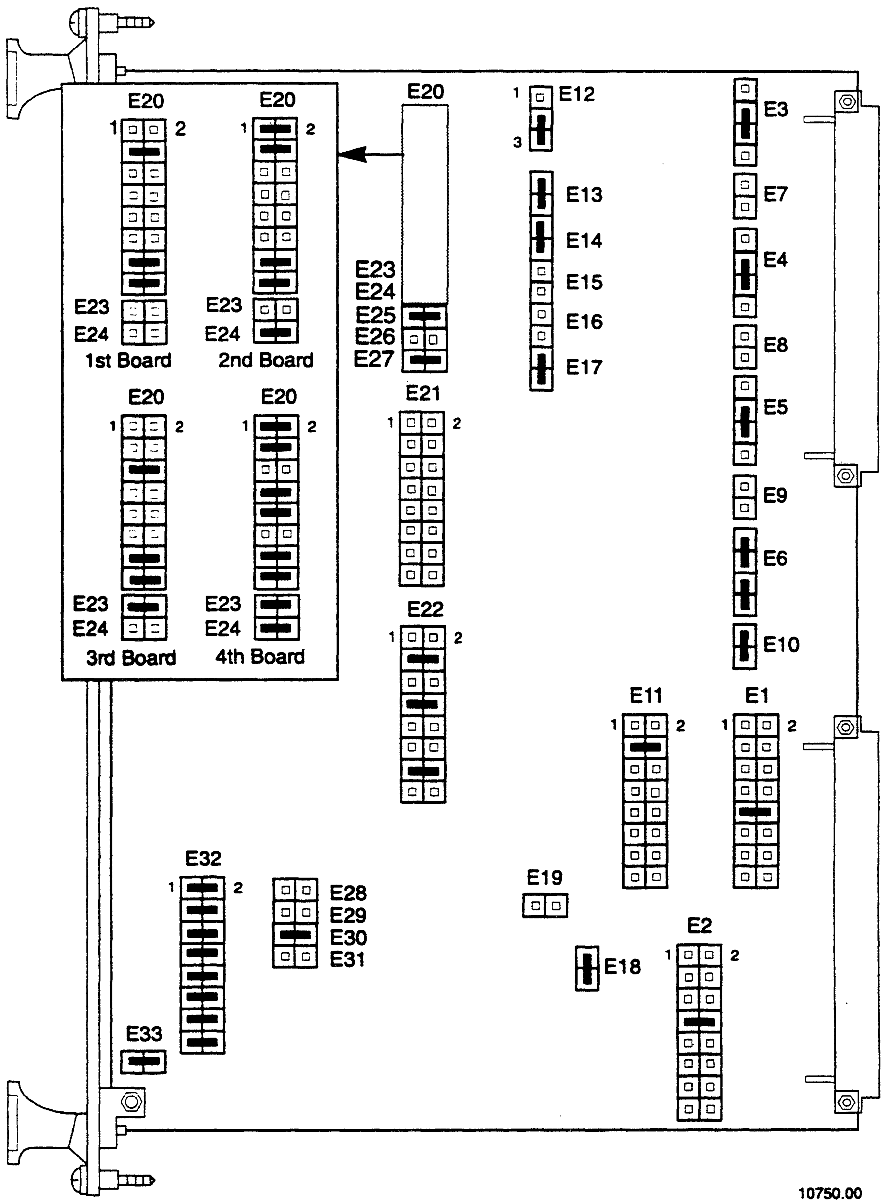
MVME338 Terminal I/O Subsystem Controller

The MVME338 terminal I/O subsystem controller is a terminal server used to connect a variety of RS-232C devices and parallel printers to the system.

Note **If you have an MVME338 and MVME339 installed in your system, you need to make sure that the addresses of those boards are unique. If the addresses are the same, your system will panic during boot up.**

MVME338 (20 MHz) Jumper Settings

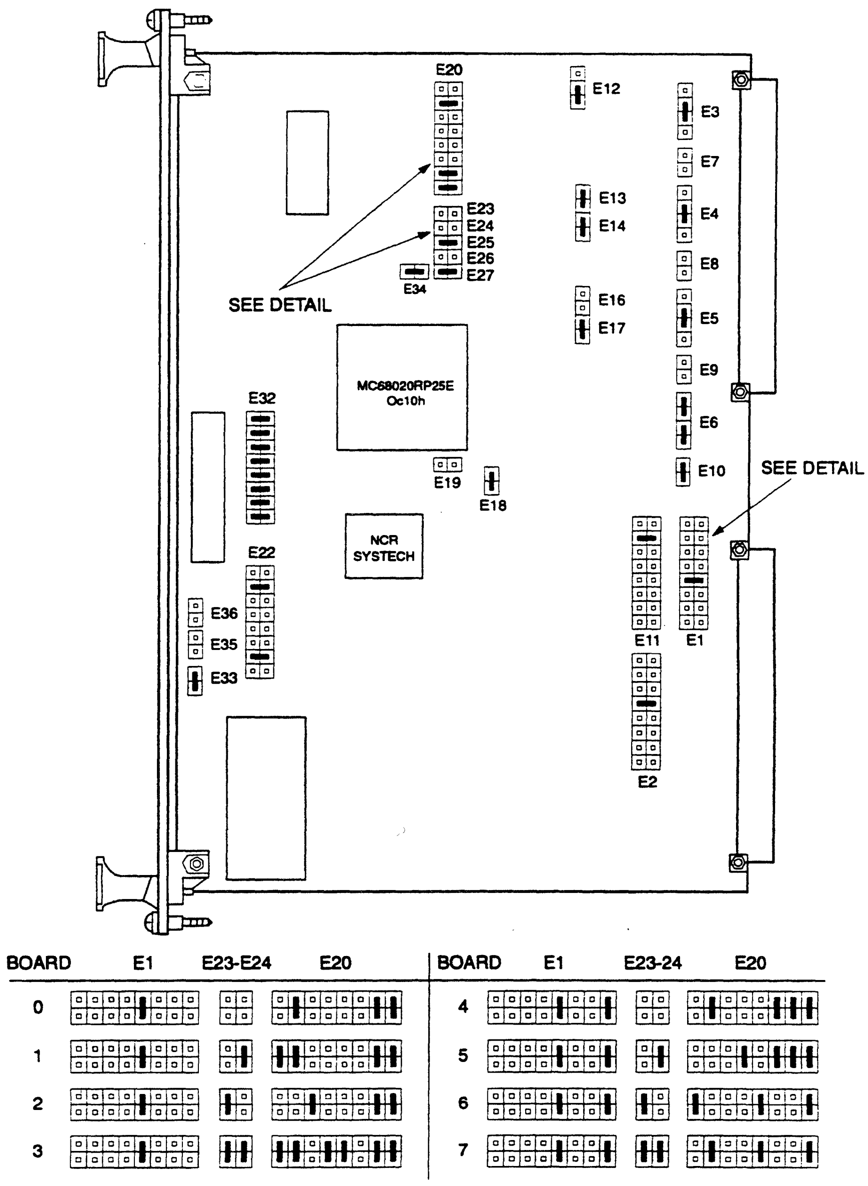
Header	Setting
E1	9-10
E2	7-8
E3, E4, E5	2-3
E6	1-2, 3-4
E7, E8, E9	No Jumper
E10	1-2
E11	3-4
E12	2-3
E13, E14, E17, E18	1-2
E15, E16, E19	No Jumper
E20	(See Figure)
E21	No Jumper
E22	3-4, 7-8, 13-14
E23 - E27	(See Figure)
E28, E29, E31	No Jumper
E30	1-2
E32	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16
E33	1-2



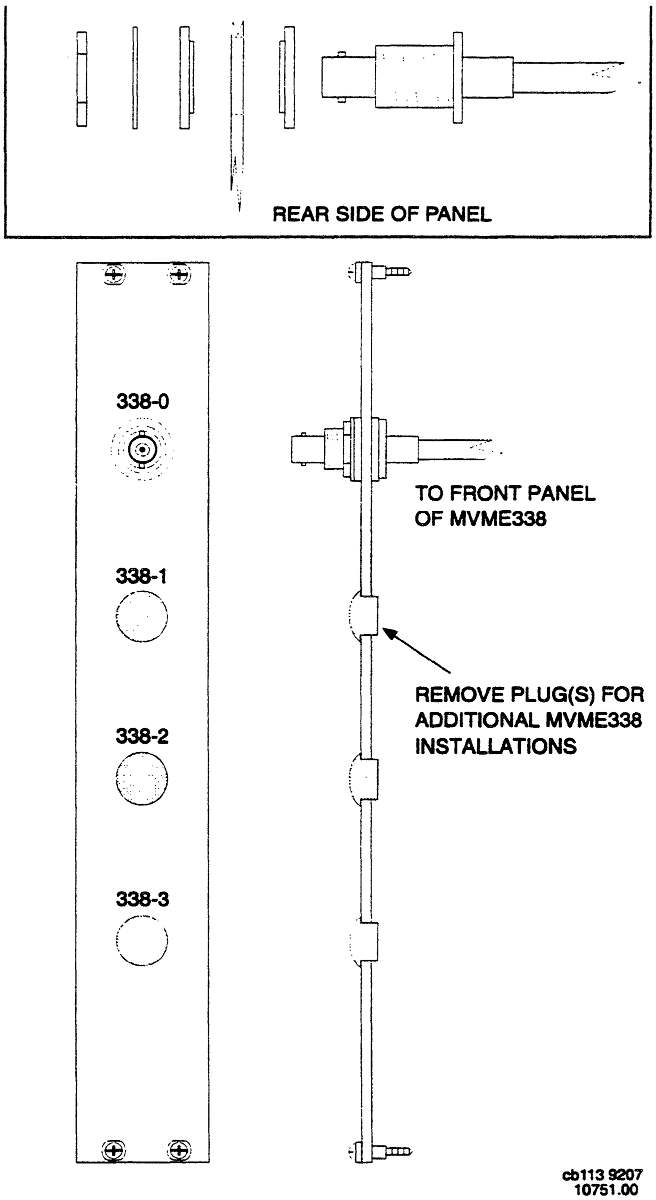
MVME338 (20 MHz) Jumper and Switch Settings

MVME338 (25 MHz) Jumper Settings

Header	Setting
E1	(See Figure)
E2	7-8
E3, E4, E5	2-3
E6	1-2, 3-4
E7, E8, E9	No Jumper
E10	1-2
E11	3-4
E12	2-3
E13, E14, E17, E18	1-2
E16, E19	No Jumper
E20	(See Figure)
E22	3-4, 13-14
E23 - E24	(See Figure)
E25, E27	1-2
E26	No Jumper
E32	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16
E33, E34	1-2
E35, E36	No Jumper



MVME338 (25 MHz) Jumper and Switch Settings



Transition Assembly

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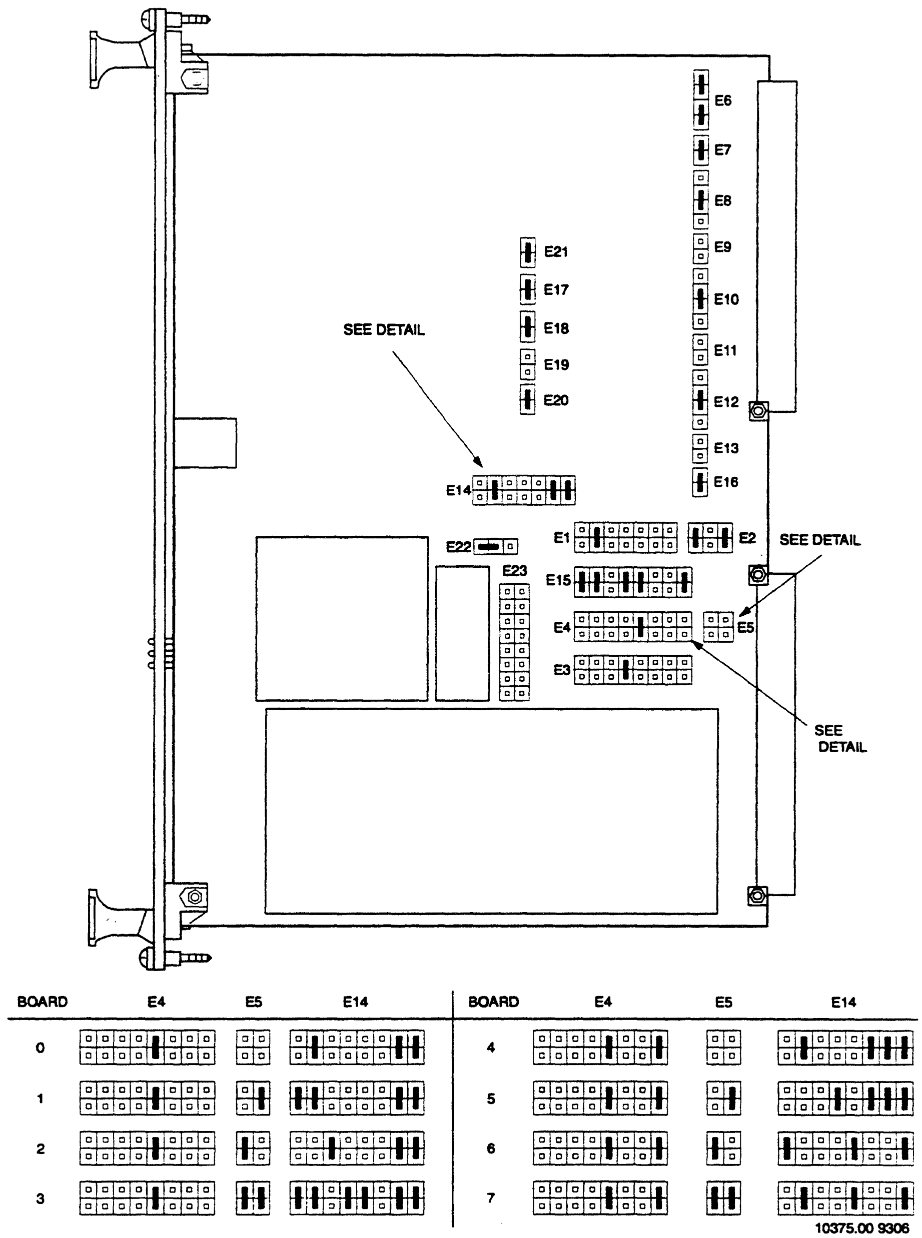
MVME339 Etherplex Controller

The MVME339 is a terminal server used to connect a variety of RS-232C devices and parallel printers to the system.

Note **If you have an MVME338 and MVME339 installed in your system, you need to make sure that the addresses of those boards are unique. If the addresses are the same, your system will panic during boot up.**

MVME339 Jumper Settings

Header	Description	Setting
E1	VMEbus Interrupt Configuration	3-4
E2		1-2, 5-6
E3	Slave Address Base	7-8
E4		(See Figure)
E5	Slave Address Jumper	(See Figure)
E6	Bus Grant Level Selection (Level 3)	1-2, 3-4
E8		2-3
E10		2-3
E12		2-3
E7	Bus Request Level Selection	1-2
E9		No Jumper
E11		No Jumper
E13		No Jumper
E14	Status/ID Byte	(See Figure)
E15	Master Cycles Allowed 100 (decimal) transfers (64H)	1-2, 3-4, 7-8, 9-10, 15-16
E16	Enables E15	1-2
E17	Dual-Port Memory Jumpers	1-2
E18		1-2
E19		No Jumper
E20		1-2
E21	32/16-Bit Master Cycles	1-2
E22	EPROM Size Configuration (64K bytes)	1-2
E23	Self-Test Jumper/Configuration Register Settings	No Jumper



MVME339 Jumper and Switch Settings

MVME341 SS7 Controller

The MVME341 SS7 is an intelligent 4-port communications controller. This board offloads the tedious and resource-consuming tasks of Message Transfer Part (MTP) of the SS7 protocol from the UNIX host processor board. Together with its companion transition board, the MVME719, this board combination is offered either factory-fitted or as a field-installable kit.

The MVME341 consists consists of a motherboard and the mezzanine board that are assembled at the factory. To configure both boards, you position jumpers on posts according to legends on the circuit board. The mezzanine attaches to the motherboard via two 100-pin miniature connectors; two plastic screws secure it to the motherboard.

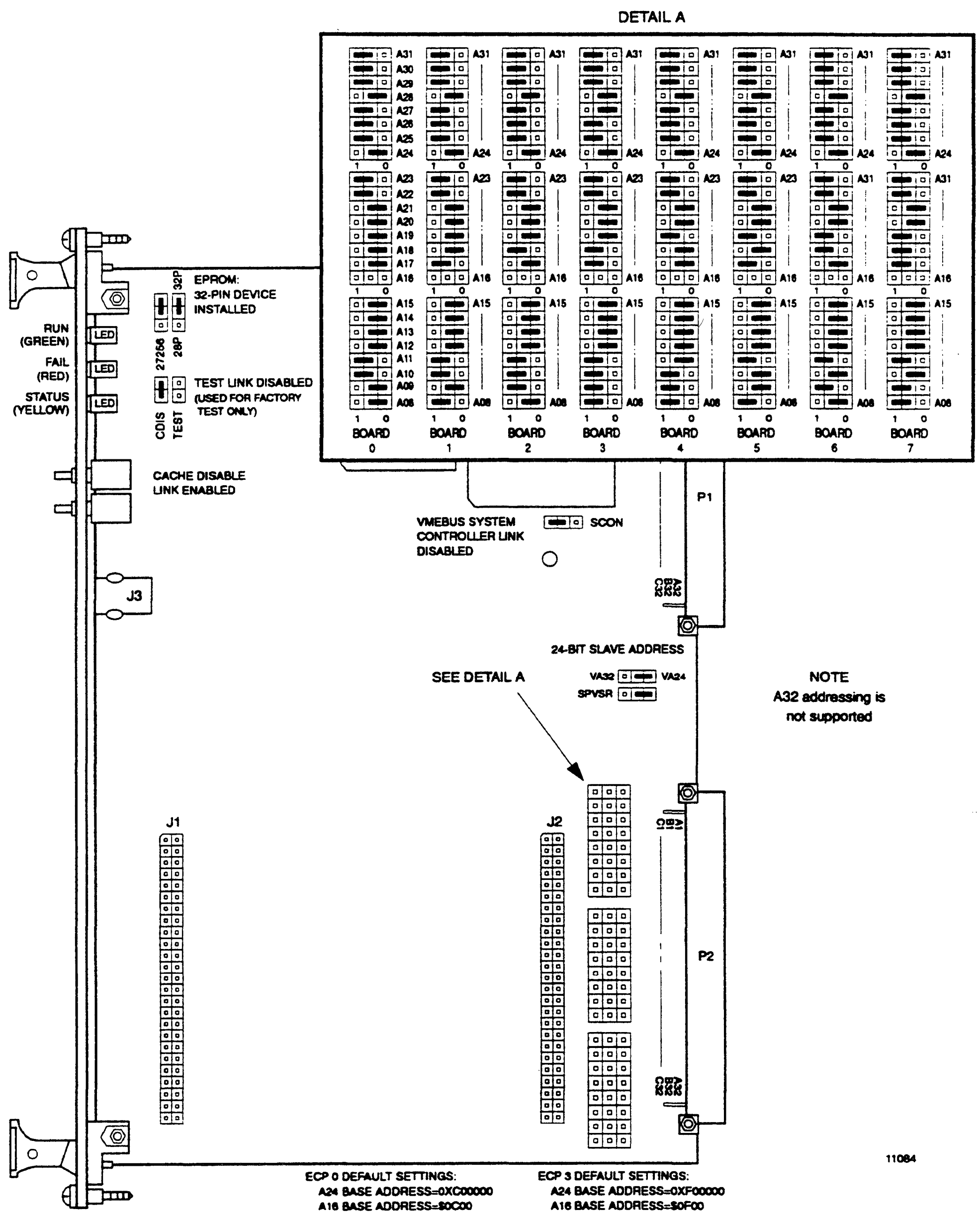
Features and Functions

- Four ports per controller.
- Maximum 4 controllers per system (depending on availability of VME slots and transition slots).
- Maximum line speed : 64 kbits/second.
- All physical interfaces available only through the transition board (no front panel connectivity). For this reason, the AccessMANAGER SS7 product is not available for the Series900 where front panel connectivity is required.
- On-board physical interfaces : Four RS-530 using female DB-25 connectors, each port individually configurable as DTE or DCE.
- Optional physical interfaces available through two types of adapter cables : 1) Male DB-25 RS-530 to male DB-25 RS232/V.24, 2) Male DB-25 RS-530 to male 34-pin V.35.
- An optional loopback cable is also available for testing and verification purposes.
- The controller is delivered with an EPROM-based download utility firmware.

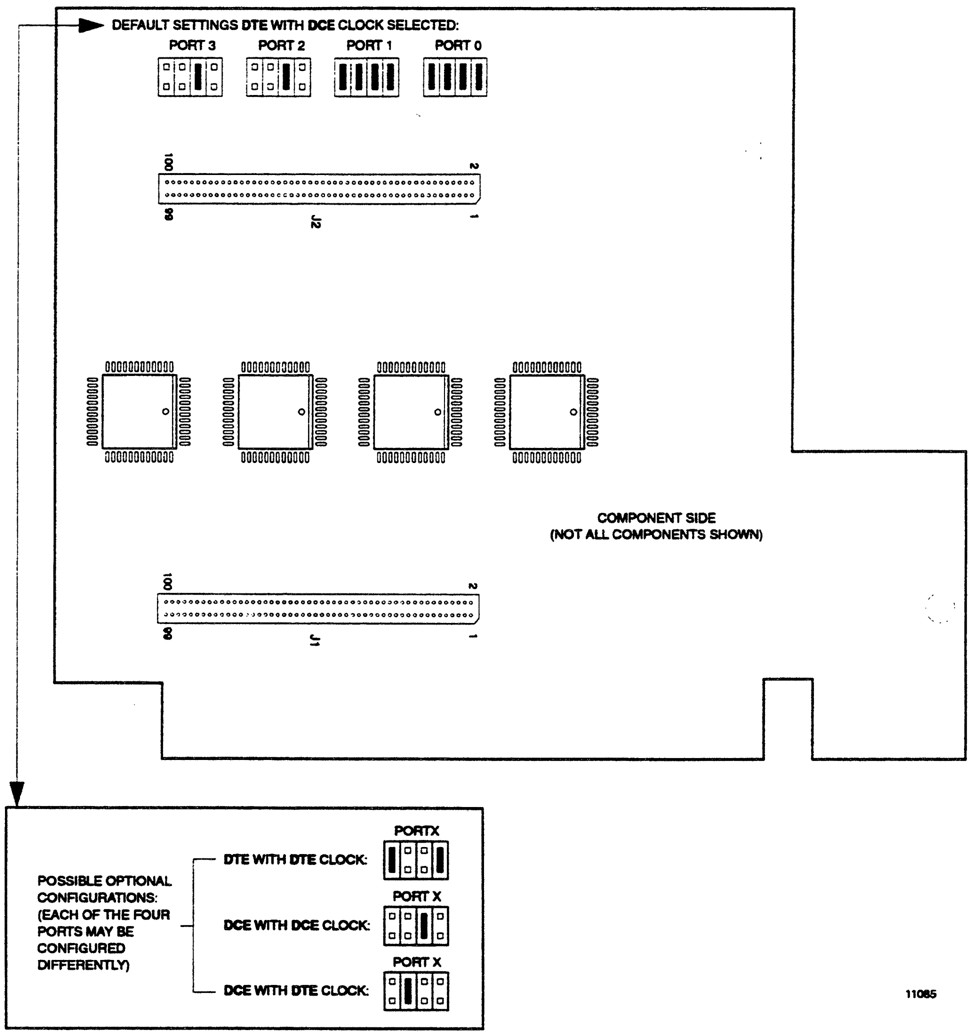
Notes

Do not use identical VME address (board device number) to avoid conflict with other VME boards in other slots.

Individual jumpering descriptions are not available for the SS7 controller board. The jumpering options for the mezzanine board are described on the face of the illustration that follows.



MVME341 Controller Jumpers



MVME341 Mezzanine Board Jumpers

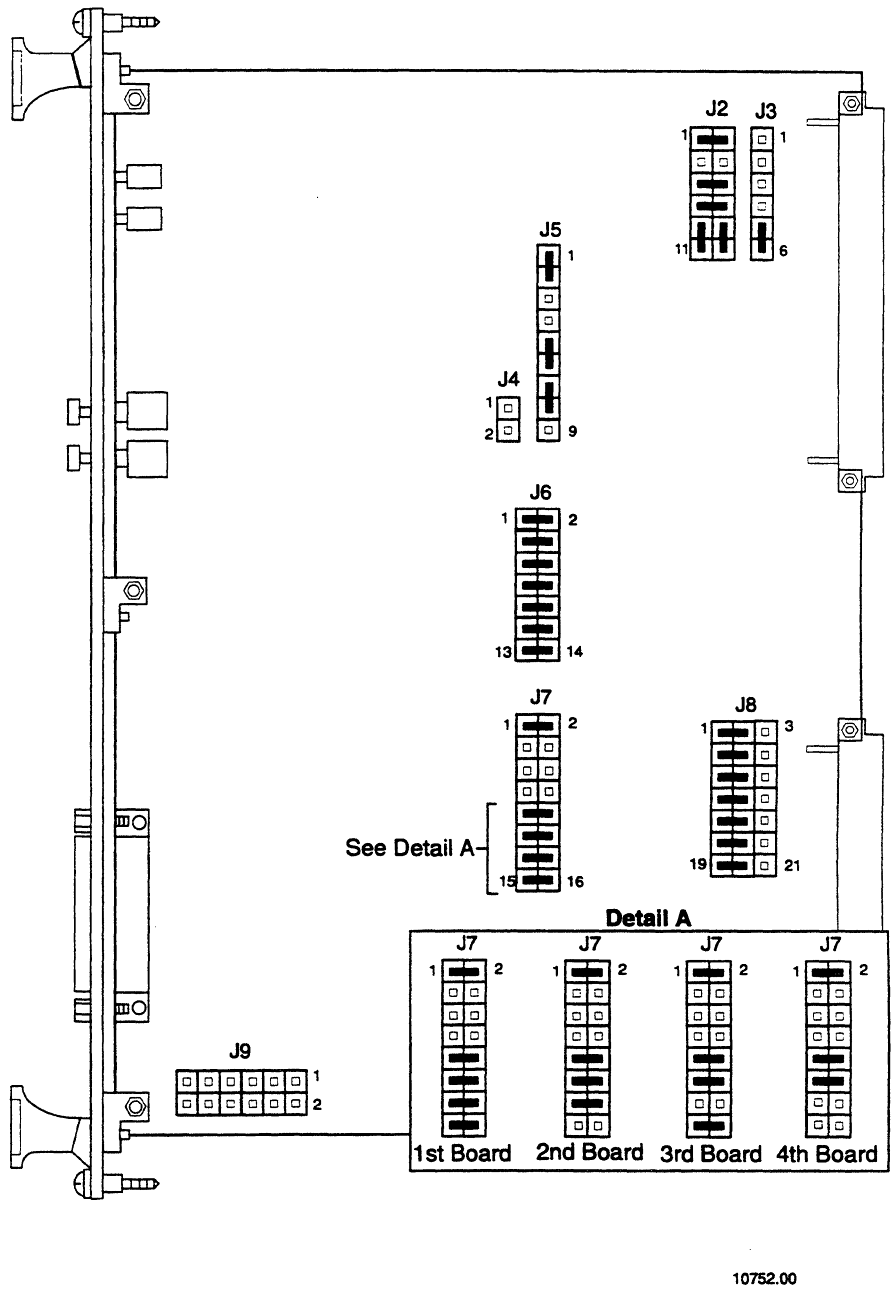
MVME374 Ethernet LAN Controller

The MVME374 is a high performance, VMEbus compatible, Multi-Protocol Ethernet Interface Module that utilizes the AM7990 LANCE chip to provide the MAC layer for an IEEE 802.3 Local Area Network (LAN) node. The MVME374 utilizes an MC68020 MPU to provide the processing power required to efficiently implement ISO-OSI (International Standards Organization - Open Systems Interface) protocol layers 2 through 7 on a single VMEbus board.

The MVME374 Multi-Protocol Ethernet Interface is a complete front end protocol processor which provides connection between an Ethernet network and the VMEbus. To relieve a VMEbus host of protocol burden, the MVME374 can serve as a front end for processing TCP/IP, XNS, DECnet, TOP and other protocols downloaded into its 1MB of shared RAM.

MVME374 Jumper Settings

Header	Description	Setting
J2	VMEbus Grant and Request Level (Level 3)	1-2, 5-6, 7-8, 9-11, 10-12
J3	VMEbus Grant and Request Level (Level 3)	5-6
J4	System Controller Select (Controller Off)	No Jumper
J5	EPROM/EEPROM Device Size (32K x 8)	1-2, 5-6, 7-8
J6	Local Address Line Select (All Lines Used)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J7	Module Base Address Select (See figure for additional boards)	1-2, 9-10, 11-12, 13-14, 15-16
J8	VMEbus Address Line Select (All Lines Used)	1-2, 4-5, 7-8, 10-11, 13-14, 16-17, 19-20
J9	Auxiliary Ethernet Connection (Ethernet Signals Connected to P2) (Ethernet Signals off AUI connector on front)	 1-2, 3-4, 5-6, 7-8, 9-10, 11-12 No Jumpers



MVME374 Jumper Locations

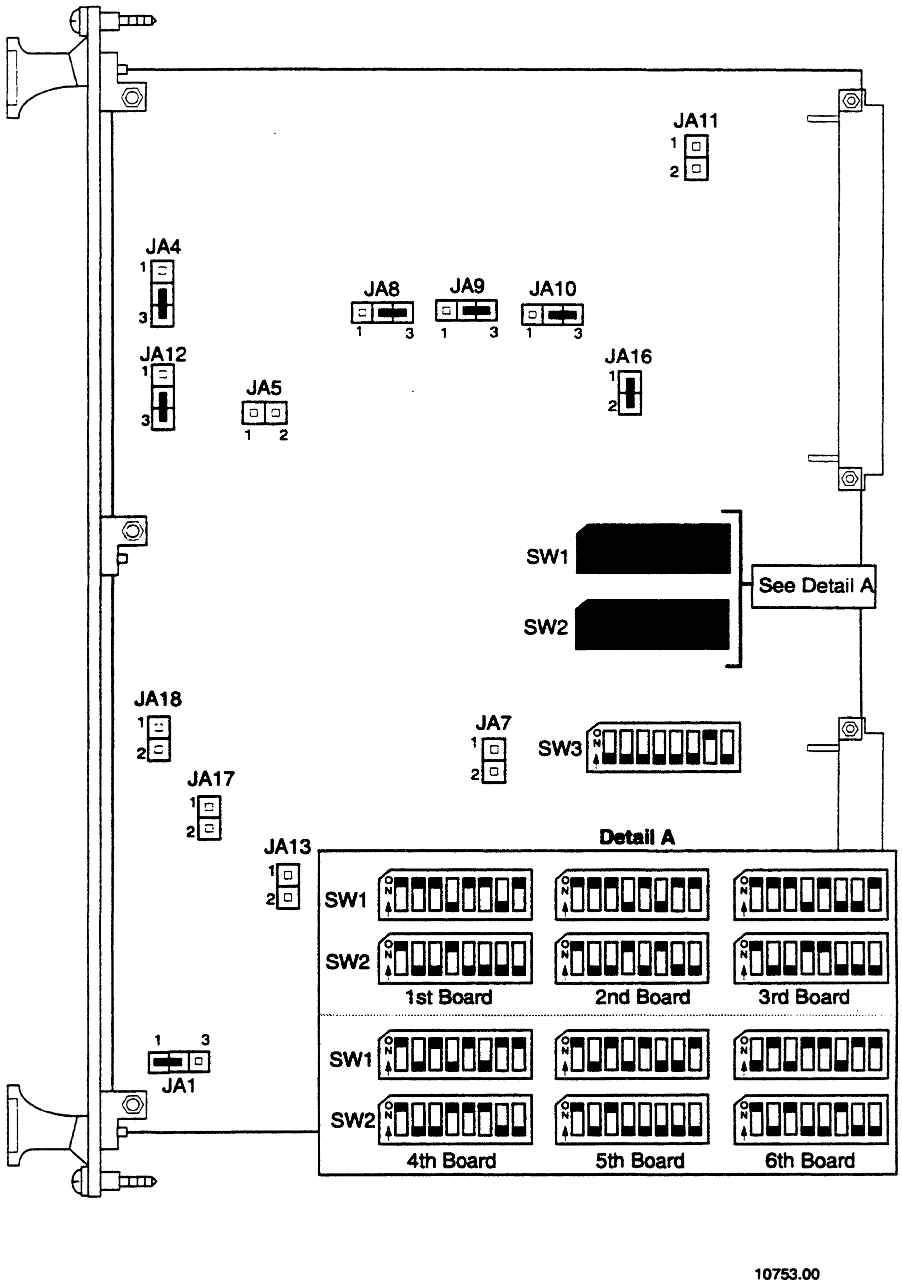
MVME376 Communications Controller

MVME376 Ethernet Communications Controller

The MVME376 is a VMEbus Local Network Controller for Ethernet and other IEEE 802.3 compatible networks. The MVME376 utilizes the combination of an Am7990 Local Area Network Controller for IEEE-802.3/Ethernet (LANCE), an Am7992B Serial Interface Adapter (SIA), and 256KB of dual ported RAM.

MVME376 Jumper Settings

Header	Description	Setting
JA1	+12V transceiver power to AUI connection at J1 connector	1-2
JA4	DTACK timing for VMEbus initiated transfers: fast	2-3
JA5	Reserved for future use	No Jumper
JA7	Factory test point	No Jumper
JA8	Disable special parity error reporting	2-3
JA9	Disable VMEbus reporting of parity error	2-3
JA10	SYSCLOCK signal	2-3
JA11	SYSFAIL to VMEbus disabled	No Jumper
JA12	Parity errors sensed by polling board level status register	2-3
JA13	Half-step signaling AUI interface	No Jumper
JA16	Selects A16 and A32 slave access only; disables A24 slave access	1-2
JA18	AUI connector	No Wire Jumper
SW1		See next figure
SW2		See next figure
SW3		See next figure



MVME376 Jumper Locations

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Industrial I/O Boards

Overview

This section contains information on the MVME500 series of industrial I/O boards that provide solutions for the industrial control market.

Jumper settings and board descriptions are given in this section for the following MVME500 boards:

Module Number	Description
MVME510	Digital Input/Output Board
MVME511	Multi-Function Analog & Digital I/O Board
MVME512-003 and MVME512-004	Analog I/O Boards
MVME512-006	High Speed Analog Input Board

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Industrial I/O

MVME510 Industrial I/O Board

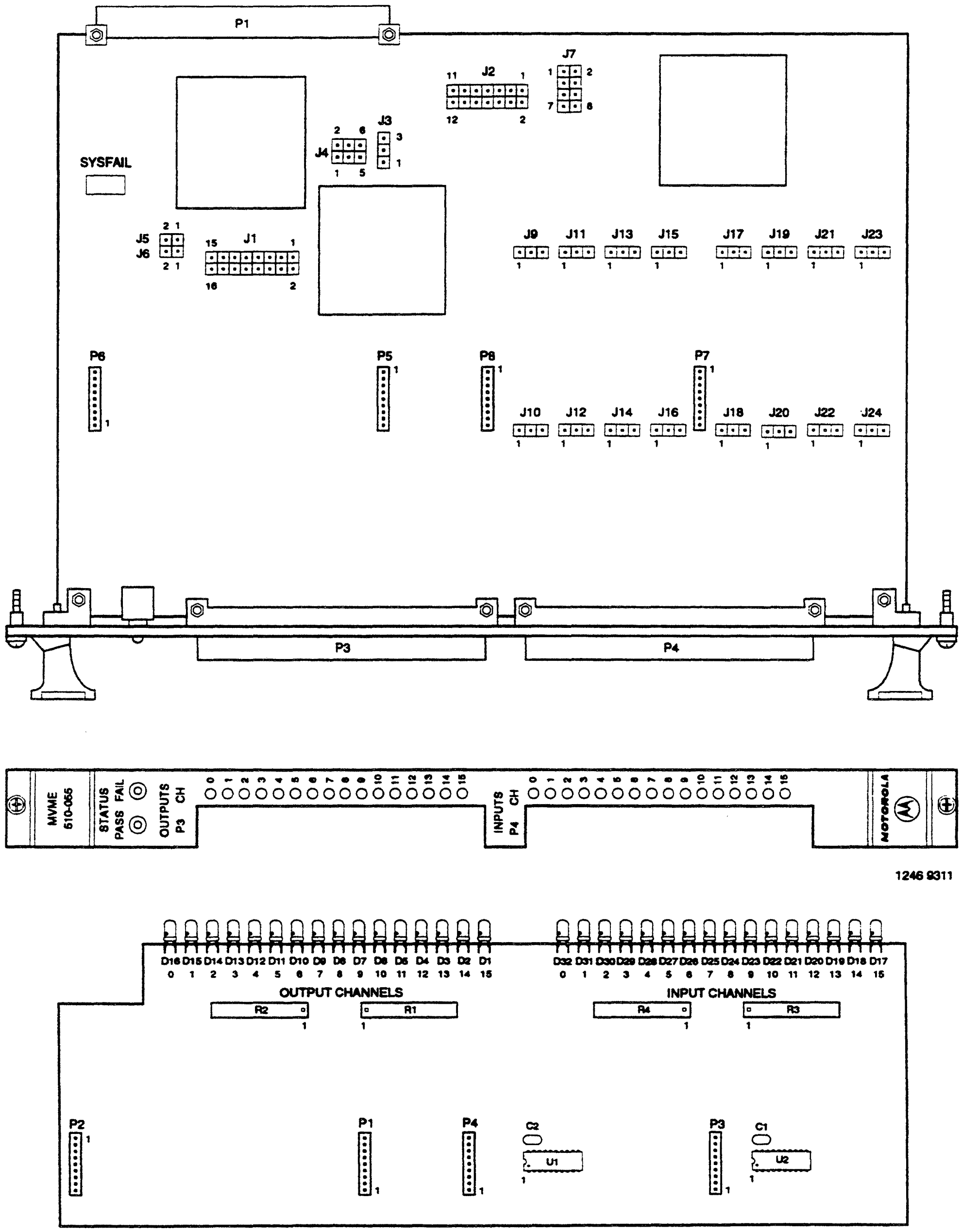
MVME510 Digital Input/Output Board

The MVME510-051 digital I/O board interfaces solid-state or mechanical control relays and other discrete industrial logic devices to the VMEbus. The interfacing is accomplished by providing 64 general purpose I/O points (or lines). Each of the 64 points is selectable as an input, an output, or both depending on the application.

The MVME510-051 can handle inputs from a low range of 0 to 5V DC to a high range of 0 to 30V DC. The host can read each of the points configured as an output.

A variety of features includes host interrupt capability and adjustable input threshold.

Motorola's Digital I/O Board is a stand-alone board and functions as a nonintelligent slave in the short I/O address space on the VMEbus.



Main Board and LED Board Layouts

Digital Input Threshold Selection (J9, J24)

Channel Range	J9-J24 1&2	J9-J24 2&3	Positive Threshold Voltage (Maximum)
4-25 Vdc	OUT	IN	4 Vdc
20-55 Vdc	IN	OUT	20 Vdc

Debounce Delay Selection (J7)

Debounce Delay Time (μs)	Pins of J7			
	1&2	3&4	5&6	7&8
7 to 8	OUT	OUT	OUT	IN
336 to 384	OUT	OUT	IN	OUT
672 to 768	OUT	IN	OUT	OUT
1344 to 1536	IN	OUT	OUT	OUT

Jumper Configuration for Base Address Locations (J2)

Pins of J2						
Base Address	A15 11&12	A14 9&10	A13 7&8	A12 5&6	A11 3&4	A10 1&2
$00000000	OUT	OUT	OUT	OUT	OUT	OUT
$00000400	OUT	OUT	OUT	OUT	OUT	IN
$00000800	OUT	OUT	OUT	OUT	IN	OUT
$00000C00	OUT	OUT	OUT	OUT	IN	IN
$00001000	OUT	OUT	OUT	IN	OUT	OUT
.	.	.	.	.	.	.
.	.	.	.	.	.	.
$0000EC00	IN	IN	IN	OUT	IN	IN
$0000F000	IN	IN	IN	IN	OUT	OUT
$0000F400	IN	IN	IN	IN	OUT	IN
$0000F800	IN	IN	IN	IN	IN	OUT
$0000FC00	IN	IN	IN	IN	IN	IN

Address Modifier Selection (J3, J5, J6)

J3 1&2	J3 2&3	J5 1&2	J6 1&2	Address Modifier Code/Function
OUT	IN	OUT	IN	$2D Only Short Supervisory Access
OUT	IN	IN	IN	$2D and $29 Short Supervisory Access and Short Non-privileged Access
IN	OUT	OUT	OUT	$3D Only Standard Supervisory Data Access
IN	OUT	IN	OUT	$3D and $39 Standard Supervisory Data Access and Standard Non-privileged Data Access

Interrupt Level Jumper Configuration (J4)

Interrupt Level	Pins of J4		
	5 & 6	3 & 4	1 & 2
None	OUT	OUT	OUT
1	OUT	OUT	IN
2	OUT	IN	OUT
3	OUT	IN	IN
4	IN	OUT	OUT
5	IN	OUT	IN
6	IN	IN	OUT
7	IN	IN	IN

Jumper Configuration for Base Address Locations (J1)

Pins of J1								
Base Address	A23 15&16	A22 13&14	A21 11&12	A20 9&10	A19 7&8	A18 5&6	A17 3&4	A16 1&2
$00000000	OUT	OUT	OUT	OUT	OUT	OUT	OUT	OUT
$00010000	OUT	OUT	OUT	OUT	OUT	OUT	OUT	IN
$00020000	OUT	OUT	OUT	OUT	OUT	OUT	IN	OUT
$00030000	OUT	OUT	OUT	OUT	OUT	OUT	IN	IN
.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.
$00FC0000	IN	IN	IN	IN	IN	IN	OUT	OUT
$00FD0000	IN	IN	IN	IN	IN	IN	OUT	IN
$00FE0000	IN	IN	IN	IN	IN	IN	IN	OUT
$00FF0000	IN	IN	IN	IN	IN	IN	IN	IN

Industrial I/O

MVME511 Industrial I/O Board

MVME510 Multi-Function Analog & Digital I/O Boards

The MVME511-051 and MVME511-052 economically interface both digital and analog I/O signals to the VMEbus. They offer an ideal solution for a wide variety of measurement and control applications where card cage space is limited.

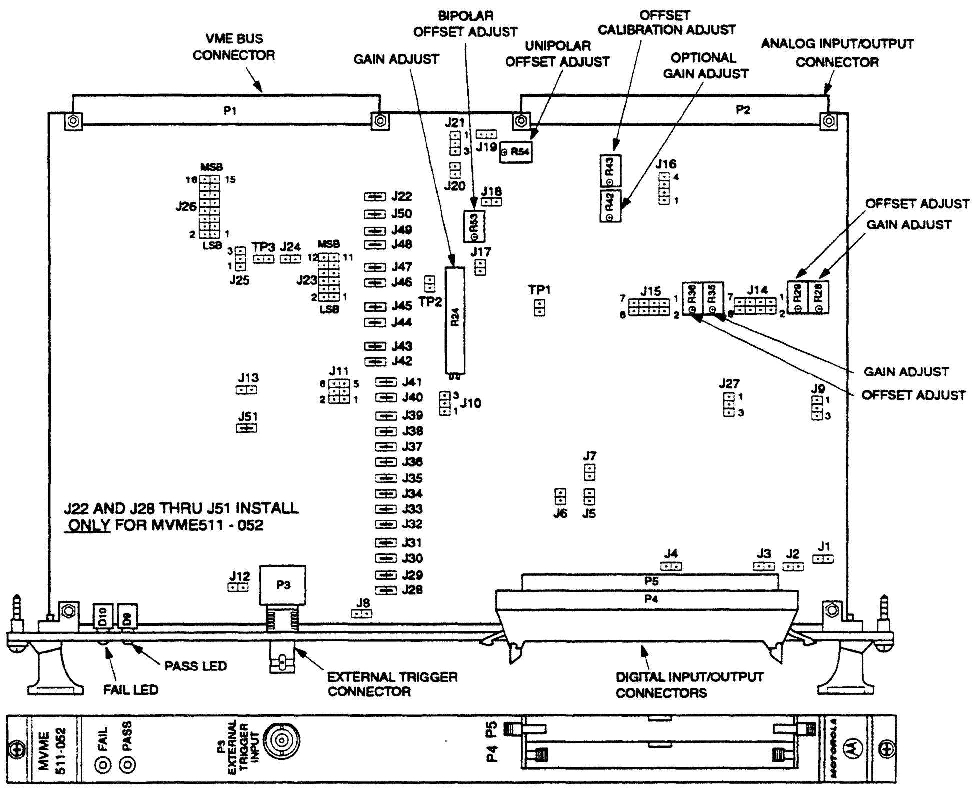
Digital points are configured as four 8-bit data ports. Each point is individually programmable as either an input or an output. The input points provide the ability to read back the output states. When using the internal power supply, an optional pull-up resistor network pulls the digital I/O lines to +5V.

Nine unique analog input ranges allow a wide variety of signal inputs. Three input ranges are jumper selectable for all channels. Four programmable gains, selectable on an individual channel basis, enable configuration for additional ranges. Three data format options provide versatile host computer data handling.

Two channel selection schemes offer single channel conversion or the scanning of a group of consecutive channels. Conversions may be initiated in three different ways. A software trigger provides host computer control while an internal timer can be programmed for precision timing intervals to generate periodic triggers. The BNC connector on the front panel allows triggering synchronized to external events. End of conversion is reported through a status register and/or interrupts, if enabled.

Two output channels generate high-level voltage signals for control applications. Each channel has its own 12-bit D/A converter and jumper-selectable output ranges. Several format options for the data written to the converters provide user-flexibility. Analog inputs and outputs are connected to the boards via the P2 connector.

The MVME511-051 adds optical isolation to the otherwise identical model MVME511-052. This safety feature isolates all analog and digital I/O as a group from the VMEbus to eliminate ground loop errors and provide protection from transient signals.



J16, J6 Analog Input Type

Configuration	Connect Pins of J16	Connect Pins of J6	Channel Address
16 Channel Differential	2 and 3	None	0 through 15
32 Channel Single-Ended	1 and 2, 3 and 4	1 and 2	0 through 31

J17, J19 Live End Points of Span Configuration

Desired Span Configuration	Connect Pins of J17	Connect Pins of J19
Non-Live End Point	1 and 2	None
Live End Point Unipolar	1 and 2	1 and 2
Live End Point Bipolar	None	None

J9, J27 Analog Output Data Format

Data Format	Analog Output Range	Connect Pins of J9 or J27
USB	Unipolar	1 and 2
BOB	Bipolar	1 and 2
BTC	Bipolar	2 and 3

Jumper Locations and Settings

MVME512-003 & 512-004 Industrial I/O Board

MVME512-003 & MVME512-004 Analog I/O Boards

The MVME512-003 and MVME512-004 combine speed and resolution to interface analog input signals to the VMEbus for a wide spectrum of laboratory and industrial applications. They are designed for data collection applications requiring high resolution (16-bit) and high accuracy (14-bit).

The MVME512-003 is ideally suited to applications using external signal conditioning where high-resolution A/D conversion is needed.

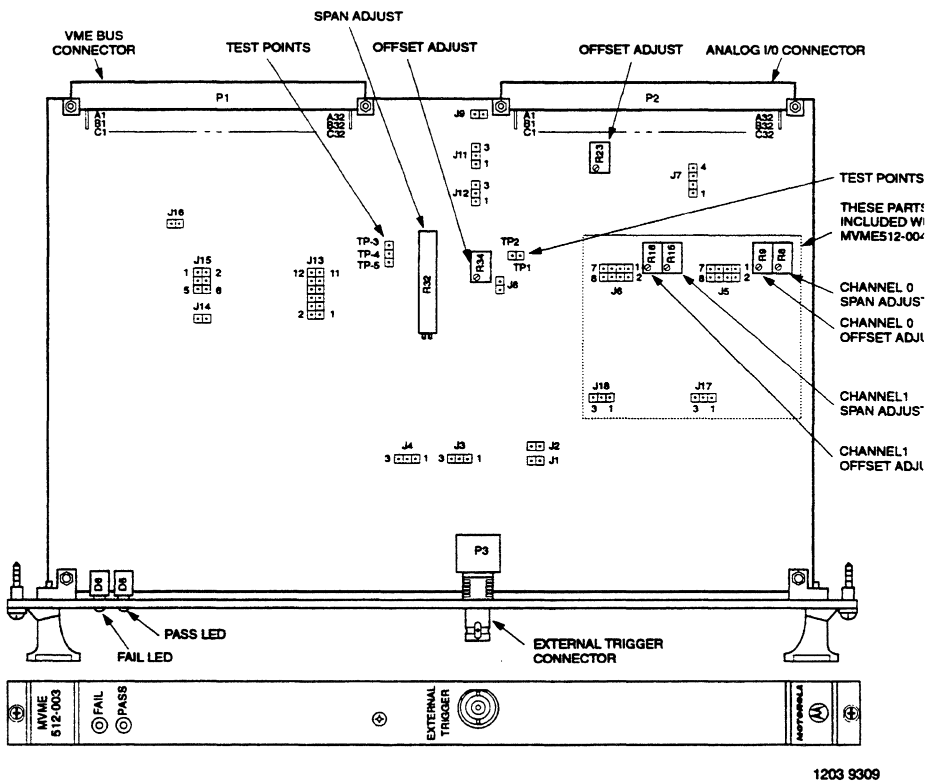
Two channel selection schemes and three trigger sources offer operational flexibility and high throughput. In the individual channel mode the input channel defined by the user undergoes an A/D conversion for each conversion trigger. The sequential scanning mode automatically increments to the next input channel after each conversion to eliminate host processing time.

Software and hardware trigger sources are generated directly by the user for precise synchronization with individual external events. An internal programmable timer provides self-triggering for scanning and precise interval timing without host intervention.

The board features nine unique input ranges selectable with three jumper positions and four programmable gains (±10, ±5, ±2.5, ±1.25, ±.625, 0 to 1.25, 0 to 2.5, 0 to 5, and 0 to 10V).

The programmable gain is selectable on an individual channel basis. Zero drift correction circuitry allows the user, on command, to short the input signal and read and store any value present. This value can then be used to correct measured inputs-thus eliminating the entire effect of offset errors, drifts, etc.

The MVME512-004 provides the same analog input capability as the MVME512-003 with the added capability of two high-speed analog output channels. The high-level output signals can be used for driving a wide range of external devices. Each channel performs digital-to-analog conversions in 7µS. There are five jumper-selectable output ranges up to ±10 volts with short circuit protection.



Analog Output Range Jumper Configuration (J5 or J6)

Output Voltage Range	Pins of J5 or J6					
	1&2	2&4	3&4	3&5	5&6	5&7
±10 V	OUT	IN	OUT	IN	OUT	OUT
±5 V	IN	OUT	OUT	IN	OUT	OUT
±2.5 V	IN	OUT	IN	OUT	OUT	IN
0 to +5 V	IN	OUT	IN	OUT	IN	OUT
0 to +10 V	IN	OUT	OUT	OUT	IN	OUT

Analog Input "Live" End Points Of Span Configuration (J8 and J9)

Desired Span Configuration	Connect Pins of J8	Connect Pins of J9
Non-Live End Point	1 and 2	None
Live End Point Unipolar	1 and 2	1 and 2
Live End Point Bipolar	None	None

Address Modifier Selection (J16)

Configuration	Connect Pins of J16
Short I/O Supervisory Access ($2D)	None
Short I/O Supervisory Access ($2D) and Non-privileged ($29) Access	1 and 2

Jumper Locations and Settings

Industrial I/O

Bipolar/Unipolar Output and Straight Binary/Two's Compliment Data Selector (J3, J17 & J18)

Jumper	Bipolar Output				Unipolar Output	
	Resets To Zero Volts		Resets To Minus Full Scale		Resets To Zero Volts	
Data	SB	2C	SB	2C	SB	2C
J3	1 & 2	2 & 3	2 & 3	1 & 2	2 & 3	1 & 2
J17, J18	1 & 2	1 & 2	2 & 3	2 & 3	2 & 3	2 & 3

SB = Straight Binary Data 2C = Two's Compliment Data

Interrupt Level Select Jumper Configuration (J15)

Interrupt Level	Pins of J15		
	1and 2	3 and 4	5 and 6
None	OUT	OUT	OUT
1	OUT	OUT	IN
2	OUT	IN	OUT
3	OUT	IN	IN
4	IN	OUT	OUT
5	IN	OUT	IN
6	IN	IN	OUT
7	IN	IN	IN

Analog Input Type Jumper Configuration (J7 and J14)

Configuration	Connect Pins of J7	Connect Pins of J14	Channel Address
16 Channel Differential	2 and 3	None	0 through 15
32 Channel Single-Ended	1 and 2, 3 and 4	1 and 2	0 through 31

Analog Input Range Jumper Configuration (J11, J12)

Configuration (at Gain = x1)	Connect Pins of J11	Connect Pins of J12
±5 V Bipolar	2 and 3	1 and 2
±10 V Bipolar	2 and 3	2 and 3
0 to +10 V Unipolar	1 and 2	1 and 2

Analog Input Data Format Jumper Configuration (J4)

Desired Data Format	Analog Input Range	Connect Pins of J4
USB	Unipolar	2 and 3
BOB	Bipolar	2 and 3
BTC	Bipolar	1 and 2

Jumper Configuration for Base Address Locations (J13)

	Pins of J13					
Base Address	A15 11 & 12	A14 9 & 10	A13 7 & 8	A12 5 & 6	A11 3 & 4	A10 1 & 2
$0000	OUT	OUT	OUT	OUT	OUT	OUT
$0400	OUT	OUT	OUT	OUT	OUT	IN
$0800	OUT	OUT	OUT	OUT	IN	OUT
$0C00	OUT	OUT	OUT	OUT	IN	IN
$1000	OUT	OUT	OUT	IN	OUT	OUT
.	.	.	.	.	.	.
.	.	.	.	.	.	.
$EC00	IN	IN	IN	OUT	IN	IN
$F000	IN	IN	IN	IN	OUT	OUT
$F400	IN	IN	IN	IN	OUT	IN
$F800	IN	IN	IN	IN	IN	OUT
$FC00	IN	IN	IN	IN	IN	IN

Industrial I/O

MVME512-006 Industrial I/O Board

MVME512-006 High Speed Analog Input Board

The MVME512-006 provides a means for interfacing analog input signals to the VMEbus. On-board RAM enables high-speed data acquisition, up to 200,000 samples per second, without monopolizing the VMEbus bandwidth. A/D conversions are performed without host processing by storing data samples in the dual port RAM. Thus, the host computer and VMEbus are able to perform other functions at maximum efficiency.

Interrupt Level Select Jumper Configuration (J7)

Interrupt Level	Pins of J7: 1 and 2	3 and 4	5 and 6
None	OUT	OUT	OUT
1	IN	OUT	OUT
2	OUT	IN	OUT
3	IN	IN	OUT
4	OUT	OUT	IN
5	IN	OUT	IN
6	OUT	IN	IN
7	IN	IN	IN

Analog Input Range Jumper Configuration (J3, J4, J5)

Configuration (at Gain = x1)	Connect Pins of J3	Connect Pins of J4	Connect Pins of J5
±5V Bipolar	2 and 3	2 and 3	None
±10V Bipolar	2 and 3	1 and 2	None
0V to +10V Unipolar	1 and 2	2 and 3	1 and 2

Jumper Configuration for Base Address Locations (J9)

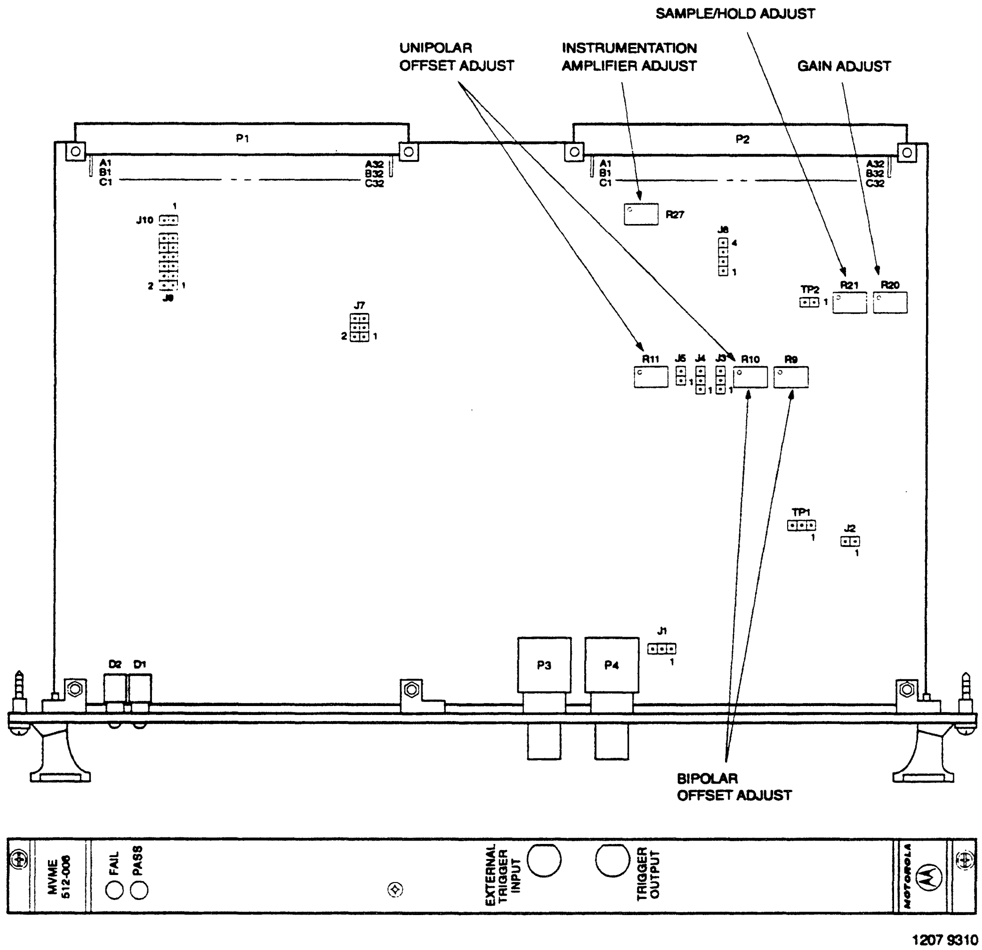
	Pins of J9					
Base Address	A23 11 & 12	A22 9 & 10	A21 7 & 8	A20 5 & 6	A19 3 & 4	A18 1 & 2
$000000	OUT	OUT	OUT	OUT	OUT	OUT
$040000	OUT	OUT	OUT	OUT	OUT	IN
$080000	OUT	OUT	OUT	OUT	IN	OUT
$0C0000	OUT	OUT	OUT	OUT	IN	IN
$100000	OUT	OUT	OUT	IN	OUT	OUT
.	.	.	.	.	.	.
.	.	.	.	.	.	.
$EC0000	IN	IN	IN	OUT	IN	IN
$F00000	IN	IN	IN	IN	OUT	OUT
$F40000	IN	IN	IN	IN	OUT	IN
$F80000	IN	IN	IN	IN	IN	OUT
$FC0000	IN	IN	IN	IN	IN	IN

J10 Address Modifier Selection

Open	Standard Supervisory data access, $3D, only
Closed	Standard Supervisory data access, $3D, or Standard Non-privileged data access. $39

Analog Input Type Jumper Configuration (J8 and J2)

Configuration	Connect Pins of J8	Connect Pins of J2	Channel Address
16-Channel Differential	2 and 3	None	0 through 15
32-Channel Single-Ended	1 and 2, 3 and 4	1 and 2	0 through 31



MVME512-006 Jumper Locations and Settings

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Transition Modules and Modems

Overview

This section contains information on the MVME700 series of components that provide connectivity or access to the resources supplied by other boards in the system.

Transition modules are connected (typically by some kind of cable) to their corresponding CPU or I/O Controller board. The MVME100 or 300 series boards provide the resource, and the MVME700 component provides the physical access to the resource by supplying the appropriate connector.

Unlike the MVME100, 200, or 300 series boards, which reside in the VME card cage of the system enclosure and connect to the backplane, the MVME700 series components reside in a separate card cage in the back or rear of the system enclosure.

The following components are illustrated in this section:

Module Number	Description	Associated Module	Slots
MVME705-1	3-Port Serial Transition Board	MVME333X25	1
MVME705A	6-Port Serial Transition Board	MVME333/X25	2
MVME705B	3-Port Serial Transition Board	MVME333X25	1
MVME709-1	3-Port Serial Transition Board	MVME334A	1
MVME710B	Serial Port Transition Board	MVME332XT	2
MVME712-06, MVME712-07, MVME712-09	Distribution Board Set	MVME166	1
MVME712-12, MVME712-13	Serial/Modem Port Transition Board	MVME1*xx* family VMEmodules	1
MVME712A MVME712AM	Serial/Modem Port Transition Board	MVME1*xx* family VMEmodules	1
MVME712B	Ethernet/SCSI Adapter	MVME1*xx* family VMEmodules	1
MVME712C	Thinnet Transition Board	MVME1*xx* family VMEmodules	1
MVME712M	Serial Port Transition Board	MVME1*xx* family VMEmodules	1
P2 Adaptor	Transition Adapter	MVME1*xx* family VMEmodules	
MVME714/M	Serial I/O Distribution Module	MVME1*xx* family VMEmodules	1
MVME715P	4-Port Serial Transition Board	MVME335	2

Transition

Transition Modules and Modems

Module Number	Description	Associated Module	Slots
MVME732 MVME733	Remote Service Modem	None; connect to MVME712A	0 1
MVSB741	I/O Engine Transition Board	MVME337-1	1
MVME751	Serial Port Transition Board	MVME336	2
MVME760	2-Port Serial Transition Module	MVME16xx family	1
no number	338 Transition Assembly	MVME338	0

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Transition

MVME705-1 Serial Transceiver Module

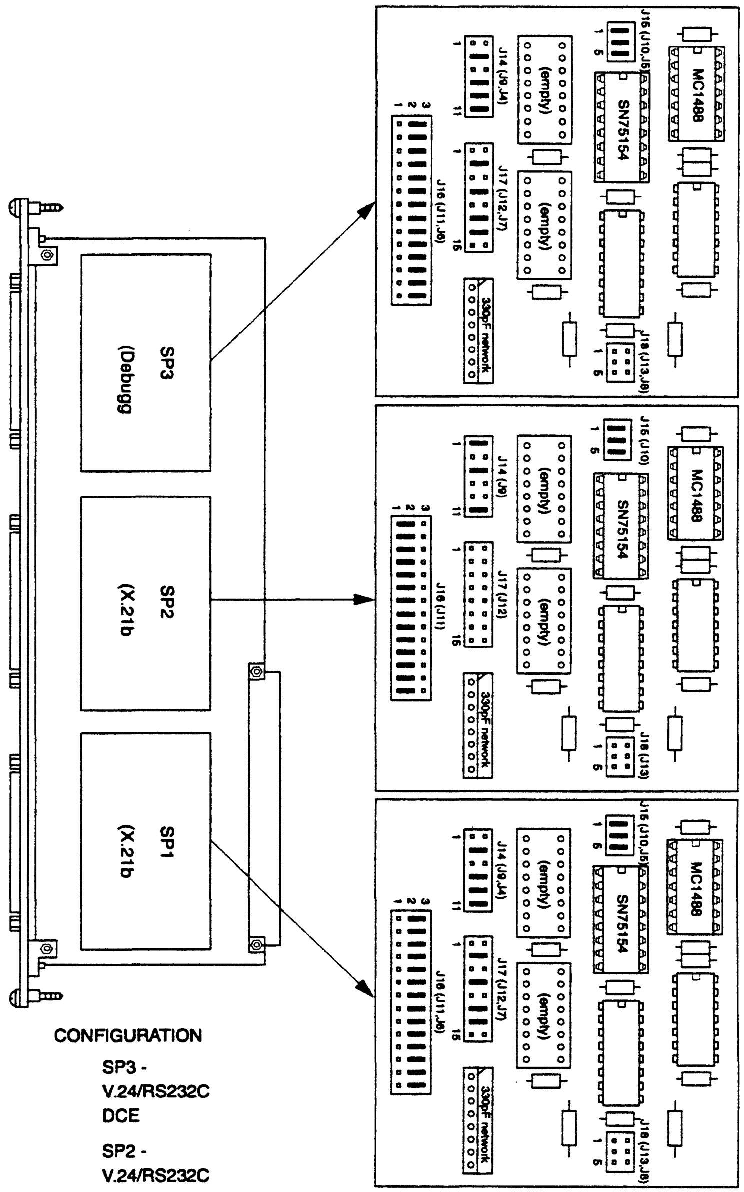
MVME705-1 3-Channel Serial Transceiver Module

The MVME705-1 3-Channel Serial Transceiver Module provides the receiver and transmitter circuits for converting the I/O signals of the MVME333X25 X.25 Communications Controller to the EIA-232-D and/or the EIA-422-B standard for serial data communications.

The MVME705-1 is connected to the MVME333X25 module via a DIN 41612 C64 connector and a 64-conductor flat ribbon cable. Three standard 25-pin subminiature D-type connectors are mounted on the front panel for attachment of serial peripherals.

Table 4-1. MVME705-1 Jumper Settings

Serial Port	Header	Setting
3	J14 (J9, J4)	3-4, 7-8, 9-10, 11-12
	J15 (J10, J5)	1-2, 3-4, 5-6
	J16 (J11, J6)	2-3, 5-6, 8-9, 11-12, 14-15, 17-18, 20-21, 23-24, 26-27, 29-30, 32-33, 35-36, 38-39, 41-42
	J17 (J12, J7)	3-4, 7-8, 11-12, 13-14
	J18 (J13, J8)	No Jumpers
2	J14 (J9)	1-2, 5-6, 11-12
	J15 (J10)	1-2, 3-4, 5-6
	J16 (J11)	1-2, 4-5, 7-8, 10-11, 13-14, 16-17, 19-20, 22-23, 25-26, 28-29, 31-32, 34-35, 37-38, 40-41
	J17 (J12)	No Jumpers
	J18 (J13)	No Jumpers
1	J14 (J9, J4)	3-4, 7-8, 9-10, 11-12
	J15 (J10, J5)	1-2, 3-4, 5-6
	J16 (J11, J6)	2-3, 5-6, 8-9, 11-12, 14-15, 17-18, 20-21, 23-24, 26-27, 29-30, 32-33, 35-36, 38-39, 41-42
	J17 (J12, J7)	3-4, 7-8, 11-12, 13-14
	J18 (J13, J8)	No Jumpers



MVME705-1 Jumper Header Locations

MVME705A Serial Transceiver Module

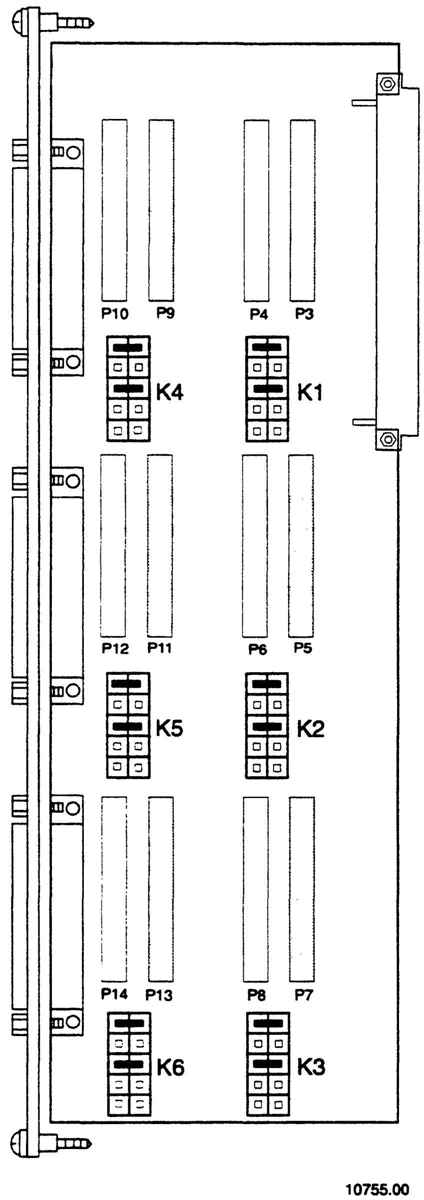
MVME705A 6-Channel Serial Transceiver Module

The MVME705A 6-Channel Serial Transceiver Module provides the receiver and transmitter circuits for converting the I/O signals of the MVME333 Intelligent WAN Controller to the RS-232C and/or the RS-422B standard for serial data communications.

The serial port connectors on the front panel are connected to the printed circuit board via 26-pole flat ribbon cables which are terminated with 26-pole connectors at the PCB end. All serial connector signals for each channel on the PCB are fed in parallel to two 26-pole connector sockets. Insertion of the plug from the serial connector into one of these sockets configures the channel as DCE for connecting terminals or printers, while insertion into the other socket configures the channel as DTE for connecting modems or host computers.

MVME705A Jumper Settings

Header	Description	Setting
K1, K2, K3 K4, K5, K6	DTE	1-2, 5-6



MVME705A Jumper Locations

MVME705B Serial Transceiver Module

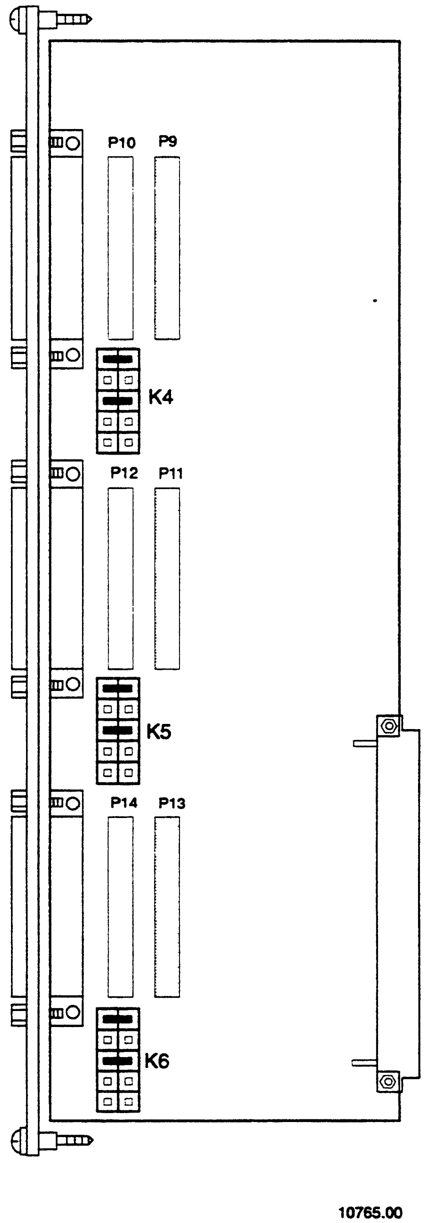
MVME705B 3-Channel Serial Transceiver Module

The MVME705B 3-Channel Serial Transceiver Module provides the receiver and transmitter circuits for converting the I/O signals of the MVME333X25 X.25 Communications Controller to the RS-232C and/or the RS-422B standard for serial data communications.

The serial port connectors on the front panel are connected to the printed circuit board via 26-pole flat ribbon cables which are terminated with 26-pole connectors at the PCB end. All serial connector signals for each channel on the PCB are fed in parallel to two 26-pole connector sockets. Insertion of the plug from the serial connector into one of these sockets configures the channel as DCE for connecting terminals or printers, while insertion into the other socket configures the channel as DTE for connecting modems or host computers.

MVME705B Jumper Settings

Header	Setting
K4, K5, K6	1-2, 5-6



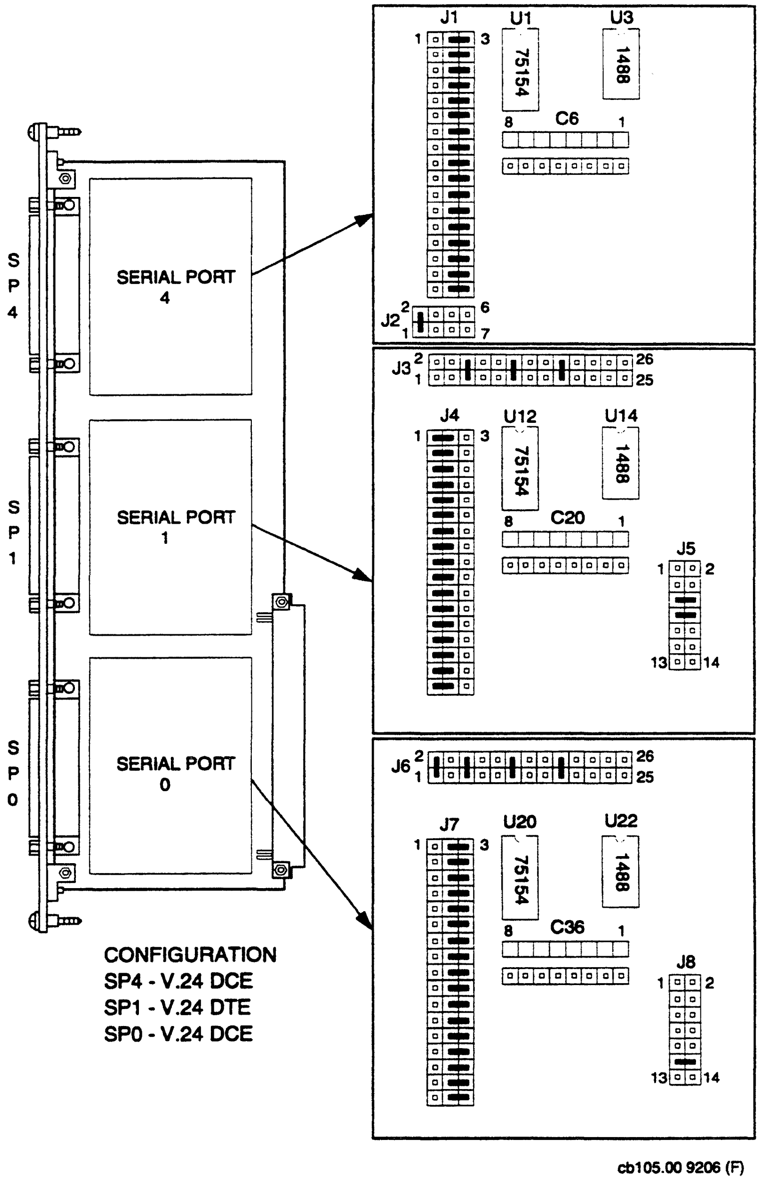
MVME705B Jumper Locations

MVME709-1 Transition Module

MVME709-1 Three Channel Transition Module

The MVME709-1 supports three serial channels as serial ports 0, 1, and 4.

The MVME709-1 provides the transmitter and receiver drivers for converting the TTL level peripheral input/output signals of the MVME334A module to the V.24 or the V.35 standard for the serial channels.



MVME709-1 Jumper Locations

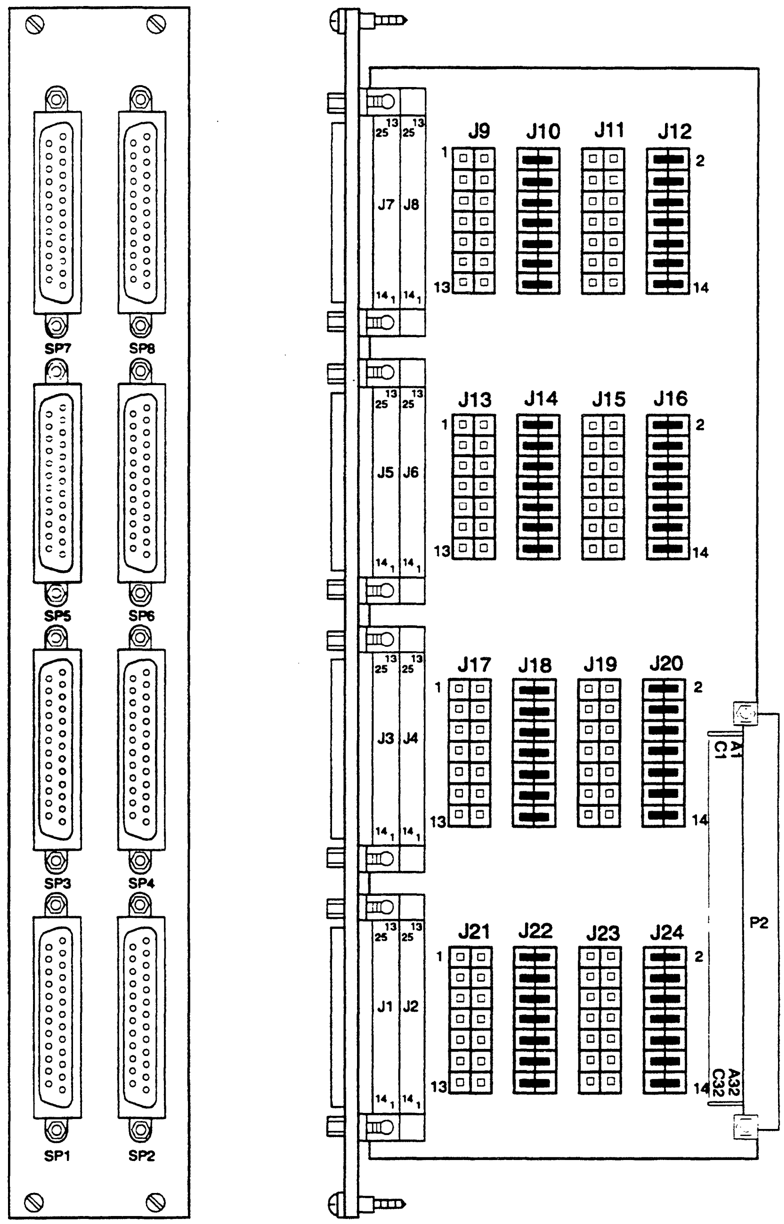
MVME710B Serial Port Transition Board

The MVME710B provides an adapter between the serial I/O cable connectors and the MVME332XT Serial I/O controller. Each of the eight serial ports on the MVME710B can be configured either DCE for connection to a terminal or DTE for connection to a modem. The MVME710B connects via a ribbon cable to P2 of the MVME332XT.

In this system, all eight ports (J1 through J8) of the MVME710B are configured DTE. To connect for DCE, move the associated jumpers to the header labeled "No Jumpers" (see table below).

MVME710B Jumper Settings (DTE)

Header	Description	Setting
J9	DCE/DTE Select	No Jumpers
J10	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J11	DCE/DTE Select	No Jumpers
J12	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J13	DCE/DTE Select	No Jumpers
J14	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J15	DCE/DTE Select	No Jumpers
J16	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J17	DCE/DTE Select	No Jumpers
J18	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J19	DCE/DTE Select	No Jumpers
J20	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J21	DCE/DTE Select	No Jumpers
J22	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J23	DCE/DTE Select	No Jumpers
J24	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14



MVME710B Jumper Locations

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MVME712-06, -07, and -09 I/O Distribution Board Set

The I/O Distribution Board Set, consisting of the MVME712-06 Quad Serial Port Transition Board, MVME712-07 I/O Transition Board, and MVME712-09 Transition Distribution Board, are used together as I/O transition modules for Motorola's MVME166 Single Board Computer VMEmodules and their peripheral devices.

Two four-foot long cables are furnished with the I/O Distribution Board Set: a 68-pin SCSI P cable and a 100-pin I/O cable. The cables are "high density" 25 mil flat ribbon cable. They are to be connected on one end to the front panel of the MVME166 using high density connectors, routed into the chassis, and connected on the other end to the Transition Distribution Board using Mini Wiremount (3M) connectors.

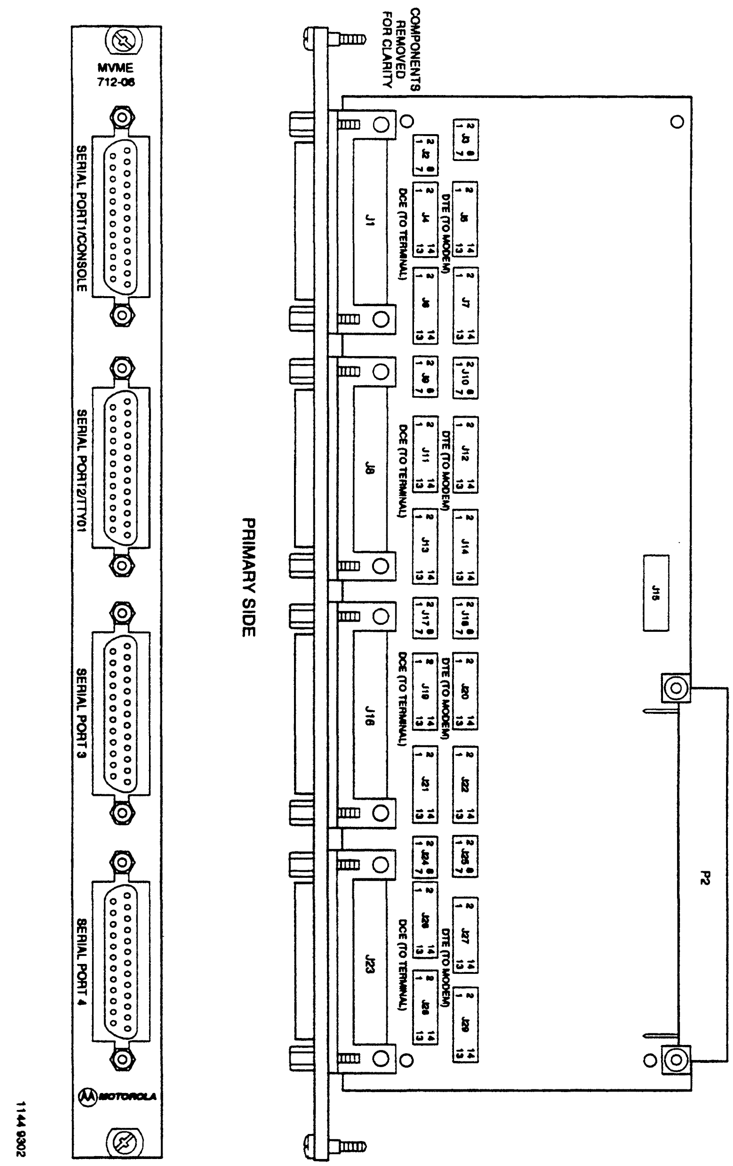
The Transition Distribution Board connects directly to both the Quad Serial Transition Board and the I/O Transition Board through DIN connectors.

For modem applications, serial port number two of the Quad Serial Transition Board can be used. A set of jumpers can be populated on the Quad Serial Port Transition Board, routing the appropriate port two signal lines across the Distribution Board and to the optional modem on the I/O Transition Board. If this is done, serial port two is used for modem operation.

MVME712-06 Quad Serial Port Transition Board

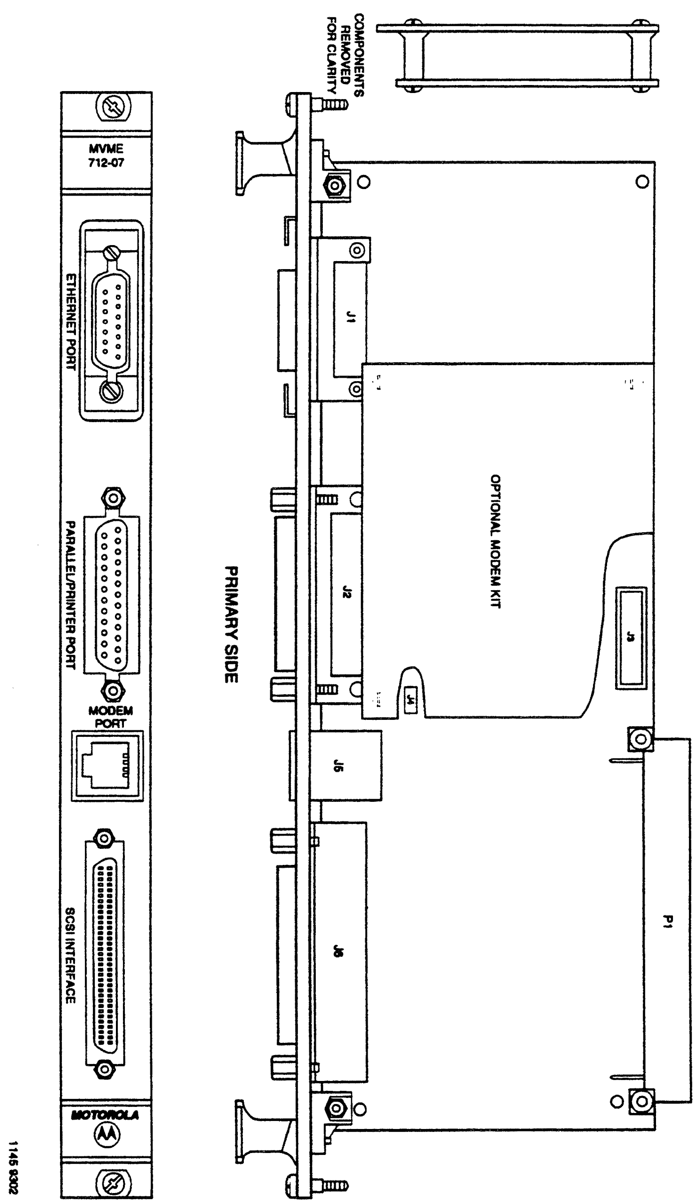
MVME712-06 Jumper Settings

Header	Description	Setting
J2	Port 1 DTE/DCE Select (DTE operation)	No jumpers
J3	Port 1 DTE/DCE Select (DTE operation)	No jumpers
J4	Port 1 DTE/DCE Select (DTE operation)	No jumpers
J5	Port 1 DTE/DCE Select (DTE operation)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J6	Port 1 DTE/DCE Select (DTE operation)	No jumpers
J7	Port 1 DTE/DCE Select (DTE operation)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J9	Port 2 DTE/DCE Select (DTE operation)	No jumpers
J10	Port 2 DTE/DCE Select (DTE operation)	No jumpers
J11	Port 2 DTE/DCE Select (DTE operation)	No jumpers
J12	Port 2 DTE/DCE Select (DTE operation)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J13	Port 2 DTE/DCE Select (DTE operation)	No jumpers
J14	Port 2 DTE/DCE Select (DTE operation)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J15	Port 2 Serial/Modem Select	No jumpers
J17	Port 3 DTE/DCE Select (DTE operation)	No jumpers
J18	Port 3 DTE/DCE Select (DTE operation)	No jumpers
J19	Port 3 DTE/DCE Select (DTE operation)	No jumpers
J20	Port 3 DTE/DCE Select (DTE operation)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J21	Port 3 DTE/DCE Select (DTE operation)	No jumpers
J22	Port 3 DTE/DCE Select (DTE operation)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J24	Port 4 DTE/DCE Select (DTE operation)	No jumpers
J25	Port 4 DTE/DCE Select (DTE operation)	No jumpers
J26	Port 4 DTE/DCE Select (DTE operation)	No jumpers
J27	Port 4 DTE/DCE Select (DTE operation)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J28	Port 4 DTE/DCE Select (DTE operation)	No jumpers
J29	Port 4 DTE/DCE Select (DTE operation)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14



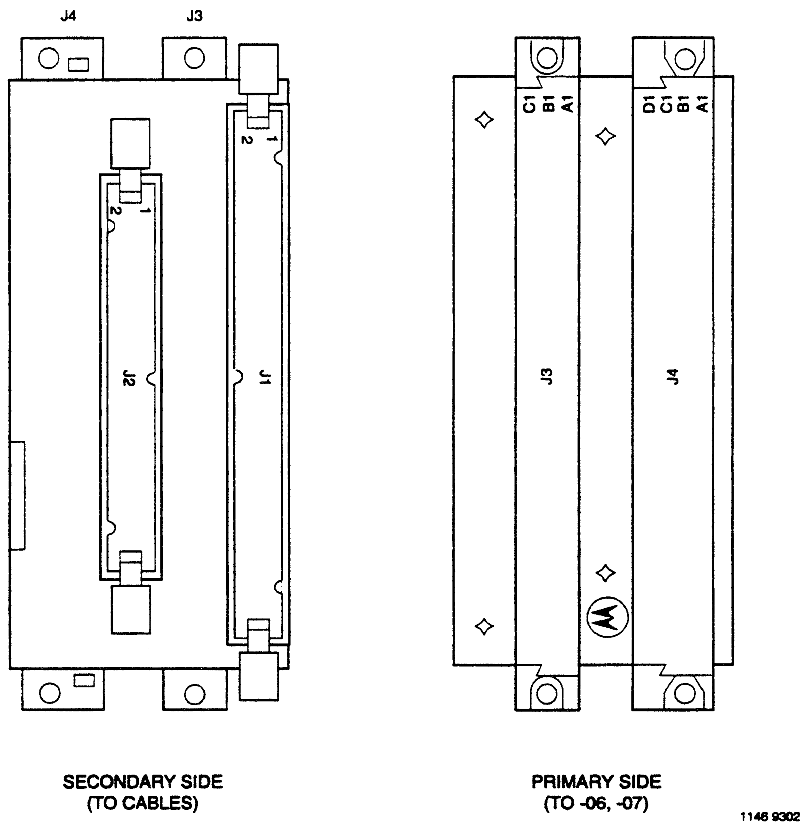
MVME712-06 Header and Connector Locations

MVME712-07 Transition Board



MVME712-07 Connector Locations

MVME712-09 Transition Distribution Board



MVME712-09 Connector Locations

MVME712-12, -13, A, and AM Transition Modules

The MVME712*x* modules are used as the interface between MVME1*xx* family VMEmodules (such as the MVME167 and MVME197) and their internally connected SCSI peripheral devices.

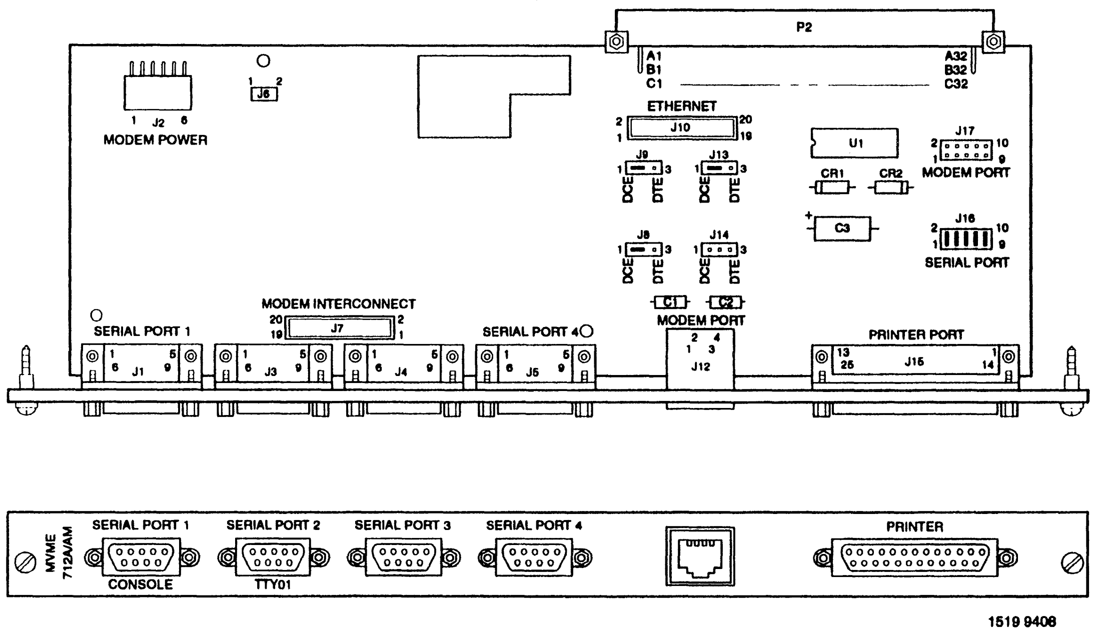
The MVME712B is designed to be used only *in conjunction with* an MVME712*x* board for external SCSI and/or Ethernet connections.

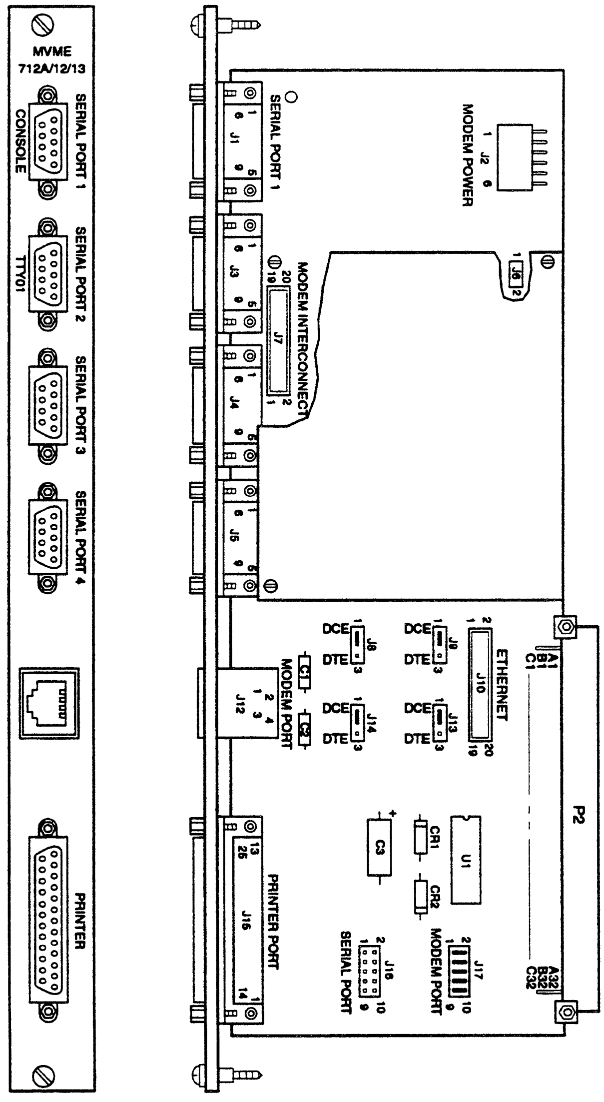
An LCP2 adapter module and a cable are supplied for interconnection between the MVME712 family module and the MVME1*xx* family VMEmodule.

MVME712-12, 13, A, AM, B and C Transition Modules

Header	Description	Setting
J8	DSR Line Pull Up, Port 3	1-2
J9	DSR Line Pull Up, Port 2	1-2
J13	DSR Line Pull Up, Port 1	1-2
J14	DSR Line Pull Up, Port 4	1-2
J16	Serial Port 2 Select Configuration (No Modem- MVME712A)	1-2, 3-4, 5-6, 7-8, 9-10
J17	Modem Port Configuration (With MVME732 modem - MVME712AM)	1-2, 3-4, 5-6, 7-8, 9-10

MVME712-12 Header Locations





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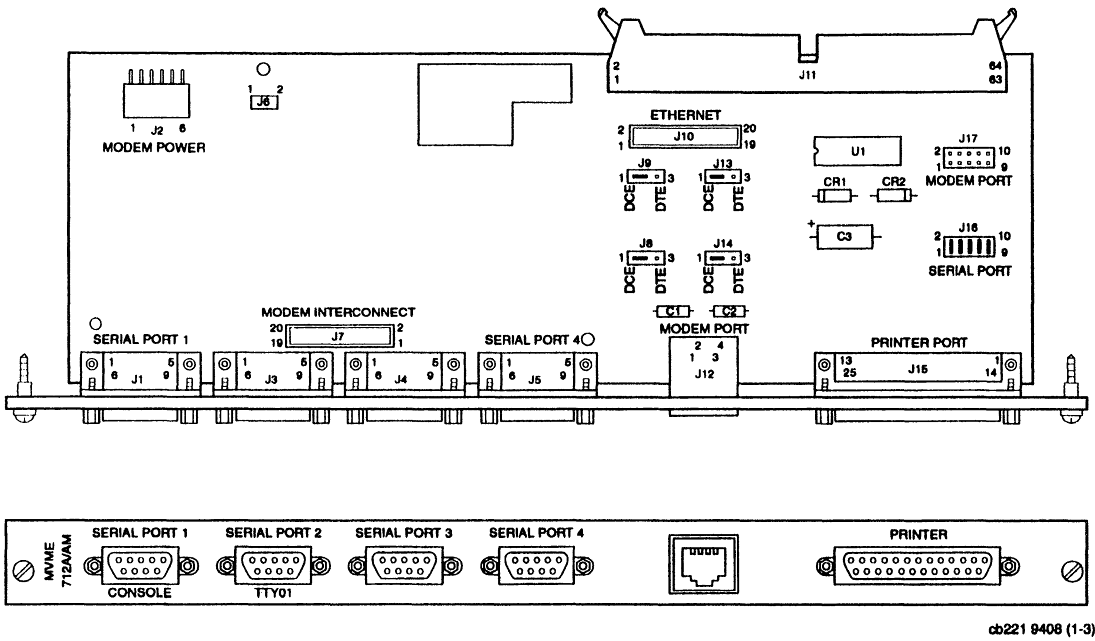
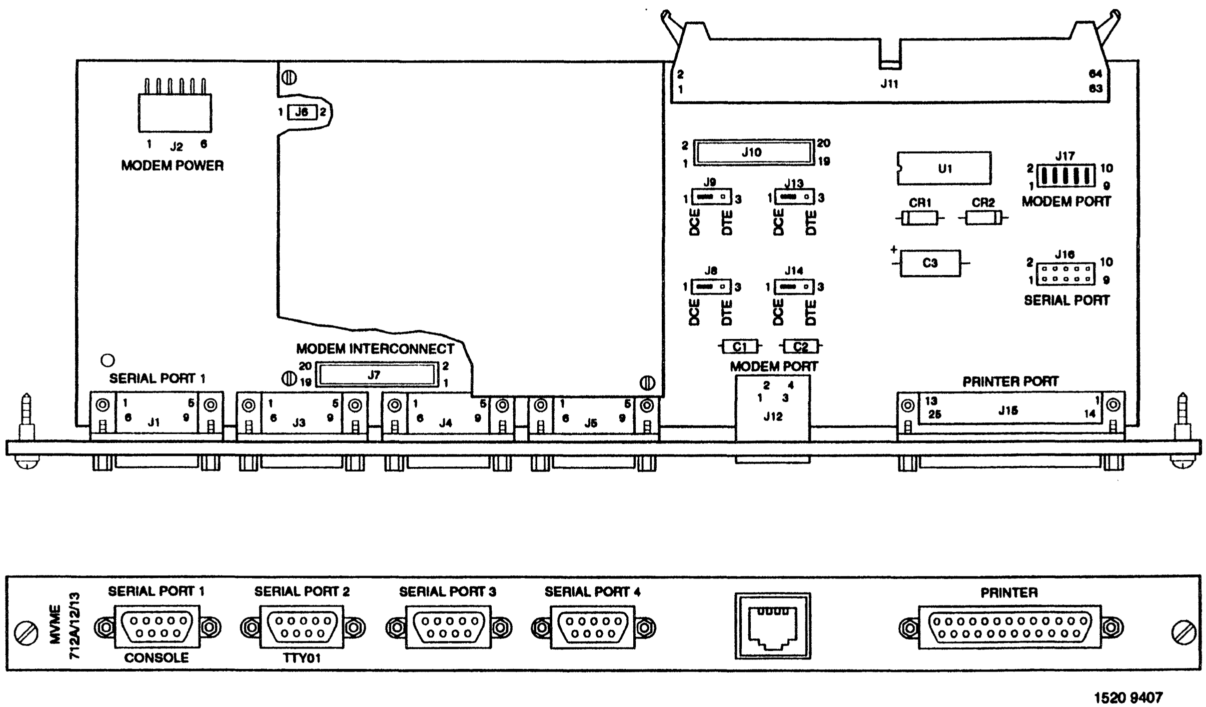
MVME712-13 Header Locations



MVME712A Header Locations



MVME712AM Header Locations

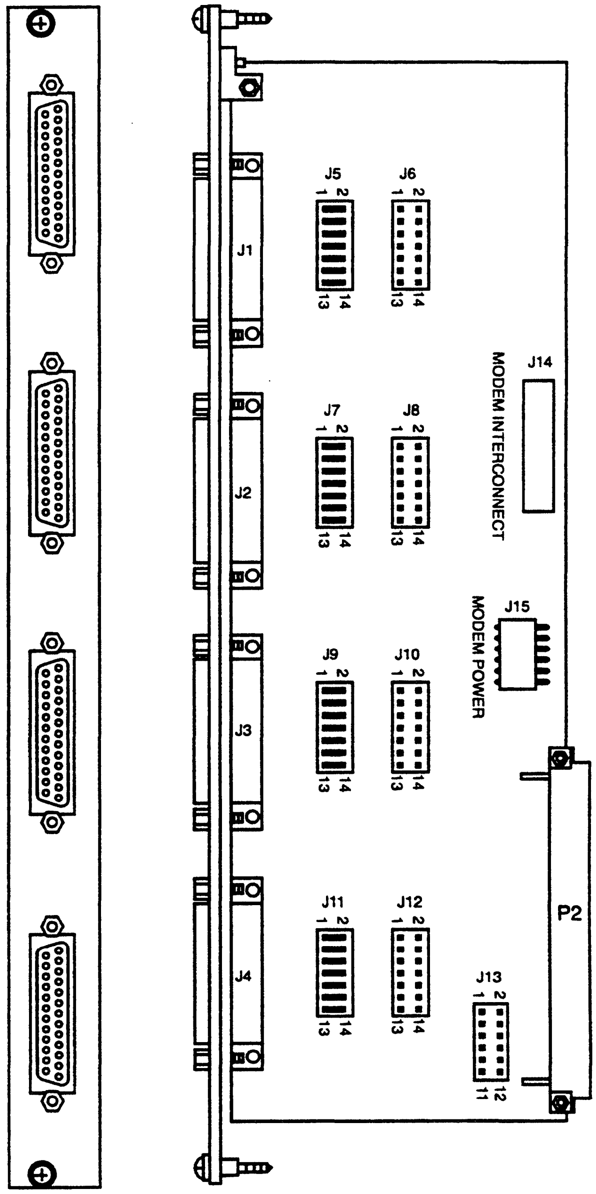
MVME712-101, -102 & -103 Transition Modules

MVME712-101, MVME712-101, and MVME712-103 Transition Modules

The MVME712-101 and MVME712-102 are transition modules for the XR Series 900 Systems. The P2 connectors are duplicated on the reverse side of the backplane to accommodate MVME700 series plug-in transition modules. Two transition module connectors, designated XP1 and XP2, are provided for the CPU module. Board slots are keyed to prevent accidental VME/transition module mismatching.

MVME712-101 Jumper Settings

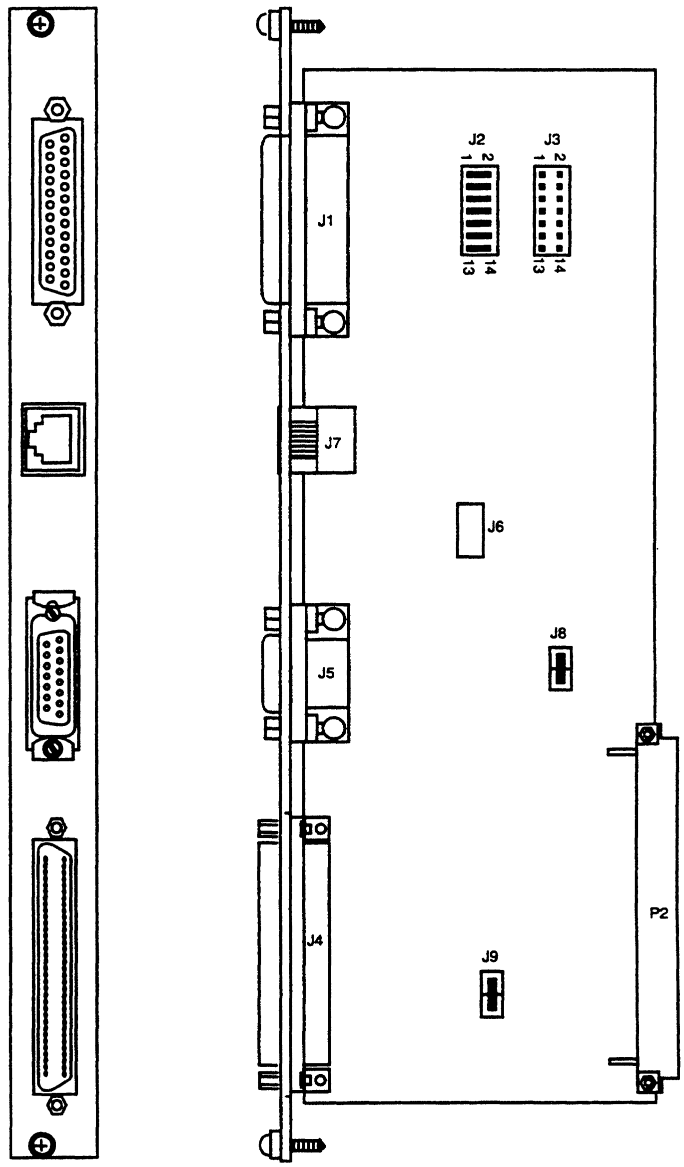
Header	Description	Setting
J5, J7, J9, J11	Modem Connect (default = on) ON = Modem enable OFF = Modem disable	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J6, J8, J10, J12	Monitor Connect (default = off) ON = Monitor enable OFF = Monitor disable	No jumpers
J13	Extended clock modes for synchronous port (default = off)	No jumpers



MVME712-101 Serial Port Transition Module

MVME712-102 Jumper Settings

Header	Description	Setting
J2	Modem Connect (default = on) ON = Modem enable OFF = Modem disable	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J3	Monitor Connect (default = off) ON = Monitor enable OFF = Monitor disable	No jumpers
J6	Board/Test (default = off) ON = test OFF = run	No jumper
J8	Oscillator Enable (default = on) ON = run OFF = test	1-2
J9	SCSI Terminators (default = on) ON = enable OFF = disable	1-2

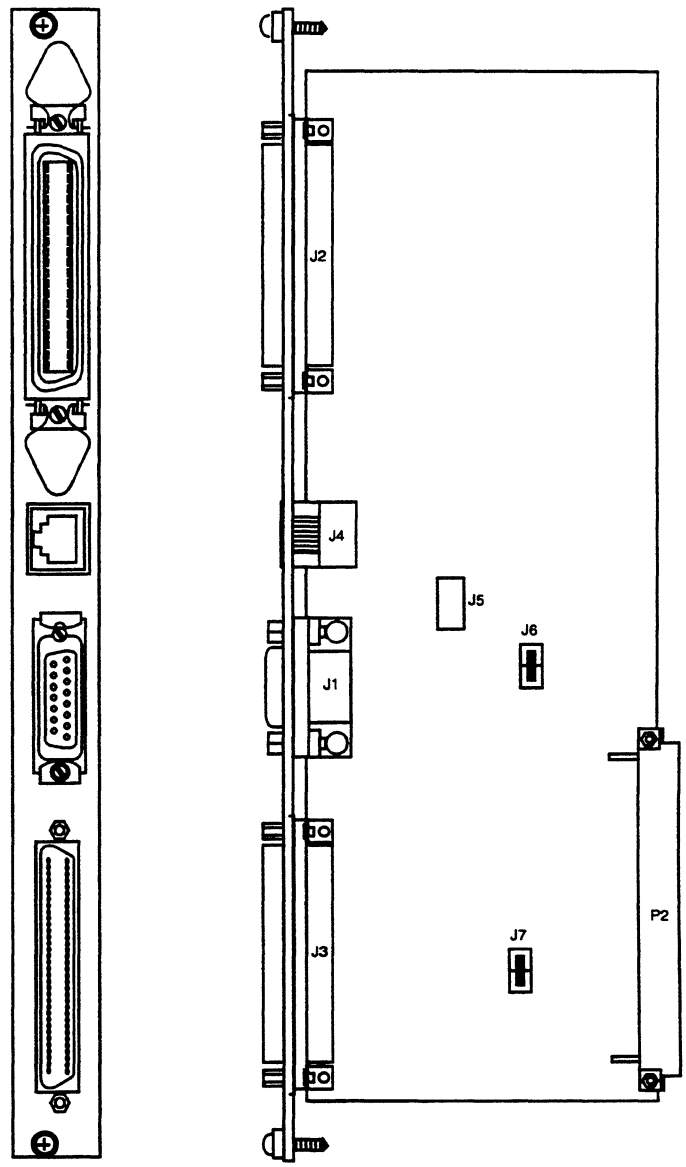


MVME712-102 Transition Module

MVME712-103 Jumper Settings

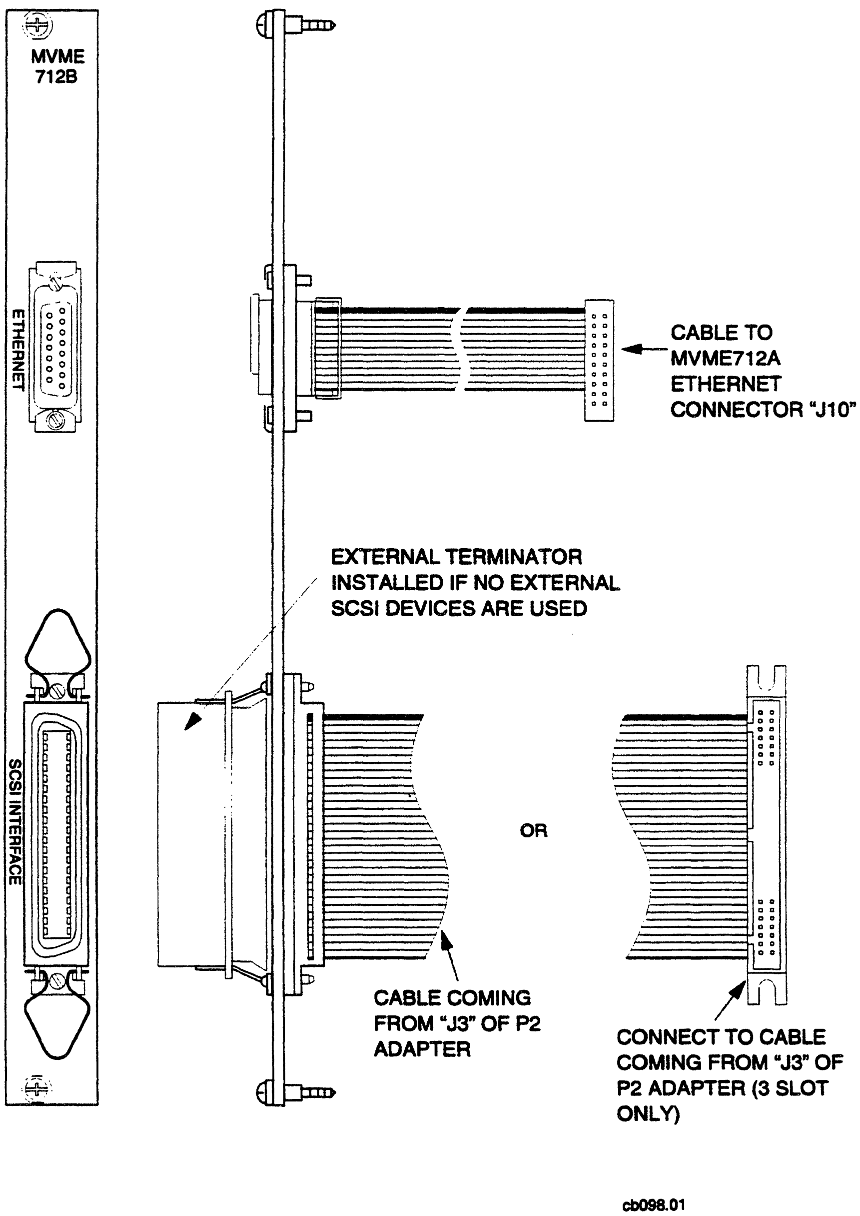
Header	Description	Setting
J5	Board Test (default = off) ON = test OFF = run	No jumpers
J6	Oscillator Enable (default = on) ON = run OFF = test	1-2
J7	SCSI Terminators (default = on) ON = enable OFF = disable	1-2

Transition

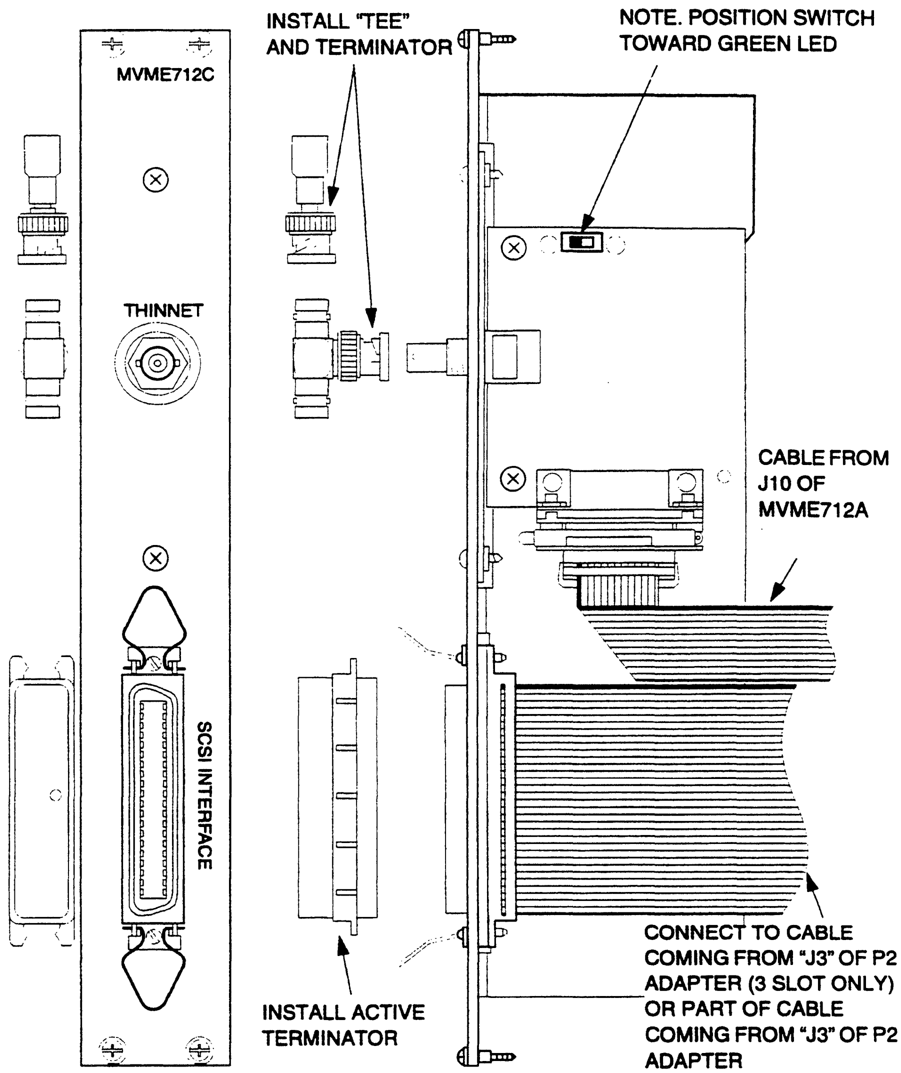


MVME712-103 Transition Module

MVME712B Transition Panel



MVME712C Thinnet Transition Module



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Transition

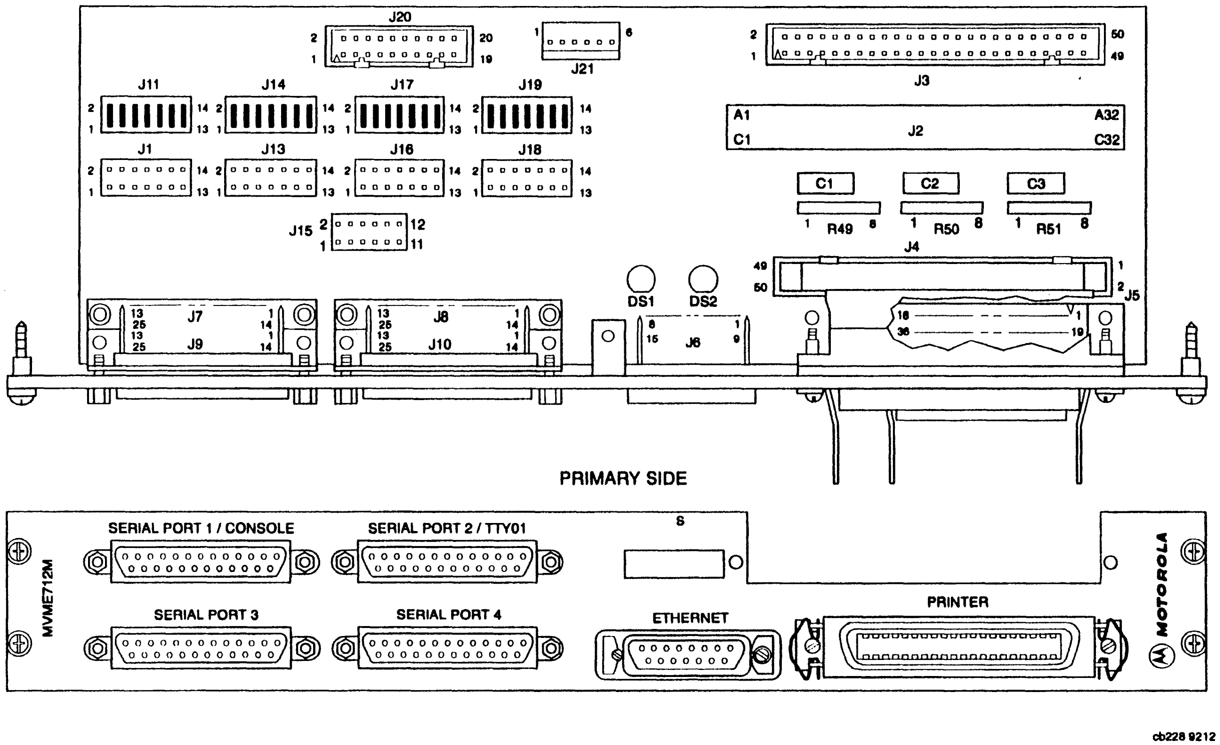
MVME712M Transition Module

The MVME712M is used as the interface between Motorola's MVME1xx RISC and CISC Single Board Computers, such as the MVME147S, MVME162, MVME167, and MVME187 families of VMEmodules, and their peripheral devices. A P2 adapter module and cables are supplied for interconnection between the MVME712M and the MVME1xx-family VMEmodule.

The MVME712M has four DB-25 connectors for the serial ports, one 36-pin connector for the printer port, one 50-pin connector for the SCSI port, and one DB-15 connector for the Ethernet port. The serial ports may be configured for use as DTE or DCE through jumper arrangements on the MVME712M.

MVME712M Jumper Settings

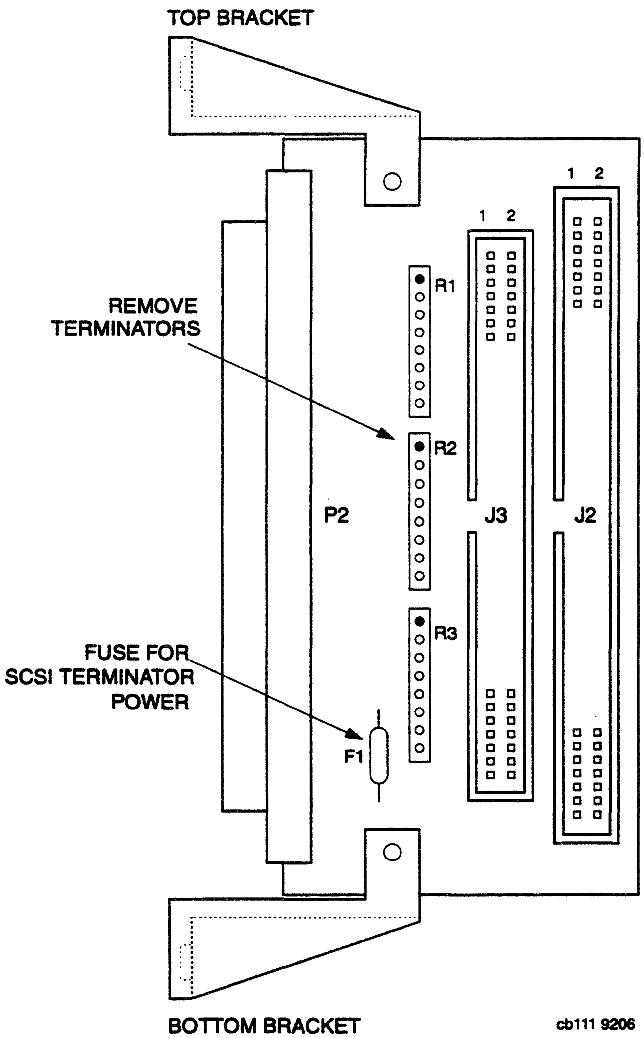
Header	Description	Setting
J1	Serial Port 1 DCE Configuration	No Jumpers
J11	Serial Port 1 DTE Configuration (default)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J13	Serial Port 3 DCE Configuration	No Jumpers
J14	Serial Port 3 DTE Configuration (default)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J15	Serial Port 4 Clock Configuration Select	No Jumpers
J16	Serial Port 2 DCE Configuration	No Jumpers
J17	Serial Port 2 DTE Configuration (default)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J18	Serial Port 4 DCE Configuration	No Jumpers
J19	Serial Port 4 DTE Configuration (default)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14



MVME712M Connector and Header Locations

P2 Adapter

P2 Adaptor for MVME1*xx* family VMEmodules



Transition

MVME714 & 714M Serial I/O Modules

MVME714 & 714M 2-Channel Serial I/O Distribution Modules

The MVME714 and MVME714M provides two-channel interface between modem and/or terminal type equipment and the MPU. The MVME714M has a modem installed.

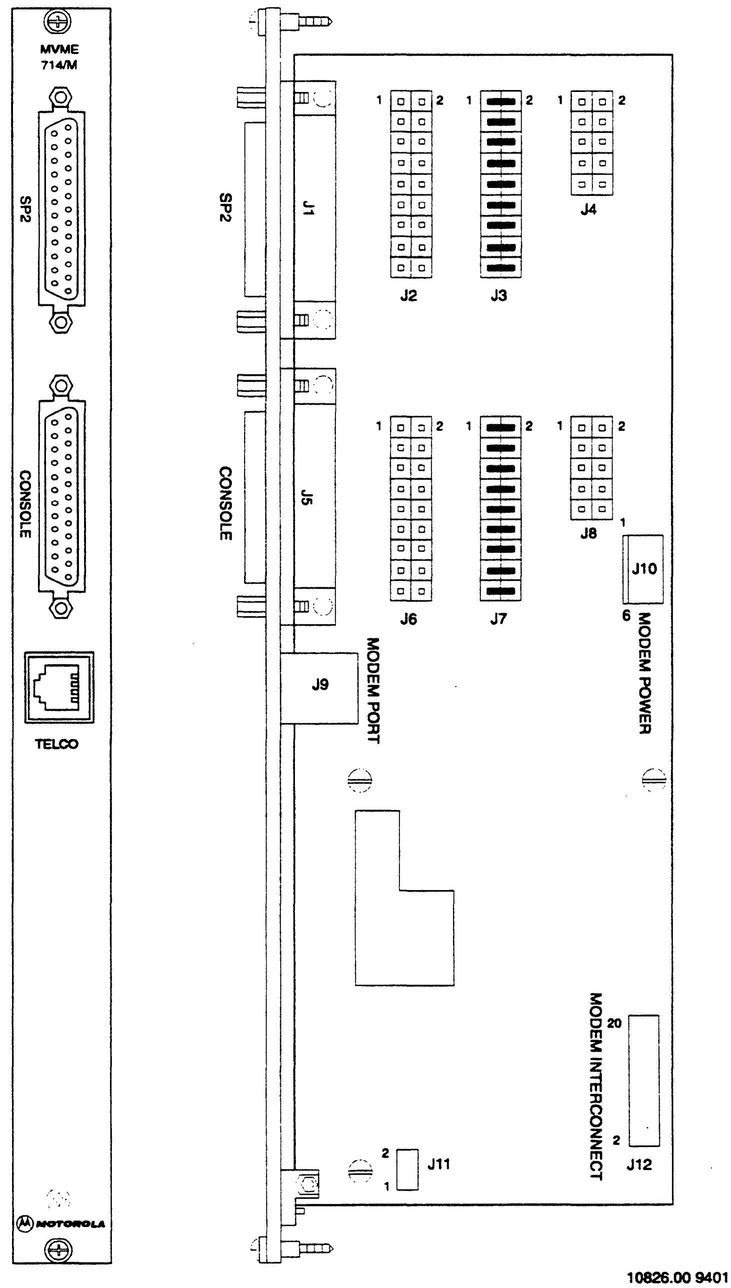
Each of the serial ports on the MVME714 can be configured as either connect to terminal (DTE) or connect to modem (DCE). The connect to terminal configuration supports most terminal equipment and serial printers. The connect to modem configuration is useful for interfacing modems or other computer serial ports to the MPU.

Each serial port is configured with a jumper arrangement associated with that port. The two MVME714 serial ports are completely independent.

For use in an MVME8940 system, the MVME714/M is used as the interface between the MVME188A module and the peripheral devices. Both ports are configured for terminal connection.

MVME714M Jumper Settings

Header	Description	Setting
J2	DCE/DTE Select	No Jumpers
J3	DTE Select (Modem installed)	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18
J6	DCE/DTE Select	No Jumpers
J7	DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14, 15-16, 17-18



MVME714 & MVME714M Jumper Locations

Transition

MVME715P Asynchronous Transition Module

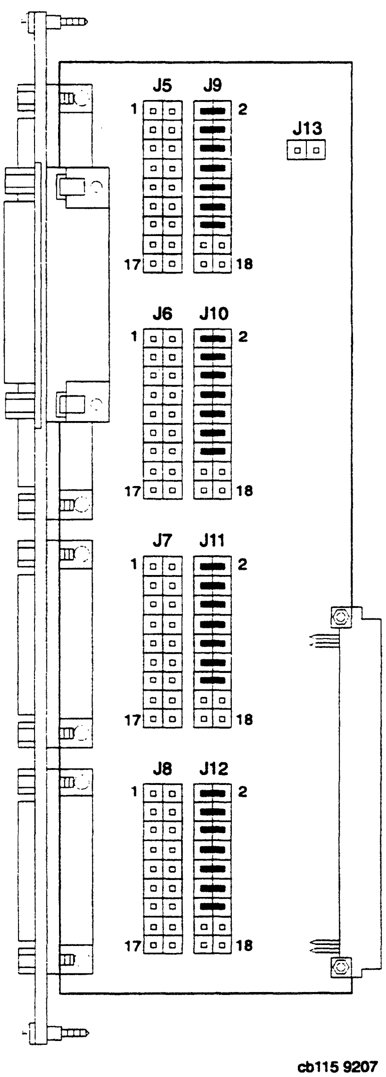
MVME715P Asynchronous Serial/Parallel Transition Module

The MVME715P provides an adapter between the serial I/O cable connector, parallel printer, and the MVME335 serial and parallel I/O module.

All four ports are configured DTE.

MVME715P Jumper Settings

Header	Description	Setting
J5	DCE/DTE Select	No Jumpers
J6	DCE/DTE Select	No Jumpers
J7	DCE/DTE Select	No Jumpers
J8	DCE/DTE Select	No Jumpers
J9	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J10	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J11	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J12	DCE/DTE Select	1-2, 3-4, 5-6, 7-8, 9-10, 11-12, 13-14
J13		No Jumper

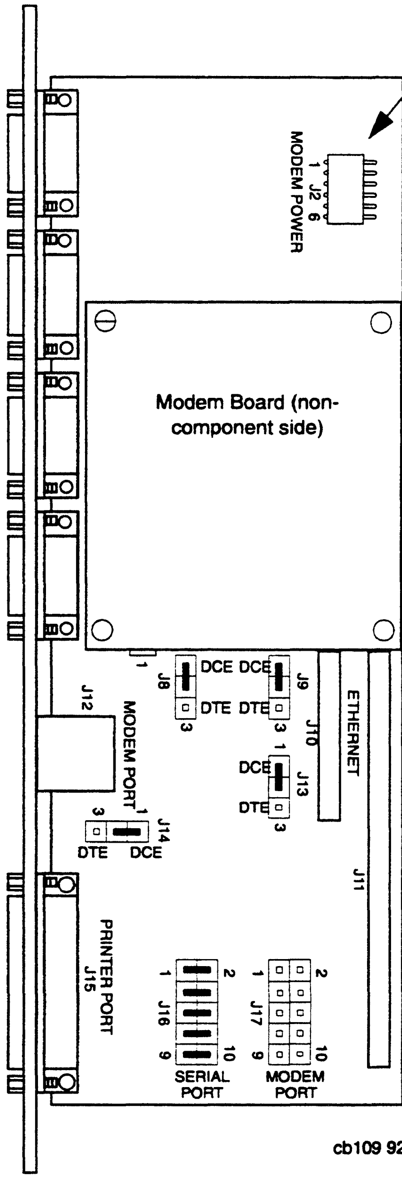


MVME715P Jumper Locations

MVME732 Remote Service Modem

The MVME732 modem is a UDS 2242980 modem that provides full duplex operation. The MVME732 operates asynchronously at data rates of 0 to 300, 600, 1200, or 2400 bps and synchronously at data rates of 1200 and 2400 bps.

The MVME732 modem provides transmit and receive filtering, adaptive equalization, and modulation and demodulation. Dual Tone Multi-Frequency (DTMF) tone encoding is also provided. The modem provides command selection of either pulse or DTMF auto dialing. Automatic answer and automatic speed adjustment to the speed of the originating modem are also included. The auto dialing command set is compatible with the "AT" command set.



Models 3220, 4220, and 8220: Power cable from main power harness installs here.

Models 3420, 4420, and 8420: Power cable from J7 of main backplane installs here.

Models 3520, 4520, and 8520: Power cable from J24 of main backplane installs here.

Models 3620, 4620, and 8620: Power cable from J24 of main backplane installs here.

Models 3820, 4820 and 8820: Power cable from main power harness installs here.

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MVME712A with MVME732 Modem

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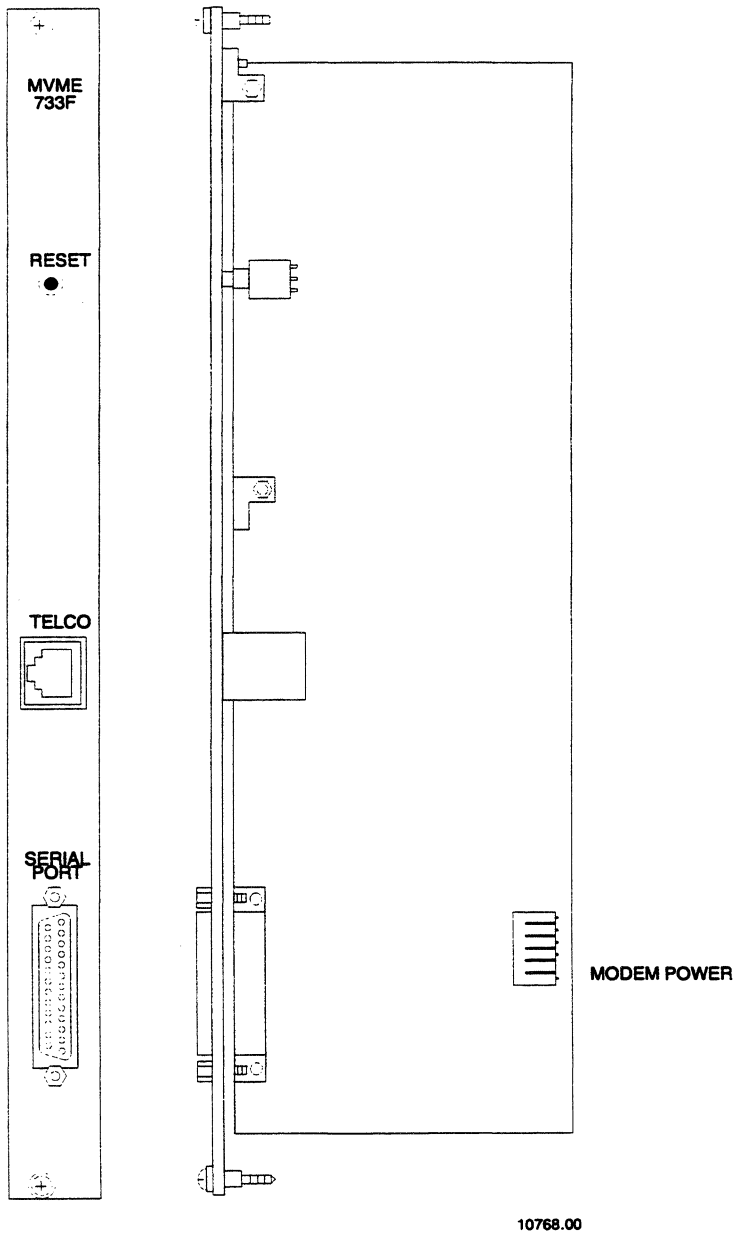
MVME733 Remote Service Modem

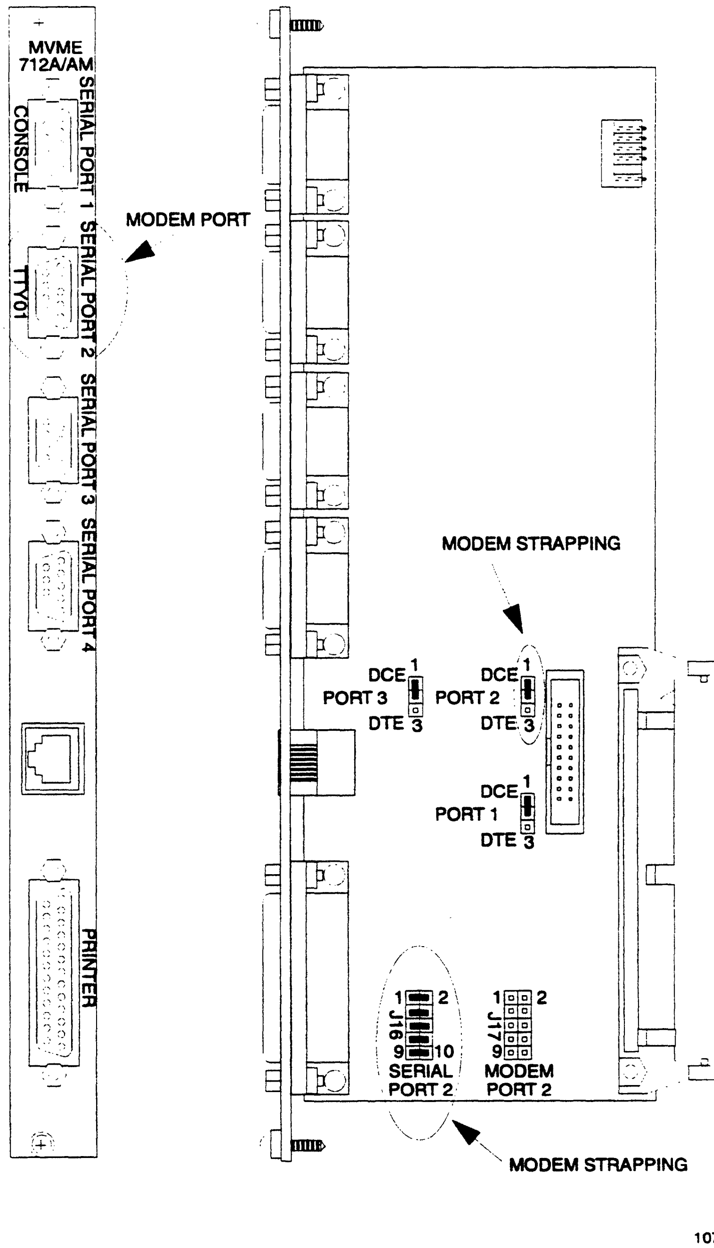
The MVME733 is a complete CCITT V.32/V.22b/V.22/Bell 103 compatible modem implemented on a single printed circuit board through the use of surface mount technology. Attached to the front of the pc card is a metal front panel bracket with access provided for the EIA-232 connector, telco connector, and modem reset switch. A power connector is located at the rear of the modem.

The modem achieves error-free compressed communications through the use of CCITT V.42/V.42b protocols. The MVME733 is an intelligent modem, supporting the AT command set for control of the modem's configuration, the automatic dialer and diagnostic test functions. The modem command set is also compatible with all major communications software packages.

The MVME733 supports both tone and pulse dialing and is certified for direct connection to the public telephone network. Also featured are complete call progress monitoring and responses. As an answering modem, the MVME733 automatically adapts to the speed of the originating modem. As a calling modem, the speed of operation (9600, 4800, 2400, 1200, or 300 bits per second) and character format are derived from the AT command prefix.

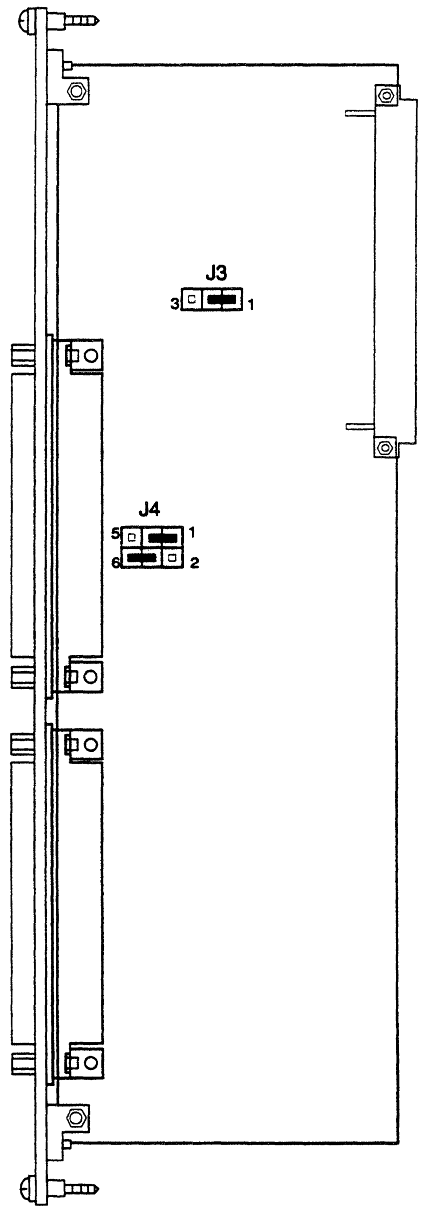


MVME733 Remote Service Modem



MVME712A with MVME733 Modem Strapping

MVSB741 Transition Module



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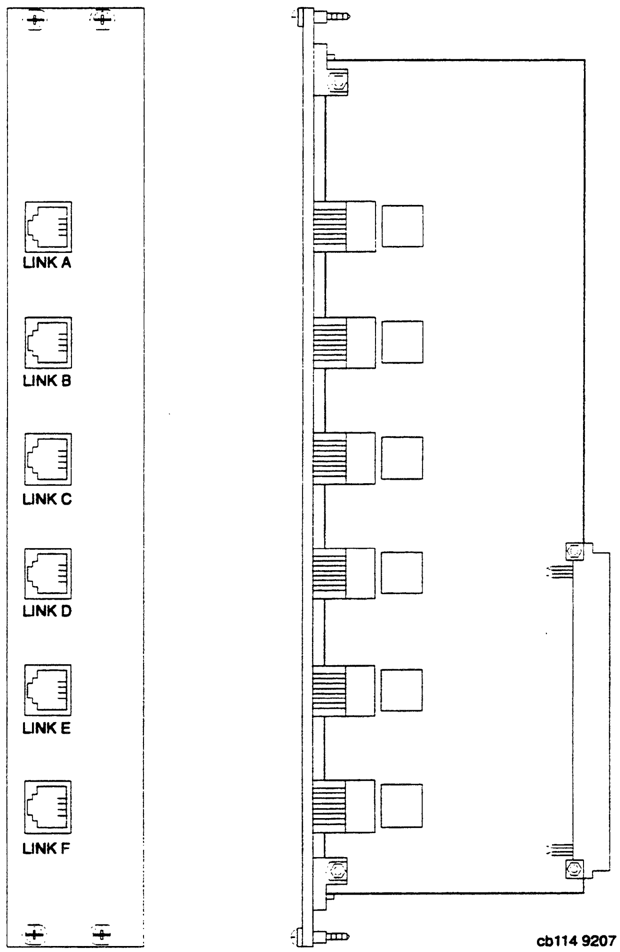
MVME751 Connector Module



Connector Module Locations

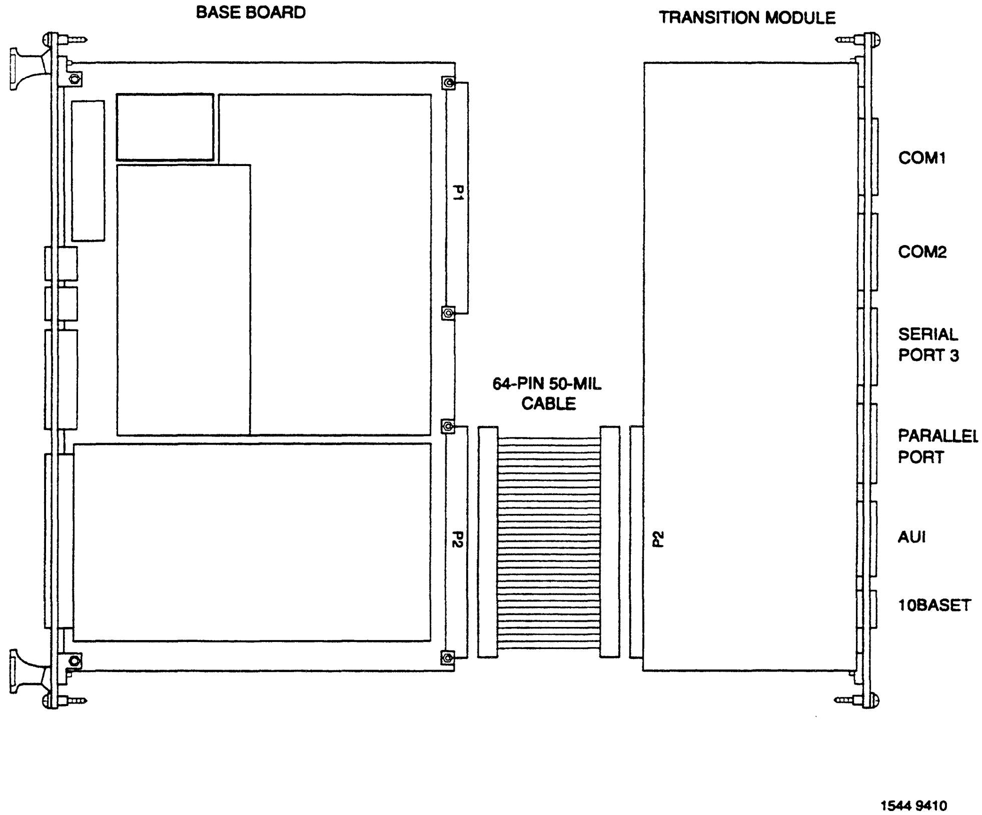
MVME760 Transition Module

The MVME760 module is used as the interface between host VMEmodules and various peripheral devices. A 64-pin ribbon cable connects the MVME760 Transition Module to the host VMEmodule.

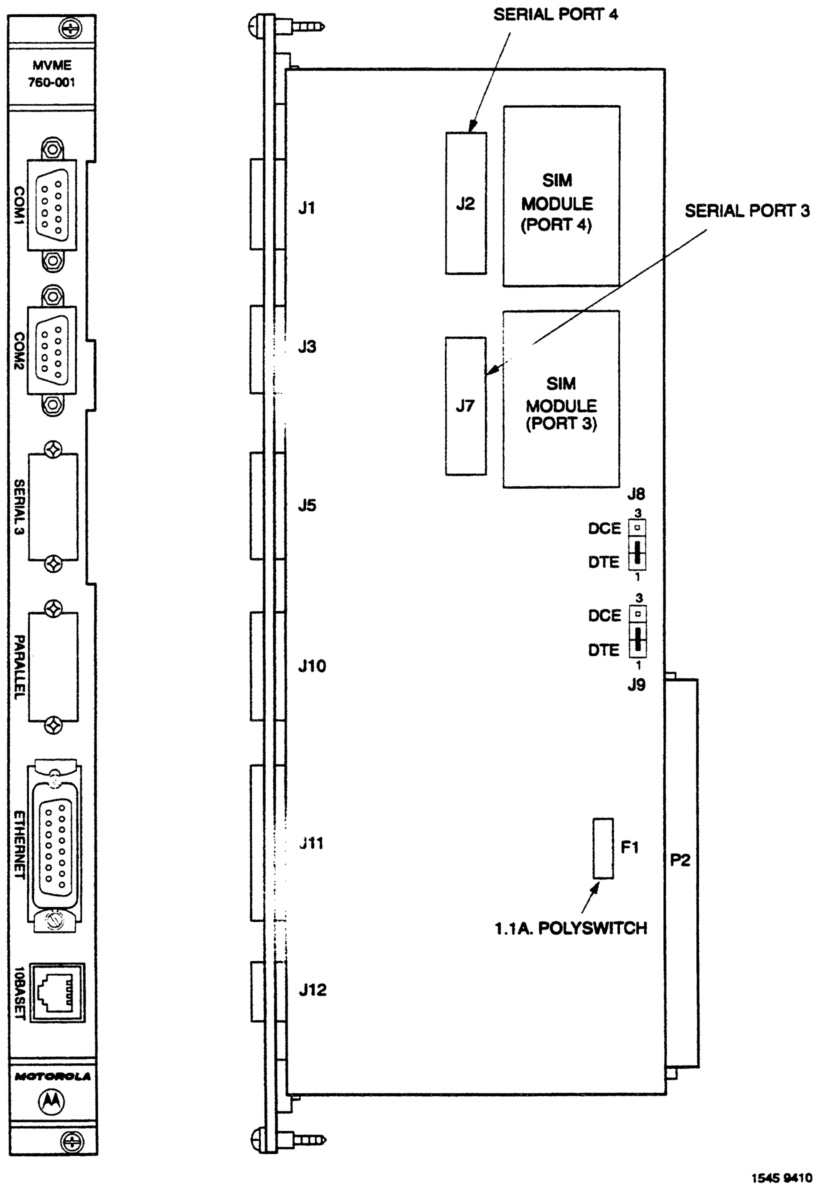
Two 60-pin connectors are provided to support existing MCG Serial Interface Modules. Currently, there are four types of SIMs available: EIA-232 DCE, EIA-232 DTE, EIA-530 DCE, and EIA-530 DTE. The selection of these modules determines the functionality of the two synchronous serial ports.

MVME760 Jumper Settings

Header	Description	Setting
J8	Serial Port 3 (DTE)	1-2
J9	Serial Port 4 (DTE)	1-2

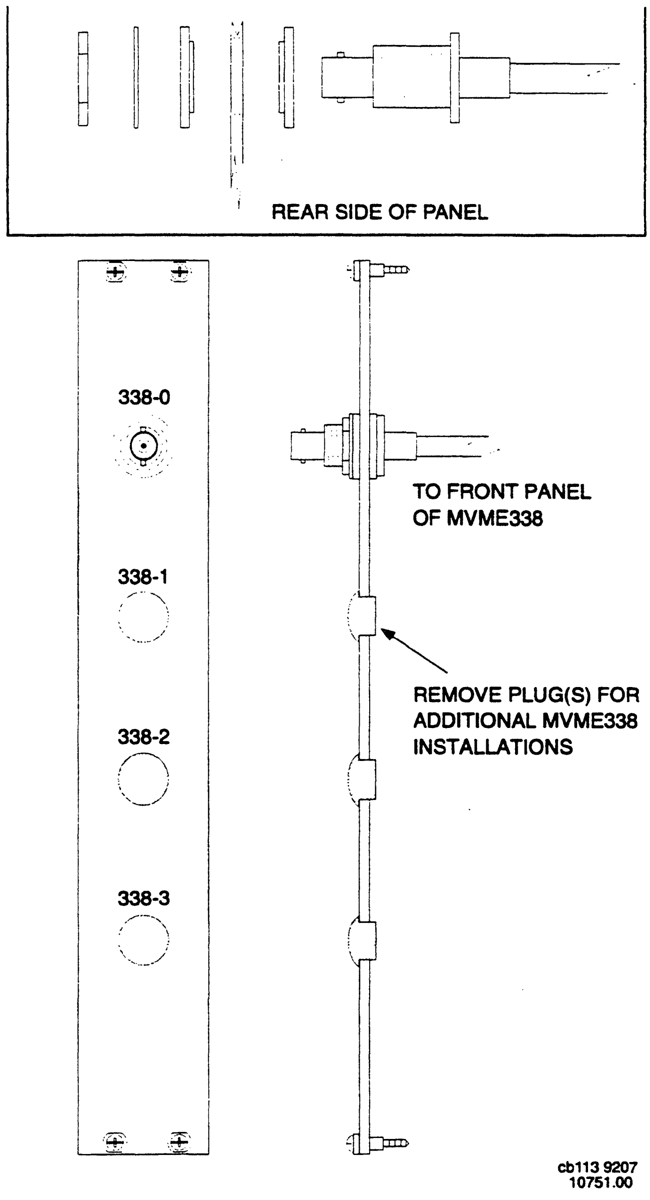


MVME760 Connector Locations



MVME760 Header Locations

MVME338 Transition Assembly



Transition

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Peripheral Devices

Overview

This section contains configuration and placement information for the devices that provide mass storage (disk drives) and that allow for system backup and software installation capability (tape, floppy, or CD drives).

In addition to the MVME800 series of peripherial devices, this section also describes the supported drives for the PowerStack RISC PC. These devices are described in the last article that begins on page 36.

Vendor model numbers are provided for your cross reference and convenience. Keep in mind, however, these drives are often modified specifically for Motorola use and are not "off-the-shelf" vendor drives.

The following peripherals are illustrated in this section:

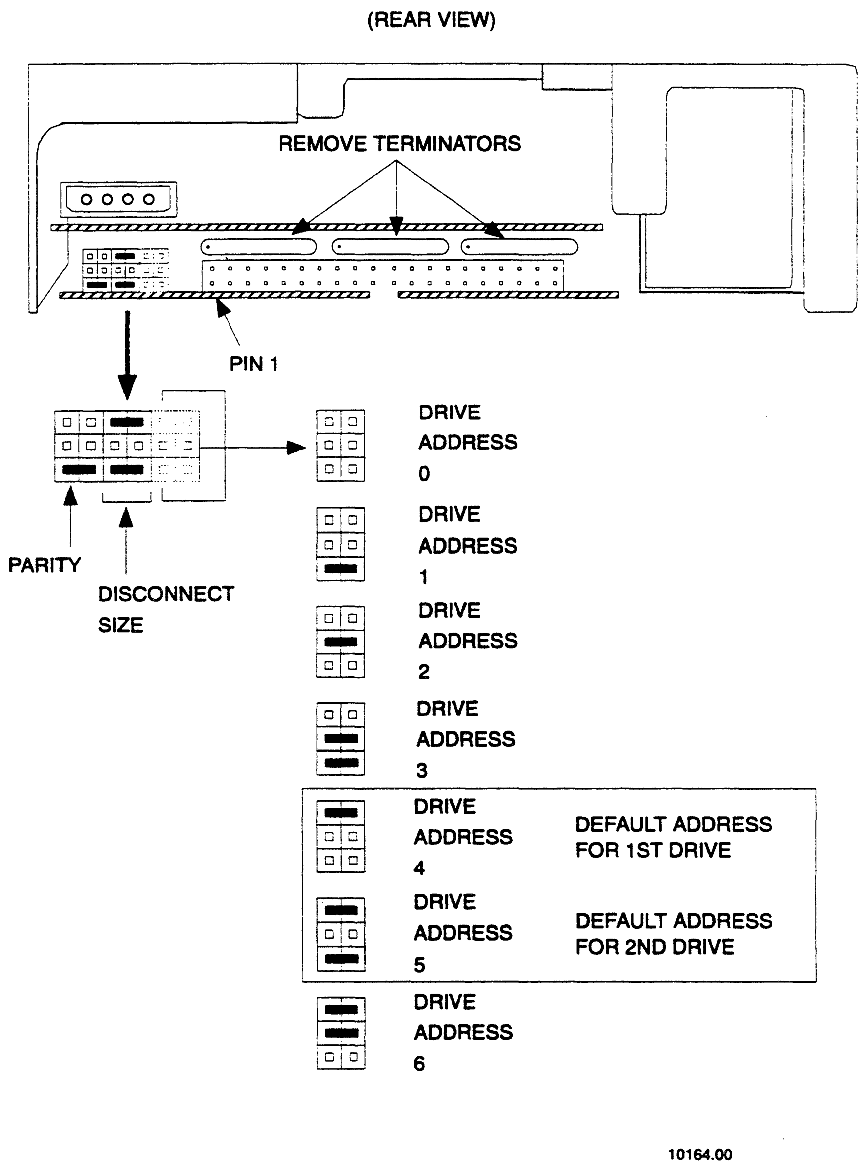
Part Number	Description	Drive Slots Used
MVME852	60MB Tape Drive	1 half-height
MVME853	150MB Tape Drive	1 half-height
MVME854	525MB Tape Drive	1 half-height
MVME855	155MB Data Cassette	1 half-height
MVME856	8mm 2.3GB SCSI Tape Subsystem	1 full-height
MVME857XT	4mm DAT Drive	1 half-height
MVME859A-1/2	1600 BPI 1/2-in. Tape	external device
MVME859B-1/2	6250 BPI 1/2-in. Tape	external device
MVME863A	135MB SCSI Disk Drive	1 half-height
MVME864A	180MB SCSI Disk Drive	1 half-height
MVME864B	180/240MB SCSI Disk Drive	1 half-height
MVME865	330MB SCSI Disk Drive	1 half-height
MVME866	520MB SCSI Disk Drive	1 half-height
MVME866A	520MB SCSI Disk Drive	1 half-height
MVME867	1GB SCSI Disk Drive	1 half-height
MVME867A	1GB SCSI Disk Drive	1 half-height
MVME868	2GB SCSI Disk Drive	1 half-height
MVME869	4GB SCSI Disk Drive	1 full-height

Part Number	Description	Drive Slots Used
MVME875	300MB SCSI Disk Drive	1 full-height
MVME876	600MB SCSI Disk Drive	1 full-height
MVME877	1GB SCSI Disk Drive	1 full-height
MVME881A	1.2MB 5 1/4-inch SCSI Diskette Drive	1 half-height
MVME884	2.9MB 3 1/2-inch SCSI Diskette Drive	1 half-height
MVME885	1.4MB Diskette Drive	1 half-height
MVME888	600MB CD-ROM Drive	1 half-height
P401-FDF/K 01AW2747D01A	1.44MB Floppy drive	1 half-height
P851-DC2F/K 01AW2716D11A	2GB Mini QIC tape	1 half-height
P854-525F/K 01AW2755D02A	525MB QIC tape	1 half-height
P856-7GBF/K 01AW2860D02A	8mm Cartridge tape	1 half-height
P857-4GBF/K 01AW2670D12A	4mm DAT	1 half-height
P862-545F/K 01AW2725D01B	545MB 3.5-inch hard drive (19mm)	1 half-height
P862-1GBF/K P863-1GBF/K 01AW2713D01A	1GB 3.5-inch hard drive	1 half-height
P862-2GBF/K 01AW2523D01B	2GB 3.5-inch hard drive	1 half-height
P862-4GBF/K 01AW2813D01A	4.3GB 3.5-inch hard drive	1 half-height
P881-600F/K 01AW2781C03B	600MB, 2X CD-ROM	1 half-height
P881-600X4F/K 01AW2819D02A	600MB, 4X CD-ROM	1 half-height
P881-600LCF/K 01AW2815D01A	600MB, 4X (low-cost) CD-ROM	1 half-height

Peripheral

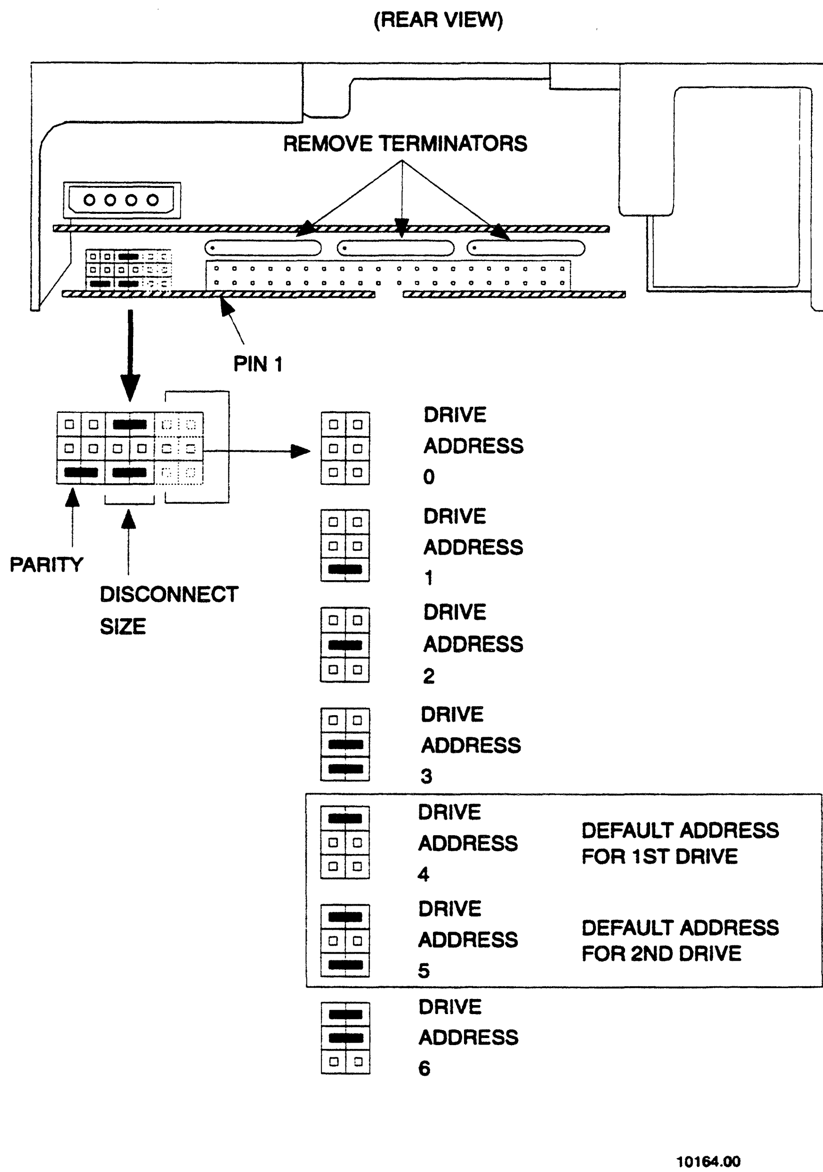
MVME852 - 60MB SCSI QIC Tape Drive

Archive 2060S



MVME853 - 150MB SCSI QIC Tape Drive

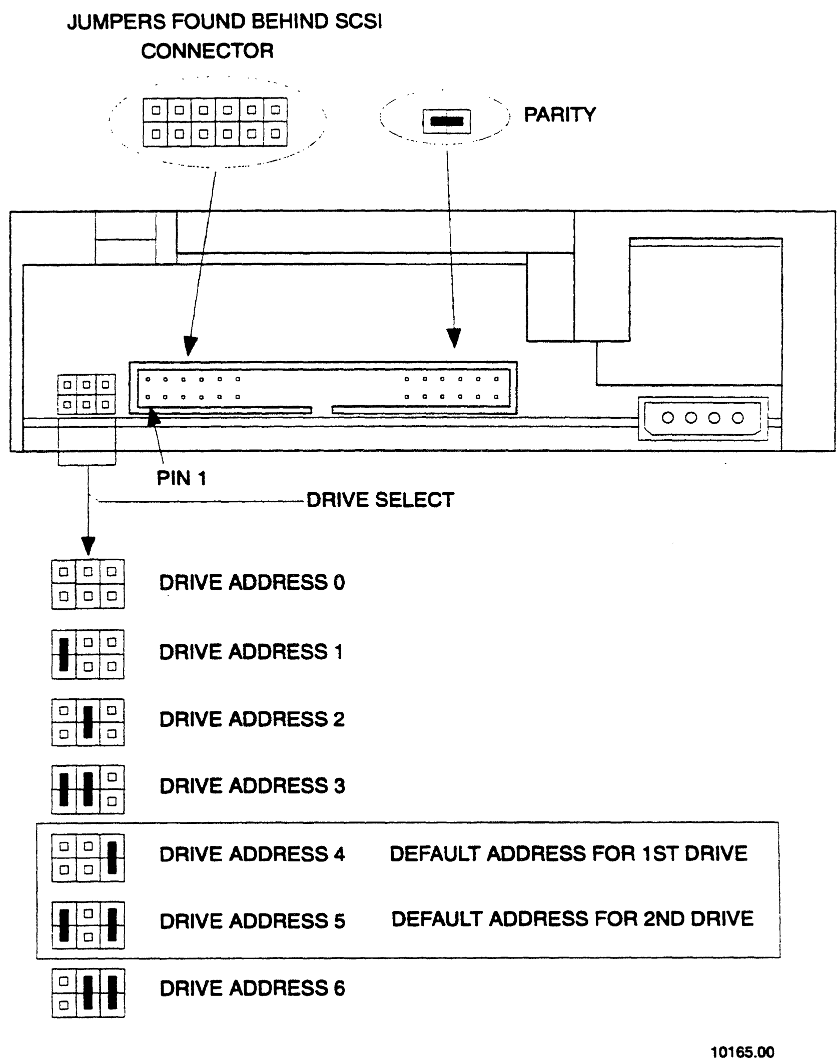
Archive 2150S



Peripheral

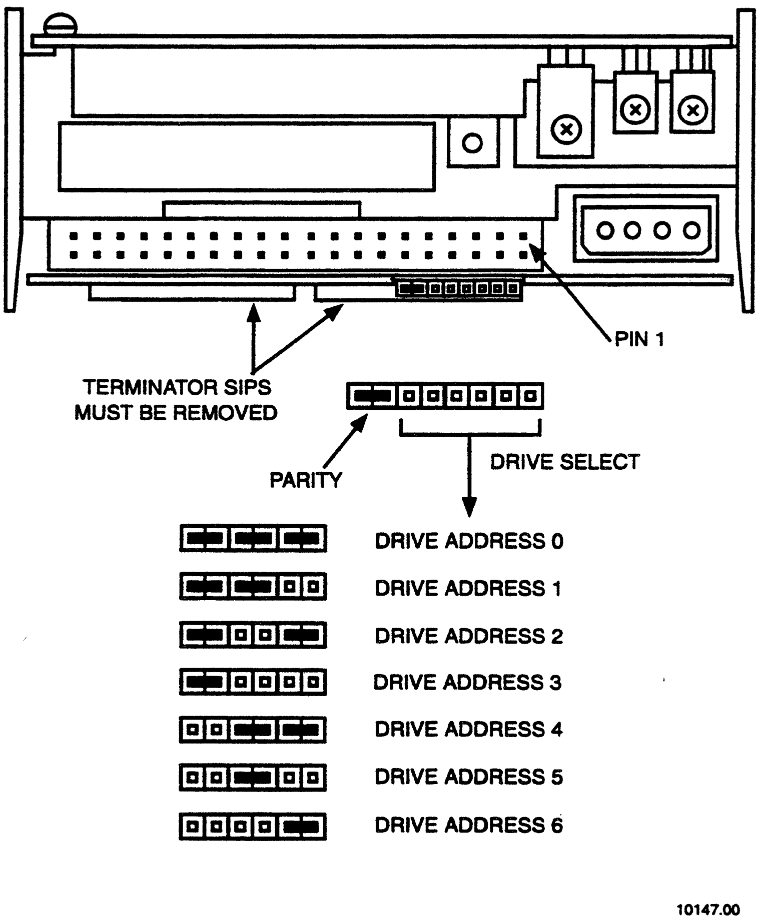
MVME854 - 525MB SCSI QIC Tape Drive

Archive 2525S



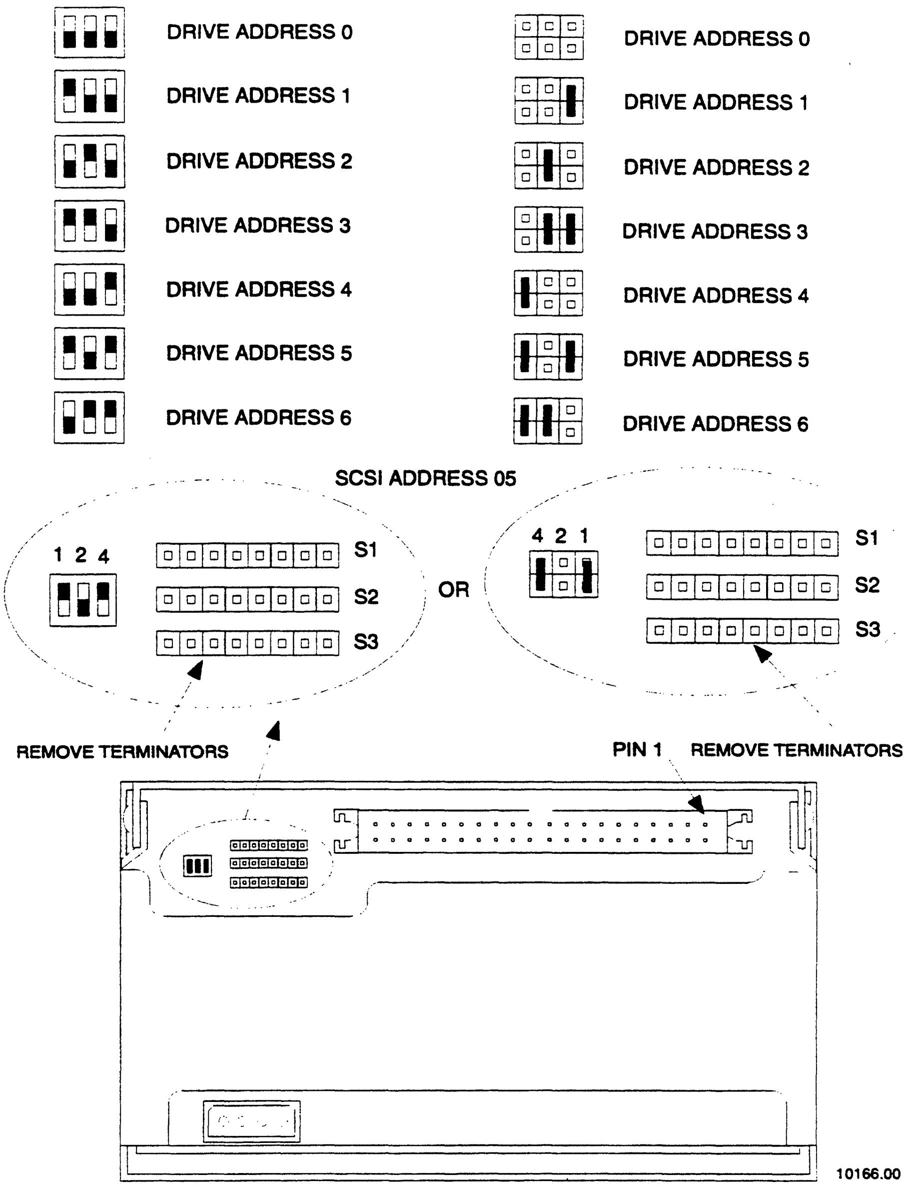
MVME855 - 155MB SCSI 3 1/2" Data Cassette

Teac MT-2ST/N50



MVME856 - 2.3GB SCSI 8mm Tape Drive

EXABYTE EXB-8200



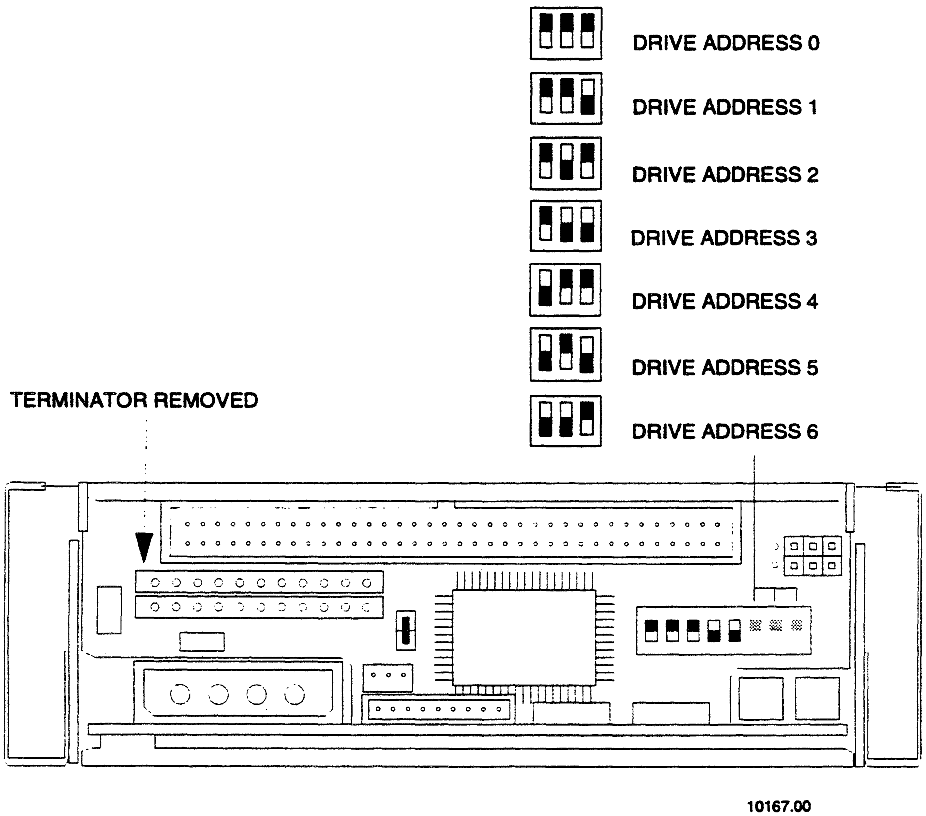
Notes

A cleaning kit is supplied with the MVME856 drive. Depending on the environment, the drive should be cleaned after every 8 to 30 hours of use. Use only EXABYTE-approved cleaning cartridges and media (data-grade only) and use only as instructed by the manufacturer.

Peripheral

MVME857XT - 4mm DAT Drive

2.0+GB Archive Digital Audio Tape (DAT)

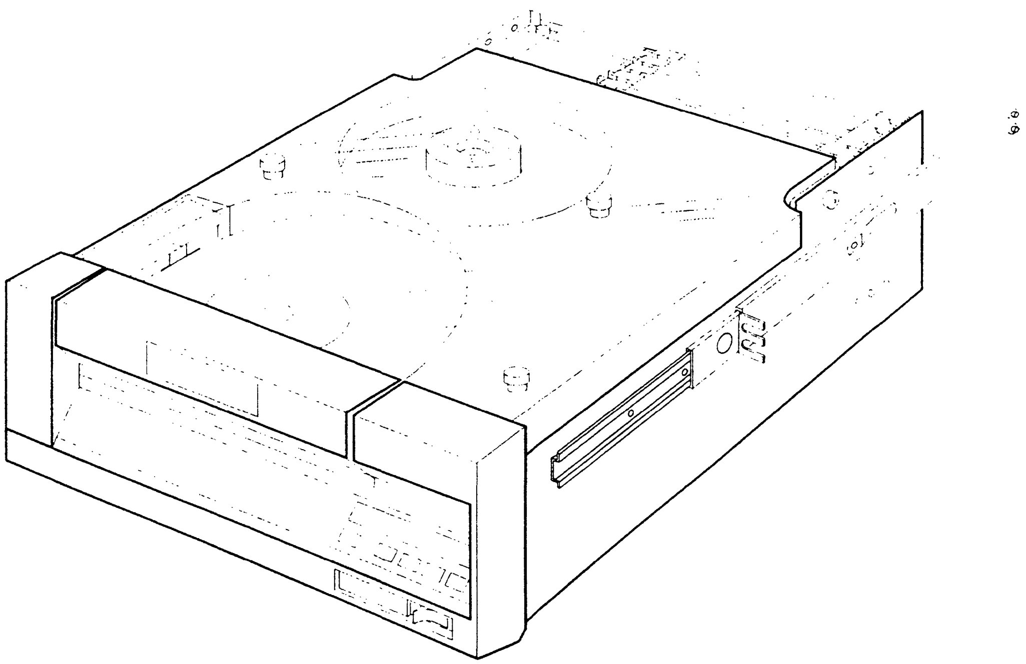


Peripheral

Note **A cleaning kit is supplied with the MVME857XT DAT drive. The drive should be cleaned after every 25 hours of use.**

MVME859 - 1/2" External Tape Drive

M4 9905 & 9914

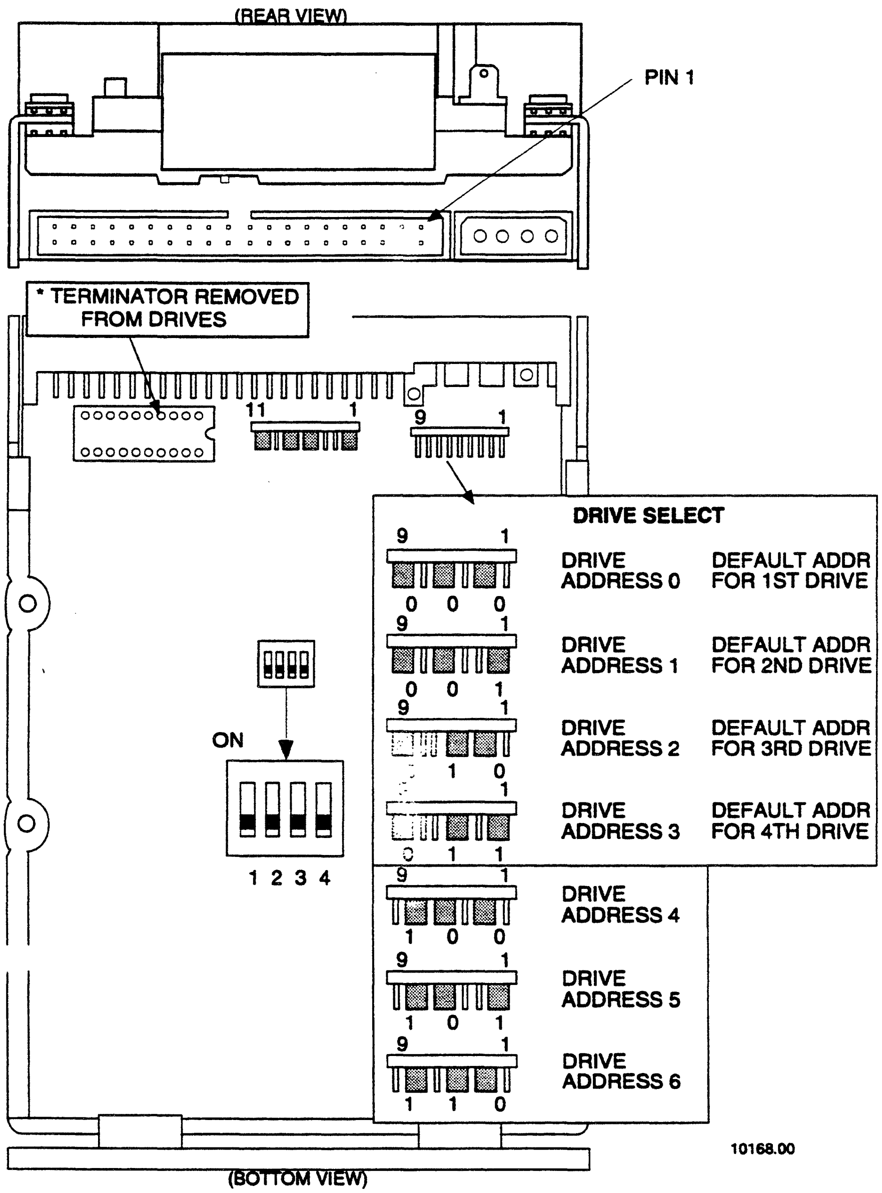


10771.00

Peripheral

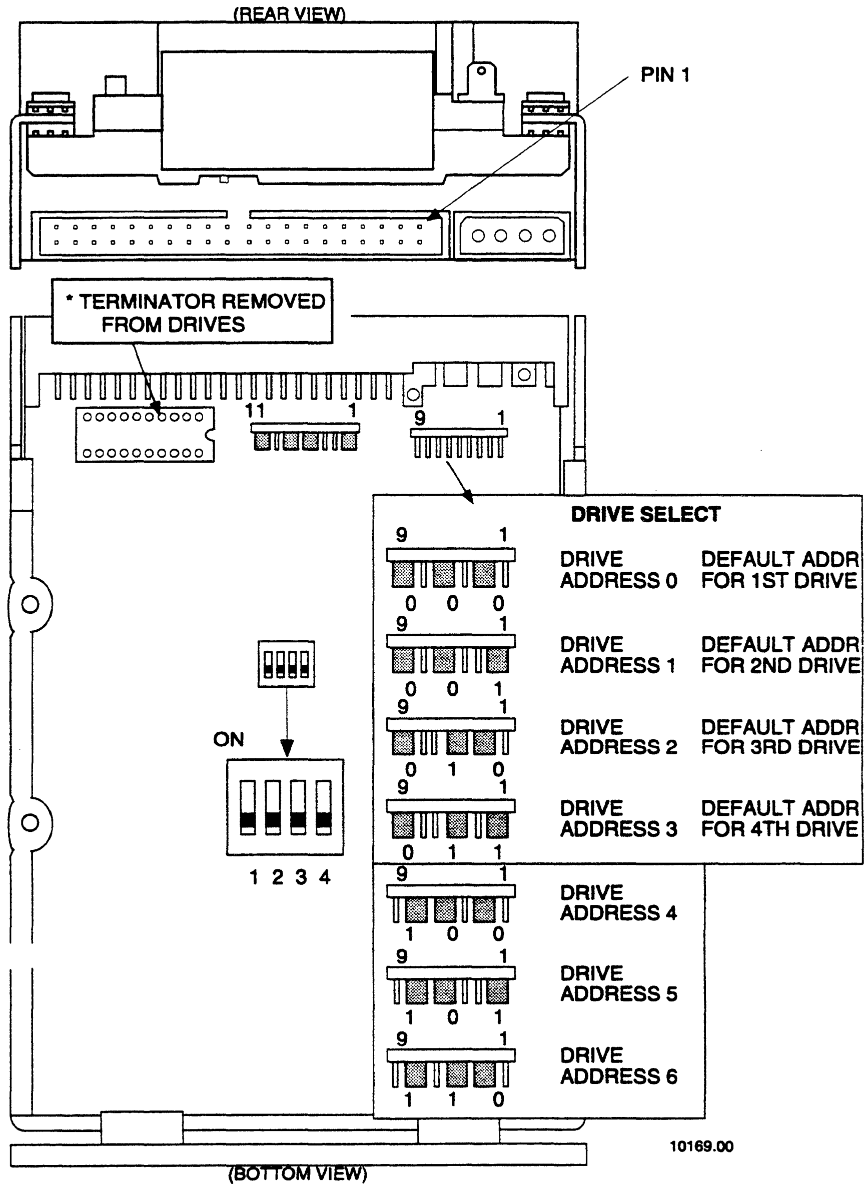
MVME863A - 135MB SCSI 3 1/2" Disk Drive

Fujitsu M2613ESA



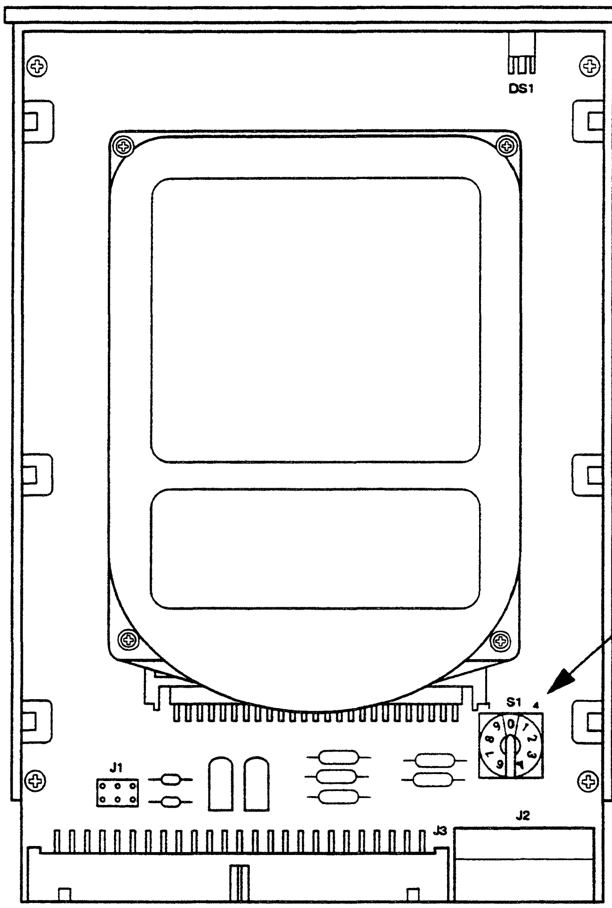
MVME864A - 180MB SCSI 3 1/2" Disk Drive

Fujitsu M2614ESA



MVME864B - 180/240MB SCSI Disk Drive

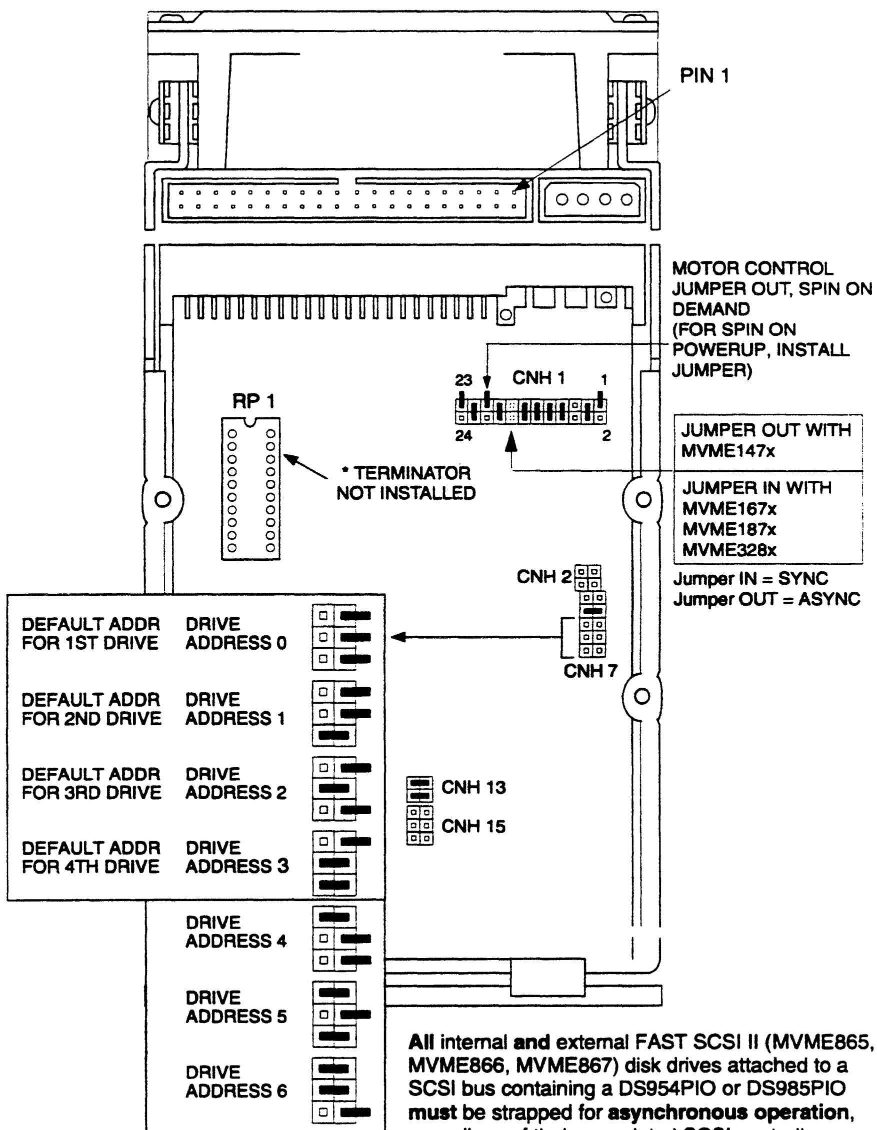
Fujitsu M2637S-MOT



MVME865 - 330MB SCSI 3 1/2" Disk Drive

Fujitsu M2622SA

Revision A/B

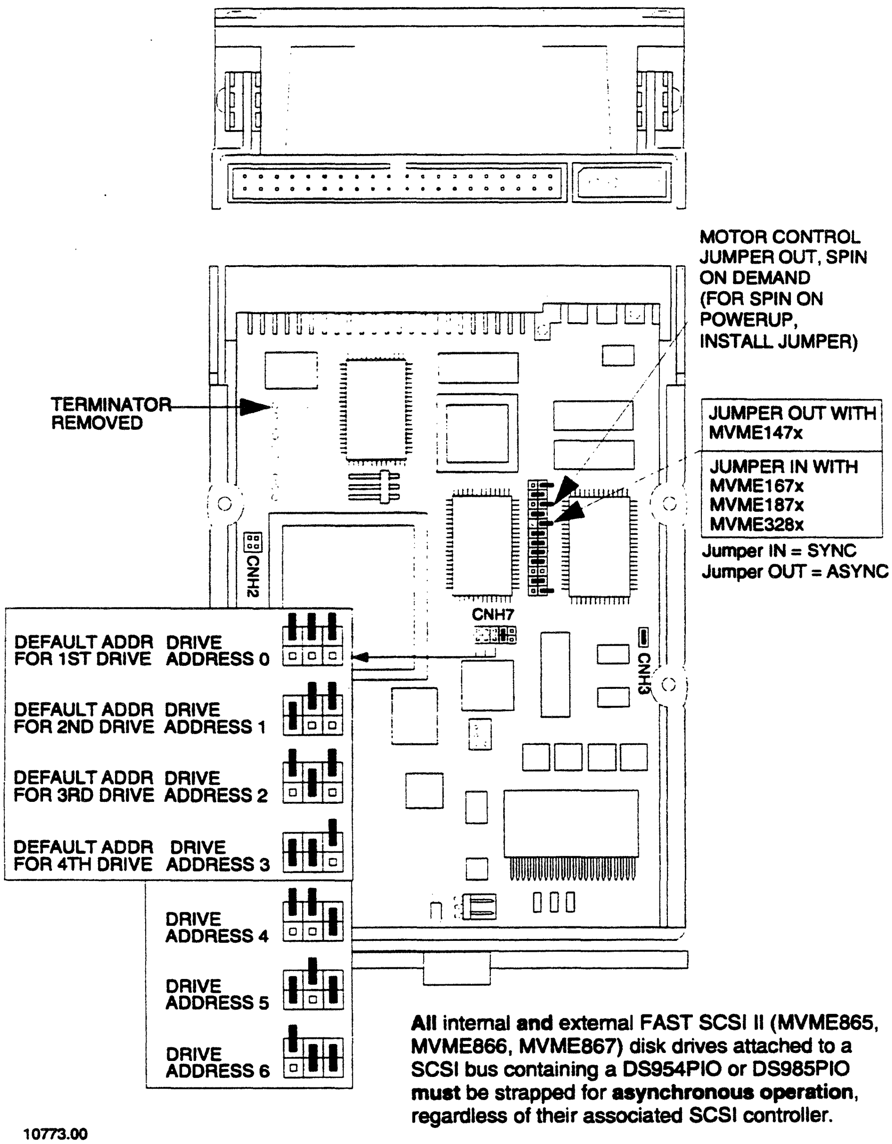


All internal **and** external FAST SCSI II (MVME865, MVME866, MVME867) disk drives attached to a SCSI bus containing a DS954PIO or DS985PIO **must** be strapped for **asynchronous operation**, regardless of their associated SCSI controller.

10772.00

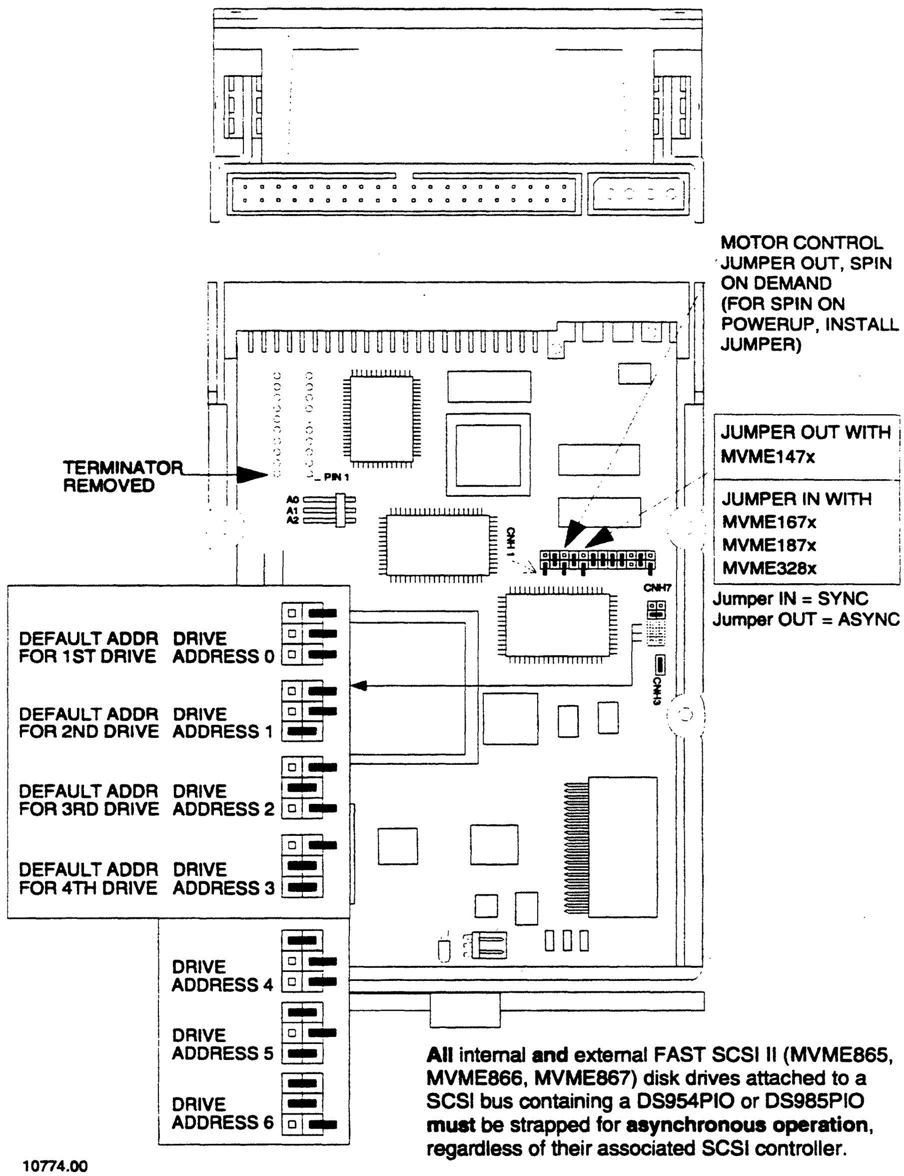
Peripheral

Revision C



All internal **and** external FAST SCSI II (MVME865, MVME866, MVME867) disk drives attached to a SCSI bus containing a DS954PIO or DS985PIO **must** be strapped for **asynchronous operation**, regardless of their associated SCSI controller.

Revision D

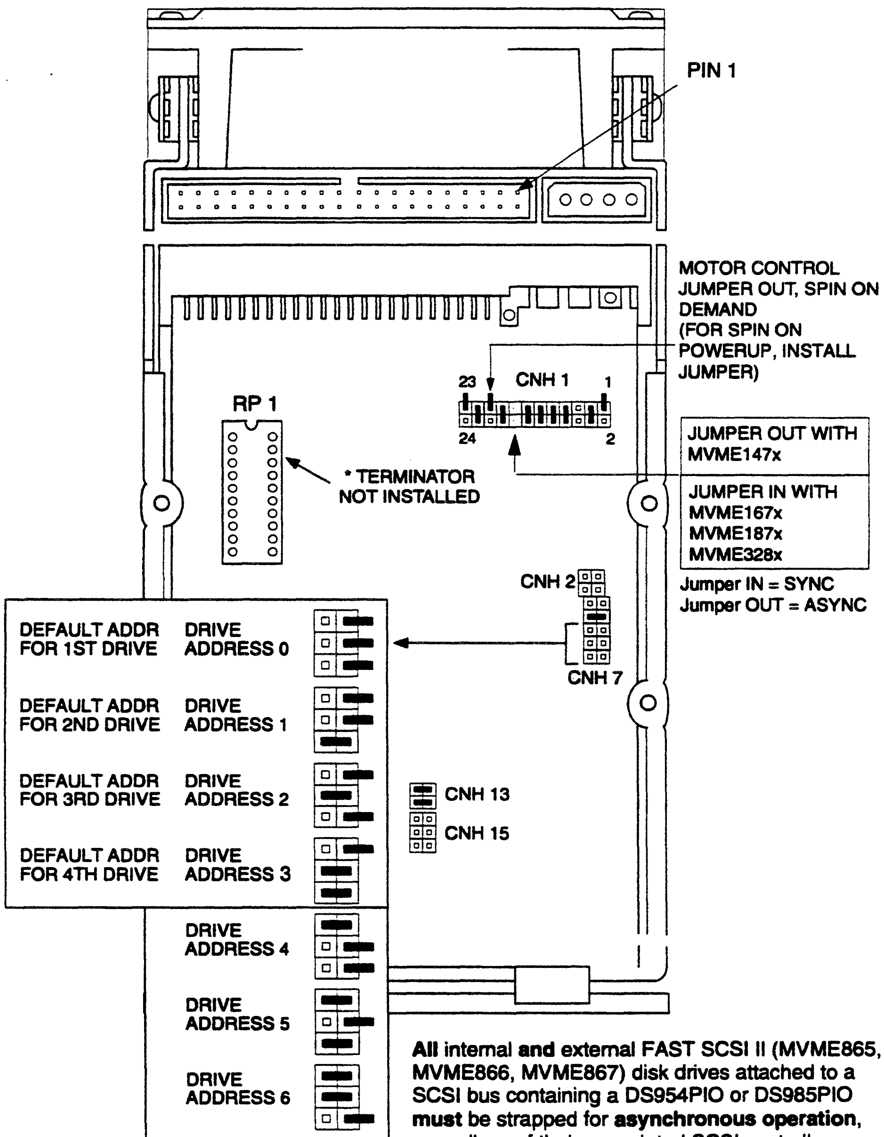


All internal **and** external FAST SCSI II (MVME865, MVME866, MVME867) disk drives attached to a SCSI bus containing a DS954PIO or DS985PIO **must** be strapped for **asynchronous operation**, regardless of their associated SCSI controller.

MVME866 - 520MB SCSI 3 1/2" Disk Drive

Fujitsu M2624SA

Revision A/B

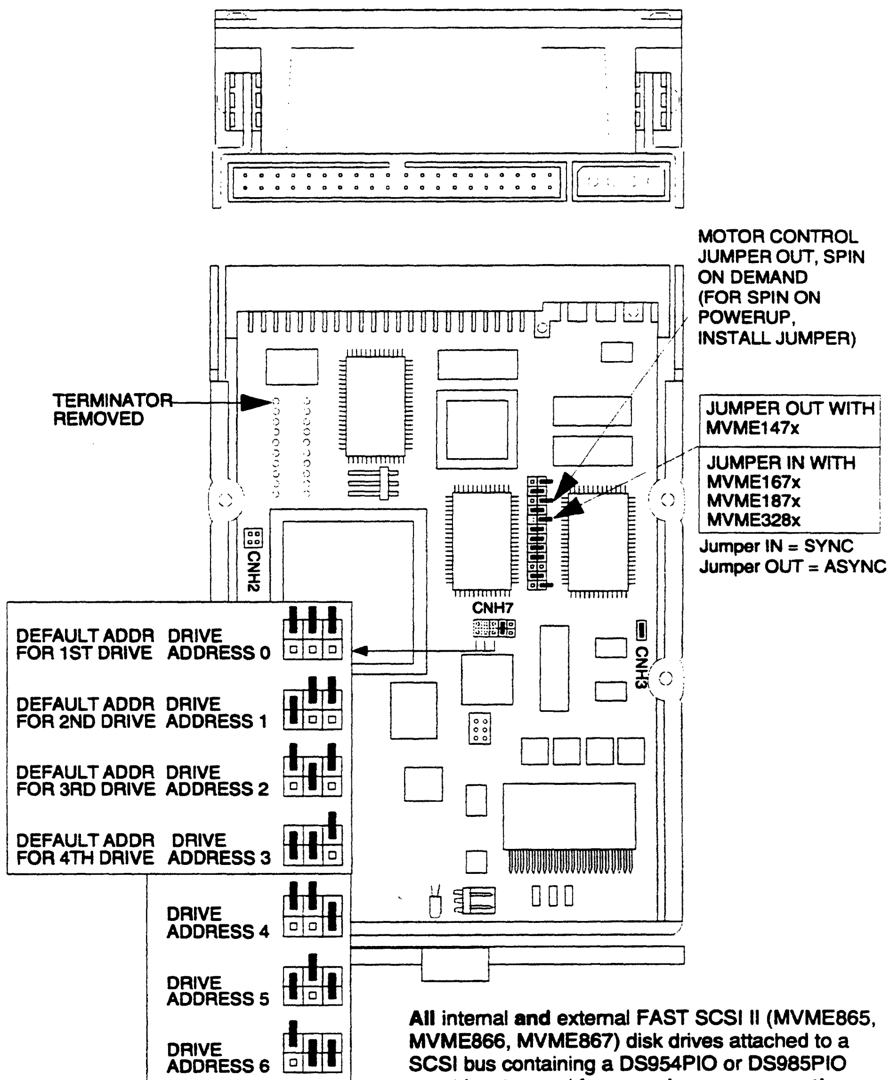


All internal **and** external FAST SCSI II (MVME865, MVME866, MVME867) disk drives attached to a SCSI bus containing a DS954PIO or DS985PIO **must** be strapped for **asynchronous operation**, regardless of their associated SCSI controller.

10775.00

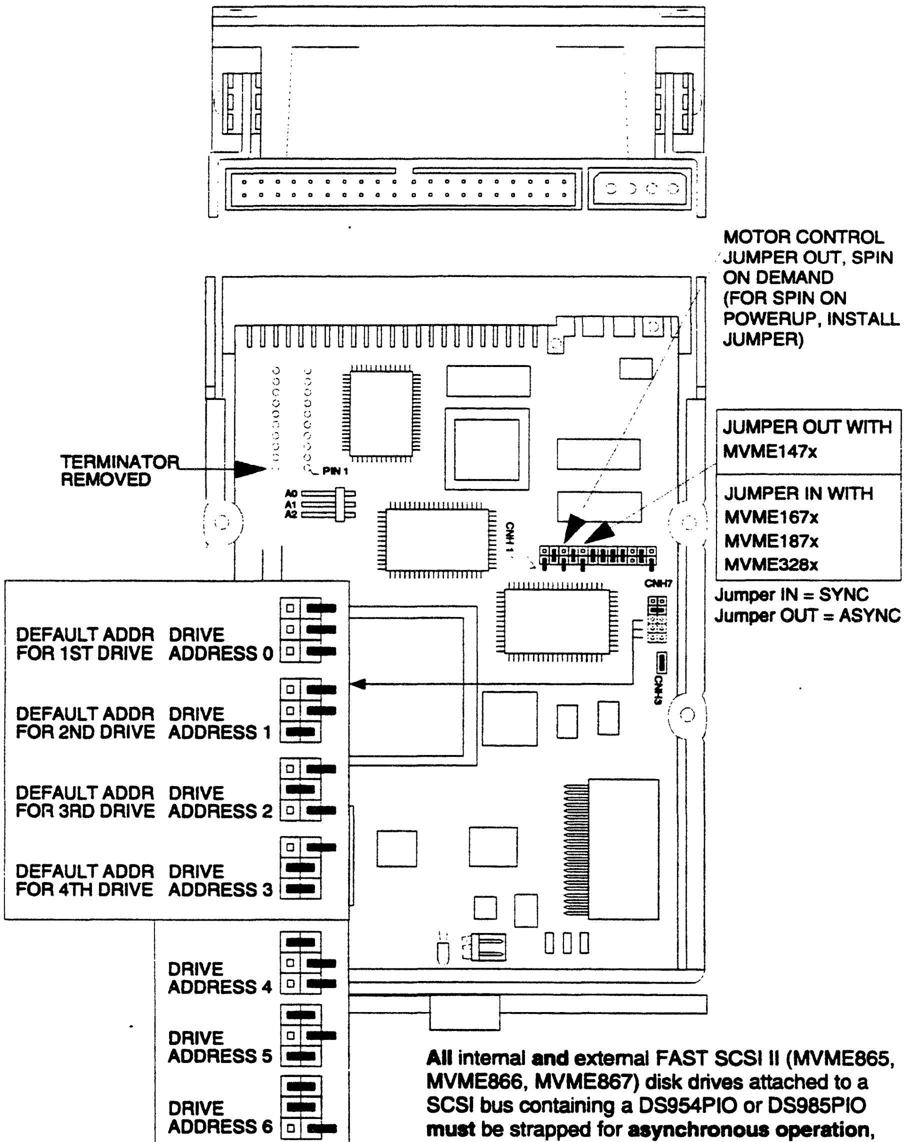
Peripheral

Revision C



All internal **and** external FAST SCSI II (MVME865, MVME866, MVME867) disk drives attached to a SCSI bus containing a DS954PIO or DS985PIO **must** be strapped for **asynchronous operation**, regardless of their associated SCSI controller.

Revision D



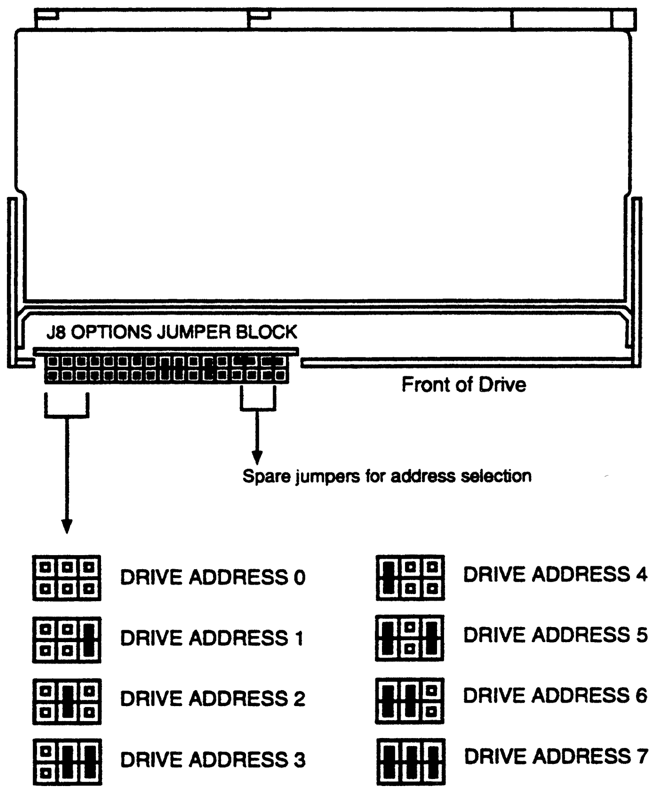
All internal **and** external FAST SCSI II (MVME865, MVME866, MVME867) disk drives attached to a SCSI bus containing a DS954PIO or DS985PIO **must** be strapped for **asynchronous operation**, regardless of their associated SCSI controller.

10777.00

Peripheral

MVME866A- 520MB SCSI 3 1/2" Disk Drive

Seagate ST566N



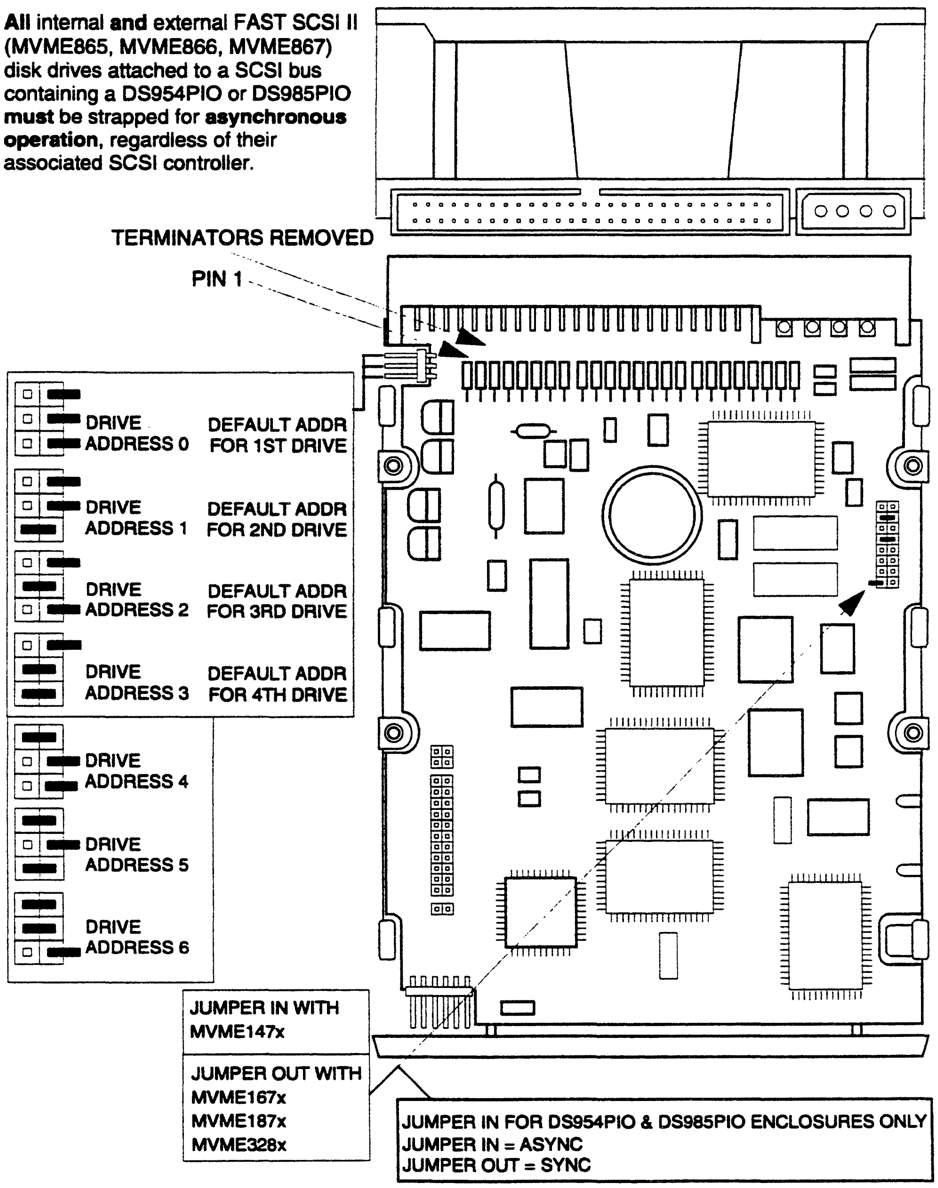
Peripheral

MVME867 - 1GB SCSI 3 1/2" Disk Drive

Seagate ST11200N

Revision B

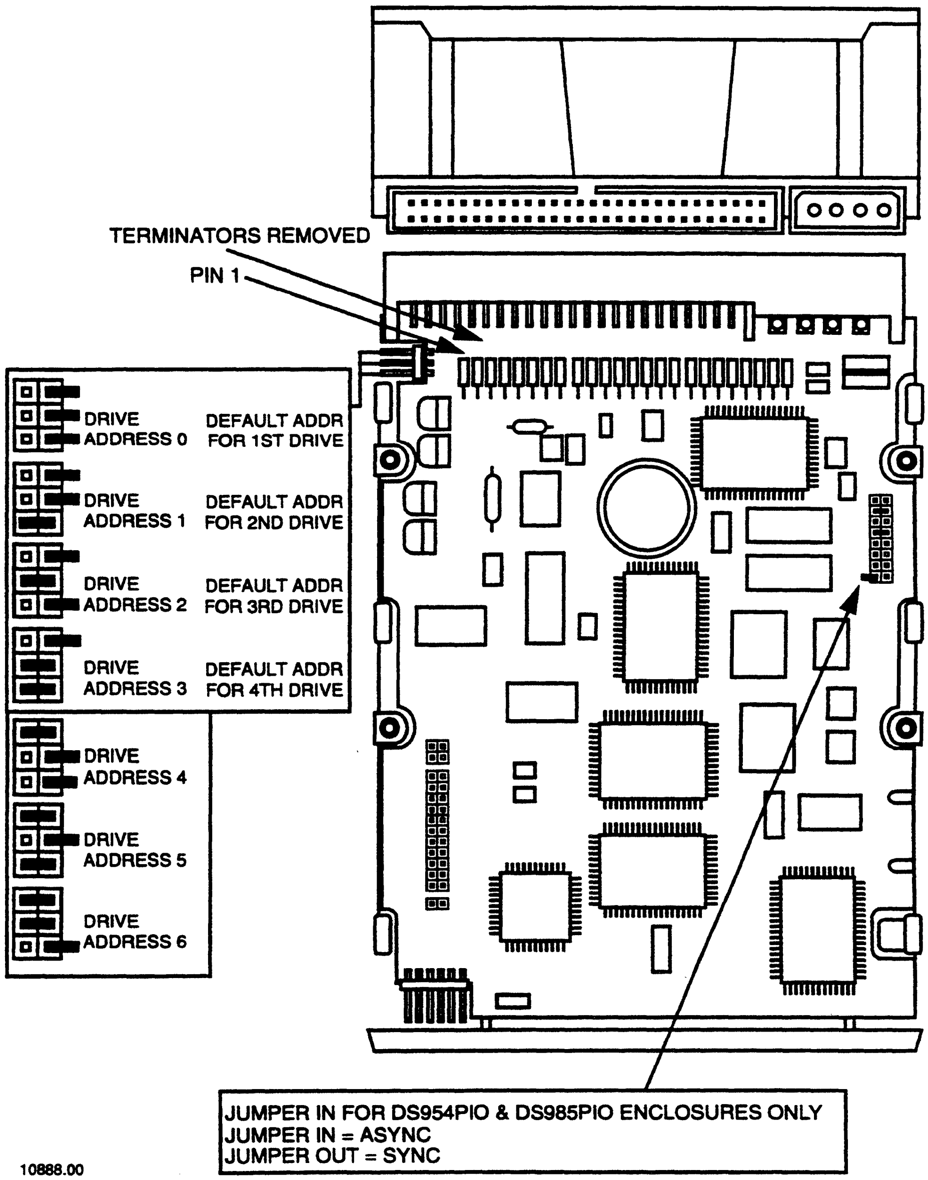
All internal **and** external FAST SCSI II (MVME865, MVME866, MVME867) disk drives attached to a SCSI bus containing a DS954PIO or DS985PIO **must** be strapped for **asynchronous operation**, regardless of their associated SCSI controller.



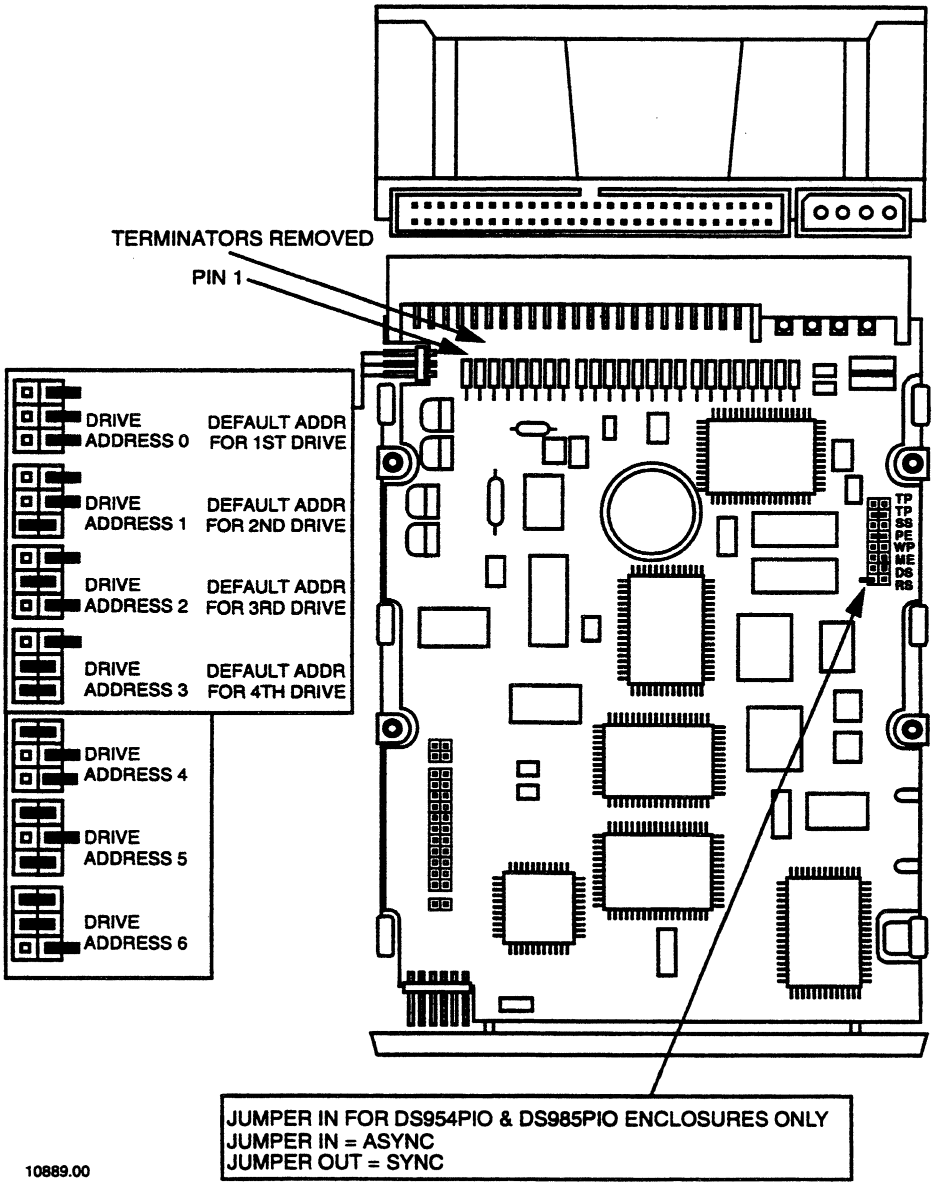
10173.00

Peripheral

Revisions C - E

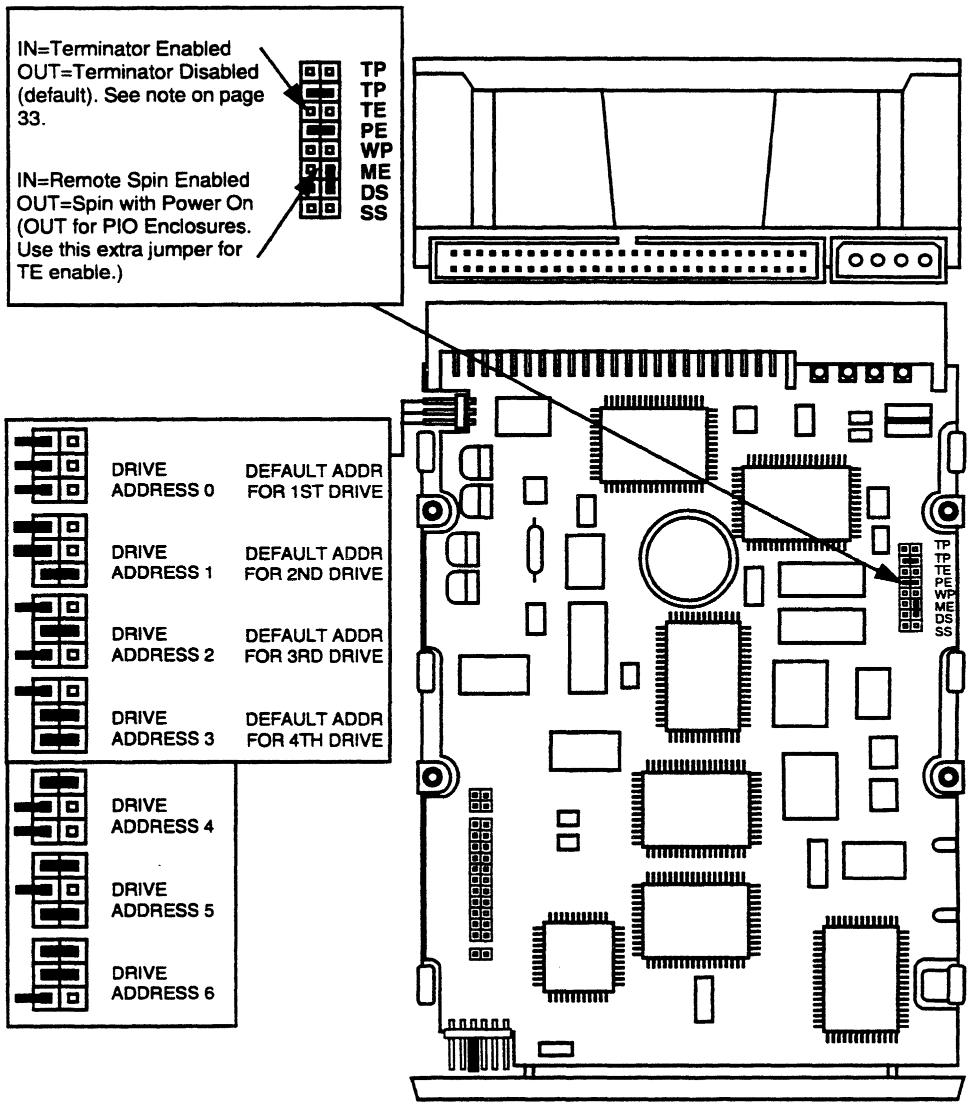


Revision F


TERMINATORS REMOVED
PIN 1
DRIVE ADDRESS 0
DEFAULT ADDR FOR 1ST DRIVE
DRIVE ADDRESS 1
DEFAULT ADDR FOR 2ND DRIVE
DRIVE ADDRESS 2
DEFAULT ADDR FOR 3RD DRIVE
DRIVE ADDRESS 3
DEFAULT ADDR FOR 4TH DRIVE
DRIVE ADDRESS 4
DRIVE ADDRESS 5
DRIVE ADDRESS 6
TP
TP
SS
PE
WP
ME
DS
RS
JUMPER IN FOR DS954PIO & DS985PIO ENCLOSURES ONLY
JUMPER IN = ASYNC
JUMPER OUT = SYNC
10889.00

MVME867A 1GB SCSI Disk Drive

Seagate ST31230



Peripheral

MVME868 - 2GB SCSI Disk Drive

Note

New active termination scheme for the DS954PIO and DS985PIO enclosures:

The significant change is that connectors J18 and J19 have been removed from the Power Distribution Interface board. Termination is provided via an active terminator connected to the end of the SCSI cable that formerly plugged into connectors J18 and/or J19.

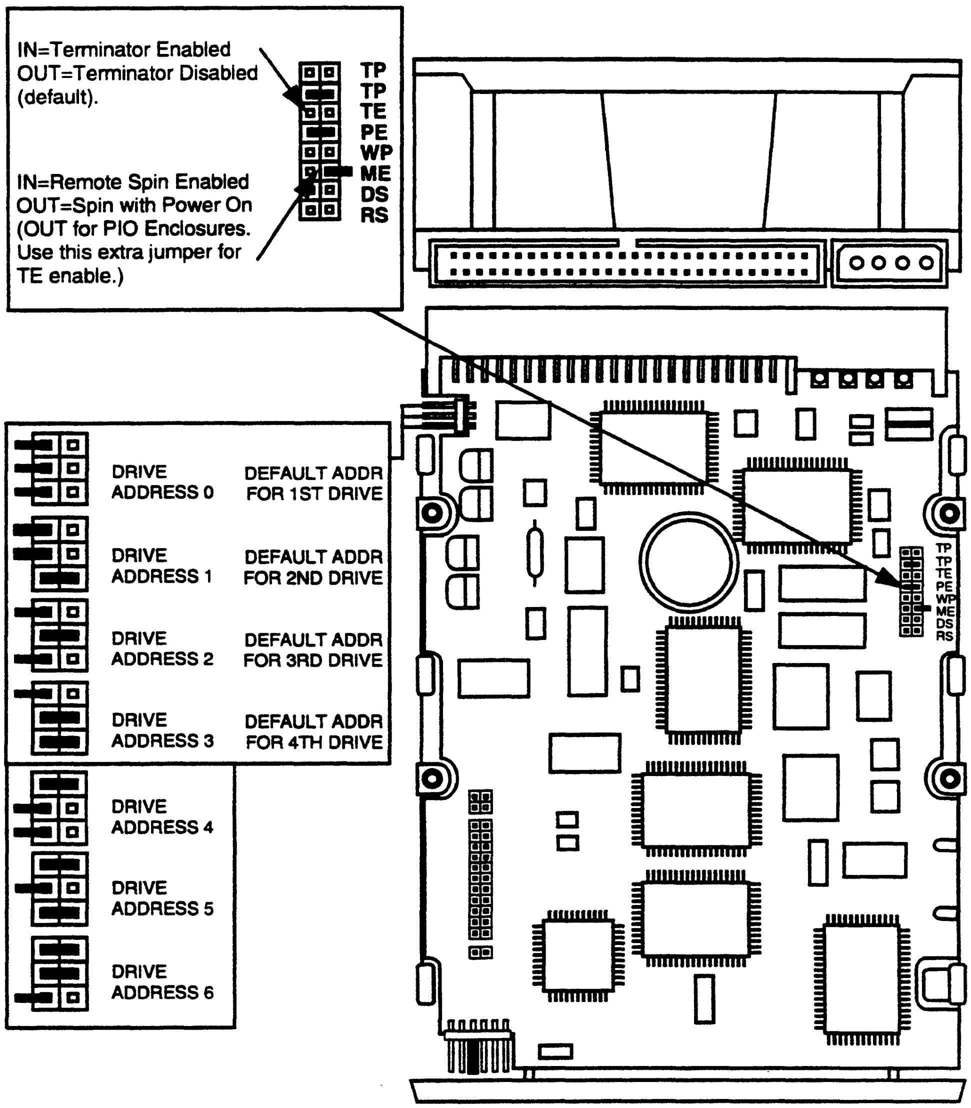
Disregard references to SCSI termination on the Interface board in other manuals or installation instructions. The instructions here supercede those found in DRVPIO-X/Kx as far as termination instructions within the PIO enclosure.

If you have an MVME868 2GB SCSI disk drive in your system, disregard the caution on pages 14 and 18 in the Installation Instructions (part number MVME868/K2).

The TE jumper must be OUT.

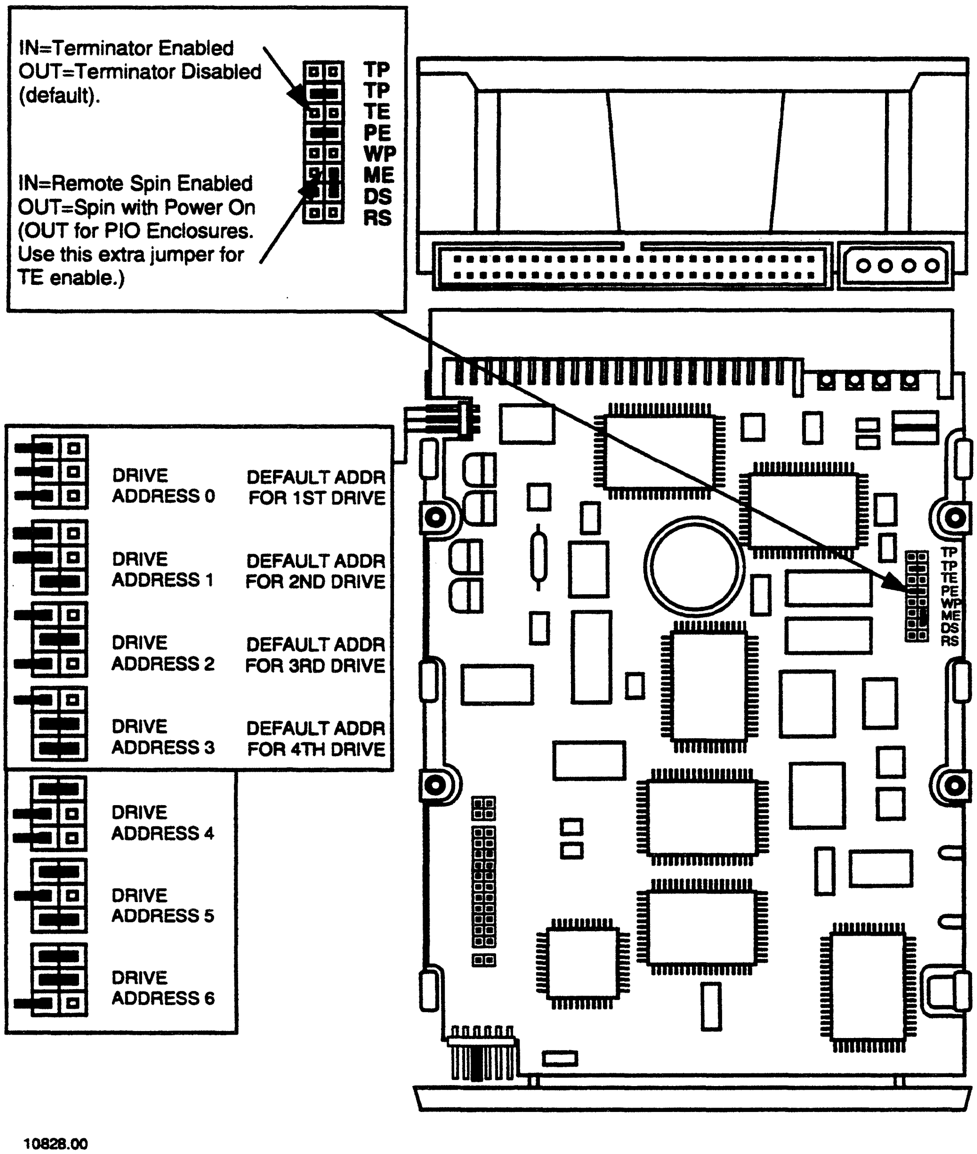
Seagate ST12400N

Revision A



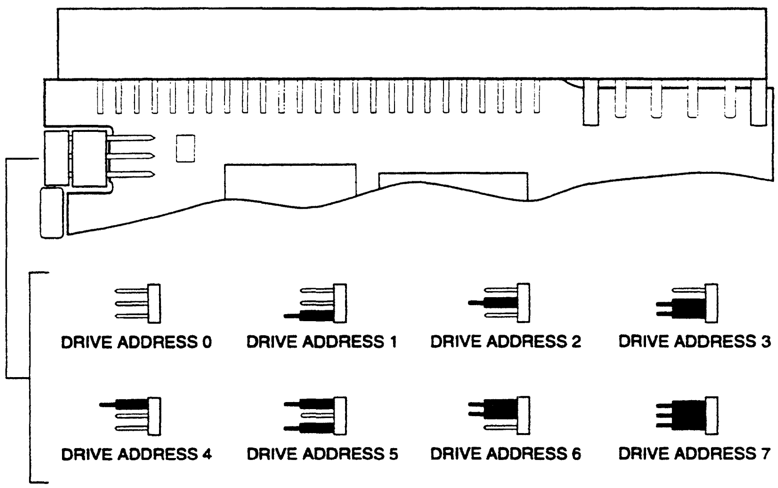
10827.00

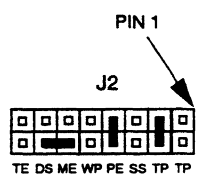
Revision B


IN=Terminator Enabled
OUT=Terminator Disabled (default).
IN=Remote Spin Enabled
OUT=Spin with Power On
(OUT for PIO Enclosures. Use this extra jumper for TE enable.)
TP
TP
TE
PE
WP
ME
DS
RS
DRIVE ADDRESS 0
DEFAULT ADDR FOR 1ST DRIVE
DRIVE ADDRESS 1
DEFAULT ADDR FOR 2ND DRIVE
DRIVE ADDRESS 2
DEFAULT ADDR FOR 3RD DRIVE
DRIVE ADDRESS 3
DEFAULT ADDR FOR 4TH DRIVE
DRIVE ADDRESS 4
DRIVE ADDRESS 5
DRIVE ADDRESS 6
10828.00

MVME869 SCSI 4GB Disk Drive

Seagate ST15230



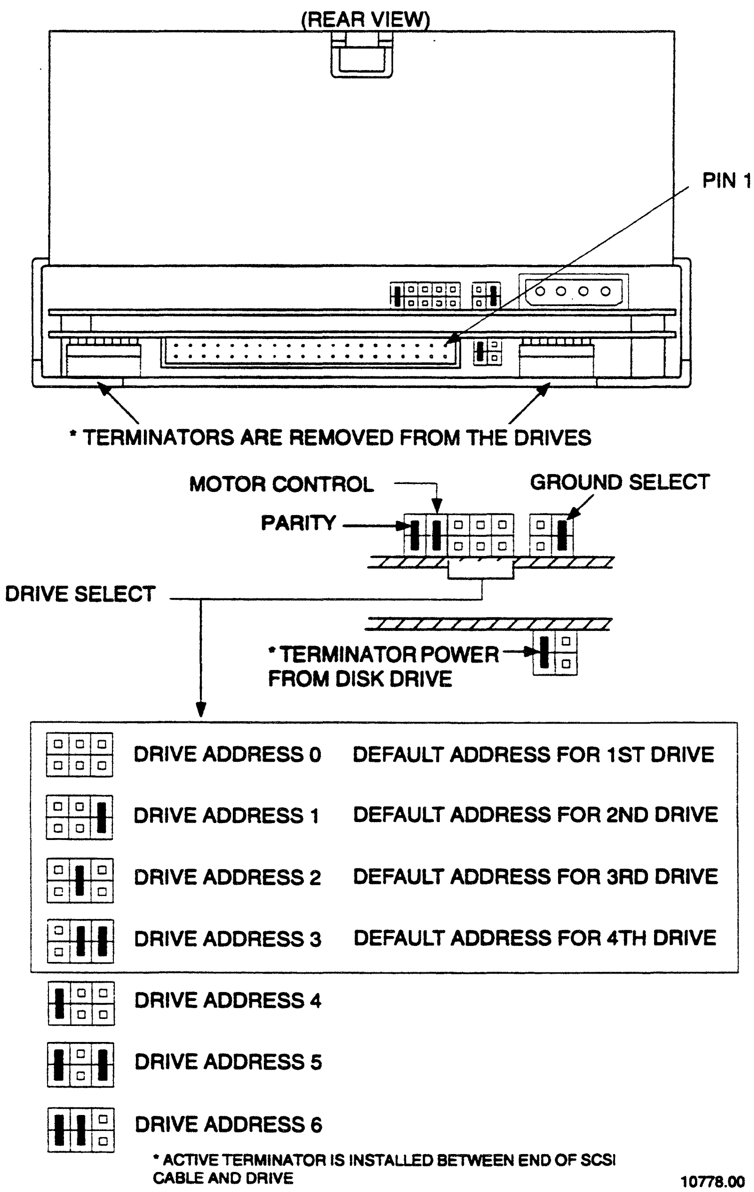


TP: Factory Setting
TE: Terminator Enable
PE: Parity Enable
WP: Write Protect
ME: Motor Start Enable
(OUT=spin with power;
IN=motor start required)
DS: Delayed Spin Enable
(jumper always removed)
SS: Reserved

11245.00 9501

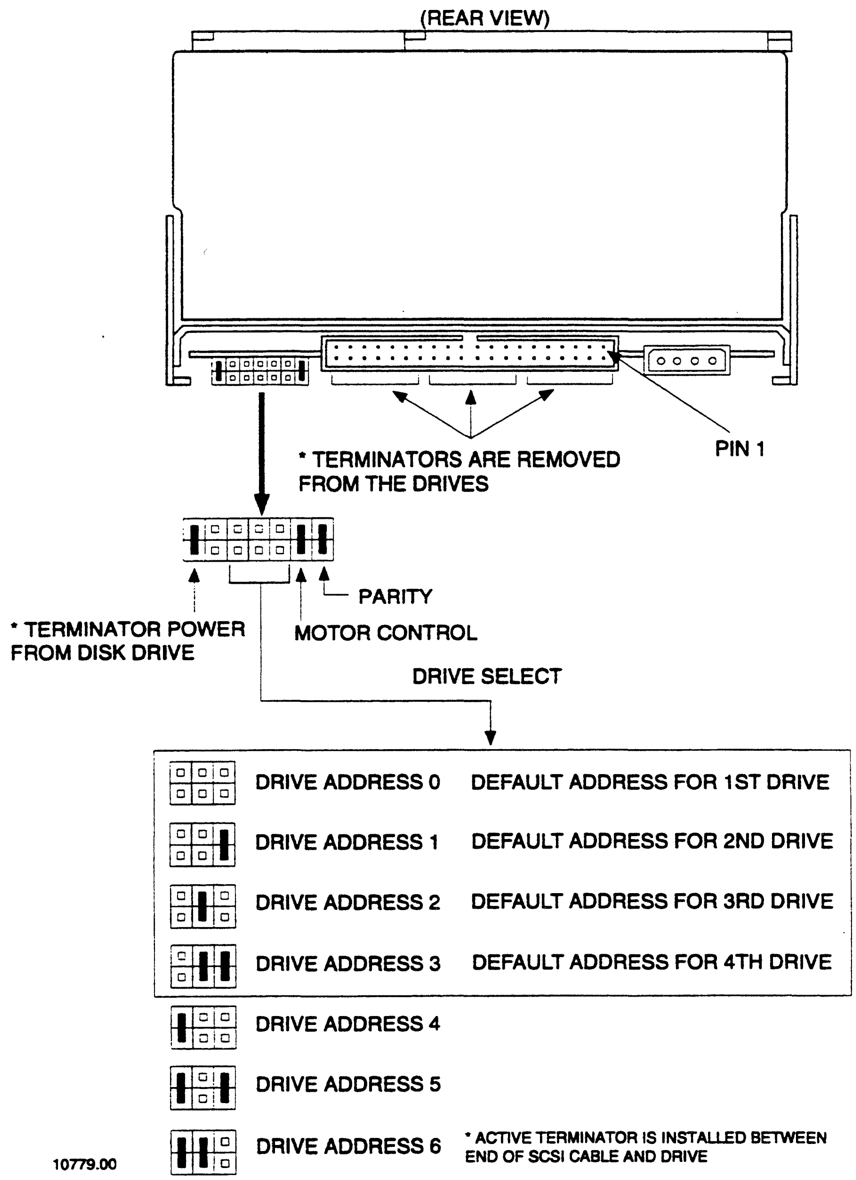
MVME875 - 300MB SCSI 5 1/4" Disk Drive

CDC 94171-307



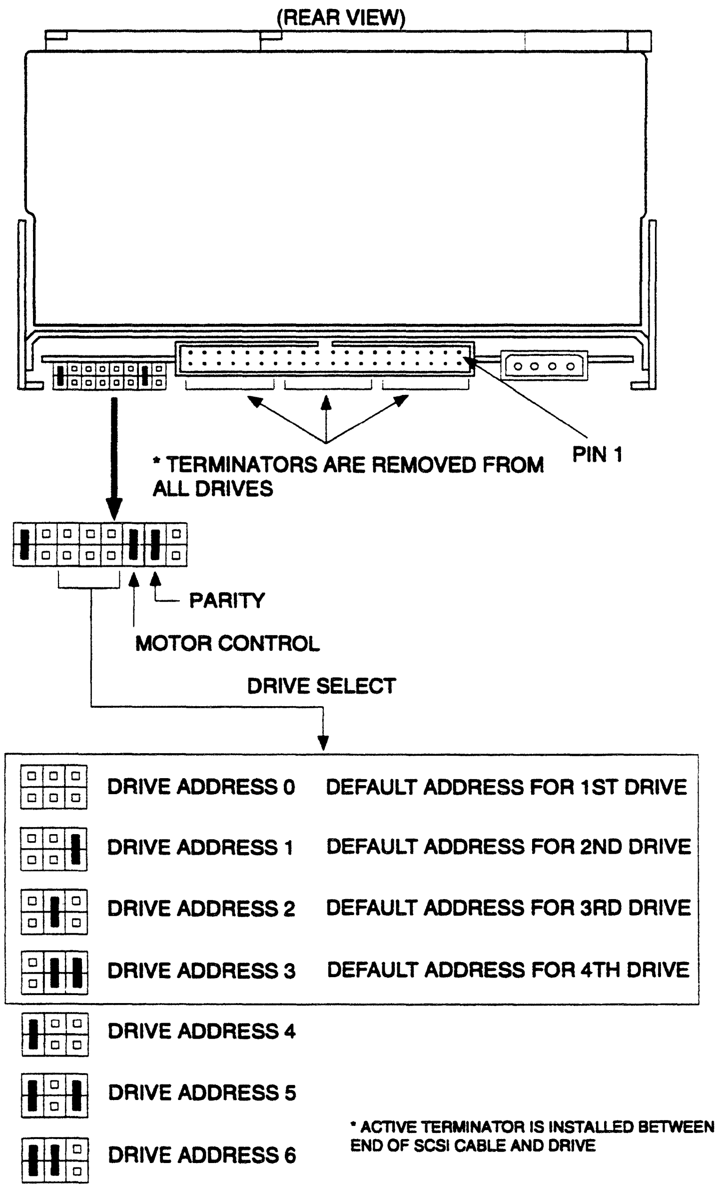
MVME876 - 600MB SCSI 5 1/4" Disk Drive

CDC 94181-702



MVME877 - 1GB SCSI 5 1/4" Disk Drive

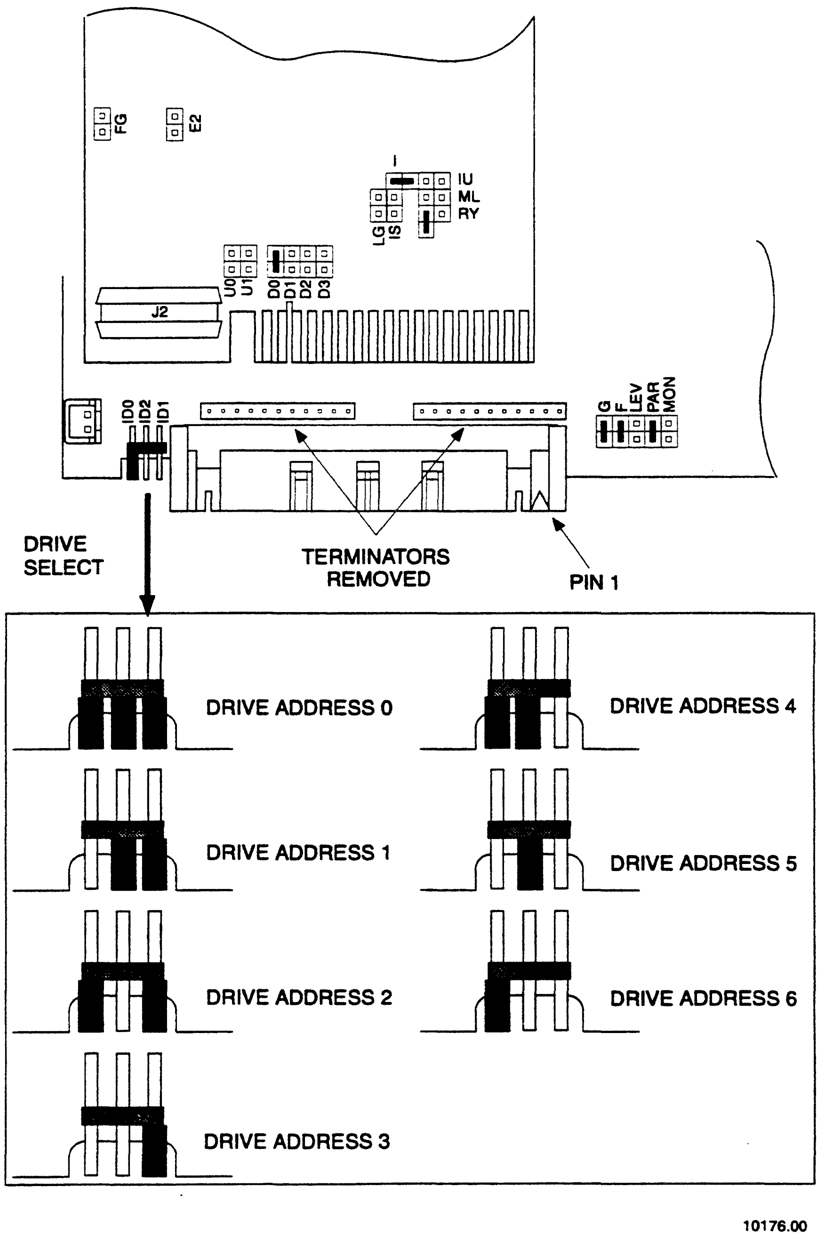
CDC 94601-12G



10780.00

MVME881A - 1.2MB 5 1/4" Diskette Drive

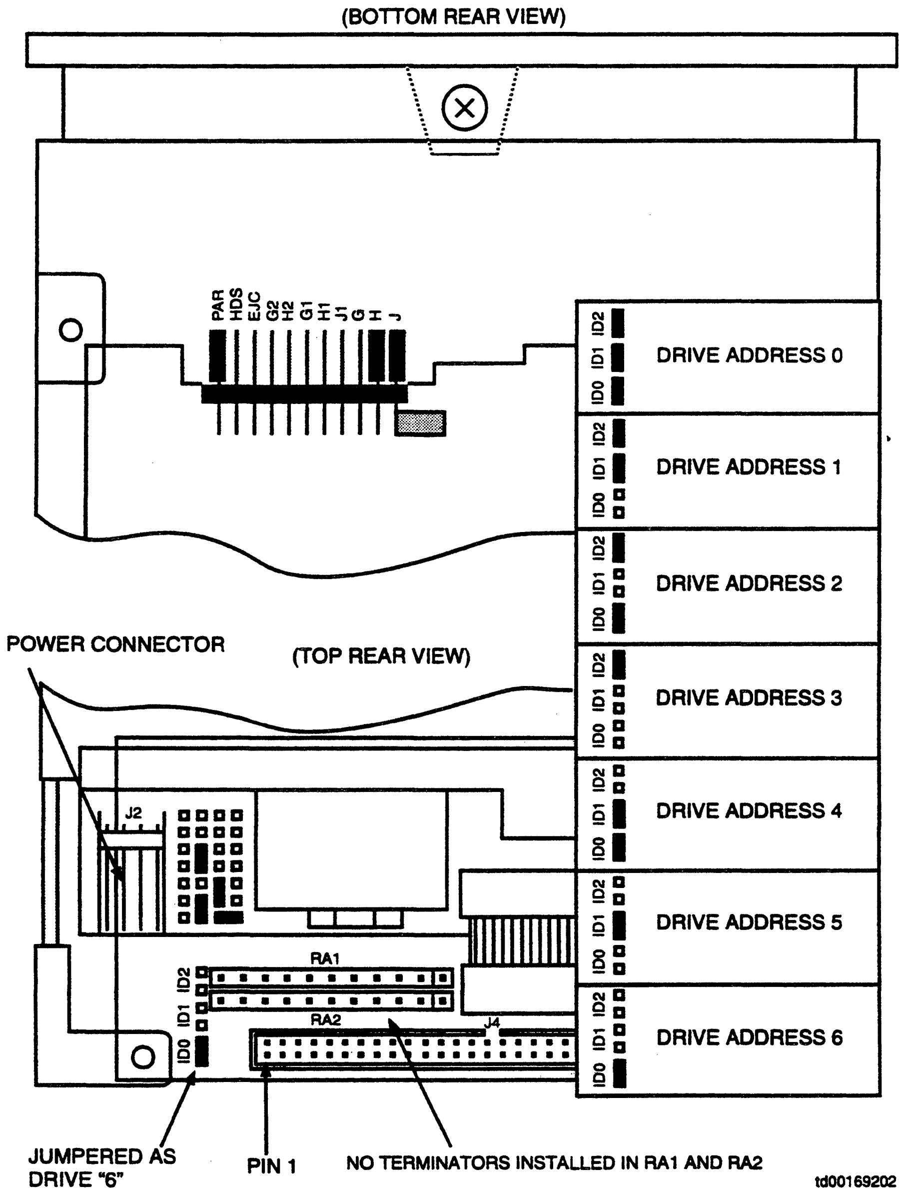
Teac FD55-GFRS (PC-AT Compatible Floppy)



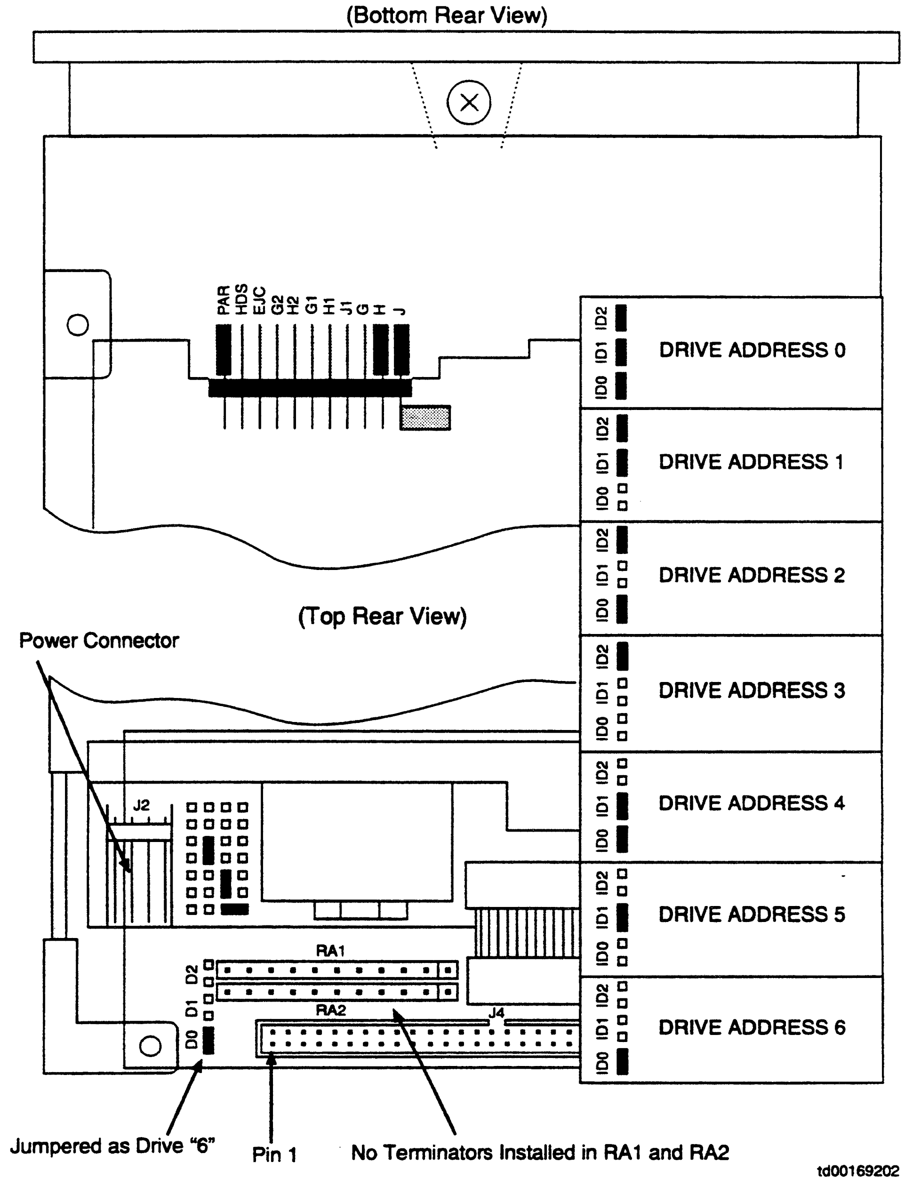
Peripheral

MVME884 - 2.9MB SCSI 3 1/2" Diskette Drive

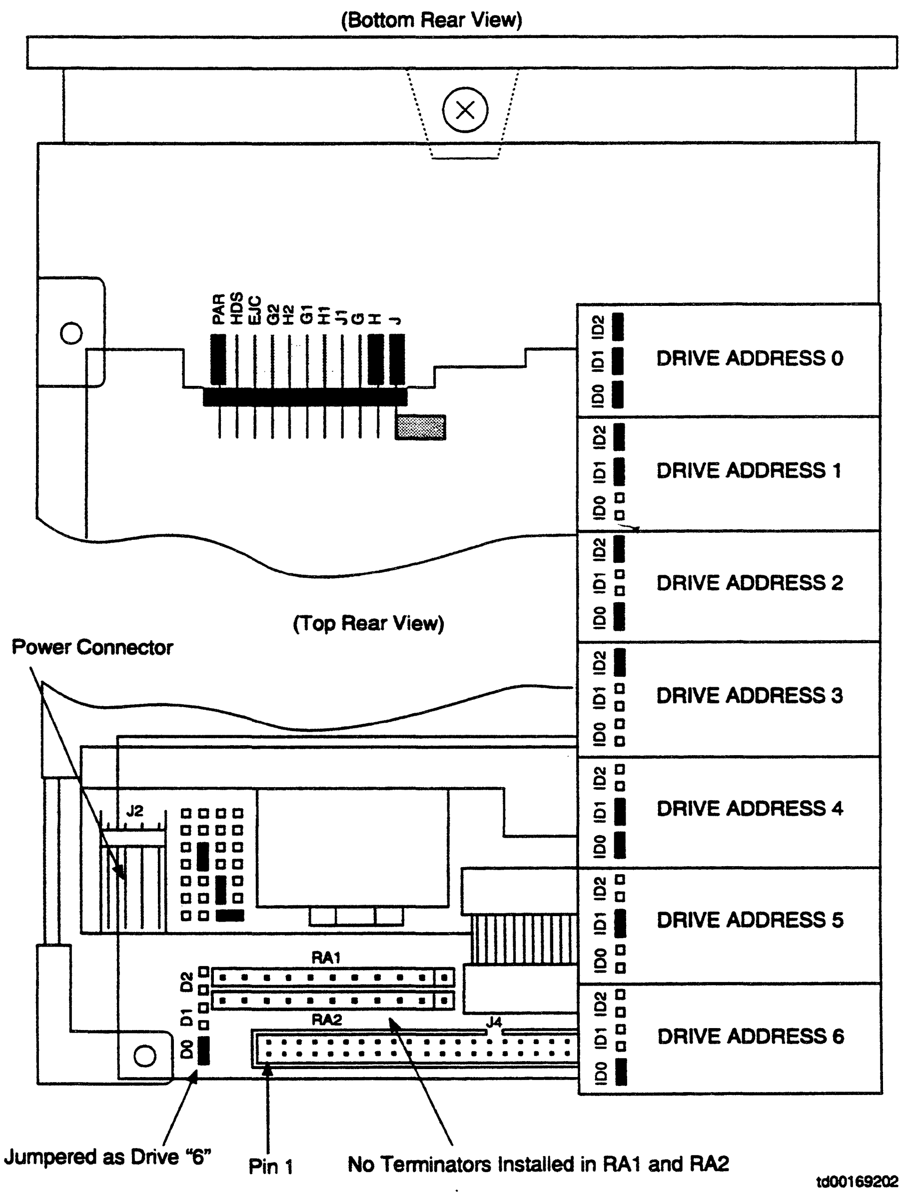
Teac FD235-JS (PS/2 Compatible Floppy)



C01D, C02D

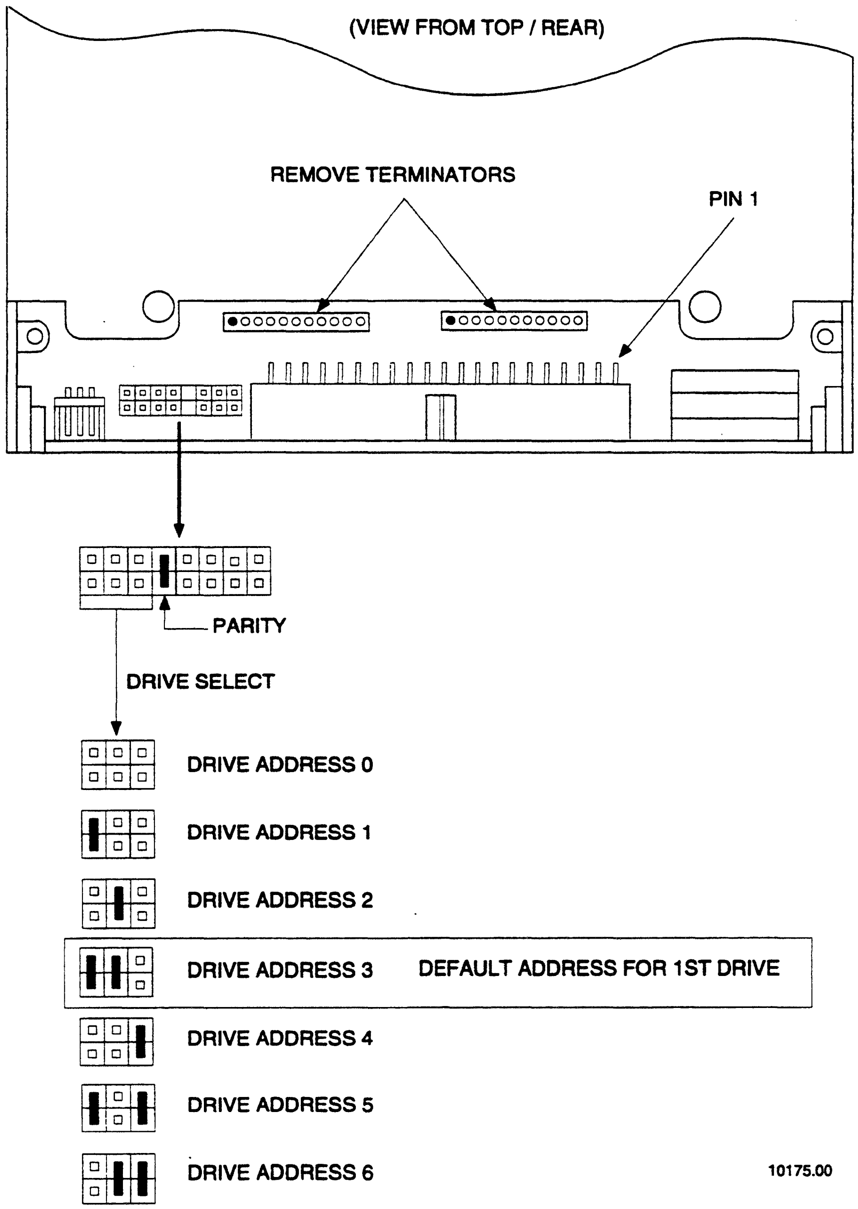

(Bottom Rear View)
PAR
HDS
EJC
G2
H2
G1
H1
J1
G
H
J
ID2
ID1
ID0
DRIVE ADDRESS 0
DRIVE ADDRESS 1
DRIVE ADDRESS 2
DRIVE ADDRESS 3
DRIVE ADDRESS 4
DRIVE ADDRESS 5
DRIVE ADDRESS 6
(Top Rear View)
Power Connector
J2
RA1
RA2
J4
D2
D1
D0
Jumpered as Drive "6"
Pin 1
No Terminators Installed in RA1 and RA2
td00169202

MVME885 - 1.4 MB Diskette Drive



MVME888 - 600MB SCSI 5 1/4" CD-ROM Drive

Toshiba XM-3301B-MR (internal), TXM-3301E1 (external), & 3401 (external)



Peripheral

PowerStack RISC PC Supported Drives

DeskTop Supported Drives

There are three SCSI bays in the DeskTop enclosure. Two bays support standard 5.25-inch half-height removable devices such as the Minicassette DC-2000 tape drive or the CD-ROM drive. One of these bays may be used for a standard half-height 3.5-inch disk drive.

The third SCSI device bay behind the front bezel is for one-inch high, 3.5-inch hard disk drives only.

MiniTower Supported Drives

There are five SCSI bays in the MiniTower enclosure. Three bays support standard 5.25-inch half-height removable devices such as the Minicassette DC-2000 tape drive or the CD-ROM drive. One of these bays may be used for a standard half-height 3.5-inch disk drive.

Two SCSI device bays inside the rear of the enclosure are for one-inch high, 3.5-inch hard disk drives only.

Floppy Disk

The floppy disk occupies its own device bay. It is not a SCSI device and therefore does not consume a SCSI address.

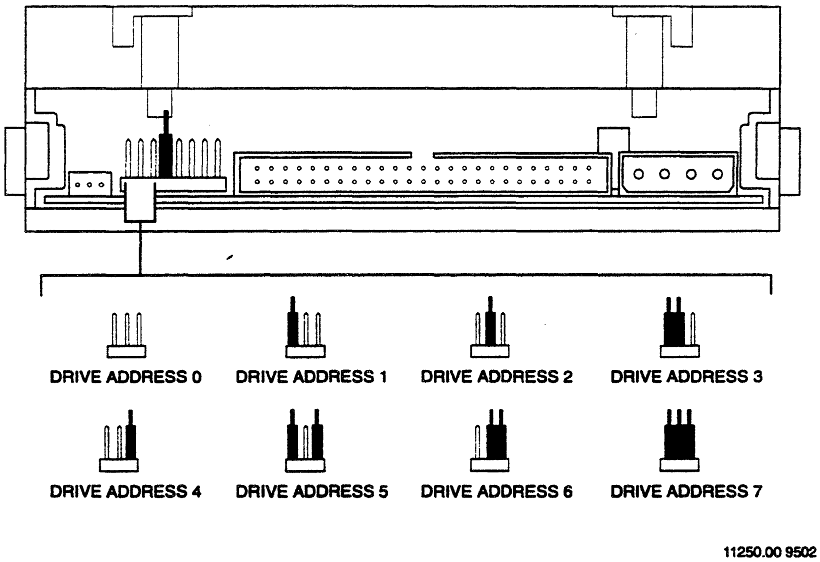
RISC PC Supported Drive Devices

Motorola Part Number	Device Type	Vendor
P401-FDF/K 01AW2747D01A	1.44 MB Floppy drive	Teac
P851-DC2F/K 01AW2716D11A	2GB Mini QIC tape	Conner
P854-525F/K 01AW2755D02A	525 MB QIC tape	Tandberg
P857-4GBF/K 01AW2670D12A	4mm DAT	Conner
P856-7GBF/K 01AW2860D02A	8mm Cartridge tape	Exabyte

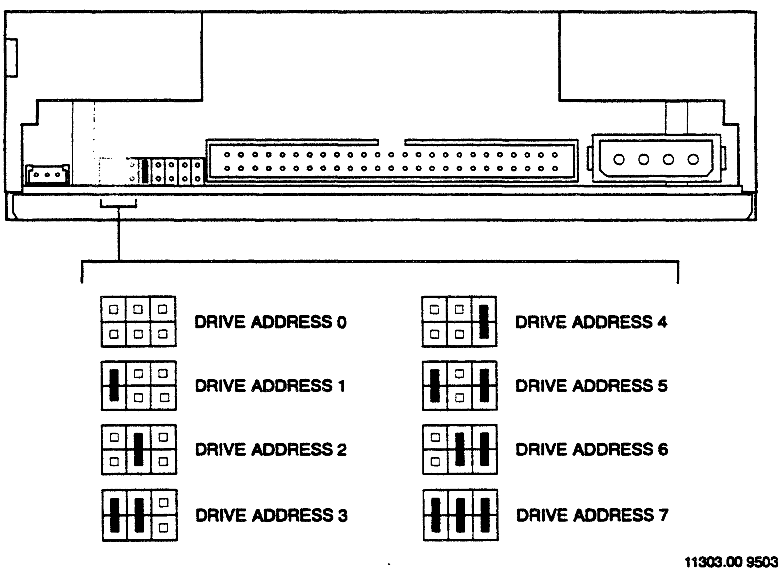
Peripheral

RISC PC Supported Drive Devices

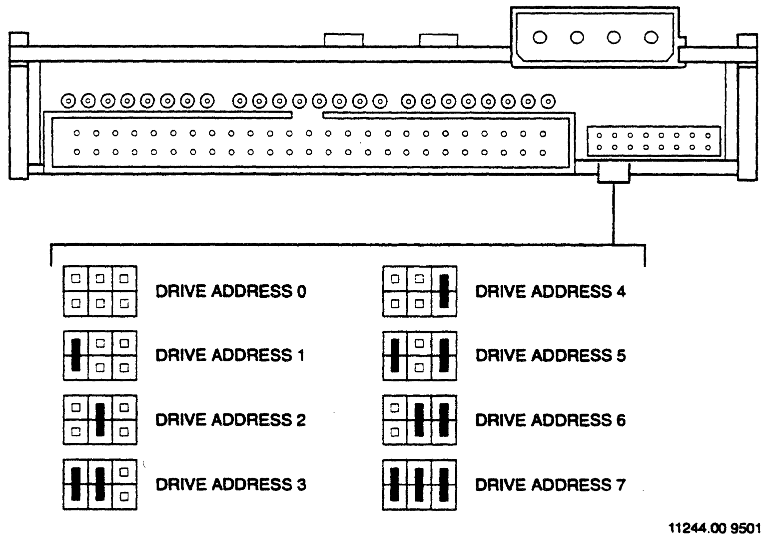
Motorola Part Number	Device Type	Vendor
P862-545F/K 01AW2725D01B	545MB 3.5-inch hard drive (19mm)	Seagate
P862-1GBF/K P863-1GBF/K 01AW2713D01A	1GB 3.5-inch hard drive	Seagate
P862-2GBF/K 01AW2523D01B	2GB 3.5-inch hard drive	Seagate
P862-4GBF/K 01AW2813D01A	4.3 GB 3.5-inch hard drive	Seagate
P881-600F/K 01AW2781C03B	600MB 2X, CD-ROM	Toshiba
P881-600X4F/K 01AW2819D02A	600MB, 4X, CD-ROM	Toshiba
P881-600LCF/K 01AW2815D01A	600MB, 4X, CD-ROM (low cost)	Toshiba



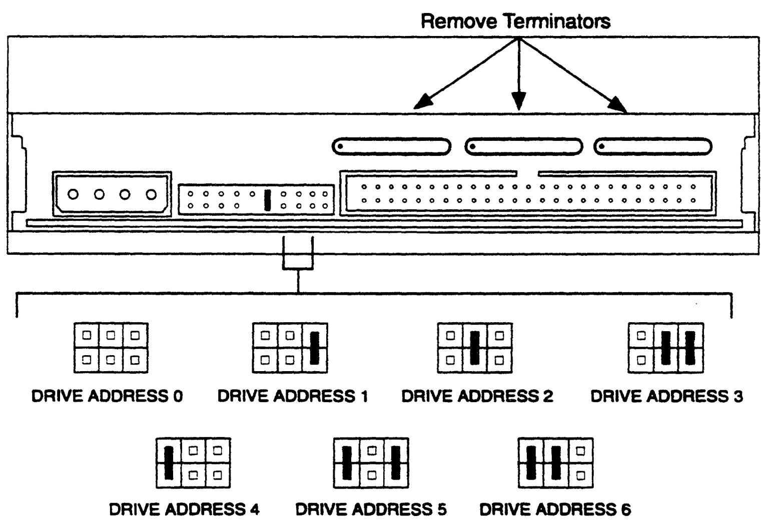
P881-600F CD-ROM Drive Addressing



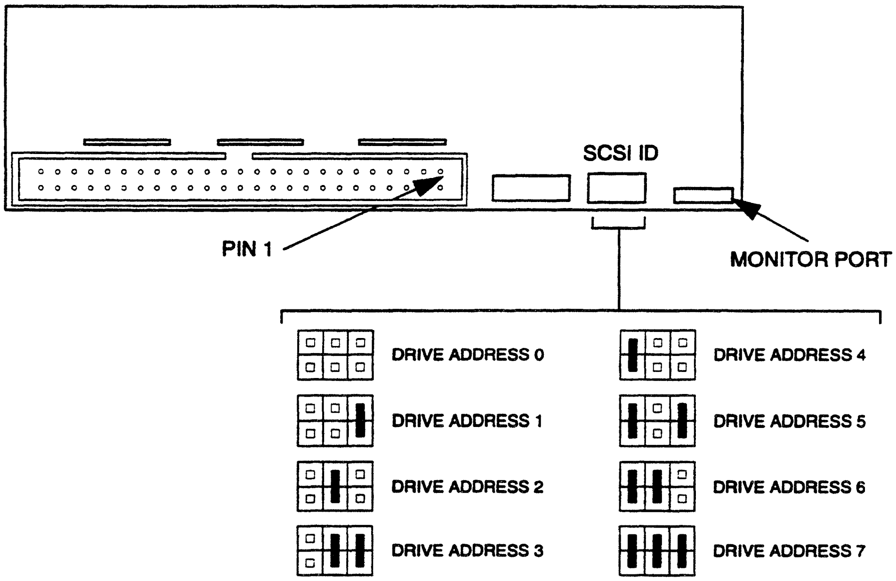
P881-600X4 and P881-600LC CD-ROM Drive Addressing



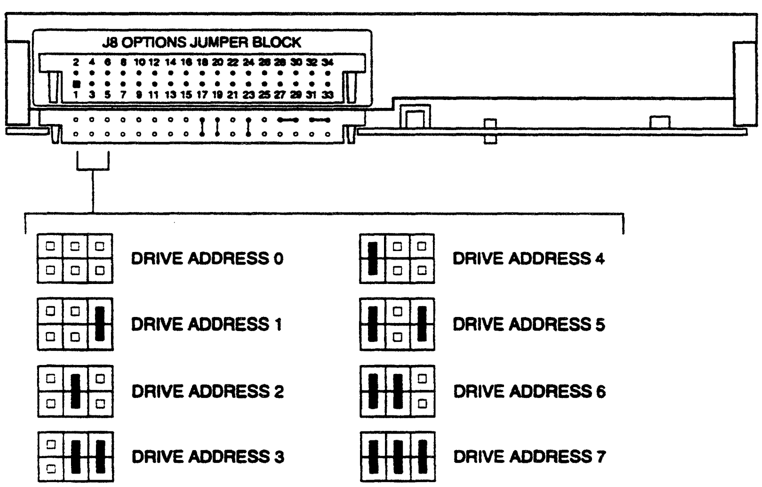
P851-DC2 Tape Drive Addressing



P854-525 QIC Tape Drive Addressing



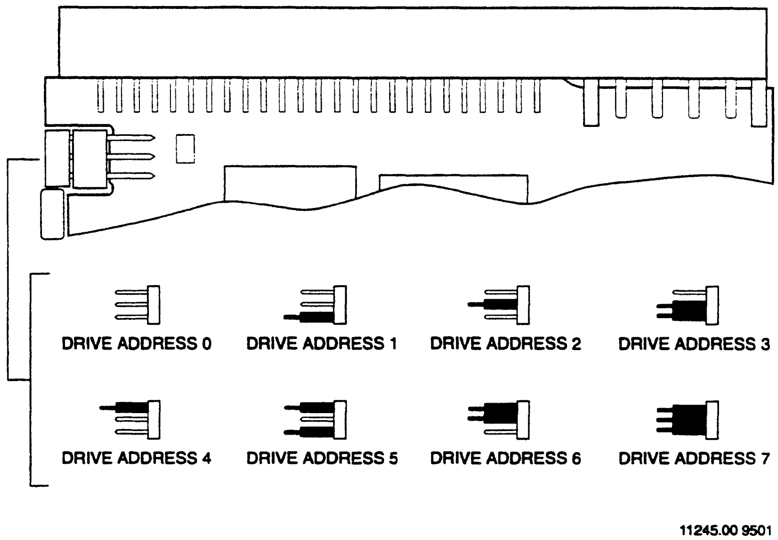
P856-7GB Cartridge Tape Drive Addressing



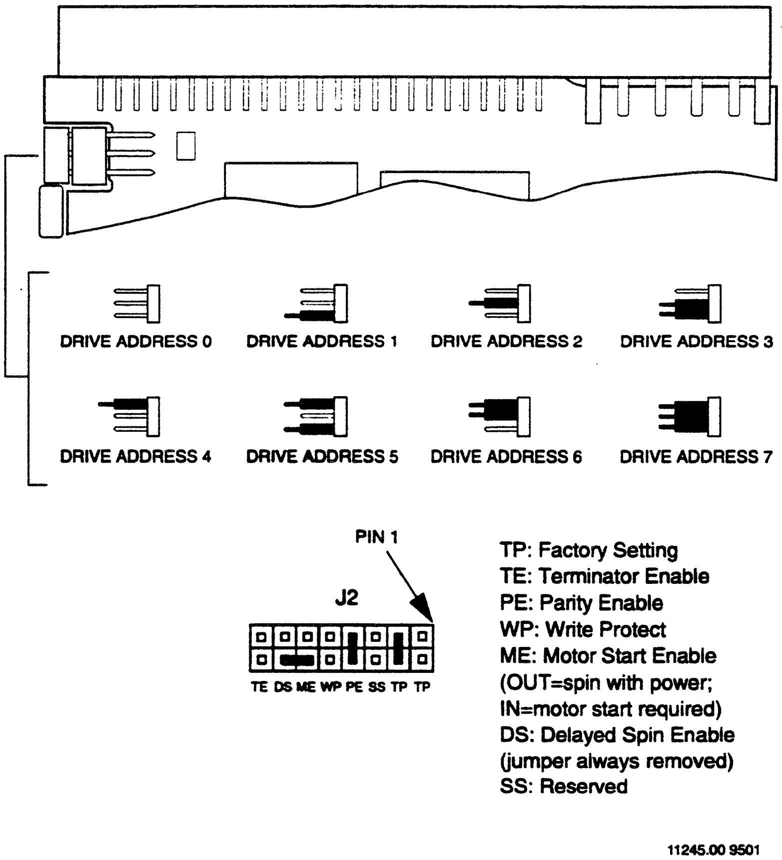
11246.00 9501

P862-545 Disk Drive Addressing

Peripheral



P862-1GB and P862-2GB Disk Drives Addressing



P862-4GB Disk Drive Addressing

VME Enclosures

Overview

This section lists the Motorola series of enclosures that house VME system components, including the VMEbus backplane, VME boards and card cage, transition modules and card cage, peripheral storage devices, cooling fans, and DC power supply.

The following enclosures are used in Motorola VME computer systems. They are also available separately for use with customer-supplied payloads.

Module Number	Description	System Models Used In
MVME952	3-Slot VME Desktop Chassis	Models 3220, 4220, & 8220
MVME954A	6-Slot VME Deskside Chassis	Models 3420, 4420, 8420, & 8440
MVME946	12-Slot VME Benchtop/Rackmount Chassis	Models 3520, 4520, 8520/40, & 95*xx*
MVME955C	12-Slot VME Pedestal Chassis	Models 3620, 4620, 8620, & 8640
MVME984	Compact 20-slot VME Benchtop/Rackmount Chassis	
MVME985-1	20-Slot VME Pedestal Chassis	Models 3820, 4820, 8820, & 8840
MVME990	20-Slot Rackmount Bay Chassis	Model 8940 & 99*xx*
MC1000	3-, dual 9-, 12-, or 20-slot Modular Pedestal or Rackmount Chassis	XR9109, XR9112, XR9120, XR9209

These chassis, together with other types of system enclosures used by Motorola, are described and illustrated in the *Systems* section of this guide.

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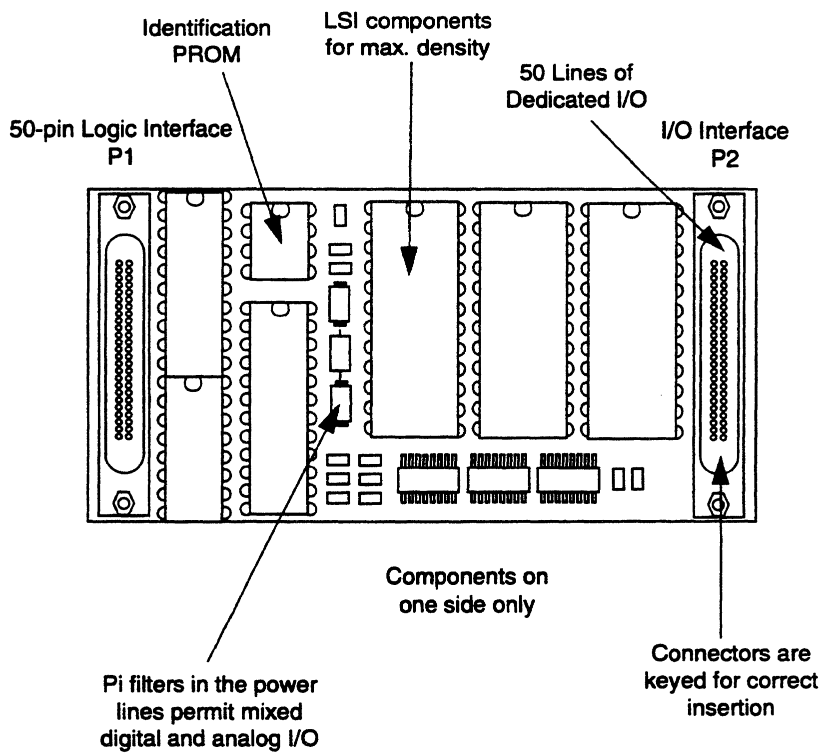
IndustryPacks

Overview

This section contains information on the IndustryPacks (MVIPs) that are available from Motorola Computer Group. The IndustryPacks are used with the MVME162 Embedded Controller.

Below is an example layout of a typical IndustryPack module. The bus interface is very simple, typically requiring no more than 2 or 3 PALs. The ID PROM can be very useful for writing device drivers because it allows software to determine the personality of each IndustryPack module.



MVIPs

Current Offerings

Motorola currently offers the following MVIPs for use with the MVME162.

Part Number	Description
MVIP200	8 MB FLASH memory IP.
MVIP300	IEEE 488 Interface, GPIB Talker, listener, controller module.
MVIP301-001	Two multiprotocol serial channels for EIA232, or EIA422. Asynchronous or synchronous protocols.
MVIP302	Eight asynchronous serial channels on EIA232 to 38.4 Kbaud.
MVIP303	Eight asynchronous serial channels on EIA422 to 38.4 Kbaud.
MVIP340	Two MC68230 programmable interface timers support 32 digital lines, double buffered byte and 16-bit data transfers, bi-directional data transfers and hardware handshake.
MVIP341	Two MC68230 programmable interface/timer chips that support 48 digital I/O lines accessible as bits or bytes.
MVIP390	Dual wide IP graphics board, 128KB instruction RAM, 384 KB VRAM, VGA and SVGA interfaces, on-board firmware and driver object package.
MVIP512-002	12-bit, high density, single-wide analog input IP with capability to monitor 20 differential or 40 single-ended analog input channels.
MVIP512-027	12-bit high density, single-wide analog output IP with capability to drive 16 analog voltage output channels.
MVIP520	Provides eight inputs from mechanical switches or external voltage sources. Each input is individually optically isolated. Each of the eight inputs can be read directly or used to generate an input.
MVIP521	24-channel TTL input and output. Individual bits programmable.
MVIP703	Octal serial distribution panel. 19-inch rack-mounted panel that takes two 50-pin cable input on rear and feeding to two rows of DB9 connectors (16 total channels).
MVIP790	Transition module for MVIP390. Includes interfaces and connectors for a mouse, keyboard, and VGA/SVGA video displays.

Board Placement

This section provides board placement charts for the card cage and back panel for,

- ❑ Models 3220, 4220, and 8220 (3-slot)
- ❑ Models 3420, 4420, and 8420 (6-slot)
- ❑ Models 3620, 4620, and 8620 (12-slot tower)
- ❑ Models 3520, 4520, and 8520 (12-slot tabletop)
- ❑ Models 3820, 4820, and 8820 (20-slot)
- ❑ Models 95*xx* and 99*xx* (197-based)
- ❑ EVSB

Use these charts only as a guideline as to where to place the boards in your chassis. Since the charts show all available options, they may not directly reflect what is in your system.

The board placement illustrations in this section are organized in numerical, then alphabetical sequence.

Model 3220 Card Cage and Back Panel

Card Cage

1*	2	3	Slot/Priority	
1st			MVME147/A/B/C/D	1
	1st	2nd	1st MVME332XT	2
		1st	2nd MVME332XT	3
	1st	2nd	MVME333	4
	1st	2nd	MVME333X25/334A	5
	1st	2nd	MVME374/376	6
	1st	2nd	MVME337-1	7
	1st	2nd	MVME336	8
	1st	2nd	MVME335	9
* Note that slot 1 is the bottom slot.				

Back Panel

1*	2	3	4	5	6	Slot/Priority	
1st						MVME712A	1
	1st					MVME712B	2
	1st					MVME712C	3
	1st					MVME733	4
				1st	2nd	MVSB741	5
		1st		2nd		1st MVME710B	6
				1st		2nd MVME710B	7
				1st	2nd	MVME332PA1	8
		1st		2nd		MVME705A	9
		1st	2nd	3rd	4th	MVME705B	10
		1st	2nd	3rd	4th	MVME705-1	11
		1st	2nd	3rd	4th	MVME709-1	12
		1st	2nd	3rd	4th	MVMELAN	13
		1st		2nd		MVME751	14
		1st		2nd		MVME715P	15
* Note that slot 1 is the bottom slot.							

Model 3420 Card Cage and Back Panel

Slot

Card Cage

1	2	3	4	5	6	6+	Slot/Priority	
1st							MVME147/A/B/C/D	1
				2nd	1st		MVME337-1	2
		4th	3rd	2nd	1st		1st MVME332XT	3
	4th	3rd	2nd	1st			2nd MVME332XT	4
	3rd	2nd	1st				3rd MVME332XT	5
	5th	4th	3rd	2nd	1st		1st MVME333	6
	4th	3rd	2nd	1st			2nd MVME333	7
	5th	4th	3rd	2nd	1st		1st MVME333X25/334A	8
	4th	3rd	2nd	1st			2nd MVME333X25/334A	9
	5th	4th	3rd	2nd	1st		MVME374/376	10
	5th	4th	3rd	2nd	1st		MVME336	11
	5th	4th	3rd	2nd	1st		MVME335	12

Back Panel

8	7	6	5	4	3	2	1	Slot/Priority	
							1st	MVME712A	1
						1st		MVME712B	2
					1st			MVME712C	3
						1st		MVME733	4
	Installs in slots 4-7							EVSB Backplane	5
								1st MVSB741	6
								2nd MVSB741	7
								3rd MVSB741	8
								4th MVSB741	9
1st available slot from left								MVME374/376 Tran Panel	10
1st 2 slots from left								MVME338 Tran Panel	11
Next 2 slots from left								1st MVME710B	12
Next 2 slots from left								2nd MVME710B	13
Next 2 slots from left								3rd MVME710B	14
1st available slot from left								MVMEPA1	15
1st available slot from left								MVMEPA2	16
1st 2 available slots from left								1st MVME705A	17
1st 2 available slots from left								2nd MVME705A	18
1st available slot from left								1st MVME705B	19
1st available slot from left								2nd MVME705B	20
1st available slot from left								1st MVME705-1/709-1	21
1st available slot from left								2nd MVME705-1/709-1	22
1st 2 available slots from left								MVME751	23
1st 2 available slots from left								MVME715P	24

Model 3520 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	7	8	9	10	11	12	Slot/Priority	
1st												MVME147S/A/B/C/D	1
	1st											1st MVME224A-3/-2/-1	2
		1st										2nd MVME224A-3/-2/-1	3
			1st									3rd MVME224A-3/-2/-1	4
				1st								4th MVME224A-3/-2/-1	5
					1st							5th MVME224A-3/-2/-1	6
	1st	2nd	3rd									1st MVME374/376	7
		1st	2nd	3rd								2nd MVME374/376	8
			1st	2nd	3rd							3rd MVME374/376	9
				1st	2nd	3rd						4th MVME374/376	10
	1st	2nd										1st MVME337-1	11
		1st	2nd									2nd MVME337-1	12
	1st	2nd	3rd	4th	5th	6th	7th					1st MVME332XT	13
		1st	2nd	3rd	4th	5th	6th	7th				2nd MVME332XT	14
			1st	2nd	3rd	4th	5th	6th	7th			3rd MVME332XT	15
				1st	2nd	3rd	4th	5th	6th	7th		4th MVME332XT	16
					1st	2nd	3rd	4th	5th	6th	7th	5th MVME332XT	17
						1st	2nd	3rd	4th	5th	6th	6th MVME332XT	18
							1st	2nd	3rd	4th	5th	7th MVME332XT	19
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	1st MVME333	20
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	2nd MVME333	21
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	1st MVME333X25/334A	22
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	2nd MVME333X25/334A	23
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	3rd MVME333X25/334A	24
				1st	2nd	3rd	4th	5th	6th	7th	8th	4th MVME333X25/334A	25
					1st	2nd	3rd	4th	5th	6th	7th	5th MVME333X25/334A	26
						1st	2nd	3rd	4th	5th	6th	6th MVME333X25/334A	27
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	MVME336	28
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	MVME335	29

Back Panel

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
																1st	MVME712A	1
															1st		MVME712B	2
														1st			MVME712C	3
															1st		MVME733	4
1st																	1st MVMELAN Panel	5
	1st																2nd MVMELAN Panel	6
		1st															3rd MVMELAN Panel	7
			1st														4th MVMELAN Panel	8
EVSB Backplane & MVSB741																	EVSB Backplane	9
		7th		6th		5th		4th		3rd		2nd		1st			1st MVME710B	10
		6th		5th		4th		3rd		2nd		1st					2nd MVME710B	11
		5th		4th		3rd		2nd		1st							3rd MVME710B	12
		4th		3rd		2nd		1st									4th MVME710B	13
		3rd		2nd		1st											5th MVME710B	14
		2nd		1st													6th MVME710B	15
		1st															7th MVME710B	16
								Next available slot									1st - 7th MVME332PA1	17 - 23
												Next available slot					1st - 4th MVME332PA2	24 - 27
Next 2 slots available																	1st MVME705A	28
Next 2 slots available																	2nd MVME705A	29
Next slot available																	1st MVME705B	30
Next slot available																	2nd MVME705B	31
Next slot available																	1st MVME705-1/709-1	32
Next slot available																	2nd MVME705-1/709-1	33
Next slot available																	3rd MVME705-1/709-1	34
Next slot available																	4th MVME705-1/709-1	35
Next slot available																	5th MVME705-1/709-1	36
Next slot available																	6th MVME705-1/709-1	37
Next 2 slots available																	MVME751	38
Next 2 slots available																	MVME715P	39

Model 3620 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	7	8	9	10	11	12	Slot/Priority	
1st												MVME147S/A/B/C/D	1
	1st											1st MVME224A-3/-2/-1	2
		1st										2nd MVME224A-3/-2/-1	3
			1st									3rd MVME224A-3/-2/-1	4
				1st								4th MVME224A-3/-2/-1	5
					1st							5th MVME224A-3/-2/-1	6
										2nd	1st	1st MVME374/376	7
									2nd	1st		2nd MVME374/376	8
								2nd	1st			3rd MVME374/376	9
							2nd	1st				4th MVME374/376	10
						6th	5th	4th	3rd	2nd	1st	1st MVME337-1	11
						5th	4th	3rd	2nd	1st		2nd MVME337-1	12
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME338	13
	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME338	14
	9th	8th	7th	6th	5th	4th	3rd	2nd	1st			3rd MVME338	15
	8th	7th	6th	5th	4th	3rd	2nd	1st				4th MVME338	16
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME332XT	17
	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME332XT	18
	9th	8th	7th	6th	5th	4th	3rd	2nd	1st			3rd MVME332XT	19
	8th	7th	6th	5th	4th	3rd	2nd	1st				4th MVME332XT	20
	7th	6th	5th	4th	3rd	2nd	1st					5th MVME332XT	21
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME333	22
	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME333	23
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME333X25/334A	24
	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME333X25/334A	25
	9th	8th	7th	6th	5th	4th	3rd	2nd	1st			3rd MVME333X25/334A	26
	8th	7th	6th	5th	4th	3rd	2nd	1st				4th MVME333X25/334A	27
	7th	6th	5th	4th	3rd	2nd	1st					5th MVME333X25/334A	28
	6th	5th	4th	3rd	2nd	1st						6th MVME333X25/334A	29
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	MVME336	30
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	MVME335	31

Back Panel

17*	16*	15*	14*	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
1st																MVME712A	1
	1st															MVME712B	2
		1st														MVME712C	3
	1st															MVME733	4
				1st												1st SCSI Interface	5
					1st											2nd SCSI Interface	6
						1st										3rd SCSI Interface	7
							1st									4th SCSI Interface	8
														2nd	1st	1st MVMELAN Panel	9
													2nd	1st		2nd MVMELAN Panel	10
												2nd	1st			3rd MVMELAN Panel	11
											2nd	1st				4th MVMELAN Panel	12
										Next 2 slots from right						MVMETRAN/338	13
				EVSB Backplane & MVSB741												EVSB Backplane	14
				1st		2nd		3rd								1st MVME710B	15
						1st		2nd		3rd						2nd MVME710B	16
								1st		2nd		3rd				3rd MVME710B	17
										1st		2nd		3rd		4th MVME710B	18
												1st		2nd		5th MVME710B	19
									7th	6th	5th	4th	3rd	2nd	1st	MVME332PA1	20
									7th	6th	5th	4th	3rd	2nd	1st	1st MVME332PA2	21
										5th	4th	3rd	2nd	1st		2nd MVME332PA2	22
				Next 2 slots from left												1st MVME705A	23
						Next 2 slots from left										2nd MVME705A	24
				Next slot from left												1st MVME705B	25
					Next slot from left											2nd MVME705B	26
				Next slot from left												1st MVME705-1/709-1	27
					Next slot from left											2nd MVME705-1/709-1	28
						Next slot from left										3rd MVME705-1/709-1	29
							Next slot from left									4th MVME705-1/709-1	30
								Next slot from left								5th MVME705-1/709-1	31
									Next slot from left							6th MVME705-1/709-1	32
				Next 2 slots from left												MVME751	33
				Next 2 slots from left												MVME715P	34

* Slots 14-17 are located horizontally (numbered bottom to top) above the vertical back panel.

Model 3620

Model 3820 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Slot/Priority	
1st																				MVME147S/A/B/C/D	1
	1st																			1st MVME224A-3/-2/-1	2
		1st																		2nd MVME224A-3/-2/-1	3
			1st																	3rd MVME224A-3/-2/-1	4
				1st																4th MVME224A-3/-2/-1	5
					1st															5th MVME224A-3/-2/-1	6
																		*	1st	1st MVME374/376	7
																	*	1st		2nd MVME374/376	8
																*	1st			3rd MVME374/376	9
															*	1st				4th MVME374/376	10
																		*	1st	1st MVME337-1	11
																	*	1st		2nd MVME337-1	12
																*	1st			3rd MVME337-1	13
															*	1st				4th MVME337-1	14
																		*	1st	1st MVME338	15
																	*	1st		2nd MVME338	16
																*	1st			3rd MVME338	17
															*	1st				4th MVME338	18
																		*	1st	1st MVME332XT	19
																	*	1st		2nd MVME332XT	20
																*	1st			3rd MVME332XT	21
															*	1st				4th MVME332XT	22
														*	1st					5th MVME332XT	23
													*	1st						6th MVME332XT	24
												*	1st							7th MVME332XT	25
											*	1st								8th MVME332XT	26
																		*	1st	1st MVME333	27
																	*	1st		2nd MVME333	28
																*	1st			1st MVME333X25/334A	29
															*	1st				2nd MVME333X25/334A	30
														*	1st					3rd MVME333X25/334A	31
													*	1st						4th MVME333X25/334A	32
												*	1st							5th MVME333X25/334A	33
											*	1st								6th MVME333X25/334A	34
																		*	1st	MVME336	35

* Boards are populated starting at slot 19 and on to the next available slot.

Model 3820

Back Panel

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
																			1st	MVME712A	1
																		2nd		MVME712B	2
																	3rd			MVME712C	3
																		1st		MVME733	4
1st																				1st SCSI Interface	5
	1st																			2nd SCSI Interface	6
		1st																		3rd SCSI Interface	7
			1st																	4th SCSI Interface	8
				1st																5th SCSI Interface	9
					1st															6th SCSI Interface	10
	1st	2nd	3rd	4th	5th	6th														1st MVMELAN Panel	11
		1st	2nd	3rd	4th	5th	6th													2nd MVMELAN Panel	12
			1st	2nd	3rd	4th	5th	6th												3rd MVMELAN Panel	13
				1st	2nd	3rd	4th	5th	6th											4th MVMELAN Panel	14
	*1st 2 available slots																			MVMETRAN/338	15
EVSB Backplane and MVSB741																				EVSB Backplane	16
	*1st 2 available slots																			1st MVME710B	17
			*1st 2 available slots																	2nd MVME710B	18
					*1st 2 available slots															3rd MVME710B	19
							*1st 2 available slots													4th MVME710B	20
									*1st 2 available slots											5th MVME710B	21
											*1st 2 available slots									6th MVME710B	22
													*1st 2 available slots							7th MVME710B	23
															*1st 2 available slots					8th MVME710B	24
			*1st available slot																	1st MVME332PA2	25
				*1st available slot																2nd MVME332PA2	26
					*1st available slot															3rd MVME332PA2	27
						*1st available slot														4th MVME332PA2	28
			*1st available slot																	MVME332PA1	29
	*1st 2 available slots																			1st MVME705A	30
			*1st 2 available slots																	2nd MVME705A	31
	*1st available slot																			1st MVME705B	32
		*1st available slot																		2nd MVME705B	33
	*1st available slot																			1st MVME705-1/709-1	34
		*1st available slot																		2nd MVME705-1/709-1	35
			*1st available slot																	3rd MVME705-1/709-1	36
				*1st available slot																4th MVME705-1/709-1	37
					*1st available slot															5th MVME705-1/709-1	38
						*1st available slot														6th MVME705-1/709-1	39
	*1st 2 available slots																			MVME751	40

Model 3820

Model 4220 Card Cage and Back Panel

Card Cage

1*	2	3	Slot/Priority	
1st			MVME167/A/B/C	1
	1st		MVME258/A/B/C	2
	1st		MVME260/A/B/C	3
	1st	2nd	1st MVME332XT	4
		1st	2nd MVME332XT	5
	1st	2nd	MVME338	6
	1st	2nd	MVME333	7
	1st	2nd	MVME333X25/334A	8
	1st	2nd	MVME374/376	9
	1st	2nd	MVME337-1	10
	1st	2nd	MVME336	11
* Slot 1 is the bottom slot.				

Back Panel

1*	2	3	4	5	6	Slot/Priority	
1st						MVME712A	1
	1st					MVME712B	2
	1st					MVME712C	3
	1st					MVME733	4
				1st	2nd	MVSB741	5
		1st		2nd		1st MVME710B	6
				1st		2nd MVME710B	7
				1st	2nd	MVME332PA1	8
		1st		2nd		MVMETRAN/338	9
		1st		2nd		MVME705A	10
		1st	2nd	3rd	4th	MVME705B	11
		1st	2nd	3rd	4th	MVME705-1	12
		1st	2nd	3rd	4th	MVME709-1	13
		1st	2nd	3rd	4th	MVMELAN	14
		1st		2nd		MVME751	15
* Slot 1 is the bottom slot.							

Model 4420 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	6+	Slot/Priority	
1st							MVME167/A/B/C	1
	1st						MVME258/A/B/C	2
	1st						MVME260/A/B/C	3
					1st		1st MVME328S-1/2	4
				1st			2nd MVME328S-1/2X	5
				2nd	1st		MVME337-1	6
			3rd	2nd	1st		MVME338	7
		4th	3rd	2nd	1st		1st MVME332XT	8
	4th	3rd	2nd	1st			2nd MVME332XT	9
	3rd	2nd	1st				3rd MVME332XT	10
	5th	4th	3rd	2nd	1st		1st MVME333	11
	4th	3rd	2nd	1st			2nd MVME333	12
	5th	4th	3rd	2nd	1st		1st MVME333X25/334A	13
	4th	3rd	2nd	1st			2nd MVME333X25/334A	14
	5th	4th	3rd	2nd	1st		MVME374/376	15
	5th	4th	3rd	2nd	1st		MVME336	16

Back Panel

8	7	6	5	4	3	2	1	Slot/Priority	
							1st	MVME712A	1
						1st		MVME712B	2
					1st			MVME712C	3
						1st		MVME733	4
1st								1st SCSI Interface	5
	1st							2nd SCSI Interface	6
	Installs in slots 4-7							EVSB Backplane	7
								1st MVSB741	8
								2nd MVSB741	9
								3rd MVSB741	10
								4th MVSB741	11
1st available slot from left								MVME374/376 Tran Panel	12
1st 2 slots from left								MVME338 Tran Panel	13
Next 2 slots from left								1st MVME710B	14
Next 2 slots from left								2nd MVME710B	15
Next 2 slots from left								3rd MVME710B	16
1st available slot from left								MVMEPA1	17
1st available slot from left								MVMEPA2	18
1st 2 available slots from left								1st MVME705A	19
1st 2 available slots from left								2nd MVME705A	20
1st available slot from left								1st MVME705B	21
1st available slot from left								2nd MVME705B	22
1st available slot from left								1st MVME705-1/709-1	23
1st available slot from left								2nd MVME705-1/709-1	24
1st 2 available slots from left								MVME751	25

Model 4520 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	7	8	9	10	11	12	Slot/Priority	
1st												MVME167/A/B/C	1
	1st											MVME258/A/B/C	2
	1st											MVME260/A/B/C	3
											1st	1st MVME328S-1X	4
											1st	1st MVME328S-2X	5
										1st		2nd MVME328S-2X	6
									1st			3rd MVME328S-2X	7
								1st				4th MVME328S-2X	8
	1st	2nd										1st MVME374/376	9
		1st	2nd									2nd MVME374/376	10
			1st	2nd								3rd MVME374/376	11
				1st	2nd							4th MVME374/376	12
	1st	2nd	3rd	4th	5th							1st MVME337-1	13
		1st	2nd	3rd	4th	5th						2nd MVME337-1	14
	1st	2nd	3rd	4th	5th	6th	7th					1st MVME332XT	15
		1st	2nd	3rd	4th	5th	6th	7th				2nd MVME332XT	16
			1st	2nd	3rd	4th	5th	6th	7th			3rd MVME332XT	17
				1st	2nd	3rd	4th	5th	6th	7th		4th MVME332XT	18
					1st	2nd	3rd	4th	5th	6th	7th	5th MVME332XT	19
						1st	2nd	3rd	4th	5th	6th	6th MVME332XT	20
							1st	2nd	3rd	4th	5th	7th MVME332XT	21
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	1st MVME333	22
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	2nd MVME333	23
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	1st MVME333X25/334A	24
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	2nd MVME333X25/334A	25
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	3rd MVME333X25/334A	26
				1st	2nd	3rd	4th	5th	6th	7th	8th	4th MVME333X25/334A	27
					1st	2nd	3rd	4th	5th	6th	7th	5th MVME333X25/334A	28
						1st	2nd	3rd	4th	5th	6th	6th MVME333X25/334A	29
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	MVME336	30

Back Panel

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
																1st	MVME712A	1
															1st		MVME712B	2
														1st			MVME712C	3
															1st		MVME733	4
1st																	1st SCSI Interface	5
	1st																2nd SCSI Interface	6
		1st															3rd SCSI Interface	7
			1st														4th SCSI Interface	8
1st	2nd	3rd	4th	5th	6th												1st MVMELAN Panel	9
	1st	2nd	3rd	4th	5th	6th											2nd MVMELAN Panel	10
		1st	2nd	3rd	4th	5th	6th										3rd MVMELAN Panel	11
			1st	2nd	3rd	4th	5th	6th									4th MVMELAN Panel	12
EVSB Backplane & MVSB741																	EVSB Backplane	13
	7th		6th		5th		4th		3rd		2nd		1st				1st MVME710B	14
	6th		5th		4th		3rd		2nd		1st						2nd MVME710B	15
	5th		4th		3rd		2nd		1st								3rd MVME710B	16
	4th		3rd		2nd		1st										4th MVME710B	17
	3rd		2nd		1st												5th MVME710B	18
	2nd		1st														6th MVME710B	19
	1st																7th MVME710B	20
Next available slot																	1st - 7th MVME332PA1	21 - 27
Next available slot																	1st - 4th MVME332PA2	28 - 31
Next 2 available slots																	1st MVME705A	32
Next 2 available slots																	2nd MVME705A	33
Next available slot																	1st MVME705B	34
Next available slot																	2nd MVME705B	35
Next available slot																	1st MVME705-1/709-1	36
Next available slot																	2nd MVME705-1/709-1	37
Next available slot																	3rd MVME705-1/709-1	38
Next available slot																	4th MVME705-1/709-1	39
Next available slot																	5th MVME705-1/709-1	40
Next available slot																	6th MVME705-1/709-1	41
Next available slot																	MVME751	42

Model 4520

Model 4620 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	7	8	9	10	11	12	Slot/Priority	
1st												MVME167/A/B/C	1
	1st											MVME258/A/B/C	2
	1st											MVME260/A/B/C	3
											1st	MVME328S-1/2	4
										1st		1st MVME328S-1/2X	5
									1st			2nd MVME328S-1/2X	6
								1st				3rd MVME328S-1/2X	7
										2nd	1st	1st MVME374/376	8
									2nd	1st		2nd MVME374/376	9
								2nd	1st			3rd MVME374/376	10
							2nd	1st				4th MVME374/376	11
						6th	5th	4th	3rd	2nd	1st	1st MVME337-1	12
						5th	4th	3rd	2nd	1st		2nd MVME337-1	13
				8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME338	14
			8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME338	15
		8th	7th	6th	5th	4th	3rd	2nd	1st			3rd MVME338	16
	8th	7th	6th	5th	4th	3rd	2nd	1st				4th MVME338	17
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME332XT	18
	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME332XT	19
	9th	8th	7th	6th	5th	4th	3rd	2nd	1st			3rd MVME332XT	20
	8th	7th	6th	5th	4th	3rd	2nd	1st				4th MVME332XT	21
	7th	6th	5th	4th	3rd	2nd	1st					5th MVME332XT	22
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME333	23
	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME333	24
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME333X25/334A	25
	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME333X25/334A	26
	9th	8th	7th	6th	5th	4th	3rd	2nd	1st			3rd MVME333X25/334A	27
	8th	7th	6th	5th	4th	3rd	2nd	1st				4th MVME333X25/334A	28
	7th	6th	5th	4th	3rd	2nd	1st					5th MVME333X25/334A	29
	6th	5th	4th	3rd	2nd	1st						6th MVME333X25/334A	30
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	MVME336	31

Back Panel

17*	16*	15*	14*	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
1st																MVME712A	1
	1st															MVME712B	2
		1st														MVME712C	3
	1st															MVME733	4
				1st												1st SCSI Interface	5
					1st											2nd SCSI Interface	6
						1st										3rd SCSI Interface	7
							1st									4th SCSI Interface	8
															1st	1st MVMELAN Panel	9
														1st		2nd MVMELAN Panel	10
													1st			3rd MVMELAN Panel	11
												1st				4th MVMELAN Panel	12
										Next 2 slots from right						MVMETRAN/338	13
				EVSB Backplane & MVSB741												EVSB Backplane	14
				1st		2nd										1st MVME710B	15
						1st		2nd								2nd MVME710B	16
								1st		2nd						3rd MVME710B	17
										1st		2nd				4th MVME710B	18
												1st		2nd		5th MVME710B	19
									7th	6th	5th	4th	3rd	2nd	1st	MVME332PA1	20
									7th	6th	5th	4th	3rd	2nd	1st	1st MVME332PA2	21
													2nd	1st		2nd MVME332PA2	22
				Next 2 slots from left												1st MVME705A	23
						Next 2 slots from left										2nd MVME705A	24
				Next slot from left												1st MVME705B	25
					Next slot from left											2nd MVME705B	26
				Next slot from left												1st MVME705-1/709-1	27
					Next slot from left											2nd MVME705-1/709-1	28
						Next slot from left										3rd MVME705-1/709-1	29
							Next slot from left									4th MVME705-1/709-1	30
								Next slot from left								5th MVME705-1/709-1	31
									Next slot from left							6th MVME705-1/709-1	32
				Next 2 slots from left												MVME751	33

Model 4620

Model 4820 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Slot/Priority	
1st																				MVME167/A/B/C	1
	1st																			MVME258/A/B/C	2
	1st																			MVME260/A/B/C	3
																			1st	MVME328S-1/2	4
																		1st		1st MVME328S-1/2X	5
																	1st			2nd MVME328S-1/2X	6
																1st				3rd MVME328S-1/2X	7
															1st					4th MVME328S-1/2X	8
														1st						5th MVME328S-1/2X	9
																	*	1st		1st MVME374/376	10
																*	1st			2nd MVME374/376	11
															*	1st				3rd MVME374/376	12
														*	1st					4th MVME374/376	13
																	*	1st		1st MVME337-1	14
																*	1st			2nd MVME337-1	15
															*	1st				3rd MVME337-1	16
														*	1st					4th MVME337-1	17
																	*	1st		1st MVME338	18
																*	1st			2nd MVME338	19
															*	1st				3rd MVME338	20
														*	1st					4th MVME338	21
																	*	1st		1st MVME332XT	22
																*	1st			2nd MVME332XT	23
															*	1st				3rd MVME332XT	24
														*	1st					4th MVME332XT	25
													*	1st						5th MVME332XT	26
												*	1st							6th MVME332XT	27
											*	1st								7th MVME332XT	28
										*	1st									8th MVME332XT	29
																	*	1st		1st MVME333	30
																*	1st			2nd MVME333	31
																	*	1st		1st MVME333X25/334A	32
																*	1st			2nd MVME333X25/334A	33
															*	1st				3rd MVME333X25/334A	34
														*	1st					4th MVME333X25/334A	35
													*	1st						5th MVME333X25/334A	36
												*	1st							6th MVME333X25/334A	37
																		*	1st	MVME336	38

* Boards are populated starting at slot 19 and on to the next available slot.

Back Panel

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
																			1st	MVME712A	1
																		1st		MVME712B	2
																	1st			MVME712C	3
																		1st		MVME733	4
1st																				1st SCSI Interface	5
	1st																			2nd SCSI Interface	6
		1st																		3rd SCSI Interface	7
			1st																	4th SCSI Interface	8
				1st																5th SCSI Interface	9
					1st															6th SCSI Interface	10
	1st	2nd																		1st MVMELAN Panel	11
		1st	2nd																	2nd MVMELAN Panel	12
			1st	2nd																3rd MVMELAN Panel	13
				1st	2nd															4th MVMELAN Panel	14
*1st 2 available slots																				MVMETRAN/338	15
EVSB Backplane and MVSB741																				EVSB Backplane	16
*1st 2 availalbe slots																				1st MVME710B	17
		*1st 2 available slots																		2nd MVME710B	18
				*1st 2 available slots																3rd MVME710B	19
						*1st 2 available slots														4th MVME710B	20
								*1st 2 available slots												5th MVME710B	21
										*1st 2 available slots										6th MVME710B	22
												*1st 2 available slots								7th MVME710B	23
														*1st 2 available slots						8th MVME710B	24
		*1st available slot																		1st MVME332PA2	25
			*1st available slot																	2nd MVME332PA2	26
				*1st available slot																3rd MVME332PA2	27
					*1st available slot															4th MVME332PA2	28
		*1st available slot																		MVME332PA1	29
*1st 2 available slots																				1st MVME705A	30
		*1st 2 available slots																		2nd MVME705A	31
*1st available slot																				1st MVME705B	32
	*1st available slot																			2nd MVME705B	33
*1st available slot																				1st MVME705-1/709-1	34
	*1st available slot																			2nd MVME705-1/709-1	35
		*1st available slot																		3rd MVME705-1/709-1	36
			*1st available slot																	4th MVME705-1/709-1	37
				*1st available slot																5th MVME705-1/709-1	38
					*1st available slot															6th MVME705-1/709-1	39
*1st 2 available slots																				MVME751	40

* Boards are populated starting at slot 20 and on to the next available slot.

Model 8220 Card Cage and Back Panel

Card Cage

1*	2	3	Slot/Priority	
1st			MVME187/A/B/C	1
	1st		MVME258/A/B/C	2
	1st		MVME260/A/B/C	3
	1st	2nd	1st MVME332XT	4
		1st	2nd MVME332XT	5
	1st	2nd	MVME338	6
	1st	2nd	MVME333	7
	1st	2nd	MVME333X25/334A	8
	1st	2nd	MVME374/376	9
	1st	2nd	MVME337-1	10
	1st	2nd	MVME336	11
* Slot 1 is the bottom slot.				

Back Panel

<table>
<tr><th>1*</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>Slot/Priority</th><th></th></tr>
<tr><td>1st</td><td></td><td></td><td></td><td></td><td></td><td>MVME712A</td><td>1</td></tr>
<tr><td></td><td>1st</td><td></td><td></td><td></td><td></td><td>MVME712B</td><td>2</td></tr>
<tr><td></td><td colspan="2">1st</td><td></td><td></td><td></td><td>MVME712C</td><td>3</td></tr>
<tr><td></td><td>1st</td><td></td><td></td><td></td><td></td><td>MVME733</td><td>4</td></tr>
<tr><td></td><td></td><td></td><td></td><td>1st</td><td>2nd</td><td>MVSB741</td><td>5</td></tr>
<tr><td></td><td></td><td colspan="2">1st</td><td colspan="2">2nd</td><td>1st MVME710B</td><td>6</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">1st</td><td>2nd MVME710B</td><td>7</td></tr>
<tr><td></td><td></td><td></td><td></td><td>1st</td><td>2nd</td><td>MVME332PA1</td><td>8</td></tr>
<tr><td></td><td></td><td colspan="2">1st</td><td colspan="2">2nd</td><td>MVMETRAN/338</td><td>9</td></tr>
<tr><td></td><td></td><td colspan="2">1st</td><td colspan="2">2nd</td><td>MVME705A</td><td>10</td></tr>
<tr><td></td><td></td><td>1st</td><td>2nd</td><td>3rd</td><td>4th</td><td>MVME705B</td><td>11</td></tr>
<tr><td></td><td></td><td>1st</td><td>2nd</td><td>3rd</td><td>4th</td><td>MVME705-1</td><td>12</td></tr>
<tr><td></td><td></td><td>1st</td><td>2nd</td><td>3rd</td><td>4th</td><td>MVME709-1</td><td>13</td></tr>
<tr><td></td><td></td><td>1st</td><td>2nd</td><td>3rd</td><td>4th</td><td>MVMELAN</td><td>14</td></tr>
<tr><td></td><td></td><td colspan="2">1st</td><td colspan="2">2nd</td><td>MVME751</td><td>15</td></tr>
<tr><td colspan="8">* Slot 1 is the bottom slot.</td></tr>
</table>

Model 8420 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	6+	Slot/Priority	
1st							MVME187/A/B/C	1
	1st						MVME258/A/B/C	2
	1st						MVME260/A/B/C	3
					1st		MVME328S-1/2	4
				1st			MVME328S-1/2X	5
				2nd	1st		MVME337-1	6
			3rd	2nd	1st		MVME338	7
		4th	3rd	2nd	1st		1st MVME332XT	8
	4th	3rd	2nd	1st			2nd MVME332XT	9
	3rd	2nd	1st				3rd MVME332XT	10
	5th	4th	3rd	2nd	1st		1st MVME333	11
	4th	3rd	2nd	1st			2nd MVME333	12
	5th	4th	3rd	2nd	1st		1st MVME333X25/334A	13
	4th	3rd	2nd	1st			2nd MVME333X25/334A	14
	5th	4th	3rd	2nd	1st		MVME374/376	15
	5th	4th	3rd	2nd	1st		MVME336	16

Back Panel

8	7	6	5	4	3	2	1	Slot/Priority	
							1st	MVME712A	1
						1st		MVME712B	2
					1st			MVME712C	3
						1st		MVME733	4
1st								1st SCSI Interface	5
	1st							2nd SCSI Interface	6
	Installs in slots 4-7							EVSB Backplane	7
								1st MVSB741	8
								2nd MVSB741	9
								3rd MVSB741	10
								4th MVSB741	11
1st available slot from left								MVME374/376 Tran Panel	12
1st 2 slots from left								MVME338 Tran Panel	13
Next 2 slots from left								1st MVME710B	14
Next 2 slots from left								2nd MVME710B	15
Next 2 slots from left								3rd MVME710B	16
1st available slot from left								MVMEPA1	17
1st available slot from left								MVMEPA2	18
1st 2 available slots from left								1st MVME705A	19
1st 2 available slots from left								2nd MVME705A	20
1st available slot from left								1st MVME705B	21
1st available slot from left								2nd MVME705B	22
1st available slot from left								1st MVME705-1/709-1	23
1st available slot from left								2nd MVME705-1/709-1	24
1st 2 available slots from left								MVME751	25

Model 8520 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	7	8	9	10	11	12	Slot/Priority	
1st												MVME187/A/B/C	1
	1st											MVME258/A/B/C	2
	1st											MVME260/A/B/C	3
											1st	1st MVME328S-1X	4
											1st	1st MVME328S-2X	5
										1st		2nd MVME328S-2X	6
									1st			3rd MVME328S-2X	7
								1st				4th MVME328S-2X	8
	1st	2nd										1st MVME374/376	9
		1st	2nd									2nd MVME374/376	10
			1st	2nd								3rd MVME374/376	11
				1st	2nd							4th MVME374/376	12
	1st	2nd	3rd	4th	5th							1st MVME337-1	13
		1st	2nd	3rd	4th	5th						2nd MVME337-1	14
	1st	2nd	3rd	4th	5th	6th	7th					1st MVME332XT	15
		1st	2nd	3rd	4th	5th	6th	7th				2nd MVME332XT	16
			1st	2nd	3rd	4th	5th	6th	7th			3rd MVME332XT	17
				1st	2nd	3rd	4th	5th	6th	7th		4th MVME332XT	18
					1st	2nd	3rd	4th	5th	6th	7th	5th MVME332XT	19
						1st	2nd	3rd	4th	5th	6th	6th MVME332XT	20
							1st	2nd	3rd	4th	5th	6th MVME332XT	21
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	1st MVME333	22
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	2nd MVME333	23
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	1st MVME333X25/334A	24
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	2nd MVME333X25/334A	25
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	3rd MVME333X25/334A	26
				1st	2nd	3rd	4th	5th	6th	7th	8th	4th MVME333X25/334A	27
					1st	2nd	3rd	4th	5th	6th	7th	5th MVME333X25/334A	28
						1st	2nd	3rd	4th	5th	6th	6th MVME333X25/334A	29
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	MVME336	30

Model 8520

Back Panel

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
																1st	MVME712A	1
															1st		MVME712B	2
														1st			MVME712C	3
															1st		MVME733	4
1st																	1st SCSI Interface	5
	1st																2nd SCSI Interface	6
		1st															3rd SCSI Interface	7
			1st														4th SCSI Interface	8
1st	2nd	3rd	4th	5th	6th												1st MVMELAN Panel	9
	1st	2nd	3rd	4th	5th	6th											2nd MVMELAN Panel	10
		1st	2nd	3rd	4th	5th	6th										3rd MVMELAN Panel	11
			1st	2nd	3rd	4th	5th	6th									4th MVMELAN Panel	12
EVSB Backplane & MVSB741																	EVSB Backplane	13
	7th		6th		5th		4th		3rd		2nd		1st				1st MVME710B	14
	6th		5th		4th		3rd		2nd		1st						2nd MVME710B	15
	5th		4th		3rd		2nd		1st								3rd MVME710B	16
	4th		3rd		2nd		1st										4th MVME710B	17
	3rd		2nd		1st												5th MVME710B	18
	2nd		1st														6th MVME710B	19
	1st																7th MVME710B	20
Next available slot																	1st - 7th MVME332PA1	21 - 27
Next available slot																	1st - 4th MVME332PA2	28 - 31
Next 2 available slots																	1st MVME705A	32
Next 2 available slots																	2nd MVME705A	33
Next available slot																	1st MVME705B	34
Next available slot																	2nd MVME705B	35
Next available slot																	1st MVME705-1/709-1	36
Next available slot																	2nd MVME705-1/709-1	37
Next available slot																	3rd MVME705-1/709-1	38
Next available slot																	4th MVME705-1/709-1	39
Next available slot																	5th MVME705-1/709-1	40
Next available slot																	6th MVME705-1/709-1	41
Next 2 available slots																	MVME751	42

Model 8520

Model 8620 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	7	8	9	10	11	12	Slot/Priority	
1st												MVME187/A/B/C	1
	1st											MVME258/A/B/C	2
	1st											MVME260/A/B/C	3
											1st	MVME328S-1/2	4
										1st		1st MVME328S-1/2X	5
									1st			2nd MVME328S-1/2X	6
								1st				3rd MVME328S-1/2X	7
										2nd	1st	1st MVME374/376	8
									2nd	1st		2nd MVME374/376	9
								2nd	1st			3rd MVME374/376	10
							2nd	1st				4th MVME374/376	11
						6th	5th	4th	3rd	2nd	1st	1st MVME337-1	12
						5th	4th	3rd	2nd	1st		2nd MVME337-1	13
				8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME338	14
			8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME338	15
		8th	7th	6th	5th	4th	3rd	2nd	1st			3rd MVME338	16
	8th	7th	6th	5th	4th	3rd	2nd	1st				4th MVME338	17
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME332XT	18
	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME332XT	19
	9th	8th	7th	6th	5th	4th	3rd	2nd	1st			3rd MVME332XT	20
	8th	7th	6th	5th	4th	3rd	2nd	1st				4th MVME332XT	21
	7th	6th	5th	4th	3rd	2nd	1st					5th MVME332XT	22
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME333	23
	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME333	24
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	1st MVME333X25/334A	25
	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st		2nd MVME333X25/334A	26
	9th	8th	7th	6th	5th	4th	3rd	2nd	1st			3rd MVME333X25/334A	27
	8th	7th	6th	5th	4th	3rd	2nd	1st				4th MVME333X25/334A	28
	7th	6th	5th	4th	3rd	2nd	1st					5th MVME333X25/334A	29
	6th	5th	4th	3rd	2nd	1st						6th MVME333X25/334A	30
	11th	10th	9th	8th	7th	6th	5th	4th	3rd	2nd	1st	MVME336	31

Back Panel

17*	16*	15*	14*	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
1st																MVME712A	1
	1st															MVME712B	2
		1st														MVME712C	3
	1st															MVME733	4
				1st												1st SCSI Interface	5
					1st											2nd SCSI Interface	6
						1st										3rd SCSI Interface	7
							1st									4th SCSI Interface	8
															1st	1st MVMELAN Panel	9
														1st		2nd MVMELAN Panel	10
													1st			3rd MVMELAN Panel	11
												1st				4th MVMELAN Panel	12
										Next 2 slots from right						MVMETRAN/338	13
				EVSB Backplane & MVSB741												EVSB Backplane	14
				1st		2nd										1st MVME710B	15
						1st		2nd								2nd MVME710B	16
								1st		2nd						3rd MVME710B	17
										1st		2nd				4th MVME710B	18
												1st		2nd		5th MVME710B	19
									7th	6th	5th	4th	3rd	2nd	1st	MVME332PA1	20
									7th	6th	5th	4th	3rd	2nd	1st	1st MVME332PA2	21
													2nd	1st		2nd MVME332PA2	22
				Next 2 slots from left												1st MVME705A	23
						Next 2 slots from left										2nd MVME705A	24
				Next slot from left												1st MVME705B	25
					Next slot from left											2nd MVME705B	26
				Next slot from left												1st MVME705-1/709-1	27
					Next slot from left											2nd MVME705-1/709-1	28
						Next slot from left										3rd MVME705-1/709-1	29
							Next slot from left									4th MVME705-1/709-1	30
								Next slot from left								5th MVME705-1/709-1	31
									Next slot from left							6th MVME705-1/709-1	32
				Next 2 slots from left												MVME751	33

* Slots 14-17 are located horizontally (numbered bottom to top) above the vertical back panel.

Model 8820 Card Cage and Back Panel

Card Cage

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Slot/Priority	
1st																				MVME187/A/B/C	1
	1st																			MVME258/A/B/C	2
	1st																			MVME260/A/B/C	3
																			1st	MVME328S-1/2	4
																		1st		1st MVME328S-1/2X	5
																	1st			2nd MVME328S-1/2X	6
																1st				3rd MVME328S-1/2X	7
															1st					4th MVME328S-1/2X	8
														1st						5th MVME328S-1/2X	9
																	*	1st		1st MVME374/376	10
																*	1st			2nd MVME374/376	11
															*	1st				3rd MVME374/376	12
														*	1st					4th MVME374/376	13
																	*	1st		1st MVME337-1	14
																*	1st			2nd MVME337-1	15
															*	1st				3rd MVME337-1	16
														*	1st					4th MVME337-1	17
																	*	1st		1st MVME338	18
																*	1st			2nd MVME338	19
															*	1st				3rd MVME338	20
														*	1st					4th MVME338	21
																	*	1st		1st MVME332XT	22
																*	1st			2nd MVME332XT	23
															*	1st				3rd MVME332XT	24
														*	1st					4th MVME332XT	25
													*	1st						5th MVME332XT	26
												*	1st							6th MVME332XT	27
											*	1st								7th MVME332XT	28
										*	1st									8th MVME332XT	29
																	*	1st		1st MVME333	30
																*	1st			2nd MVME333	31
																	*	1st		1st MVME333X25/334A	32
																*	1st			2nd MVME333X25/334A	33
															*	1st				3rd MVME333X25/334A	34
														*	1st					4th MVME333X25/334A	35
													*	1st						5th MVME333X25/334A	36
												*	1st							6th MVME333X25/334A	37
																	*	1st		MVME336	38

* Boards are populated starting at slot 19 and on to the next available slot.

Back Panel

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
																			1st	MVME712A	1
																		1st		MVME712B	2
																	1st			MVME712C	3
																		1st		MVME733	4
1st																				1st SCSI Interface	5
	1st																			2nd SCSI Interface	6
		1st																		3rd SCSI Interface	7
			1st																	4th SCSI Interface	8
				1st																5th SCSI Interface	9
					1st															6th SCSI Interface	10
	1st	2nd																		1st MVMELAN Panel	11
		1st	2nd																	2nd MVMELAN Panel	12
			1st	2nd																3rd MVMELAN Panel	13
				1st	2nd															4th MVMELAN Panel	14
*1st 2 available slots																				MVMETRAN/338	15
EVSB Backplane and MVSB741																				EVSB Backplane	16
*1st 2 available slots																				1st MVME710B	17
		*1st 2 available slots																		2nd MVME710B	18
				*1st 2 available slots																3rd MVME710B	19
						*1st 2 available slots														4th MVME710B	20
								*1st 2 available slots												5th MVME710B	21
										*1st 2 available slots										6th MVME710B	22
												*1st 2 available slots								7th MVME710B	23
														*1st 2 available slots						8th MVME710B	24
		*1st available slot																		1st MVME332PA2	25
			*1st available slot																	2nd MVME332PA2	26
				*1st available slot																3rd MVME332PA2	27
					*1st available slot															4th MVME332PA2	28
		*1st available slot																		MVME332PA1	29
*1st 2 available slots																				1st MVME705A	30
		*1st 2 available slots																		2nd MVME705A	31
*1st available slot																				1st MVME705B	32
	*1st available slot																			2nd MVME705B	33
*1st available slot																				1st MVME705-1/709-1	34
	*1st available slot																			2nd MVME705-1/709-1	35
		*1st available slot																		3rd MVME705-1/709-1	36
			*1st available slot																	4th MVME705-1/709-1	37
				*1st available slot																5th MVME705-1/709-1	38
					*1st available slot															6th MVME705-1/709-1	39
*1st 2 available slots																				MVME751	40
* Boards are populated starting at slot 20 and on to the next available slo.																					

Model 95*xx* Card Cage & Back Panel

Card Cage (197-based)

1	2	3	4	5	6	7	8	9	10	11	12	Slot/Priority	
1st												MVME197	1
	1st											1st memory	2
		1st										2nd memory	3
											1st	1st MVME328XT-1/-2	4
										1st		2nd MVME328XT-1/-2	5
									1st			3rd MVME328XT-1/-2	6
								1st				4th MVME328XT-1/-2	7
							1st					5th MVME328XT-1/-2	8
						1st						6th MVME328XT-1/-2	9
	1st	2nd										1st MVME376	10
		1st	2nd									2nd MVME376	11
			1st	2nd								3rd MVME376	12
				1st	2nd							4th MVME376	13
	1st	2nd	3rd	4th	5th							1st MVME337-1	14
		1st	2nd	3rd	4th	5th						2nd MVME337-1	15
			1st	2nd	3rd	4th	5th					3rd MVME337-1	16
	1st	2nd	3rd	4th	5th	6th	7th					1st MVME332XT	17
		1st	2nd	3rd	4th	5th	6th	7th				2nd MVME332XT	18
			1st	2nd	3rd	4th	5th	6th	7th			3rd MVME332XT	19
				1st	2nd	3rd	4th	5th	6th	7th		4th MVME332XT	20
					1st	2nd	3rd	4th	5th	6th	7th	5th MVME332XT	21
						1st	2nd	3rd	4th	5th	6th	6th MVME332XT	22
							1st	2nd	3rd	4th	5th	6th MVME332XT	23
								1st	2nd	3rd	4th	7th MVME332XT	24
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	1st MVME333	25
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	2nd MVME333	26
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	3rd MVME333	27
				1st	2nd	3rd	4th	5th	6th	7th	8th	4th MVME333	28
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	1st MVME334A	29
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	2nd MVME334A	30
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	3rd MVME334A	31
				1st	2nd	3rd	4th	5th	6th	7th	8th	4th MVME334A	32
					1st	2nd	3rd	4th	5th	6th	7th	5th MVME334A	33
						1st	2nd	3rd	4th	5th	6th	6th MVME334A	34
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	1st MVME338/339	35
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	2nd MVME338/339	36
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	3rd MVME338/339	37
				1st	2nd	3rd	4th	5th	6th	7th	8th	4th MVME338/339	38
					1st	2nd	3rd	4th	5th	6th	7th	5th MVME338	39
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	6th MVME338	40
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	7th MVME338	41
			1st	2nd	3rd	4th	5th	6th	7th	8th	9th	8th MVME338	42

Back Panel (197-based)

17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
																1st	MVME712M	1
															1st		MVME733	2
1st																	1st SCSI Interface	3
	1st																2nd SCSI Interface	4
		1st															3rd SCSI Interface	5
			1st														4th SCSI Interface	6
				1st													5th SCSI Interface	7
					1st												6th SCSI Interface	8
1st	2nd	3rd	4th	5th	6th												1st MVMELAN Panel	9
	1st	2nd	3rd	4th	5th	6th											2nd MVMELAN Panel	10
		1st	2nd	3rd	4th	5th	6th										3rd MVMELAN Panel	11
			1st	2nd	3rd	4th	5th	6th									4th MVMELAN Panel	12
EVSB Backplane & MVSB741 (see previous page for placement)																	EVSB Backplane	13
	7th		6th		5th		4th		3rd		2nd		1st				1st MVME710B	14
	6th		5th		4th		3rd		2nd		1st						2nd MVME710B	15
	5th		4th		3rd		2nd		1st								3rd MVME710B	16
	4th		3rd		2nd		1st										4th MVME710B	17
	3rd		2nd		1st												5th MVME710B	18
	2nd		1st														6th MVME710B	19
	1st																7th MVME710B	20
Next available slot																	MVME332PA1	21
Next available slot																	1st - 4th MVME332PA2	22 - 25
Next 2 available slots																	1st MVME705A	26
Next 2 available slots																	2nd MVME705A	27
Next 2 available slots																	3rd MVME705A	28
Next 2 available slots																	4th MVME705A	29
Next available slot																	1st MVME705-1/709-1	30
Next available slot																	2nd MVME705-1/709-1	31
Next available slot																	3rd MVME705-1/709-1	32
Next available slot																	4th MVME705-1/709-1	33
Next available slot																	5th MVME709-1	34
Next available slot																	6th MVME709-1	35
Next 2 available slots																	1st MVME338 T/M	36
Next 2 available slots																	2nd MVME338 T/M	37
Next available slot																	1st -4th Transceiver for MVME339	38 - 41

Model 95xx

Model 99*xx* Card Cage & Back Panel

Card Cage (197-based)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Slot/Priority	
1st																				MVME197	1
	1st																			1st memory	2
		1st																		2nd memory	3
																			1st	1st MVME328XT-1/-2	4
																		1st		2nd MVME328XT-1/-2	5
																	1st			3rd MVME328S-1/-2	6
																1st				4th MVME328S-1/-2	7
															1st					5th MVME328S-1/-2	8
														1st						6th MVME328S-1/-2	9
																	*	1st		1st MVME376	10
																*	1st			2nd MVME376	11
															*	1st				3rd MVME376	12
														*	1st					4th MVME376	13
																	*	1st		1st MVME337-1	14
																*	1st			2nd MVME337-1	15
															*	1st				3rd MVME337-1	16
														*	1st					4th MVME337-1	17
																	*	1st		1st MVME338	18
																*	1st			2nd MVME338	19
															*	1st				3rd MVME338	20
														*	1st					4th MVME338	21
													*	1st						5th MVME338	22
												*	1st							6th MVME338	23
											*	1st								7th MVME338	24
										*	1st									8th MVME338	25
																	*	1st		1st MVME332XT	26
																*	1st			2nd MVME332XT	27
															*	1st				3rd MVME332XT	28
														*	1st					4th MVME332XT	29
													*	1st						5th MVME332XT	30
												*	1st							6th MVME332XT	31
											*	1st								7th MVME332XT	32
										*	1st									8th MVME332XT	33
																	*	1st		1st MVME333	34
																*	1st			2nd MVME333	35
															*	1st				3rd MVME333	36
														*	1st					4th MVME333	37
																	*	1st		1st MVME334A	38
																*	1st			2nd MVME334A	39
															*	1st				3rd MVME334A	40
														*	1st					4th MVME334A	41
													*	1st						5th MVME334A	42
												*	1st							6th MVME334A	43
																	*	1st		1st MVME339	44
																*	1st			2nd MVME339	45
															*	1st				3rd MVME339	46
														*	1st					4th MVME339	47

* Boards are populated starting at slot 19 and on to the next available slot.

Back Panel (197-based)

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Slot/Priority	
																			1st	MVME712M	1
																		1st		MVME733	2
1st																				1st SCSI Interface	3
	1st																			2nd SCSI Interface	4
		1st																		3rd SCSI Interface	5
			1st																	4th SCSI Interface	6
				1st																5th SCSI Interface	7
					1st															6th SCSI Interface	8
	1st	2nd																		1st MVMELAN Panel	9
		1st	2nd																	2nd MVMELAN Panel	10
			1st	2nd																3rd MVMELAN Panel	11
				1st	2nd															4th MVMELAN Panel	12
EVSB Backplane and MVSB741 (see previous page for placement)																				EVSB Backplane	13
*1st 2 available slots																				1st MVME338 T/M	14
*1st 2 available slots																				2nd MVME338 T/M	15
*1st 2 available slots																				1st MVME710B	16
		*1st 2 available slots																		2nd MVME710B	17
				*1st 2 available slots																3rd MVME710B	18
						*1st 2 available slots														4th MVME710B	19
								*1st 2 available slots												5th MVME710B	20
										*1st 2 available slots										6th MVME710B	21
												*1st 2 available slots								7th MVME710B	22
														*1st 2 available slots						8th MVME710B	23
		*1st available slot																		1st MVME332PA2	24
			*1st available slot																	2nd MVME332PA2	25
				*1st available slot																3rd MVME332PA2	26
					*1st available slot															4th MVME332PA2	27
		*1st available slot																		MVME332PA1	28
*1st 2 available slots																				1st MVME705A	29
		*1st 2 available slots																		2nd MVME705A	30
				*1st 2 available slots																3rd MVME705A	31
						*1st 2 available slots														4th MVME705A	32
*1st available slot																				1st MVME705-1/709-1	33
	*1st available slot																			2nd MVME705-1/709-1	34
		*1st available slot																		3rd MVME705-1/709-1	35
			*1st available slot																	4th MVME705-1/709-1	36
				*1st available slot																5th MVME709-1	37
					*1st available slot															6th MVME709-1	38
*1st available slot																				1st - 4th Transceiver for MVME339	39-42

* Boards are populated starting at slot 20 and on to the next available slot.

Model 99xx

EVSB Placement

12-slot Chassis

12	11	10	9	8	7	6	5	4	3	2	1	Slot Position
												1st EVSB Backplane
				1st								1st MVSB741
					1st							2nd MVSB741
						1st						3rd MVSB741
							1st					4th MVSB741
												2nd EVSB Backplane
								1st				1st MVSB741
									1st			2nd MVSB741
										1st		3rd MVSB741
											1st	4th MVSB741

20-slot Chassis

20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Slot Position
																				1st EVSB Backplane
		1st																		1st MVSB741
			1st																	2nd MVSB741
				1st																3rd MVSB741
					1st															4th MVSB741
																				2nd EVSB Backplane
						1st														1st MVSB741
							1st													2nd MVSB741
								1st												3rd MVSB741
									1st											4th MVSB741
																				3rd EVSB Backplane
										1st										1st MVSB741
											1st									2nd MVSB741
												1st								3rd MVSB741
													1st							4th MVSB741
																				4th EVSB Backplane
														1st						1st MVSB741
															1st					2nd MVSB741
																1st				3rd MVSB741
																	1st			4th MVSB741

EVSB

Miscellaneous

This section contains miscellaneous information on

- ❑ Power cords
- ❑ Cabling
- ❑ EIA-232-D Interconnections
- ❑ Parallel Interconnections
- ❑ SCSI Interconnections
- ❑ UPS (uninterruptible power supply)

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Power Cords & Sockets

Power Cords

Motorola units are equipped with separable power cords (pluggable at both the equipment and the wall socket). The processor enclosure should be placed within six feet of its electric receptacle. The use of extension cords is discouraged.

Motorola computers configured for 115 Vac input for United States domestic use are shipped with a three-prong male plug on the power cable (NEMA type 5-15P or, for the 20-slot enclosure, 5-20P). Some units for international shipment may require local installation of the correct male connector; if so, the connector should be installed by a qualified technician.

The power supply is factory-set for the correct input voltage.[1] If there is uncertainty about the power supply setting of your new computer, have it checked by a competent technician before you apply power.

Power cables equipped with German (i.e., Continental European), British, and other styles of plugs are available from Motorola for units shipped to various international destinations using those connector styles:

Power Cords

Part Number	Cable Type
MVMECORDANZ	Australian power cord
MVMECORDDN	Danish power cord
MVMECORDFR	French power cord
MVMECORDFRG	German power cord
MVMECORDIT	Italian power cord
MVMECORDSW	Swiss power cord
MVMECORDUK	British power cord
MCORD15CSA-1-8	Canadian power cord (20-slot chassis, 125 Vac)
MCORD15NA-2-8	U.S./Canadian power cord (20-slot chassis, 250 Vac)
MCORD16FRG-2-8	German power cord (20-slot chassis, 250 Vac)
MCORD10UK-2-8	British power cord (20-slot chassis, 250 Vac)

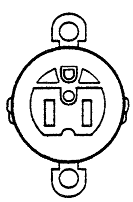
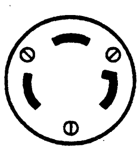
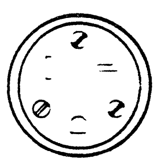
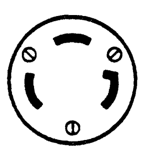
1. Some models are equipped with autoranging power supplies that adjust themselves automatically.

Power Sockets

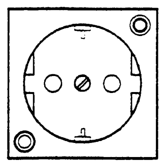
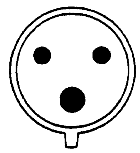
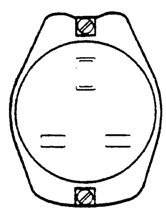
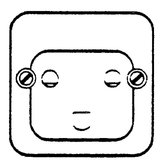
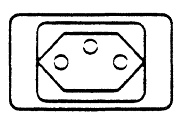
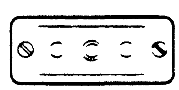
The following table, while not exhaustive, is a representative listing of the supply voltages and power socket configurations used in various countries of the world.

Note **For simplicity, the current and voltage ratings listed below are those applicable to the receptacle itself. In regions using 125 Vac receptacles, the actual voltage used in a given country may vary from 100 Vac to 120 Vac. In areas using 250 Vac receptacles, it may vary from 220 to 240 Vac. Some countries use both voltage ranges, and frequency may be 50 Hz or 60 Hz in either case. More specific data is available on site and from sources such as plug and socket manufacturers.**

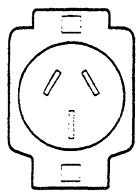
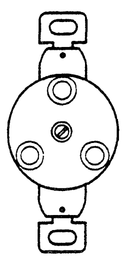
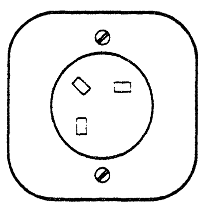
Power Sockets

North American— 10A-15A/125Vac Receptacle (NEMA 5-15P)  30A/125Vac Receptacle[b] (NEMA L5-30P) 	20A/125Vac Receptacle[a] (NEMA 5-20P  30A/250Vac Receptacle[c] (NEMA L6-30P)  cn013 9209	U.S.A., Bahamas, Barbados, Bermuda, Bolivia, Canada, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Japan, Netherlands Antilles, Panama, Saudi Arabia, South Korea, Suriname, Taiwan, Trinidad, Venezuela

Power Sockets (Continued)

Continental European— 10A-16A/250Vac Receptacle  10A-16A/250Vac Receptacle[d]  cn014 9209	Argentina, Austria, Belgium, Brazil, Egypt, Finland, France,Germany, Greece, Indonesia, Netherlands, Norway, Portugal, Spain, Sweden, Turkey, Yugoslavia
British— 13A/250Vac Receptacle 	Hong Kong, Ireland, Malaysia, Singapore, United Arab Emirates, United Kingdom
Danish— 10A/250Vac Receptacle 	Denmark
Swiss— 10A/250Vac Receptacle 	Switzerland
Italian— 10A-16A/250Vac Receptacle 	Chile, Italy

Power Sockets (Continued)

Australian— 10A/250Vac Receptacle		Australia, New Zealand, Papua New Guinea
Indian— 15A/250Vac Receptacle		India, Kuwait, Qatar, South Africa
Israeli— 16A/250Vac Receptacle		Israel

a. Used with 20-slot enclosures.

b. Used with Model UPS2004 uninterruptible power supplies.

c. Used with Model MVME990PWRNA power distribution modules for rack systems.

d. Used with Model MVME990PWREU power distribution modules for rack systems.

Cabling

General

Cables must not be placed in traffic areas, where they may create hazards or be kicked out of connectors.

All signal cables used with Motorola systems must be shielded to reduce RFI (radio frequency interference). Motorola-supplied cables are designed to meet this requirement.

Cabling Precautions

- ❑ Ensure that all network cable terminators and BNC connectors are insulated from any building metal (at ground potential) or any other unintended conductor. Terminators should be wrapped with insulating tape. BNC connectors should be covered with an insulating boot.
- ❑ Separate network cables from the building's electrical wiring by at least three inches (8 cm).
- ❑ Do not run signal cables parallel to AC power cables if they are within four inches of each other.
- ❑ Avoid laying signal cables near equipment that generates power line "noise" (e.g., air conditioners, water coolers, copy machines, electric motors, power line regulators, fluorescent lights, relays, power supplies, etc.).
- ❑ Do not run signal cables near equipment that generates radio frequency interference (i.e., radio transmitters, etc.).
- ❑ Do not expose cables to moisture or heat. If you install signal cables outdoors, use a conduit or raceway to protect them from lightning and weather.
- ❑ Protect external interconnecting cables from physical damage without endangering users. Install the cables under a raised floor if possible.
- ❑ Use the shortest cabling possible between the processor enclosure and peripherals.
- ❑ When installing two or more terminal cable runs, tag all cables at both ends for identification.
- ❑ Support vertical cable runs individually or in a bundle every 10 feet (3 m).
- ❑ To ensure maximum protection for the equipment and operators, check the protective grounds at each power outlet for adequacy.

EIA-232-D Cable Length

Since Motorola computer systems are designed with a view towards use on a network, much of the cabling necessary for their installation is done with sections of Ethernet or fiber optic cable. Non-networked terminals and serial printers, however, use EIA-232-D serial communication cables. Some peripherals attached to networked computers, such as serial printers, also use EIA-232-D cables when connected directly to the processor enclosure.

Although longer cables are available, the maximum recommended length for EIA-232-D cables is 50 feet (15 meters). Motorola cannot guarantee error-free communication on EIA-232-D cables longer than 50 feet because reliable communication over such cables depends on correct ground potentials at termination points, on the absence of electrical noise, and on other variables. If operations over extended cables prove to be undependable, an alternative is to use limited-distance modems or some form of serial communications adapter for equipment located farther than 50 feet from the processor enclosure.

System Cables

Motorola computer systems that are equipped for LAN operations use various types of Ethernet cabling. Some external peripherals in networked systems, such as serial or parallel printers, use other types of cables.

In Motorola computer installations not set up for network operations, most external peripherals are linked to the processor enclosure by EIA-232-D serial cables. Some peripherals, such as parallel printers and SCSI devices, use other types of cables.

Motorola currently packages the necessary cables with the equipment it ships; suitable cables are also available from many other sources.

Peripheral cables presently offered by Motorola are listed in the following table:

Peripheral Cables

Part Number	Cable Type
CA22	10-ft CENTRONICS parallel printer cable
CA23	25-ft CENTRONICS parallel printer cable
CA24	50-ft CENTRONICS parallel printer cable
MVMECBL261	15-ft system- or remote-terminal-to-modem EIA-232-D cable
MVMECBL285	15-ft remote-printer-to-modem EIA-232-D cable
MVMECBL330	25-ft terminal or printer EIA-232-D cable
MVMECBL331	50-ft terminal or printer EIA-232-D cable
MVMECBL332	100-ft terminal or printer EIA-232-D cable
MVMECBL333	200-ft terminal or printer EIA-232-D cable
MVMECBL334	300-ft terminal or printer EIA-232-D cable
MVMECBL916	15-ft Dest OCR document reader EIA-232-D cable
MVMECBLSA2	2-ft DB9-to-DB25 serial adapter cable
MVMECBLSCSI8	8-ft 50-pin SCSI peripheral cable
MVMECBLT25	25-ft DB9-to-DB25 terminal or printer cable
MVMECBLCP25	25-ft DB25-to-CENTRONICS printer cable

Ethernet kits presently offered by Motorola are listed below. The cables in these kits are industry-standard 50-ohm RG-58A/U (Thinnet) coaxial cables.

Network Cabling Hardware

Part Number	Kit Description
NDS-ETH-SYS	System connection kit: System cable System Ethernet transceiver System Ethernet transceiver T connector System Ethernet transceiver terminators
NDS-ETH-T5	5-meter terminal connection: Terminal T connector 5-meter terminal cable
NDS-ETH-T10	10-meter terminal connection: Terminal T connector 10-meter terminal cable
NDS-ETH-T20	20-meter terminal connection: Terminal T connector 10-meter terminal cable

Local Area Network Connections

A local area network (LAN) allows high-speed data exchange among computing equipment attached to the network within a building, an office complex, or a moderately sized geographical area. Motorola offers two types of LAN interfaces: ISO 8802.3 (Ethernet) and FDDI (Fiber Distributed Data Interface).

Ethernet

Devices are attached to a network trunk cable via a transceiver cable and transceiver. Each device on a network can communicate directly with any other device on that same network. Data is transmitted among devices in "packets" consisting of synchronization bits, data, a destination address, a source address, and a frame check sequence.

Packets are transmitted serially from a network device (node) to the trunk cable. All transceivers on the network receive the data and relay it to their attached nodes. Each node recognizes its own address and ignores the packet if it is addressed to another node.

The following types of Ethernet interface cabling are available from Motorola:

- ❏ Thicknet (10Base5) RG-8 coaxial cabling
- ❏ Thinnet (10Base2) RG-58 coaxial cabling
- ❏ Twisted-pair (10BaseT) telephone wiring

The following table lists the specifications for the two varieties of coaxial network cable.

Coaxial Cable Specifications for LAN Environments

Parameter	Thicknet	Thinnet
Cable thickness	0.4 in.	0.2 in.
Bend radius	254 mm (10 in.)	76 mm (3 in.)
Maximum segment length	500 m (1640 ft)	167 m (547 ft)
Cable connectors	N-series	BNC
Cable termination	50 ohms	50 ohms
Transceiver spacing	2.5 m (or any multiple)	0.5 m (minimum)
Maximum transceivers per segment	100	30
Maximum transceivers per network	1024	930
Maximum transceiver cable length	50 m (165 ft)	50 m (165 ft)

Thicknet Cabling

Standard Thicknet coaxial cable has the following characteristics:

- ❑ A maximum length of 1640 feet (500 m). Shorter segments of 384 feet (117 m), 230 feet (70 m), and 77 feet (23 m) are also available.
- ❑ Provision for up to 100 transceivers (depending on cable length), via annular rings spaced at intervals of 2.5 m (approximately 8 feet) along the cable.
- ❑ Termination at both ends by N-series 50-ohm terminators. The network must have a single ground connection.

Standard Thicknet coaxial cable is available with either PVC or plenum insulation. Building codes in some localities require plenum cable. The standard color of PVC cable is yellow; the standard color of plenum cable is orange.

Standard Thicknet cable is 0.2 inches thicker than Thinnet cable. The annular rings spaced 2.5 m apart along the cable jacket indicate where transceivers may be installed.

Both ends of each segment must be terminated with an N-series 50-ohm terminator. It is recommended that each Thicknet cable consist of a single section of cable; if more length is needed, however, standard cable in lengths of 77, 230, or 384 feet can be joined with N-type barrel connectors to form a segment.

Thinnet Cabling

Thinnet coaxial cable has the following characteristics:

- ❑ A maximum length of 167 m (547 feet).
- ❑ Provision for up to 30 transceivers, regardless of cable length.
- ❑ Termination at both ends by BNC 50-ohm terminators. As with Standard cabling, the network must have a single ground connection.

Thinnet coaxial cable is RG-58 A/U or C/U 50-ohm cabling. It resembles MCS coaxial video cable (RG-62, 93 ohms), but is not a substitute. Many distributors offer RG-58 cable with either PVC or plenum insulation. Thinnet cabling requires that transceivers be spaced at least m (20 inches) apart.

Thinnet cable is less costly than Standard Thicknet cable, and is easier to install due to its greater flexibility. In addition, computing devices that are equipped with built-in transceivers can be coupled to the network without external transceivers and transceiver cabling if the LAN backbone is formed by Thinnet rather than Standard cable. (NDS terminals used with certain Motorola networked computers have built-in transceivers factory-configured for Thinnet cables. They require no external transceiver for connection to these cables.)

Standard cable, on the other hand, is heavily insulated and shielded against electromagnetic interference. It may be the indicated solution in installations where physical durability and immunity to electrical noise are essential.

Twisted-Pair Cabling

Twisted-pair cabling (10BaseT) utilizes telephone-type modular connectors in conjunction with commercially available cabling or with compatible telephone wiring in buildings. As a rule, twisted-pair segments are limited in length to approximately 100 m. If the cabling is part of a building's telecommunications wiring system, each connector or patch panel interconnect in the link subtracts about 12 m from the overall usable length.

Twisted-pair connections are completed with 8-pin RJ-45 modular connectors. The wire should not be smaller than 24 AWG, and must meet the requirements of the ISO 8802.3 10BaseT specification.

RJ-45 Twisted-Pair Pin Assignments

Pin	Signal
1	TX+
2	TX-
3	RX+
4, 5	No connection
6	RX-
7, 8	No connection

FDDI

FDDI (Fiber Distributed Data Interface) is a baseband LAN with, at present, a maximum data transfer rate of 100 Mbits per second.

Fiber optic cabling offers high performance with a high degree of immunity to the disturbances that affect copper-wire cabling. Fiber optic cable can be used at distances up to 2 km (about 1.2 miles). Although devices can be attached only to the ends of such a cable (no taps along its length are possible), network characteristics can be achieved through the use of high-speed switches and routers.

FDDI devices are connected in series to form a ring configuration; each device in turn receives, regenerates, and resends the packets of data. FDDI networks commonly include a secondary ring as backup in case of cable failure. The secondary ring is idle unless a fault occurs on the network.

An FDDI network may have up to 100 nodes, with up to 2 km of separation between nodes. The overall network may span up to 200 km.

Fiber optic cabling is available in 50-, 62.5- or 100-micron core thicknesses. Motorola uses 62.5/125 micron multi-mode cable terminated with ST (bayonet) connectors. No more than 12 dB of signal loss is allowed per link. The following table lists typical losses at an operating frequency of 850 nm on optical cable without splices or junctions.

Typical Loss in Optical Cable

Cable Length		Loss (dB) at 850 nm	
Feet	Meters	Typical	Maximum
100	30.48	1.1	1.70
500	152.50	1.5	1.85
1000	304.80	2.0	2.70
2000	609.60	3.0	4.40
4000	1219.20	5.0	7.80

EIA-232-D Interconnections

Standard Connections

The following table lists the standard EIA-232-D interconnections. As the diagrams and tables on the following pages show, not all pins listed below are necessary in every application.

To interpret this information correctly, remember that the EIA-232-D interface was developed to connect a terminal to a modem. When computing equipment is interconnected without modems, one of the units must be configured as a terminal (data terminal equipment: DTE) and the other as a modem (data circuit-terminating equipment: DCE). Since computers are normally configured to work with terminals, they are said to be configured as a modem in most cases.

EIA-232-D Interconnections

Pin Number	Signal Mnemonic	Signal Name and Description
1		Not used.
2	TxD	**Transmit Data**. Data to be transmitted; input to modem from terminal.
3	RxD	**Receive Data**. Data which is demodulated from the receive line; output from modem to terminal.
4	RTS	**Request To Send**. Input to modem from terminal when required to transmit a message. With RTS off, the modem carrier remains off. When RTS is turned on, the modem immediately turns on the carrier.
5	CTS	**Clear To Send**. Output from modem to terminal to indicate that message transmission can begin. When a modem is used, CTS follows the off-to-on transition of RTS after a time delay.
6	DSR	**Data Set Ready**. Output from modem to terminal to indicate that the modem is ready to send or receive data.
7	SG	**Signal Ground**. Common return line for all signals at the modem interface.
8	DCD	**Data Carrier Detect**. Output from modem to terminal to indicate that a valid carrier is being received.
9-14		Not used.
15	TxC	**Transmit Clock** (DCE). Output from modem to terminal; clocks data from the terminal to the modem.
16		Not used.
17	RxC	**Receive Clock**. Output from modem to terminal; clocks data from the modem to the terminal.
18, 19		Not used.

EIA-232-D

EIA-232-D Interconnections (Continued)

Pin Number	Signal Mnemonic	Signal Name and Description
20	DTR	**Data Terminal Ready.** Input to modem from terminal; indicates that the terminal is ready to send or receive data.
21		Not used.
22	RI	**Ring Indicator.** Output from modem to terminal; indicates to the terminal that an incoming call is present. The terminal causes the modem to answer the phone by carrying DTR true while RI is active.
23		Not used.
24	TxC	**Transmit Clock** (DTE). Input to modem from terminal; same function as TxC on pin 15.
25	BSY	**Busy.** Input to modem from terminal. A positive EIA signal applied to this pin causes the modem to go off-hook and make the associated phone busy.

Notes

1. **A high EIA-232-D signal level is +3 to +15 volts. A low level is -3 to -15 volts. Connecting units in parallel may produce out-of-range voltages and is contrary to specifications.**

2. **The EIA-232-D interface is intended to connect a terminal to a modem. When computers are connected without modems, one computer must be configured as a modem and the other as a terminal.**

Serial Cables

Figures 1 through 6 illustrate the pin configurations of the various EIA-232-D cables sold by Motorola. Figure 1 shows the pin assignments of the following cables:

- ❑ MVMECBL261 — 15-ft system- or remote-terminal-to-modem cable
- ❑ MVMECBL916 — 15-ft Dest OCR document reader cable

Note **Both of these cables have a 25-pin plug connector at each end.**

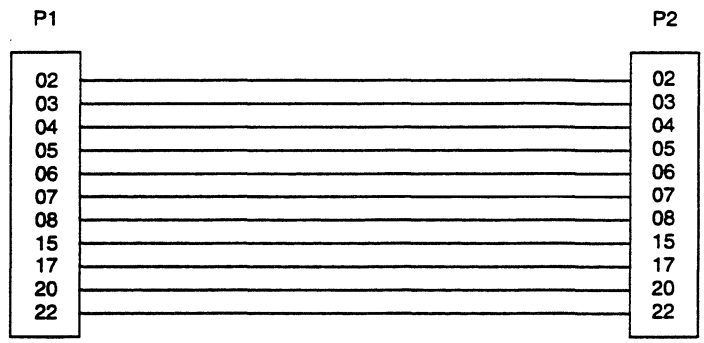


Figure 1. EIA-232-D Straight-Through Cable Connections

Figure 2 shows the pin assignments of the following cable:

- ❑ MVMECBL285 — 15-ft remote-printer-to-modem cable

Notes

1. **At P1, pins 4 and 6 are jumpered within the cable. At P2, pins 4, 5, and 6 are jumpered within the cable.**
2. **The pin 1 connection supplies a protective ground that is typically used for equipment chassis grounding. Depending on chassis AC wiring, it may also correspond to the ground lead on a system's 3-wire AC power connection. In any case, the protective ground is *not* connected to the signal ground (pin 7).**
3. **This cable has a 25-pin plug connector at each end.**

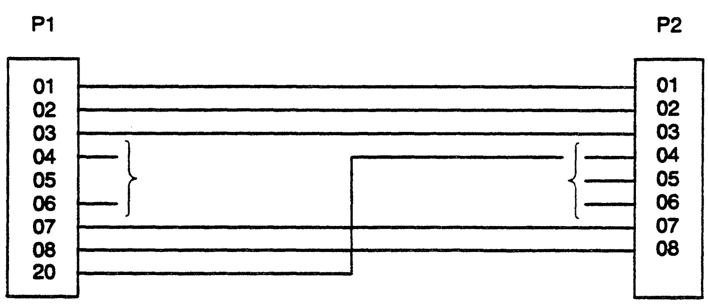


Figure 2. EIA-232-D Remote Printer Cable Connections

Figure 3 shows the pin assignments of the following cables:

- MVMECBL330 — 25-ft terminal or printer crossover cable
- MVMECBL331 — 50-ft terminal or printer crossover cable
- MVMECBL332 — 100-ft terminal or printer crossover cable
- MVMECBL333 — 200-ft terminal or printer crossover cable
- MVMECBL334 — 300-ft terminal or printer crossover cable

Notes

1. **Pins 4, 5, and 6 are jumpered within the cable at both ends.**
2. **The pin 1 connection supplies a protective ground that is typically used for equipment chassis grounding. Depending on chassis AC wiring, it may also correspond to the ground lead on a system's 3-wire AC power connection. In any case, the protective ground is *not* connected to the signal ground (pin 7).**
3. **All of these cables have a 25-pin plug connector at each end.**

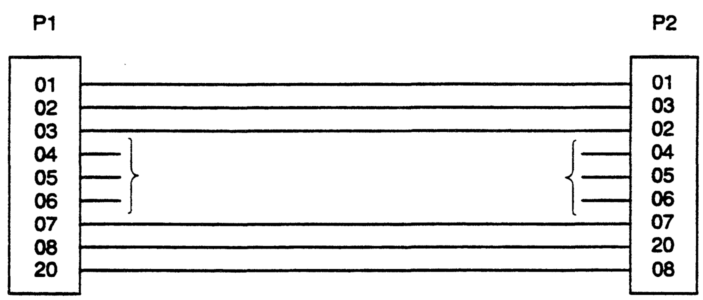


Figure 3. EIA-232-D Terminal/Printer Cable Connections

Figure 4 shows the pin assignments of the following cable:

- ❑ MVMECBLSA2 — 2-ft DB9-to-DB25 serial adapter cable

Note **This cable has a 9-pin socket connector at P1 and a 25-pin socket connector at P2.**

P1	P2
Shell (Drain Wire)	01
01	08
02	03
03	02
04	20
05	07
06	06
07	04
08	05

Figure 4. EIA-232-D DB9-to-DB25 Serial Adapter Cable Connections

Figure 5 shows the pin assignments of the following cable:

- ❑ MVMECBLT25 — 25-ft DB9-to-DB25 terminal or printer cable

Note **This cable has a 9-pin socket connector at P1 and a 25-pin plug connector at P2.**

P1	P2
01	20
02	02
03	03
04	08
05	07
06	06
07	05
08	04

Figure 5. EIA-232-D Straight-Through Cable Connections

Figure 6 shows the pin assignments of the following cable:

- ❑ MVSBCBL-3 — 25-ft quad cluster cable assembly

Note **This cable assembly has a 62-pin plug connector at P1 (the end that attaches to the MVSB742 module) and four 25-pin socket connectors at the other ends. The connector shield is attached to all shells to form a complete ground.**

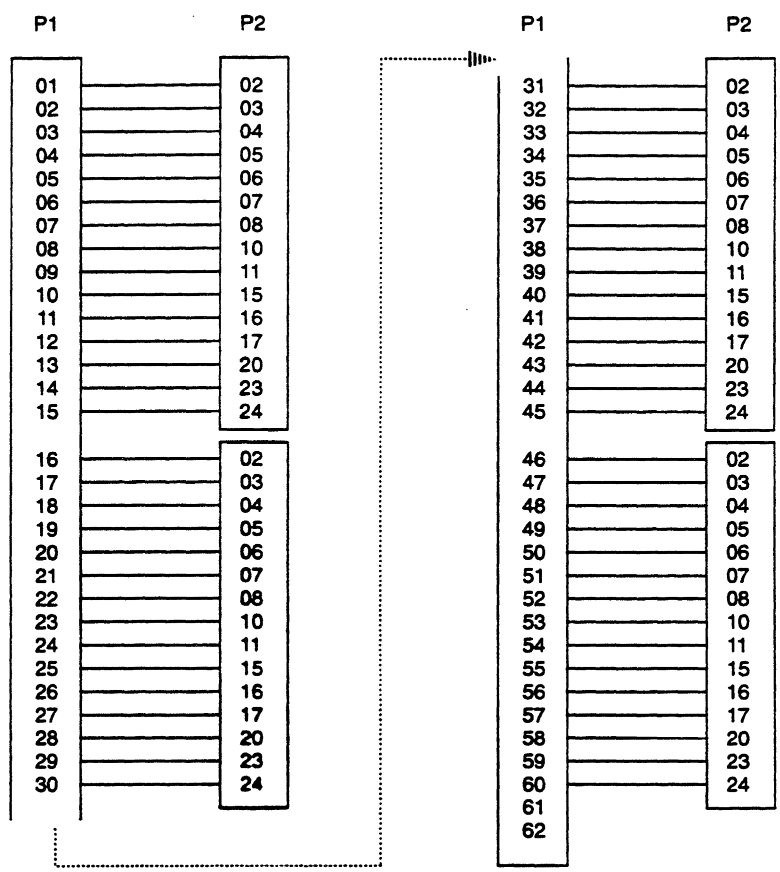


Figure 6. EIA-232-D HDA62-to-DB25 Quad Cluster Cable Connections

Serial Interfaces

The following tables describe the most common serial interface configurations you may encounter at the system side of your computer installation. These tables show the device type, serial connector type, and pinouts for various Motorola transition modules (as well as for the DeltaLINK and MVME338 Terminal I/O Subsystem servers) on which EIA-232-D connections are available.

Note **These tables show the as-shipped factory configurations of the transition modules and terminal servers. To reconfigure the equipment for other applications, refer to the *User's Manual* for the device in question.**

MVME701A I/O Transition Module

Serial Connector	Female DB25 (J3, J4/Serial Ports 1,2)		
Device Type	DTE/DCE Selectable		
Pins/Signals	01	Protective ground	
	02	Transmit data	(DTE output/DCE input)
	03	Receive data	(DTE input/DCE output)
	04	Request to send	(DTE output/DCE input)
	05	Clear to send	(DTE input/DCE output)
	06	Data set ready	(DTE input/DCE output)
	07	Signal ground	
	08	Data carrier detect	(DTE input/DCE output)
	15	Transmit clock	(DTE input/DCE output)
	17	Receive clock	(DTE input/DCE output)
	20	Data terminal ready	(DTE output/DCE input)

MVME705A 6-Channel Serial Transceiver Module

Serial Connector	Female DB25 (J1-J6/Serial Ports 1-6)		
Device Type	DTE/DCE Selectable		
Pins/Signals	02	Transmit data	(DTE output/DCE input)
	03	Receive data	(DTE input/DCE output)
	04	Request to send	(DTE output/DCE input)
	05	Clear to send	(DTE input/DCE output)
	06	Data set ready	(DTE input/DCE output)
	07	Signal ground	
	08	Data carrier detect	(DTE input/DCE output)
	15	Transmit clock	(DTE input/DCE output)
	17	Receive clock	(DTE input/DCE output)
	20	Data terminal ready	(DTE output/DCE input)
	24	Transmit clock	(DTE output/DCE input)

MVME706 6-Channel Serial Transceiver Module

Serial Connector	Female DB25 (J1-J6/Serial Ports 1-6)		
Device Type	DTE/DCE Selectable		
Pins/Signals	02	Transmit data	(DTE output/DCE input)
	03	Receive data	(DTE input/DCE output)
	04	Request to send	(DTE output/DCE input)
	05	Clear to send	(DTE input/DCE output)
	06	Data set ready	(DTE input/DCE output)
	07	Signal ground	
	08	Data carrier detect	(DTE input/DCE output)
	17	Receive clock	(DTE input/DCE output)
	20	Data terminal ready	(DTE output/DCE input)
	24	Transmit clock	(DTE output/DCE input)

MVME707/MVME707A EIA-232-D Serial Port Distribution Module

Serial Connector	Female DB25 (J2, J3/Serial Ports 1,2)		
Device Type	DTE (J2)/DCE (J3)		
Pins/Signals	01	Protective ground	
	02	Transmit data	(DTE output/DCE input)
	03	Receive data	(DTE input/DCE output)
	04	Request to send	(DTE output/DCE input)
	05	Clear to send	(DTE input/DCE output)
	06	Data set ready	(DTE input/DCE output)
	07	Signal ground	
	08	Data carrier detect	(DTE input/DCE output)
	20	Data terminal ready	(DTE output/DCE input)

MVME708A Transition Module

Serial Connector	Female DB25 (J5/Serial Port 2)		
Device Type	DTE/DCE Selectable		
Pins/Signals	02	Transmit data	(DTE output/DCE input)
	03	Receive data	(DTE input/DCE output)
	04	Request to send	(DTE output/DCE input)
	05	Clear to send	(DTE input/DCE output)
	06	Data set ready	(DTE input/DCE output)
	07	Signal ground	
	08	Data carrier detect	(DTE input/DCE output)
	15	Transmit clock	(DTE input/DCE output)
	17	Receive clock	(DTE input/DCE output)
	20	Data terminal ready	(DTE output/DCE input)

MVME709 6-Channel Transition Module

Serial Connector	Female DB25 (Serial Ports 0-5)			
Device Type	DTE/DCE Selectable			
Pins/Signals	02	Transmit data	(DTE output/DCE input)
	03	Receive data	(DTE input/DCE output)
	04	Request to send	(DTE output/DCE input)
	05	Clear to send	(DTE input/DCE output)
	06	Data set ready	(DTE input/DCE output)
	07	Signal ground	
	08	Data carrier detect	(DTE input/DCE output)
	15	Transmit clock	(DTE input/DCE output)
	17	Receive clock	(DTE input/DCE output)
	18	Local loopback	(DTE output/DCE input)
	20	Data terminal ready	(DTE output/DCE input)
	22	Ring indicator	(DTE input/DCE output)
	25	Test indicator	(DTE input/DCE output)

Note **Pin 22 is not used by ports SP4 and SP5.**

MVME710 8-Channel Serial I/O Distribution Module

Serial Connector	Female DB25 (J1-J8/Serial Ports 1-8)		
Device Type	DTE/DCE Selectable		
Pins/Signals	01	Protective ground	
	02	Transmit data	(DTE output/DCE input)
	03	Receive data	(DTE input/DCE output)
	04	Request to send	(DTE output/DCE input)
	05	Clear to send	(DTE input/DCE output)
	06	Data set ready	(DTE input/DCE output)
	07	Signal ground	
	08	Data carrier detect	(DTE input/DCE output)
	20	Data terminal ready	(DTE output/DCE input)

EIA-232-D

MVME714/MVME714M 2-Channel Serial I/O Distribution Module

Serial Connector	Female DB25 (J1/Serial Port 2, J5/Console)		
Device Type	DTE/DCE Selectable		
Pins/Signals	01	Protective ground	
	02	Transmit data	(DTE output/DCE input)
	03	Receive data	(DTE input/DCE output)
	04	Request to send	(DTE output/DCE input)
	05	Clear to send	(DTE input/DCE output)
	06	Data set ready	(DTE input/DCE output)
	07	Signal ground	
	08	Data carrier detect	(DTE input/DCE output)
	20	Data terminal ready	(DTE output/DCE input)

MVME718 Transition Module

Serial Connector	Female DB25 (J5, J7/Serial Ports 2, 3)		
Device Type	DTE/DCE Selectable		
Pins/Signals	02	Transmit data	(DTE output/DCE input)
	03	Receive data	(DTE input/DCE output)
	04	Request to send	(DTE output/DCE input)
	05	Clear to send	(DTE input/DCE output)
	06	Data set ready	(DTE input/DCE output)
	07	Signal ground	
	08	Data carrier detect	(DTE input/DCE output)
	15	Transmit clock	(DTE input/DCE output)
	17	Receive clock	(DTE input/DCE output)
	20	Data terminal ready	(DTE output/DCE input)
	24	Transmit clock	(DTE output/DCE input)

DeltaLINK Server

Serial Connector	Female DB25 (J10-J15)		
Device Type	DTE		
Pins/Signals	02	Transmit data	(output)
	03	Receive data	(input)
	04	Request to send	(output)
	05	Clear to send	(input)
	06	Data set ready	(input)
	07	Signal ground	
	08	Data carrier detect	(input)
	20	Data terminal ready	(output)

MVME712A/MVME712AM Transition Module

Serial Connector	Male DB9 (J1, J3-J5/Serial Ports 1-4)		
Device Type	DTE		
Pins/Signals	01	Data carrier detect	(input)
	02	Receive data	(input)
	03	Transmit data	(output)
	04	Data terminal ready	(output)
	07	Signal ground	
	06	Data set ready	(input)
	07	Request to send	(output)
	08	Clear to send	(input)

Note

Pin 1 is not used by port 1 (J1).

MVME712MTransition Module

Serial Connector	Female DB25 (J7-J10/Serial Ports 1-4)		
Device Type	DTE/DCE Selectable		
Pins/Signals	02	Transmit data	(DTE output/DCE input)
	03	Receive data	(DTE input/DCE output)
	04	Request to send	(DTE output/DCE input)
	05	Clear to send	(DTE input/DCE output)
	06	Data set ready	(DTE input/DCE output)
	07	Signal ground	
	08	Data carrier detect	(DTE input/DCE output)
	15	Transmit clock	(DTE input/DCE output)
	17	Receive clock	(DTE input/DCE output)
	20	Data terminal ready	(DTE output/DCE input)
	24	Transmit clock	(DTE output/DCE input)

Notes

1. **Pin 8 is not used by port 1 (J7).**
2. **Pins 15, 17, and 24 are used by port 4 (J10) only.**

MVME338 Terminal I/O Subsystem Server

Serial Connector	Female DB25 (Serial Ports 0-7 or 0-15)		
Device Type	DTE		
Pins/Signals	01	Protective ground	
	02	Transmit data	(output)
	03	Receive data	(input)
	04	Request to send	(output)
	05	Clear to send	(input)
	06	Data set ready	(input)
	07	Signal ground	
	08	Data carrier detect	(input)
	20	Data terminal ready	(output)

MVSB742 8-Channel Extensible VSB Module

Serial Connector	Female DB62 (J1/Serial Ports 0-3, J2/Serial ports 4-7)		
Device Type	DTE/DCE selectable		
Pins/Signals	01, 16, 31, 46	Transmit data	(DTE output/DCE input)
	02, 17, 32, 47	Receive data	(DTE input/DCE output)
	03, 18, 33, 48	Data terminal ready	(DTE output/DCE input)
	04, 19, 34, 49	Clear to send	(DTE input/DCE output)
	05, 20, 35, 50	Data set ready	(DTE input/DCE output)
	06, 21, 36, 51	Signal ground	
	07, 22, 37, 52	Data carrier detect	(DTE input/DCE output)
	08, 23, 38, 53	Modem test	
	09, 24, 39, 54	Modem test	
	10, 25, 40, 55	Transmit clock	(DTE input/DCE output)
	11, 26, 41, 56	Not used	
	12, 27, 42, 57	Receive clock	(DTE input/DCE output)
	13, 28, 43, 58	Request to send	(DTE output/DCE input)
	14, 29, 44, 59	Not used	
	15, 30, 45, 60	Transmit clock	(DTE output/DCE input)

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Parallel Interconnections

Standard Connections

The following table lists the standard interconnections used with the CENTRONICS parallel printer interface. As the diagrams on the following pages show, not all pins listed in the table are necessary in every application.

Parallel Interconnections

Pin Number	Signal Mnemonic	Signal Name and Description
01, 19	PSTB*	**Printer Strobe** (active low). An output pulse that clocks data from the processor to the printer.
02, 20	DATA 1	**Printer Data** (bit 1). First bit of input data to the printer.
03, 21	DATA 2	**Printer Data** (bit 2). Second bit of input data to the printer.
04, 22	DATA 3	**Printer Data** (bit 3). Third bit of input data to the printer.
05, 23	DATA 4	**Printer Data** (bit 4). Fourth bit of input data to the printer.
06, 24	DATA 5	**Printer Data** (bit 5). Fifth bit of input data to the printer.
07, 25	DATA 6	**Printer Data** (bit 6). Sixth bit of input data to the printer.
08, 26	DATA 7	**Printer Data** (bit 7). Seventh bit of input data to the printer.
09, 27	DATA 8	**Printer Data** (bit 8). Eighth bit of input data to the printer.
10, 28	PACK*	**Printer Acknowledge** (active low). An input pulse indicating that the next character may be sent.
11, 29	BUSY	**Busy**. An input signal indicating that the printer cannot receive data due to a condition such as a paper misfeed, offline status, etc.
12	PE	**Paper Empty**. Indicates that the printer paper cassette is in need of refilling.
13	SEL	**Select**. Indicates that the printer is selected (warmed up and online), and that no fault condition exists.
14, 16, 35	LOGIC GND	**Logic Ground**. Ground reference for data and control signals; 0 Vdc.
17	CHASSIS GND	**Chassis Ground**. Ground reference for frame and cable shielding.
31	INPRIME	**Input Prime**. An output signal that clears the printer buffer and initializes the logic.
32	FAULT*	**Fault** (active low). After warm-up, this signal remains set to 1 unless a printer malfunction occurs.

Notes

1. **Where pin numbers are given in pairs, the second pin is the signal return.**

2. **The following pins are not used: 15, 18, 30, 31, 33, 34, 36.**

Parallel

Parallel Cables

Figures 1 through 3 illustrate the pin configurations of the various parallel printer cables sold by Motorola. Figure 1 shows the pin assignments of the following cables:

- ❑ CA22 — 10-ft parallel printer cable
- ❑ CA23 — 25-ft parallel printer cable
- ❑ CA24 — 50-ft parallel printer cable

Notes

1. **All of these cables have a 36-pin plug connector at each end.**
2. **These cables are all 36 conductors wired; they can be used with printers that employ undefined connections on pins 33, 34, 35, and 36.**

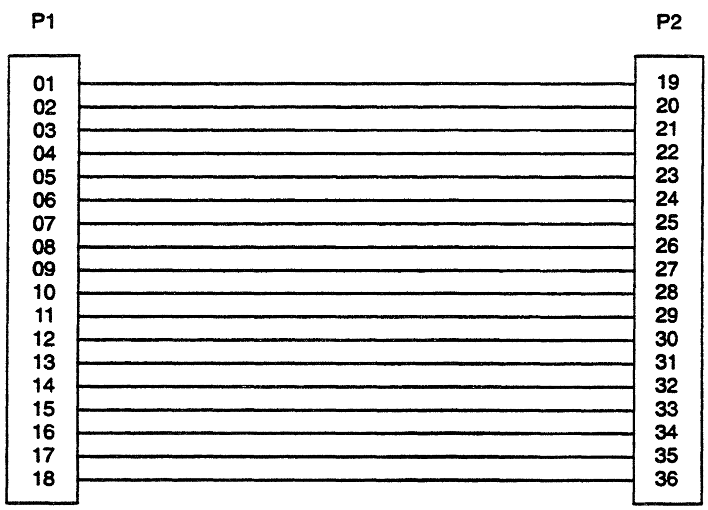

Figure 1. CENTRONICS Parallel Straight-Through Cable Connections

Note that although a 50-foot cable is available, printers using a parallel interface have a cable limitation of 25 feet in most installations.

Figure 2 shows the pin assignments of the following cable:

- MVMECBLCP25 — 25-ft DB25-to-EMC36 parallel printer cable

Notes

1. **At P1, pins 19 through 25 are jumpered within the cable. At P2, pins 19 through 30 and 16 are jumpered within the cable.**

2. **This cable has a 25-pin plug connector at P1 and a 36-pin plug connector at P2.**

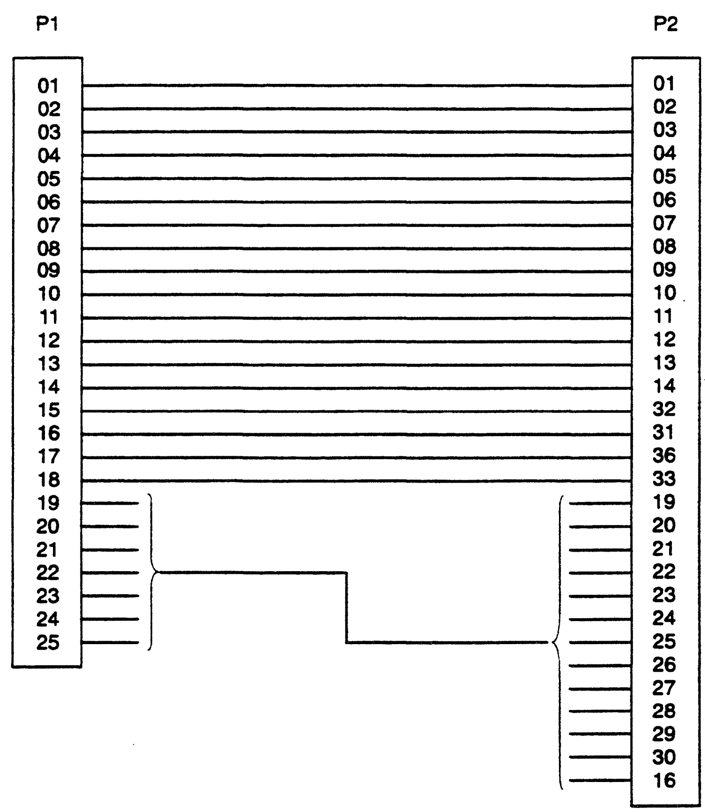

Figure 2. CENTRONICS Parallel DB25-to-EMC36 Cable Connections

Figure 3 shows the pin assignments of the following cables:

- ❑ EMC36-to-EMC36 parallel printer cable used with the SYS338S8P device (an MVME338 8 serial/1 parallel port terminal server)

Notes

1. **This cable has a 36-pin plug connector at each end.**

2. **This is not a full-function CENTRONICS-compatible cable.**

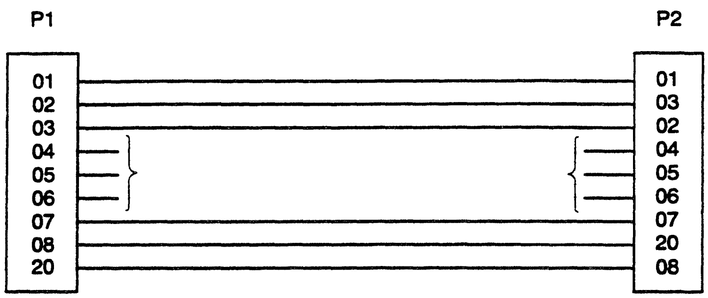

Figure 3. CENTRONICS Parallel Cable Connections for MVME338

SCSI Interconnections

The SCSI (*Small Computer System Interface*) bus is physically comprised of 18 signals. SCSI cables sold by Motorola use a 50-pin connector; the pinouts are shown in the following table. Motorola systems require external SCSI cables that conform to Motorola specification 30-W6341.

SCSI Interconnections

Pin Number	Signal Mnemonic	Signal Name and Description
1-25	GND	**Ground** (Except pin 13, which is not used).
26-33	DB0-DB7*	**Data Bus** (bits 0-7). The eight data bits on the SCSI bus.
34	DBP*	**Data Bus Parity.** Data parity is odd. Use of parity is a system option. Parity is not valid during the arbitration phase.
35-37	GND	**Ground.**
38	TERMPWR	**Terminator Power.** +5 Vdc for SCSI terminators.
39, 40	GND	**Ground.**
41	ATN*	**Attention.** Driven by an initiator; indicates that the initiator has a message to send to the target.
42	GND	**Ground.**
43	BSY*	**Bus Busy.** SCSI busy signal; indicates that the bus is in use.
44	ACK*	**Acknowledge.** Driven by an initiator; indicates an acknowledgment for a REQ/ACK data transfer handshake.
45	RST*	**Reset.** SCSI reset signal; clears the bus of all activity.
46	MSG*	**Message.** Driven by the target during the message transfer phase.
47	SEL*	**Select.** Used by the initiator to select a target or by a target to reselect an initiator.
48	C/D*	**Control/Data.** Driven by the target; indicates whether control or data information is on the data bus. True (low) indicates control information.
49	REQ*	**Request.** Driven by the target; indicates a request for a REQ/ACK data transfer handshake.
50	I/O*	**Input/Output.** Driven by a target; controls the direction of data movement on the SCSI bus. True (low) indicates input to the initiator. False (high) indicates output from the initiator. This signal is also used to distinguish between selection and re-selection phases.

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UPS (Uninterruptible Power Supply)

Power Circuit Protection

Ideally, a power circuit should be protected by an electrical line filter that prevents voltage "spikes" caused by unusual outside forces from reaching the computer. The most desirable means of protecting valuable data is to use a "no-break" UPS (uninterruptible power supply) to furnish power to the system's processor enclosure. A no-break UPS makes the central processor less susceptible to the voltage fluctuations, spikes, and frequency aberrations inherent in most power systems.

A second type of UPS is called a "standby" UPS, or SPS. This device switches to a battery system if power fails. SPS units usually lack protective circuitry; if you opt for such a unit, be sure to get one that has a switchover time of 5 milliseconds or less. Some SPS units provide enough power to shut the system down in the event of a power failure; others furnish enough for the system to continue operating for a specified period of time during the power failure.

The UPS or SPS must have receptacles to furnish power to both the processor enclosure and the console terminal. General characteristics of the UPS or SPS units available from Motorola for use with Motorola systems are listed in the following table.

UPS/SPS Specifications

Model	Parameter	North American	International
UPS2001, UPS2001-2 3, 6, 12 slot	Input voltage	120 Vac +10%, -15%	220 Vac +10%, -15%
	Input frequency	60 Hz ±5%	50 Hz ±5%
	Voltage surges	144 Vac (1/2 cycle)	288 Vac (1/2 cycle)
	Voltage sags	20% (1/2 second)	20% (1/2 second)
	Power dropout	1 cycle min. (90 Vac)	1 cycle min. (198 Vac)
	Transfer time to backup	3 milliseconds	5 milliseconds
	Battery backup time	6 minutes	6 minutes
	Output power	1200 W	1200 W
	Output voltage	120 Vac ±2%	220 Vac ±3%
	Output frequency	60 Hz ±1%	50 Hz ±2%
	Output current	10 amperes	5.5 amperes
	Input connector	NEMA 5-15P	CEE 7/7
	Output receptacles	4 (NEMA 5-15R4)	2 (CEE 7/7)

UPS/SPS Specifications (Continued)

Model	Parameter	North American	International
UPS2001, UPS2001-2 3, 6, 12 slot	Input voltage	120 Vac +10%, -15%	220 Vac +10%, -15%
	Input frequency	60 Hz ±5%	50 Hz ±5%
	Voltage surges	144 Vac (1/2 cycle)	288 Vac (1/2 cycle)
	Voltage sags	20% (1/2 second)	20% (1/2 second)
	Power dropout	1 cycle min. (90 Vac)	1 cycle min. (198 Vac)
	Transfer time to backup	3 milliseconds	5 milliseconds
	Battery backup time	6 minutes	6 minutes
	Output power	1200 W	1200 W
	Output voltage	120 Vac ±2%	220 Vac ±3%
	Output frequency	60 Hz ±1%	50 Hz ±2%
	Output current	10 amperes	5.5 amperes
	Input connector	NEMA 5-15P	CEE 7/7
	Output receptacles	4 (NEMA 5-15R4)	2 (CEE 7/7)
UPS2004 20 slot	Input voltage	120 Vac +10%, -15%	N/A
	Input frequency	60 Hz ±5%	—
	Voltage surges	144 Vac (1/2 cycle)	—
	Voltage sags	20% (1/2 second)	—
	Power dropout	1 cycle min. (90 Vac)	—
	Transfer time to backup	4 milliseconds	—
	Battery backup time	10 minutes	—
	Output power	2000 W	—
	Output voltage	120 Vac ±3%	—
	Output frequency	60 Hz ±1%	—
	Output current	16.6 amperes	—
	Input connector	NEMA 5-30P	—
	Output receptacles	2 (NEMA 5-20R2)	—

SCSI Disk Expansion Module and Wide-Capable Disk Drives Installation Information

This subsection provides important information on the use of wide-capable SCSI devices with the Series E platform. The following pages describe the conditions under which wide-capable devices can be installed. Please read this entire document before installing your wide devices.

For information on drive placement and instructions on how to install a drive, refer to your *System Installation Guide.*

Wide-capable SCSI Expansion Module

The wide-capable SCSI Expansion Module can be identified in two ways, by a yellow label on the back of the module,

```
WIDE CAPABLE

Wide operation determined
by total system capabilities.
Total bus length is critical.
Consult manuals.
```

or, after removing the enclosure cover and the SCSI devices in the left-hand side of the Expansion Module, the words, "wide capable," can be viewed on the SCSI backplane.

Supported wide SCSI devices include:

Series E	SCSI Device Expansion Module	Height and Capacity
P861-1GBWK	P867WK	1-inch high, 1GB
P861-2GBWK	P868AWK	1-inch high, 2GB
	P869WK	1.6-inch high, 4GB

Wide SCSI

Note **All MCG cables with 68-pin connectors have all 68 wires making them suitable for wide SCSI systems.**

SCSI Bus Length

The maximum SCSI bus length is a total of **three meters**. Use the next table to determine the SCSI bus length.

Device	Bus Length
Series E system (internal length)	1 meter
RAID1/5-n-xGB (internal length)	.5 meter
SCSI Device Expansion Module (internal plus external SCSI jumper)	.5 meter
STS-S8P/STS-S16P scsiTerminal Server™ (including external SCSI jumper)	.2 meter
External SCSI cable length (minimum cable length)	1 meter

Note

All external round SCSI cables up to and including one meter in length are given an assigned value of one meter. For example, if a system requires the use of a .5 meter cable, that cable counts as one meter in the total SCSI bus length equation. Longer cables are legal and are assigned their actual length value in the total SCSI length equation.

Even though the SCSI specification allows six meters, it does *recommend* a maximum total SCSI bus length of three meters when fast transfers are performed (as in all MCG systems). Many vendors specify a three meter bus length maximum. The longer the SCSI bus, the greater the chances are for error.

Wide SCSI Device Addressing and Priority

Use the following guidelines when setting your device's address.

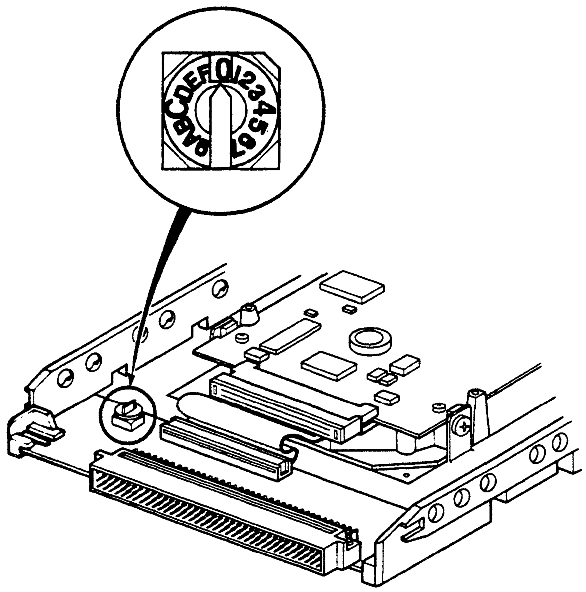
- The maximum number of devices per wide SCSI bus is 15.
- Narrow SCSI devices use ID's zero through 6.
- SCSI ID 7 is used for the initiator (i.e. the controller).
- Wide SCSI devices use ID's zero through 6 and 8 through 15.
- Priority of devices for SCSI bus arbitration is 7 through zero, 15 through 8. Address 7 is the highest priority and address 8 is the lowest priority. This allows narrow devices (which can only be at SCSI ID's zero through 6) to gain SCSI bus control even if a device at SCSI ID's 8 through 15 is also requesting the bus.

  This is necessary since narrow devices do not recognize devices at SCSI ID's 8 through 15.

Note **Current versions of PPCBug do not recognize devices above SCSI ID 7. See** ***PPCBug Support for Wide SCSI*** **on page 38.**

- ❑ Wide drive carriers have a 15-position rotary address switch.

  The address switch has settings zero through F (hexadecimal). Care must be taken when setting the SCSI ID because the detents are closer than on the 8-position switches.



11334.00 9506

Note **Address 7 should not be used since it is reserved for the controller's address.**

Mixing Wide and Narrow SCSI Devices

Use the following guidelines when trying to determine what type of devices will work in your system.

IF you have ...	THEN ...
Internal wide device	It must **not** be attached to a narrow SCSI Expansion Module. There will be no termination for the additional SCSI bus signals on the narrow SCSI bus and the signals will float.
Wide devices installed in a narrow SCSI Expansion Module	They must not be mounted in a narrow SCSI Expansion Module attached to any Series E on-board SCSI bus or any wide PCI SCSI controller. The wide controller and the wide device would negotiate for wide transactions, but the additional signal lines needed for wide transfer would not be available.
Wide SCSI controller	Mixing narrow and wide SCSI Expansion Modules is **not allowed** if any wide devices exist on the entire SCSI bus (including the Series E's on-board SCSI bus). The wide controller and the wide device would negotiate for wide transactions, but the additional signal lines needed for wide transfer would not be available.
Wide devices	Wide devices can be installed in a system where the controller supports only narrow operations. The controller will never negotiate for wide operations so the wide device operates in a narrow mode.
RAID device	The RAID device is a supported external wide device. The RAID must not be attached to a narrow SCSI Expansion Module when the controller is wide capable.

Using Wide Devices on a Narrow Bus

A wide SCSI device works on a narrow SCSI bus **only** if:

- ❑ the SCSI controller is narrow (does not negotiate for wide transactions)

and

- ❑ the wide device is addressed at SCSI ID 0 through 6 (SCSI ID's 8 through 15 cannot be used)

PPCBug Support for Wide SCSI

You need to be aware of some restrictions PPCBug has with wide devices.

- ❑ Current versions of PPCBug do not recognize devices above SCSI ID 7.
- ❑ The **IOI** command does not show any devices addressed at SCSI ID's 8 through 15. You can determine device addresses through your operating system.
- ❑ PPCBug does not allow booting from devices addressed at SCSI ID's 8 through 15.

Troubleshooting

This section contains information on troubleshooting:

- ❑ General troubleshooting guidelines
- ❑ Troubleshooting CPUs
- ❑ Troubleshooting tape drives
- ❑ Troubleshooting disk drives
- ❑ Troubleshooting terminals
- ❑ Troubleshooting printers
- ❑ SCSI troubleshooting
- ❑ Troubleshooting flowcharts for
  - Hardware
  - System lock-ups
  - Systems that won't boot

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General Troubleshooting

General Troubleshooting Guidelines

❑ Document everything!

Keep written notes about the problem and the different things you try to resolve the problem. It may be helpful to also document any suspicions you might have about the cause of the problem and come up with a troubleshooting action plan.

❑ Find out what happened.

Problems generally happen when something changes or something out of the ordinary happens. Try to determine what changed or what happened just prior to the problem occurrence. Describe, as best you can, the sequence of events leading up to the problem. For example,

- Was any hardware or software installed, removed, or upgraded?
- Did any kind of power surge or outage occur? For example, was there a storm or lightening in the area? Have the lights flickered?
- Was the equipment moved?
- Were changes made to the surrounding or supporting environment that could have an effect on the problem (i.e., the building was just rewired or re-cabled)?
- Were configuration changes made?
- Is the problem reproducible?
- Is this the first time the problem has occurred? Or has the problem occurred before and with what frequency?
- Is there a pattern to the occurrence (i.e, a specific time of day or after a certain action like system backups)?
- Is the problem specific piece of equipment? To one system?

❑ What are the symptoms?

Seek out as much symptom information as you can:

- Check the console for error messages.
- Check the physical equipment for red fault lights.
- Check the appropriate error files/logs for clues.

❑ Make no assumptions.

Do not depend on the customer's description of the problem. Recreate or duplicate the problem yourself.

Periodically review the overall picture. Make sure you are still troubleshooting the same problem and the same symptoms—it may be time to change your approach.

- **Know when to ask for help.**

  Do not spend too much time "trying one more thing." Ask for help! Do not be afraid to escalate the problem if you cannot resolve it quickly.

  Remember that you are supporting a customer who is interested in getting a problem resolved posthaste.

- **Read the manual.**

  A vast amount of knowledge is at your fingertips—use it!

  If you can't find the information you are looking for or it isn't there, write a TAR!

- **Use the tools available to you.**

  Use the tools available to you to try to isolate the problem. For example,

  - ROM-based SSTs (BUG)
  - Standalone System Interactive Diagnostics (SSID)
  - General On-Line Diagnostics (GOLD)

- **Do one thing at a time!**

  Take a very systematic approach to the problem.

  If you suspect a hardware problem, make sure you swap out only one piece of equipment at a time. If that one change has no effect on the problem, put the original piece of equipment back into the system before swapping out anything else.

  If you suspect a software or configuration problem, make only one change at a time. Again, if the change has no effect on the problem, change things back to the way they were, so that you are not introducing new problems.

  For example, if you want to change a configuration file, make a backup copy of the original file and if the changes do not work, you can simply restore the file back to it's original state.

- **Start with the simple things!**

  Always ask the customer to power down the machine, leave it off for a couple of minutes, and then power it back on. See if this simple procedure clears up the problem.

  In addition, always ask the customer to check the power source, check for loose cords and cables, and ask them to make sure internal components are secure and properly seated.

CPU Troubleshooting

CPU Troubleshooting Guidelines

You can utilize the on-board debugger firmware to resolve some of the more common processor problems. Taking a few minutes to run through these simple routines can avoid returning a perfectly good board as defective.

Before performing these routines,

- ❑ **Check the CPU board location and jumpering.**

  Power off the system and make sure the board is installed in the proper position in the chassis (see the *Board Placement* section) and that the jumpering matches the factory configuration diagrams shown in the *Components* section of this guide or refer to the installation instructions for the particular processor board.

- ❑ **Make sure the board is properly seated.**

  Check to see that the processor board and all other internal components are securely and properly seated. (Take care not to damage or bend the connector pins and avoid touching areas of integrated circuitry.)

You are now ready to use the on-board debugger routines. Refer to the subsection corresponding to the processor board you are working with.

MVME147 Troubleshooting

1. **Reset or power up the system.**

   If the board is set up and functioning properly, it will come up in System Mode and autoboot—no need to troubleshoot any further.

2. **If nothing appears on the console, try a double-button reset.**

   Press and hold the ABORT button on the front panel of the board. While still depressing the ABORT button, press and release the RESET button. Continue to hold the ABORT button for five to seven seconds or until a prompt appears.

   The double-button reset procedure resets the processor to the default environment.

   If nothing appears on the console after the double-button reset, return the board for service.

3. If the bug prompt (147-Bug>) appears, ensure the environment is properly set.

Enter the following commands at the bug prompt:

147-Bug> env;d <Return>

Update Non-Volatile RAM (Y/N)= N? y <Return>

CPU clock frequency (16,20,25,32)= 25? *<Enter correct speed>* <Return>

Reset System (Y/N)= N? y <Return>

The **env** command updates the environment with the default configuration. Note that the default answers for updating RAM and resetting the system need to be changed to "yes" before pressing <Return>.

4. Run the self test.

After reset, the board comes up Bug Mode. Enter the following commands at the bug prompt to change to the diagnostic directory and run the self test:

147-Bug> sd <Return>

147-Diag> st <Return>

The system performs a self test and returns pass or fail results. (Depending on the RAM size and the system configuration, the self test can take a while to run.)

5. If the self test fails, document the problem and return the board for service.

Write down the error message that appears and return this documentation with the board.

MVME162 Troubleshooting

1. Reset or power up the system.

If the board is set up and functioning properly, it will come up in Bug Mode.

2. If the bug prompt (162-Bug>) does not appear, try a double-button reset.

Press and hold the ABORT button on the front panel of the board. While still depressing the ABORT button, press and release the RESET button. Continue to hold the ABORT button for five to seven seconds or until a prompt appears.

The double-button reset procedure resets the processor to the default environment.

If the bug prompt still does not appear after the double-button reset, return the board for service.

3. **If the bug prompt (`162-Bug>`) appears, ensure the calendar clock is running and that the environment is properly set.**

   Enter the following commands at the bug prompt:

   `162-Bug>` set mmddyyhhmm <Return>

   `162-Bug>` env;d <Return>

   `Update Non-Volatile RAM (Y/N)?` y <Return>

   `Reset Local System (CPU)(Y/N)?` y <Return>

   The **set** command sets the internal board clock. The **env** command updates the environment with the default configuration.

4. **Run the self test.**

   After reset, the board comes up Bug Mode. Enter the following commands at the bug prompt to run the self test:

   `162-Bug>` sd <Return>

   `162-Bug>` st <Return>

   The system performs a self test and returns pass or fail results. (Depending on the RAM size and the system configuration, the self test can take a while to run.)

5. **If the self test fails, document the problem and return the board for service.**

   Write down the error message that appears and return this documentation with the board.

MVME166, 167, 187, 188, and 197 Troubleshooting

1. **Reset or power up the system.**

   If the board is set up and functioning properly, it will come up in System Mode and autoboot—no need to troubleshoot any further.

2. **If nothing appears on the console, try a double-button reset.**

   Press and hold the ABORT button on the front panel of the board. While still depressing the ABORT button, press and release the RESET button. Continue to hold the ABORT button for five to seven seconds or until a prompt appears.

   The double-button reset procedure resets the processor to the default environment.

   If nothing appears on the console after the double-button reset, return the board for service.

3. **If the bug prompt (`1xx-Bug>`) appears, ensure the calendar clock is running and that the environment is properly set.**

Enter these commands at the bug prompt:

`1xx-Bug>` set *mmddyyhhmm* <Return>

`1xx-Bug>` env;d <Return>

`Update Non-Volatile RAM (Y/N)?` y <Return>

`Reset Local System (CPU)(Y/N)?` y <Return>

The **set** command sets the internal board clock. (If the time is incorrect once you boot the system, use **date**(1) to reset the UNIX clock to reflect the correct local time.) The **env** command updates the environment with the default configuration.

After reset, the board comes up in System Mode, performs a self test, returns pass or fail results, and tries to autoboot. (Depending on the RAM size and the system configuration, the self test can take a while to run.)

4. **If the self test fails, document the problem and return the board for service.**

Write down the error message that appears and return this documentation with the board.

Tape Drive Troubleshooting

Tape Drive Troubleshooting Guidelines

- ❑ **Perform cleaning and other maintenance as specified in the manufacturer's documentation.**
  - Has the customer performed the recommended cleaning, care, and maintenance procedures as defined in the manufacturer's user's manual?
  - Did the problem occur as a result or following such maintenance?

- ❑ **Use the tape media recommended by the manufacturer.**

  Make sure the tape used meets the specifications recommended by the tape drive manufacturer. Using the proper, high-quality media will preserve the data on the tape for longer periods of time and prolong the life of the drive.

- ❑ **Care for and store the tape media properly.**

  Follow the tape manufacturer's recommendations for the proper care and storage of the tape media.

- ❑ **Make sure the drive door is closed or locked.**

  Silly as it sounds, it's easy to forget to push the tape in completely, leave the drive door open, or not lock the tape in place.

- ❑ **Make sure you are not trying to write to a write-protected tape.**

  If you experience difficulty writing to a tape, check to make sure the write-protect mechanism is not set.

- ❑ **Try another tape.**

  The tape you are trying to use may be corrupted, defective, or broken.

- ❑ **Make sure you are not trying to read a high density tape in a low density drive.**

  You can read a low density tape in a high density drive, but you cannot read a high density tape in a low density drive.

- ❑ **Check to see if the drive is active.**

  Check to see if an access light illuminates or listen for spinning noises. Make sure you are reading or writing to the correct drive.

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Exabyte Drive Troubleshooting

Troubleshooting Exabyte Drives and Media

- ❑ **Clean the drive frequently!**

Find out if the proper maintenance cleaning is being performed. Even though the Exabyte vendor suggests cleaning after every 30 hours of use, encourage the customer to clean the drive more frequently, particularly in dirtier environments. Use only Exabyte-approved cleaning tapes.

If a customer waits until they get a tape error to clean the drive, they may have already damaged the media and the tape drive! The Exabyte tape drive was designed for office, not industrial environments. The 525MByte QIC tape drive is a recommended alternative for dirtier environments.

- ❑ **Use data grade tape!**

The customer needs to use data grade, not video grade tape. Both Exabyte and Sony sell a media product with extended life (Sony QG1 12BS and EXATAPE 112M).

- ❑ **Remove the tape media from the drive when not in use and before booting the system.**

In addition to using the proper media, encourage customers to remove tape media from the drive when not in use and before booting the system. Contaminates can lodge between the media and head, which will result in scratches when the heads spins up and tension is applied.

- ❑ **Care for and store the tape media properly!**

To prevent damage to data on the cartridge tapes, avoid touching the exposed surfaces or breaking open the protective coverings on the media.

To prevent loss of data or damage to the cartridge tapes, store them in a protected location that meets the following requirements:

- No direct sunlight
- No sources of magnetization
- No dust
- Temperature range from 50 degrees to 125 degrees F (10 to 40 degrees C), or as stated on the cartridge cover (may vary from one manufacturer to another). The best storage environment is in the middle of this range.
- Relative humidity range from 8% to 80%. The best storage environment is in the middle of this range.

Before use, let the tape media acclimate to the operating environment for 24 hours or the length of time it was exposed to dissimilar conditions. In addition, follow the manufacturer's tape usage and replacement frequency recommendations.

❑ Don't panic, the drive may be doing more than is obvious.

The amber LED activity light goes on when there is SCSI bus activity related to the Exabyte. The activity light goes off when the Exabyte disconnects from the SCSI to perform a lengthy command. So, the Exabyte may be working even though the activity light is off!

❑ Be patient, some commands take a long time.

The erase command, for example, can take over two hours. This, coupled with the activity light going out, can make a customer think the drive is hung.

Suggest to the customer that they purchase a bulk tape eraser if they need to accomplish this task on a regular basis. (Radio Shack stores carry bulk tape erasers that can accomplish this task in a matter of seconds.)

Be patient also, when you press the tape eject button. The Exabyte can exhibit a short time delay before it ejects the tape and pressing the eject button a second time can hang the drive. Wait until you see the green LED activity light before pressing the eject button.

❑ Rewind the tape to eject.

The drive door will not open unless the tape is rewound. If you are having trouble ejecting a tape, make sure that the drive is not active (see previous item) and that the tape is rewound.

Here are some examples of tape rewind commands:

- mt -f /dev/rmt/m187_40n rewind
- mt -f /dev/rmt/m328_004n rewind
- </dev/rmt/m328_004
- </dev/rmt/m187_40

Refer to the mt(1), mvme187(7), mvme328(7) and mvmetape(7) manual pages for more information on tape operations.

❑ Check the firmware version if you experience system hangs.

Older Exabyte firmware versions can hang the SCSI bus when an open request to the driver occurs while the tape is loaded. Exabyte firmware version 262L does not exhibit the problem. You can determine the firmware version you are running in the following ways:

- Locate the listing of board levels on the top of the drive and look for the MX card to find the Exabyte firmware version.
- (SVR3) As root, use the command **/etc/scsiconfig** and find the "Revision" field for the Exabyte in question.
- (SVR4) As root, use the command **/sbin/scsiscan** and find the "Rev" field for the Exabyte in question.
- Use Inquiry under SSID.

It is not practical to upgrade the firmware in the field. Replace the drive.

❑ Understand and use the correct device names and nodes.

You can associate multiple device nodes with a single tape device. Each of these nodes causes the tape device to behave differently, so it important to understand the ramifications of using each device node and that you choose the correct one for the desired behavior.

The format of a device node is

<prefix>_<body><suffix>

where the <prefix> identifies the type of controller (for example, m147, m167, m327, m328, or m187), the <body> identifies the specific device attached to the controller, and the <suffix> specifies the behavior of the device.

Take care in specifying both the <body> (device name) and the <suffix> correctly, or you may find yourself writing to a file instead of a device and requesting tape operations or behaviors that you do not want or expect. Here are some device node format examples:

- For SVR3, /dev/rmt/m328_005n is the no rewind device node for the tape at address 5 on the first bus of the first MVME328 controller.
- For SVR3, /dev/rmt/m187_50n is the no rewind device node for the tape at address 5 on the MVME187 controller.
- For SVR4, /dev/rmt/m328_c0d5n is the no rewind device node for the tape at address 5 on the first bus of the first MVME328 controller.
- For SVR4, /dev/rmt/m187_c0d5n is the no rewind device node for the tape at address 5 on the MVME187 controller.

Again, the <suffix> specifies the behavior of the device. For example, a device node without any suffix, specifies that the tape will automatically rewind when it is closed. A device node suffix of **n**, specifies that the device will not rewind when it is closed. So, the **n** suffix lets you repeatedly write to or append files to a tape. Remember, however, that when you are appending to a device using a device node with the letter **n** suffix, the tape will fill up and eventually hit the end-of-tape marker, at which point you may get unexpected but technically correct messages.

Consult the on-line manual pages for more information on device node formats. For SVR3, refer to mvme147(7), mvme167(7), mvme187(7), mvme327(7), or mvme328(7), depending on the type of controller. For SVR4, refer to intro(7), as all SVR4 devices have the same naming convention.

❑ Check the OS level if the tape ejects unexpectedly.

A known tape eject problem exists with retension device nodes and the MVME327 controller when using OS level R3V6.2 (FE03.62).

This problem was fixed in R3V7 (FE03.70). Upgrade the OS, if necessary.

Tape Drives

The following table summarizes the detailed information contained in the previous troubleshooting section. Refer back to the bullet items for a more thorough explanation of the symptoms and actions.

Exabyte Troubleshooting Summary

If you experience these symptoms . . .	***Consider these actions . . .***
Sense key errors	• Clean tape drive • Use data grade media • Perform SCSI troubleshooting routines
Read errors	• Clean tape drive • Use data grade media
Write errors	• Make sure tape is not write protected • Clean tape drive • Use data grade media • Try different media (bad tape)
Unexpected end of tape messages	• Make sure tape is not full • Write less data (too much data on a tape) • Check device node format and usage • Check rewind command usage
Can't open for write or drive not ready messages	• Make sure there is a tape in the drive • Make sure drive door is closed • Try different media (bad tape) • Make sure tape is not write protected
Disk device full	• Check device node format and usage (using file name instead of device name)
Can't access tape (amber light off)	• Is the Exabyte performing a lengthy command? • Check device node format and usage (using bad device name) • Perform SCSI troubleshooting routines

Exabyte Troubleshooting Summary

If you experience these symptoms . . .	***Consider these actions . . .***
Tape won't eject	• Check activity light • Rewind tape
Tape ejects unexpectedly	• Upgrade OS - software bug fixed in R3V7 (FE03.70)
Tape drive/system hangs	• No action required—drive may be performing lengthy command • Remember, amber activity light is not always on when the Exabyte is operating • Do not repeatedly press tape eject button • Replace drive (old firmware)
Repeated bad media problems	• Clean tape drive • Use data grade media • Care for media properly
Write protect errors on non-write protected media	• Upgrade OS - software bug fixed in R32V3.1 (FH32.31) and R40V3 (FH40.30)

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Disk Drive Troubleshooting

Disk Drive Troubleshooting Guidelines

- ❑ **Always be prepared for disaster.**

  Backup your system. Backup your system. Backup your system. Make it a habit, do it regularly!

- ❑ **Check for drive activity.**

  Make sure you are accessing the proper or expected drive. Listen for access noise and, if possible, check to see if the access light is coming on.

- ❑ **Check for fault lights and console error messages.**

  If you cannot access a drive, check for flashing fault lights and check the console for error messages.

- ❑ **Is the drive unusually noisy?**

  This may be a sign of mechanical problems. Try to reboot the system and see if the problem goes away.

- ❑ **Check the configuration and formatting of the drive.**

  Make sure the system knows about the disk device (must be in **/dev**). Review the partitioning or slicing information (refer to the System Administrator's Manual for more information).

- ❑ **Map areas that develop defects.**

  You can redirect bad blocks (bad spots on the disk) without having to reformat the entire disk. Refer to the System Administrator's Manual for more information.

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ASCII Terminal Troubleshooting

ASCII Terminal Troubleshooting Guidelines

Attempt to resolve ASCII terminal problems over the telephone. Minimize on-site customer visits by reviewing basic troubleshooting routines with the customer over the telephone and/or logged into the customer's system.

If dispatching field support personnel to a customer site is required to resolve an ASCII terminal problem, make sure the issue is resolved in the eyes of the customer before the support person leaves the site!

If the problem cannot be resolved in one visit, make sure the customer is aware of why the problem cannot be resolved now and the future action plan for resolving the issue.

❑ Obtain the model number of the terminal.

Insist that the customer provide the exact model number of the terminal. You cannot provide knowledgeable assistance without this information. Make sure the terminal type and model number are noted in the call log.

❑ Obtain a detailed description of what is wrong with the terminal.

Obtain detailed problem information and include this in the call log:

- Did the terminal work a minute ago, but now is locked up?
- Was this terminal just installed or moved from a different location?
- Is there just a specific keyboard key that is not working?
- Is the screen completely blank? Or is there unusual or unexpected output on the screen?

Also, find out any historical information you can about the terminal and problem and include this in the call log:

- Did any unusual event or circumstance occur prior to the exhibited problem (for example, hardware or software changes, environmental or weather issues)?
- Did someone else use the terminal or change its configuration?
- Have other terminals exhibited this same problem or is this an isolated problem?
- Has this problem happened before and how was it resolved?
- What corrective actions have been attempted to resolve the problem?

In addition to asking the customer, check old call logs for chronic problems and historical information.

Now, run through the following troubleshooting routines. If these actions do not resolve the problem, dispatch field support personnel to perform advanced troubleshooting routines or to replace the terminal.

❑ Check all cord and cabling connections.

- Make sure that the power cord is properly and tightly seated both at the electrical source (plug) and into the back of the terminal.
- Make sure the power source (plug) is providing electricity to the unit. Try a different plug or plug something else in the outlet.
- Make sure you are using the correct type of interface cable and that it is properly and tightly seated both at the back of the terminal and where it connects to the system.
- Inspect connectors, cords, and cables for possible damage.
- Ask if any cabling problems or changes occurred at the site.

❑ Power cycle the terminal.

Ask the customer to turn the terminal off for 20 to 30 seconds and then turn it back on. The terminal usually beeps as it comes back up.

Power cycling the terminal can clear up some software-induced problems. This action is also effective on some configuration problems, as it generally resets the terminal to the last saved configuration.

If the last saved configuration does not work, try using the factory default configuration selection from the setup. Keep in mind that configuration changes (baud rate, for example) may then be required to return the terminal back to the proper local operating environment.

Request a report of the terminal's behavior as it comes back up and as they try to again use the terminal.

❑ Make any necessary monitor adjustments.

If the display is out of focus, too bright, or too dark (including no picture at all), locate and adjust the monitor's brightness and contrast knobs.

❑ Try Ctrl-q.

If there is text is on the screen and the terminal appears frozen, try the Ctrl-q key combination. Communication with the terminal may have accidently been turned off with the Ctrl-s key combination.

❑ See if the "local" terminal is working.

Go into "Local Mode" from the setup screen. Enter characters from the keyboard and see if they appear on the screen. If nothing appears, the terminal is broken. If characters do appear, continue troubleshooting.

❑ Make sure the keyboard is not locked.

Kokusai (TM3180, TM3179, TM3220, TM32418) and FT45 terminals have a key lock at the back of the terminal that locks the keyboard. Ensure the key is in the "unlocked" position.

❑ Verify that the terminal connection is okay.

Use the **cat** command to send a text file directly to the port that the terminal is connected to. For example,

```
cat /etc/passwd > /dev/<port_name>
```

If the command hangs, a problem with the physical terminal connection is likely.

If text appears on the terminal, connection to the terminal is probably fine.Type Ctrl-d to get out.

❑ Terminal hung, frozen, or can't get a login screen?

- See if a **getty**(1M) is running on the port the terminal is connected to:

  ```
  ps -ef | grep /dev/<port_name>
  ```

  If a **getty**(1M) is running (a process status line is returned), kill the getty process and let a new one respawn. (Note that if someone was logged on when the terminal hung up, **getty**(1M) will not be running on the associated port.)

  If a **getty**(1M) is not running, check for other applications or processes running on that port and use

  ```
  kill -9 <process-id>
  ```

  to get rid of these processes that may be hanging the terminal.

  If there is no **getty**(1M) or other processes running on the port, check /etc/inittab to see if a getty is defined for that port and that it is set to respawn.
- This behavior can also indicate a baud rate problem. (Refer to "Verify that the baud rate is correct." on page 5 of this section.)

❑ Keystrokes entered exhibiting odd or unexpected behavior?

- Verify that the TERM variable is set correctly. Use the following command to determine the current TERM variable:

  ```
  echo $TERM
  ```

  The TERM variable must match the terminal setup screen emulation. Refer to the following table for the recommended emulations and TERM variable values:

Recommended Emulations and TERM Variable Values

Terminal	Keyboard	Emulation	TERM Value
Link MC-5 (TM5000)	105-Key VT220-Compatible (KB0220)	TM220-7 or TM220-8	tm220
	101-Key Enhanced PC-style (KB0101)	wyse60	wy60epc
Link MC-5 with 029-style keyboard (TM5029)	Enhanced PC 029-style (KB0290)	tm220-7	tm220
Link MC-6 (TM5600)[a]	105-Key VT220-Compatible (KB0220)	tm220-7 or tm220-8	tm220 or vt220
	101-Key Enhanced PC-style (KB0101)	wyse160	wy60eg
Link MC-70 (TM5372)	105-Key VT220-Compatible (KB0220)	VT220/VT320	tm220c
	101-Key Enhanced PC-style (KB0101)	Wyse Ascii[b]	wy360
Kokusai with 3100 keyboard (TM3180-mono)	TM3100	TM3000	tm228i
Kokusai with 3100 keyboard (TM3179-color)	TM3100	TM3000	tm229i
Kokusai with 3200 keyboard (TM3220-mono)	TM3200	TM3000	tm228
Kokusai with 3200 keyboard (TM3241-color)	TM3200	TM3000	tm229
Ampex (TM220)	DEC 220	M220 (-7 or -8)	tm220
Motorola FT45	FT45 (KB500)	None	ft45

a. The MC-6 (TM5600) terminal was designed primarily for use with the KB0101 keyboard. If used with the KB0220 keyboard and TERM=tm220, then it may not work in all applications. Status lines are not supported in vt220 mode and they are supported in tm220 mode on the TM5000. The MC-6 does not have a tm220 emulation, only a vt220 which does not have a status line.

b. If your MC-70 (TM5372) terminal does not show Wyse Ascii in its list of emulations, then you need to have the Proms in the terminal updated. The Wyse Ascii emulation is found under the PC-Term section of the Cartridge setup, which shows up at the bottom of the standard emulation menu in setup.

Also, if the software application has configuration variables pertaining to emulation, verify that the application is properly configured. Refer to the specific application's installation or user's manual for more information.

- This behavior can also indicate a baud rate problem. (Refer to "Verify that the baud rate is correct." on page 5 of this section.)

❑ Verify that the baud rate is correct.

Use the command

```
ps -ef | grep getty
```

to see if there is a getty(1M) running on the port and what the baud rate is. Check this against the setup configuration and the /etc/inittab file. Remember that the console terminal can only be configured for a maximum of 9600 baud.

❑ If none of the terminals connected to system are working, suspect system or network problems.

Contact the system administrator to ensure that the system the terminal is connected to is up and running. Ask if there were any circumstances or changes that might be affecting the terminals.

❑ Verify the setup configuration.

Check the setup configuration in the following ways:

- If the terminal locks up and appears dead, NVRAM might be scrambled. You can try power cycling the terminal or get into setup mode and reset the parameters to the default settings.

  How you get into the setup mode depends on the terminal model and keyboard type. Refer to the following table for setup mode key sequences:

Setup Mode Key Combinations

Terminal	Keyboard	Key Sequence
Link MC-5 (TM5000)	105-Key VT220-Compatible (KB0220)	F3 If F3 does not work, try Ctrl-F20.[a]
	101-Key Enhanced PC-style (KB0101)	Shift-Select
Link MC-5 with 029-style keyboard (TM5029)	Enhanced PC 029-style (KB0290)	Ctrl-Numeric-F20
Link MC-6 (TM5600)	105-Key VT220-Compatible (KB0220)	F3 If F3 does not work, try Ctrl-Select.[a]
	101-Key Enhanced PC-style (KB0101)	Select If F3 does not work, try Ctrl-Select.[a]

Setup Mode Key Combinations

Terminal	Keyboard	Key Sequence
Link MC-70 (TM5372)	105-Key VT220-Compatible (KB0220)	F3 If F3 does not work, try Select.[a]
	101-Key Enhanced PC-style (KB0101)	Select
Kokusai with 3100 keyboard (TM3180-mono/TM3179-color)	TM3100	Alt-PF3 If Alt-PF3 does not work, try 7-PF3.[b]
Kokusai with 3200 keyboard (TM3220-mono/TM3241-color)	TM3200	Ctrl-F3 If Ctrl-F3 does not work, try F5-F3.[b]
Ampex (TM220)	DEC 220	F3
Motorola FT45	FT45 (KB500)	No setup screen. Check dip switches on back of terminal.

a. If the standard setup mode key or key combination does not work, the Keycode may be incorrectly set to Scan Mode. Use the alternative identified in the table to get into setup mode, then change the Keycode selection to ASCII instead of Scan Mode.

b. If the standard setup mode key or key combination does not work, the keyboard type may be incorrectly specified. Use the alternative identified in the table to get into setup mode, then correct the keyboard type (TM3100 for a TM3180-mono or TM3179-color or TM3200 for a TM3220-mono or TM3241-color).

- Verify the setup mode baud rate against the results of running **stty**(1) on the port the terminal is connected to:

```
stty -a < /dev/<port_name>
```

  (Note that there is not a setup mode for the FT45. Check the dip switches on the back of the FT45.)
- Make sure the terminal setup configuration is set according to the manufacturer's defaults. Refer to the documentation that accompanied the terminal for specific setup information.
- If there is another working terminal of the same type nearby, compare and adjust the setup configurations to match the working terminal.
- Look at the back of the terminal and see which port is being used to connect the terminal to the system—typically, Port A or the Main Port is used. Make sure the terminal is set up to use the correct port. Look at the status line or check the setup screen. (It is possible to accidently change this setting on the TM5000 and TM5600 by pressing the Ctrl-Enter key combination.)

Once you get the terminal operational, ensure that configurable, variable information (especially baud rate, port, and parity information) is correctly defined for the local environment.

❑ If multiple terminals are exhibiting strange behavior or intermittent lockups, suspect out-of-date drivers or firmware.

Check the Tech database for similar problem symptoms. The database will often point to specific fixes available for particular problems.

The Engineering patch machine contains driver and firmware fixes available for download. Be wary of any fix made to a system that was not obtained from this source.

You can obtain the current system driver and firmware version level information using the following commands (as root):

For SVR3

- If the system has a 332xt

```
/etc/m332xctl -r /dev/<printer-port> |pg
```

where: <printer-port> is the printer port for the controller that your terminal is on (m332x08 or tty19, for example).

- If the system has a 337

```
/etc/m332xctl -r /dev/ttyXYZ |pg
```

where: X=337 board number (0-3)
Y=741 board number (0-3)
Z= port number (0-f).

- If the system has a 338

```
/etc/hpsver -d /dev/rhpX |pg and
/etc/hps_log -d /dev/rhpX |pg
```

where: X=338 board number (0-5).

- If the system has a 338 cluster

```
/etc/hps_log -d /dev/rhpX -c Y
```

where: X=338 board number (0-5)
Y=cluster number (0-15).

For SVR4

- If the system has a 332xt

```
/usr/sbin/m332xctl -r /dev/printer/m332_cXd8 |pg
```

where X=332xt controller number (0-7).

- If the system is running SVR4V4.3 or later and has a 337

```
/usr/sbin/m332ctl -r /dev/port/m337_cXdY |pg
```

where X=337 board number (0-3)
Y=port number (0-63).

- If the system has a 338

  `/usr/sbin/hpsver -t -d /dev/xedt/mvme_cX` and
  `/usr/sbin/hps_log -d /dev/xedt/mvme_cX`

  where X=338 board number (0-5).

- If the system has a 338 cluster

  `/usr/sbin/hps_log -d /dev/xedt/mvme_cX -c Y`

  where X=338 board number (0-5)
  Y=cluster number (0-15).

Advanced ASCII Terminal Troubleshooting

Note **The following routines should only be executed by qualified, on-site field personnel.**

Before performing advanced troubleshooting routines, run through the general troubleshooting routines described earlier in this section.

If any of these troubleshooting routines resolve the problem, contact the CSC specialist and describe exactly what fixed the problem. If you feel that the customer was negligent in performing any of the requested troubleshooting routines, have the specialist note this in the log, as the call may be billable.

Terminals

❑ **If none of the terminals connected to the system are working, check the boards on the system.**

Open the system chassis and make sure none of the boards are fail-lighted. Reset any boards that indicate failure.

❑ **Perform a loopback test on the terminal and the cable.**

- First, connect the loopback connector to the terminal and try typing information.

  If what you type appears on the screen, the terminal is okay and the problem is either in the cable or the connection to the host. If what you type does not appear, the terminal or keyboard may be bad.

- Then, connect the loopback device to the end of the cable, plug the cable back into the terminal, and try typing information.

  If what you type appears on the screen, the cable is okay. If what you type does not appear, the cable is probably bad.

The following table summarizes the detailed information contained in the previous troubleshooting section. Refer back to the bullet items for a more thorough explanation of the symptoms and actions.

Terminal Troubleshooting Summary

If you experience these symptoms . . .	***Consider these actions . . .***
For all problems	• Obtain terminal model number • Get a description of the problem • Ensure terminal is powered on • Check cord and cable connections • Make sure the system/network is operational • Power cycle the terminal • Verify terminal setup configuration
Terminal hangs, appears frozen, or has a dark/blank screen	• Try brightness and contrast adjustments • Try Ctrl-q key combination • See if terminal works in local mode • Make sure keyboard is not locked (Kokusai & FT45) • Verify terminal connection is okay • Check for a getty running on the terminal port • Remove and reconnect serial cable • Check for red-lighted boards and perform loopback tests (on-site troubleshooting)
Can't get a login	• Check for applications running that could be hanging the terminal port • Verify the baud rate is correct • Kill the getty and respawn a new one

Terminals

Terminal Troubleshooting Summary

If you experience these symptoms . . .	*Consider these actions . . .*
Garbage characters, odd behavior, or unrecognizable keyboard input	• Verify TERM variable is set correctly • Verify that the application terminal emulation is properly set • Verify the baud rate is correct • Verify terminal setup configuration • Verify proper driver and firmware revision levels

Terminals

NCD Terminals

NCD 19M Brightness Adjustment

WARNING

Exercise extreme caution when performing this procedure, as hazardous high voltage levels exist near the adjustment areas.

Use the following procedure to increase the brightness and extend the useful life of the 19M monitor:

1. Power off the terminal.

Note

You may find it easier to place the monitor face down on a padded surface to remove or replace the cover. You will also need to disconnect and reconnect the power cord and video cable (running from the terminal to the base) as needed throughout this procedure.

2. Remove the four screws at the back of the monitor and pull the cover backward to remove it.
3. Remove five screws at the top of the metal frame and lift the metal cage screen upward to remove it.
4. Set the external contrast control to the detent position and set the external brightness control clockwise to the maximum position.
5. Power up the terminal and allow a five minute warm-up before adjusting.
6. Using a plastic tuner/alignment tool, slowly turn the pot labelled RV303 (located at lower left corner of the neckboard) clockwise. Adjust until the raster barely appears at the side edges of the screen.
7. Power off the terminal and re-install the metal cage screen removed in step 2.

Note

When re-installing metal cage screen, ensure that the metal stamped fingers are properly aligned and positioned or you will have difficulty sliding on this shield.

8. Reinstall the monitor cover removed in step 1.
9. Power up the terminal and adjust the brightness and contrast to the desired levels.

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Printer Troubleshooting

General Guidelines for Troubleshooting Printers

The CSC can and should attempt to resolve printer problems over the telephone. Minimize on-site customer visits for troubleshooting printer problems by reviewing the following information with the customer over the telephone.

If dispatching field support personnel to a customer site is required to resolve a printer problem, make certain the issue is resolved in the eyes of the customer before the support person leaves the site!

❑ Obtain the model number of the printer.

Insist that the customer provide the exact model number of the printer, typically located at the rear of the printer. You cannot provide knowledgeable assistance without this information.

❑ Find out how the printer is connected to the system.

- Direct to the tty port on the host system?
- Direct to the tty port on a remote system?
- LAN connection?
- From the back of a terminal?

❑ Obtain a complete description of the problem.

Have the customer describe the circumstances leading up to the problem:

- Did any unusual or maintenance event occur just prior to the exhibited problem (environmental changes, equipment moves, etc.)?
- Did the same printer work yesterday, in the same location, printing the same document, using the same software?
- What software application is the customer is attempting to print from?

❑ Obtain a copy of the print problem and printer setup.

Where applicable, ask the customer to fax a copy of the exhibited print problem and the printer setup. Refer to the specific printer manufacturer's user's manual for instructions for printing the setup.

❑ Check for error messages.

Find out how the customer came to discover the problem and what the symptoms are. Ask if error messages appear on the printer itself or on the terminal where the print request was made.

Particularly in instances where an error message appears on the printer, lead the customer through troubleshooting the problem by having them look up the message in the manufacturer's user's manual.

- **Make sure the printer is powered on.**

  Check that the power switch is in the on position and that the "on-line" or "ready" indicator is illuminated.

- **Check and inspect all connectors, cords, and cables.**
  - Make sure the power cord is properly and tightly seated both at the electrical source (plug) and into the back of the printer.
  - Make sure the power source (plug) is providing electricity to the unit. Try a different plug or plug something else in the outlet.
  - Make sure you are using the correct type of interface cable and that it is properly and tightly seated both at the back of the printer and where it connects to the system.
  - Inspect connectors, cords, and cables for possible damage.
  - Ask if any cabling problems or changes occurred at the site.

- **Check to make sure that font cartridges, interface, memory, or personality components are properly seated.**

  Particularly if the printer has recently been serviced or moved, make sure that all internal components are properly seated.

- **Power cycle the printer.**

  Ask the customer to turn the printer off for 20 - 30 seconds and then turn it back on. Power cycling the printer can clear up some print problems. Request a report of any extraordinary behavior, error messages, or fault lights when the printer comes back up and they again attempt to print.

- **Run the printer self-test.**

  Run the printer self-test (ripple test). If the test output is okay, suspect a problem with the setup, the user's file, or the software used to print the job.

- **Ask if recommended preventative maintenance has been performed.**
  - Has the customer performed the recommended cleaning, care, and maintenance procedures as defined in the manufacturer's user's manual?
  - Did the problem occur as a result or following such maintenance?

WARNING

Do not use regular vacuum cleaners for cleaning printers. Use only special vacuums specific for printer use.

Printers

Poor Print Quality Troubleshooting Guidelines

❑ Ask if recommended preventative maintenance has been performed.

This issue was already mentioned in the *General Printer Troubleshooting* section, however, a clean printer is key to good print quality. It is the customer's responsibility to perform the regular cleaning, care, and maintenance procedures as defined in the printer manufacturer's user's manual including, but not limited to, vacuuming and cleaning platens, rollers, charger wires and other internal parts.

WARNING

Do not use regular vacuum cleaners for cleaning printers. Use only special vacuums specific for printer use.

❑ Ask if the customer has properly serviced all replaceable items (consumable supplies).

- Has the customer replaced the toner, developer, print heads, ribbons, etc. recently or according to the printer manufacturer's recommendations?
- Did the customer recently change suppliers for the consumable supplies? Is it possible that the new consumables are of poor quality, have reached their expiration date, or do not meet the printer manufacturer's specifications for these goods?

❑ Reseat internal consumables.

Make sure the developer, toner, drum, and fuser cartridges are properly seated (laser printers).

❑ Suspect paper problems.

- Does the paper specifications (especially thickness and quality) meet with the printer manufacturer's recommendations?
- Did you recently change manufacturers or suppliers?
- Is the tension of continuous-form paper set properly?

❑ Check paper path.

Make sure the paper path (tractor-feed type printers) is not obstructed or that the paper is not rubbing or catching on foreign objects.

❑ Does the printer self-test run okay?

If the printer self-test (ripple test) runs okay, but you still experience print quality problems with the file you are trying to print, review the *Erratic or Unexpected Print Troubleshooting Guidelines* subsection.

❑ Is the print is too light or too dark?

For character printers,

- Make sure the ribbon is properly installed, and that the ribbon feeds smoothly.
- Replace ribbon if it is worn (too light) or re-inked (too dark).
- Make sure the paper thickness level is set for the proper thickness of your paper.

For laser printers,

- Adjust the darkness setting on printer. If still too light, then problem is probably due to lack of toner. Replace the toner cartridge.

❑ Do stains or smudges appear on the output?

For character printers,

- Make sure the print head is clean.
- Replace ribbon if it is worn, frayed, or re-inked.
- Make sure the paper thickness level is set for the proper thickness of your paper.

For laser printers,

- Check for excess or spilled toner inside the printer housing.
- Clean the printer!

❑ Do spots appear in the same vertical position (laser printers)?

Permanent spots that appear in the same vertical position on every page are caused by a damaged drum cartridge. Take care when cleaning the printer or removing the drum cartridge to avoid damaging the drum surface.

Erratic or Unexpected Print Troubleshooting Guidelines

This problem can manifest itself in a number of ways, for example; unreadable text, greek, non-English, or graphic characters, overprinting, intermittent blank lines, or a large volume of paper with unexpected or garbage text.

❑ Check the interface cable connection.

This issue was already mentioned in the *General Printer Troubleshooting* section, however, this symptom often results from loose cable connections.

❑ Check the printer setup.

Verify that the emulation, baud rate, parity setting, data bits, flow control, and XON/XOFF settings are correct and that these settings match the setup on the terminal, system, or LAN (depending on how the printer is connected).

Particularly if the printer is slaved directly off a terminal, make sure the terminal is set up correctly.

Check the setting for CR-MODE or CR-CODE (character printers) to ensure that carriage returns (CR) are mapped to carriage returns plus line feeds (typically referred to as CR & LF).

❑ Use the correct printer emulation.

Make sure you are using a supported printer type or have the emulation mode (for example, HP Laserjet or PostScript) set correctly for the software you are using. Refer to the software vendor's installation or user's manual for specific printer support or emulation information.

❑ Make sure port_hold is running for serial printers.

The **port_hold** process holds open the tty port for a serial device and, by default, keeps the desired stty configuration settings constant. You can check to see if **port_hold** is running on the desired tty by either

- Using the command

  ps -ef | grep port_hold

- Looking for the tty in the file

  /etc/psttys

Printers

Paper Jamming Troubleshooting Guidelines

❑ Check for jams, foreign objects, and an adequate paper supply.

- Make sure that there are no foreign objects or paper stuck inside the printer. Pull the paper out and check under the rollers and platen.
- If you use the printer to print labels, make sure there are no labels stuck on the rollers and make sure the platen is not sticky or gummy.
- Make sure there is an adequate supply of paper in the paper feeds or trays and that these are properly seated or closed.
- Make sure the paper's path (tractor-feed type printers) is clear and that the paper is not rubbing, catching on foreign objects, or binding out of the box.

❑ Ask if recommended preventative maintenance has been performed.

This issue was already mentioned in the *General Printer Troubleshooting* section, however, a clean printer is key to proper paper flow.

❑ Suspect paper problems.

- Does the paper specifications meet with the printer manufacturer's recommendations? Did you recently change manufacturers or suppliers?
- Is the paper damp? Is the paper being stored properly?
- Is the printer located in an area of extreme humidity? (High humidity can dampen the paper or cause it to curl and low humidity can cause excess static. Both of these conditions cause paper jamming problems.)
- Is the paper path (tractor-feed type printers) obstructed or rubbing or catching on foreign objects?
- Is the paper loaded correctly? (Try fanning or turning the paper over.)

Printers

❑ Check the paper routing.

Make sure the paper is routed properly through the printer (tractor-feed) and that the ingoing paper is feeding in a straight line and located within the recommended feeding distance. Refer to the manufacturer's user's manual for routing details.

❑ Make sure the platen release lever is set correctly.

Make sure the platen lever is set correctly for type of paper and feeding desired. Set the lever to the release position for tractor feed. Set the lever to the engaged position for friction feed.

❑ Make sure the forms thickness lever is in the proper position.

Make sure the forms thickness lever (character printers) is in the proper position for the paper/forms used.

No Output Troubleshooting Guidelines

Before reviewing the following guidelines, be sure to step through the *General Troubleshooting Guidelines* on pages 1 and 2 of this subsection. Many of the simple procedures identified in the general section resolve "no output" printing problems.

- ❑ **Check the paper supply.**

  As simple as this sounds, low or out-of-paper conditions are the cause of many an embarrassing, yet time-consuming printer problem.

- ❑ **Check to see if the computer is talking to or recognizes the printer.**

  Printers can be configured two ways; through **lp** or through MPS. You can see lp-configured printers using the **lpstat** command. You can see MPS-configured printers running the **mpsutil** utility.

  Note that there is a complication with lp-configured printers in that these can be direct connect printers or network printers. Direct connect printers are those that are connected directly to a port on the back of the machine that you run **lpstat** from. Network printers can be located anywhere on a network and are connected to some network server box like an emulex. The **lpstat** command will not give you as much specific information about network printers.

  The following example of the **lpstat -s** command shows device information about lp-configured printers, tells you if the scheduler is running, identifies the system default printer, and identifies which tty device the printer is connected to:

  ```
  scheduler is running
  system default destination: cpr_1
  device for cpr_1: /dev/tty18
  device for cpr_2: /dev/tty19
  ```

  The following is an example of the **lpstat -s** command for lp-configured network printers. (Assuming the printers were configured using the *LP Support System* (LPSS) utility **lp.cnfg/ptnnx**, run the **lp.cnfg** utility to show just what type of network printer it is.)

  ```
  device for psrv1_HP2: /dev/null
  device for psrv1_PS3: /dev/null
  ```

  MPS-configured printers may not appear using the **lpstat** command. Refer to the *Motorola Print System User's Manual* for detailed information on **mpsutil.**

- ❑ **Make sure the interface cable is connect to the correct port.**

  If it is a direct connect printer, check the cable on the printer and ensure it is connected to the proper port on the back of the system.

  In the previous example, the **lpstat -s** output shows that printer name cpr_1 is defined for /dev/tty18, so check that the cable for that printer is connected to the tty18 port on the back of the system.

Printers

- ❑ **Disable and reenable the printer.**

Like power cycling the printer, simply disabling and reenabling a printer can sometimes clear up strange printer behavior and problems.

Use the following command to disable a printer:

disable <printer_name>

where <printer_name> is the printer you wish to disable.

Use the following command to enable a printer:

enable <printer_name>

where <printer_name> is the printer you wish to enable.

You can use the **lpstat -t** command to determine if a lp-configured printer is enabled or disabled. You can use the **mpsutil** utility to determine is an MPS-configured printer is enabled or disabled.

- ❑ **Use the correct printer emulation.**

Make sure you are using a supported printer type or have the emulation mode (for example, HP Laserjet or PostScript) set correctly for the software you are trying to print from.

For example, if you try to send a plain ASCII text file to a PostScript printer without specifying the -opsf or -oplain emulation option to **lp**, the printer will go into processing mode and then return to idle, but nothing will print.

Or, if you send a PostScript file to an HP Laserjet emulation printer or a printer in that mode, you will get back a ream of paper with a bit of garbage text on each page.

- ❑ **Make sure the scheduler is running.**

Use the **lpstat -s** command to determine if the scheduler is running. If you determine that the scheduler is not running, you will need to restart it manually on the command line or using the **sysadm** menus.

– Use the following procedure to start the scheduler using **sysadm**:

1. Log in as root.
2. Enter the command

   sysadm lpmgmt

   The following appears on the screen:

```
1 filterlFilter management menu
2 forms Forms management menu
3 printers Printer management menu
4 service Print service management menu
5 status Print service status menu
6 users User management menu
```

Printers

3. Select menu item 4, "service".

   The following appears on the screen:

   ```
   1 default Set default print destination
   2 start Start the print service
   3 stop Stop the print service
   ```

4. Select menu item 2, "start".

   This selection starts the **lp** scheduler. When complete, the following message appears:

   ```
   Print services started.
   ```

5. Enter 'q' to quit **sysadm**.

- Use the following procedure to start the scheduler on the command line:

1. Log in as root.
2. Enter the command

   /usr/lib/lpsched

   This command starts the **lp** scheduler. When complete, the following message appears:

   ```
   Print services started.
   ```

❑ Make sure port_hold is running for serial printers.

Establish a **port_hold** condition on all printers attached to your system with a serial port, but never on a parallel port or Network Printer Server port.

The **port_hold** process holds open the tty port for a serial device and, by default, retains the desired stty configuration settings. You can check to see if **port_hold** is running on the desired tty by either

- Using the command

  ps -ef | grep port_hold

- Looking for the tty in the file

  /etc/psttys

❑ Check the connection between the printer and the system.

Try to send something directly to the port, bypassing **lp**. Keeping with the previous example,

echo "This is a test" > /dev/tty18

If this shows up on the printer, then the connection is okay.

(Note that doing an echo > /dev/ttyNN won't work if the printer is setup in PostScript mode. Change the emulation before trying this on PostScript printer.)

Printers

❑ Try a simple print request.

If the echo test works and the connection between the printer and the system is okay, try a simple **lp** command to the printer. For example,

lp -d<printer_name> /etc/group

This example will print the group file to the printer where <printer_name> is the name of the printer. If this works, suspect the user file being or the software application used to perform printing.

❑ Check the lp queue for the print request.

If the simple print request fails, run the following command to see if you can determine where the request went:

lpstat -t

This command shows the **lp** queue and the print request should appear there. For example,

```
cpr_1-286    herrmann 695 Jun 18 13:58 on cpr_1
```

where cpr_1 is the printer name and 286 is the request number. In this example, **lp** thinks the request is printing at this time, indicated by the "on cpr_1" at the end of the display. If it does not show "on cpr_1," the request is queued.

Scan the **lpstat -t** output for any indications that the printer is disabled. If the printer is disabled, use the **enable <printer_name>** command to reenable the printer.

❑ Check for lock files.

LPSS provides a locking mechanism to prevent two or more users from accessing the same printer. With this locking mechanism, if a printer receives a request when that printer is already in use, it queues the second request until the current request finishes. Lock files are stored in the **/usr/tmp** directory and look like this:

```
LCK..tty18
```

where tty18 is the device name of the printer.

If the lock file is present, this means that the previous print request is not yet finished or that the previous request finished, but for some reason, did not clear the lock file.

If you think that the print request is finished or suspect that the current print request is for some reason hanging the printer (for example, **lpstat** shows the request, but the printer is idle and nothing is printing), cancel this print job and let the next one in the queue print. If this does not clear the lock file, you will need to manually remove it from **/usr/tmp** (note that you must be root).

❑ Miscellaneous printing tips . . .

- Check your electronic mail—**lp** tries to email you error messages.
- Check file permissions—**lp** can't print if the permissions are not set correctly.
- If you are using the forms option in **lp**, make sure the proper form is mounted.

Miscellaneous Problem Troubleshooting Guidelines

- ❑ **Check the paper supply!**

  As simple as this sounds, low or out-of-paper conditions are the cause of many an embarrassing, yet time-consuming printer problem.

- ❑ **Does the printer go off line unexpectedly?**
  - Check the cable connections.
  - Suspect static—this is a common problem in low humidity environments.
  - Suspect power problems.

- ❑ **Is the printer atypically noisy?.**
  - Clean the printer!
  - Check for foreign objects in the paper path.
  - Reseat consumables.
  - Make sure that covers and access doors are closed tightly.

The following table summarizes the detailed information contained in the previous troubleshooting section. Refer back to the bullet items for a more thorough explanation of the symptoms and actions.

Printer Troubleshooting Summary

If you experience these symptoms . . .	***Consider these actions . . .***
For all problems	• Obtain printer model number and connection information • Get a description of the problem • Check printer setup • Check for error messages • Ensure printer is powered on and on-line • Check cord and cable connections • Power cycle printer • Run self-test • Perform printer maintenance routines
Poor print quality (General)	• Obtain a fax sample of the print problem • Perform printer maintenance routines • Check consumables (customer-replaceable items) for wear, quality, expiration, and proper installation • Make sure the developer, toner, drum, and fuser cartridges are properly seated (laser) • Make sure paper quality and thickness meets printer manufacturer's specifications • Check the paper path and feeding • Adjust darkness setting (laser) • Adjust phasing control (line) • Check forms thickness lever (line and character) • Check tension of continuous-form paper

Printer Troubleshooting Summary

If you experience these symptoms . . .	***Consider these actions . . .***
Poor print quality (Print is too light or dark)	Character: • Check ribbon for wear, quality, expiration, smooth feed, and proper installation • Check forms thickness lever Laser: • Adjust darkness setting • Replace toner cartridge
Poor print quality (Spots, stains, and smudges)	Character: • Check ribbon for wear, quality, expiration, smooth feed, and proper installation • Check forms thickness lever • Clean print head Laser: • Perform printer maintenance routines • Replace toner cartridge
Paper jamming	• Check for foreign objects and paper • Ensure adequate supply of paper • Check paper's path for obstruction • Suspect paper problems • Perform printer maintenance routines • Check paper routing • Check platen release lever • Check forms thickness lever
No output	• Check paper supply • Check cord and cable connections • Ensure printer is powered up and on-line • Power cycle printer • Run self-test • Check printer setup • Perform advanced troubleshooting

Printer Troubleshooting Summary

If you experience these symptoms . . .	***Consider these actions . . .***
Printer goes off-line unexpectedly (not ready)	• Check cables and connections • Suspect static problems (low humidity) • Suspect power problems
Noisy printer	• Perform printer maintenance routines • Check for foreign objects in paper path • Check for fan obstructions • Reseat consumables • Close covers and access doors tightly

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SCSI Troubleshooting

In this Section

To help you navigate through the *SCSI Troubleshooting* section, here is an overview of the information provided and a reference page number:

Common SCSI Problems

The following list identifies the most common SCSI problems. Familiarity with these general issues can help you troubleshoot SCSI equipment.

Refer to the Customer Support Center's (CSC) *SCSI Newsletter* and SCSI-related Early Warning TWXs (EWTs) for the most current information regarding such things as special termination requirements for components, allowable cable lengths, firmware release levels, etc.

❑ Improper SCSI bus length

Improper bus length can cause SCSI problems when external devices are connected. In certain circumstances, SCSI problems occur even when the bus length is well within the SCSI specifications. Keep the external SCSI cable length as short as possible—the total length (including the internal portions of the cable) should not exceed four meters (13.13 feet).

❑ Lack of term power

SCSI bus operation depends on "term" power. If the LED on the external SCSI terminator is not bright and steady when the system power is powered up, you may have a blown term power fuse on the controller.

❑ Incorrect SCSI termination

Proper termination is key to the reliable operation of the system and the SCSI bus. Though the symptoms vary and are unpredictable, a SCSI bus with only one terminator (under terminated) will generally perform slowly and suffer parity errors. A SCSI bus with too many terminators (over terminated) will perform better than a bus with only one terminator, but the transfer speed will be slow. A SCSI bus with no terminators will probably not function at all.

- Lack of termination at either end of the bus or additional termination can cause unpredictable errors. Terminate the SCSI bus only at each physical end. If there are terminators installed in a drive and the same drive has an in-line terminator installed at the SCSI bus connector, the SCSI bus is over terminated.
- ACTIVE ALT-2 is the recommended termination type. However, do not change SCSI termination on a system that is running SLICK or PASSIVE termination without any problems. Change termination only if SCSI problems occur or you add additional disks.
- You can mix termination types on the same bus. For example, if the controller has passive terminators on the board, you can install ACTIVE terminators at the other end of the SCSI bus. However, the recommendation is to use ACTIVE termination when possible.
- Use only ACTIVE termination on SCSI channels with devices running in SYNC mode.

❑ Poor SCSI cable quality and incorrect installation

- Substandard and unshielded external cables cause SCSI problems—we recommend using quality, Motorola external SCSI cables.
- Make sure the SCSI cable is not upside down. (Note that the SCSI connector on the M900 version of the older 525Mb tape drive (Archive/Conner) is reversed from the standard orientation, so the cable must be twisted to mate properly to the connector.)
- Minimize round-to-flat SCSI cable transitions, as each transition increases discontinuity of the SCSI bus.
- SCSI cable integrity degrades with repeated connection and removal of the cable from the drives.
- Changing symptoms during the troubleshooting process may indicate marginal or defective connectors on the SCSI bus. Even a marginally defective SCSI cable can cause intermittent problems.

❑ Improper SCSI identification

Conflicting SCSI IDs are a common problem when adding a new drive to the SCSI bus. Make sure SCSI device identifiers are unique.

❑ Attaching unsupported devices to the SCSI bus

Unsupported devices can cause SCSI problems. You may need to disconnect any unsupported device (not purchased through Motorola Computer Group) until SCSI problems are resolved. Contact the CSC and your local support manager before taking action on SCSI problems involving unsupported devices. Motorola-purchased devices should have a Motorola part number label on the HDA (head disk assembly) or on the drive chassis (removable drives).

SCSI Issues for DS954/DS985 PIO Chassis

Special SCSI rules and guidelines apply to the DS954 and DS985 chassis. The DS954 looks similar to the Motorola 6-slot chassis and the DS985 looks similar to the top portion of a Motorola 20-slot chassis. However, since these chassis are storage devices, they contain no CPU or other boards.

Early models of the DS954 and DS985 PIO chassis use PASSIVE rather than ACTIVE termination and do not pass the term power signal inside the chassis.

Notes These rules do not apply to the MVME*xxx*EXT chassis, where ACTIVE termination should be used.

The SCSI terminator tester does not work on the DS954/DS985 PIO chassis.

- ❑ Remove or disable the terminators from drives installed in a DS954/DS985 PIO chassis. Termination is already provided inside the PIO.
- ❑ Make sure that the chain for each channel inside the PIO, ends at the termination board.

  CURRENT EXCEPTION: If you have a Seagate ST31200 or ST12400 disk installed, this drive must be the last drive in the chain and must also have the terminator enable (TE) jumper installed to enable the ACTIVE terminators on the drive PCB. Remove the SCSI cable from the terminator board in the PIO chassis and install the last connector in the Seagate ST31200 or ST12400 disk drive. Only the last drive in the chain should have the TE jumper installed. **Do not add an in-line terminator to the cable and do not change the term power (TP) jumper.**
- ❑ When using the DS954/DS985 PIO chassis on M900 systems, the following rules apply:
  - Do not use MVME328 boards in a system 900 chassis. You must use the MVME328XTP, MVME187, or MVME197 SCSI controller.
  - A Motorola 68-pin to 50-pin SCSI converter cable is required.
  - The PIO will have to be recabled slightly to add ACTIVE termination. An ST31200 or ST12400 disk drive is required at the end of the SCSI channel in order to accomplish this.

The DS954/DS985 PIO was later modified to pass the term power signal inside the chassis and to provide ACTIVE termination, allowing the use of Motorola's standard ACTIVE in-line terminators. In these PIO chassis, there are no terminators on the board and the last SCSI connector in the chassis must terminate in a drive through an ACTIVE terminator.

You can identify these newer, actively terminated models by looking for an "N," "NRM*x*," "-DB*x*," and "-SB*x*" suffix following the DS954PIO or DS985PIO label name on the back of the chassis (for example, DS954PIO-DBF, DS985PIO-SBF, DS985PION, DS985PIONRMF, etc.).

SCSI Troubleshooting Checklist

- ❑ Check the P2 board for secure connection to the VME P2 connector and a secure connection of the SCSI cable. Also, check the SCSI cable for secure connection to a device.
- ❑ Check for bent pins under SCSI cable connections or under P2 boards on the backplane.
- ❑ Check the SCSI cable for obvious damage, kinks, or pinches.
- ❑ Check the controller or Single Board Computer for proper seating in the backplane connector.
- ❑ Check the system for non-Motorola SCSI cable or devices. Ensure that all installed devices are listed in the *Supported Devices* section of the BOS Software Release Guide.
- ❑ Make sure all devices are jumpered correctly. (Refer to the specific device documentation for jumper information.)
- ❑ Verify that the termination type is correct. ACTIVE ALT-2 is the recommended termination type. Refer to *Identifying Terminator Types* on page 9.
- ❑ Use `scsiconfig` (R3) or `scsiscan` (R4) to ensure the controller knows about each device. (Issuing the `scsiconfig` and `scsiscan` commands without options, displays the SCSI information that was saved when the system was last booted or the bus was last scanned. The commands `scsiconfig -d` and `scsiscan -s` execute the inquiry command and display the most current information.)
- ❑ Replace the term power fuse on the SCSI controller if the LED on the external SCSI terminator is blinking (not bright and solid).

  Old SCSI devices do not have diodes on their term power output, so it is possible to have multiple devices on the bus trying to drive term power, causing the SCSI term power fuse to blow. Bad terminators, worn or pinched cables, bent pins under the connectors or under the P2 boards on the backplane can also cause blown fuses.
- ❑ Use a SCSI Terminator Tester or physically examine the bus to ensure there is termination at both ends of the bus and nowhere else. Refer to *Using the SCSI Termination Tester* on page 7.
- ❑ Find out what firmware release the drives have and, if necessary, upgrade the firmware. Refer to the CSC's most recent *SCSI Newsletter* and SCSI-related EWTs for the most current information regarding firmware.

- ❑ Measure the voltage at the power connector of a problem device. Voltages on the peripherals should both be within +/- 5% (4.75VDC - 5.25VDC and 11.40VDC - 12.60VDC).
- ❑ Try the SCSI diagnostic tests available in SSID or GOLD.
- ❑ Try to access the device using Bug level commands such as `iot`, `iop`, or `ioi`.
- ❑ Use Bug `env` to verify the correct parameters in non-volatile RAM.
- ❑ Check under the daughter board on the MVME328-2 for extra PASSIVE termination.
- ❑ Review the *SCSI Known Problem Checklist* on page 12 for symptom or problem match.
- ❑ Review Tech Database, TAR Database, or Early Warning TWX resources to compare current problem with known bugs. (A fix or patch tape may be available.)

Using the SCSI Termination Tester

The SCSI termination tester checks only for the presence of terminator power and for over or under termination. The tester will **not**:

- Work on the DS954/DS985 PIO chassis.
- Find open wires in SCSI cables, unless the wire happens to be pin 26, which carries term power, or pins 2, 50, or 49.
- Test external terminators. Replacing external terminators with spares is the only way to troubleshoot bad external terminators.

To use the tester:

1. Log in as **root** at the console.
2. Use one of the following commands to shut down the system:

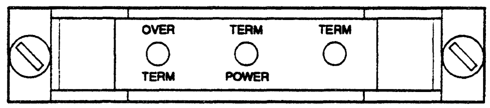
   # shutdown -i0 (R3, R32, and R4-based systems)

   or

   # shutdown -F (AIX-based systems)
3. Power off the system.
4. Remove the external terminator and replace it with the tester.
5. Power on the system.
6. Interrupt system initiation using the **Esc** or **Break** key to get the system in Bug mode.
7. Read and interpret the tester LEDs using the illustration and table following this procedure.
8. Once termination problems are resolved, power off the system, remove the tester, and replace the external terminator.

   Note Do not forget to remove the tester—the system will not function properly in normal operating mode with the termination tester installed.
9. Power on the system again, without interrupting the normal boot process.

Here is an illustration of the tester, followed by a description of terminator tester LEDs:



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Tester LEDs	Description
OVER TERM	Amber LED that indicates two or more terminators in the system. If this LED is lit, check the system for over/extra termination. If the TERM POWER and the TERM LEDs are both lit, and the OVER TERM LED is out, the bus is properly terminated.
TERM POWER	Green LED that indicates terminator power is present. If this LED is dim or out, check the system for a blown SCSI fuse. If this is the only LED lit, the bus is under terminated. Because you removed the external terminator to use the tester, check to make sure the internal end of the bus is terminated. If the green TERM POWER and the TERM LEDs are both lit, and the amber OVER TERM LED is out, the bus is properly terminated.
TERM	Green LED that indicates that at least one terminator is present. If this LED is out, check the system for a missing internal terminator. If the green TERM POWER and the TERM LEDs are both lit, and the amber OVER TERM LED is out, the bus is properly terminated.

Note When using the tester on an 8120 system, simply remove the terminator from the last DS9*x*5 PIO or MVME*xxx*EXT chassis and replace it with the tester.

Identifying Terminator Types

Again, ACTIVE (ALT-2) is the recommended termination type (see *SCSI Issues for DS954/DS985 PIO Chassis* on page 4 for exceptions dealing with the DS954 or DS985 PIO chassis). However, if a system is running SLICK or PASSIVE termination without any problem, do not arbitrarily change termination. Here are some tips for identifying the various terminator types:

- ❑ ACTIVE (ALT-2) Terminators

  Older terminators may only have the initials "S.E." printed on them. Newer terminators have the part number and the word "ACTIVE" printed on the cover.

- ❑ ACTIVE MVME328 Front 50-pin Panel Terminators

  The printed label on this part should read:

  - DATAMATE dm600-06-r active d/c xxxx 58nw9419a15

  If the terminator has "rsk" or "slick" marked on it, remove the terminator and replace it with a properly labeled one.

- ❑ SLICK Internal 50-pin Terminators

  SLICK terminators should have the word SLICK or an abbreviation like RLSK or SLCK on the cover. However, there are about 1000 of these outstanding that had no markings.

- ❑ PASSIVE Terminators

  Particularly look to replace those PASSIVE terminators without an LED on them for terminator power and the internal passive terminators used on devices.

  If you are using on-board PASSIVE terminators, make certain they are marked with "220/330"—no other terminator types are valid. Take care not to confuse PASSIVE terminators with the ACTIVE terminators on certain disk drives. The two can look alike, except the ACTIVE terminators have a 100 ohm label on them.

If you have any doubts about what kind of terminator you are dealing with, simply replace it with the appropriate and recommended terminator.

Refer to the *SCSI Newsletter* or part number database for the most current terminator part numbers.

Where to Look for Terminators

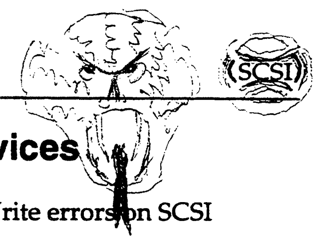
Here are some places to look for terminators:

- ❑ External SCSI bus connectors on SCSI transition boards, external devices, or external SCSI chassis
- ❑ Termination board in DS985/DS954 PIO chassis
- ❑ In-line terminators on the SCSI bus device connectors
- ❑ SIP/DIPs on any SCSI I/O device
- ❑ Termination enabling (TE) jumpers on newer SCSI I/O devices
- ❑ MVME1*x*7 P2 adapter and/or MVME712* transition board
- ❑ MVME328* base board (RN1, RN2, RN3) for channel 0
- ❑ MVME328* daughter board (RN1, RN2, RN3) for channel 1
- ❑ MVME328* front panel terminator connectors

* Denotes generic reference. For example, the MVME712 reference includes the entire family of boards (the 712, the 712A, the 712AM, etc.). The MVME328 reference also includes the entire family of boards (the 328, the 328S, the 328S-2, the 328XT, the 328XTP, etc.).

Refer to the *System Component* section of this guide for locations of the terminators on specific devices and controllers.

SCSI



Problems with SCSI Removable Media Devices

Consider the following actions if you experience Read or Write errors on SCSI removable media devices:

- ❑ Check the write-protect mechanism.
- ❑ Clean the drive head.
- ❑ Remove and reinsert the media.
- ❑ Make sure the media density is compatible with the drive.
- ❑ Try the command or option again (typing error?).
- ❑ Rewind the tape.
- ❑ Try different media (defective or inferior grade?).
- ❑ Make sure the media is formatted correctly (if applicable).

SCSI Known Problem Checklist

- ☐ Check MVME328 systems for MVME374 Revision K and replace with current revision. Here are the symptoms you might encounter with Revision K:
  - MVME374 randomly declares itself off-line (dead).
  - System exhibits random VME ARBITER or VME IACK timeouts.
  - System randomly hangs and only reset gets the system back.
  - System randomly panics (particularly in the MVME328 driver).
- ☐ If a drive reports a SCSI Sense 05 error, make sure the drive was not partitioned beyond the end of media. This is especially typical of the Seagate ST11200, 1 GB drive. Refer to EWT 620. Use `scsiconfig` or `scsiscan` to compare the number of physical blocks to the slice table.
- ☐ If you experience data corruption on hard drives and the system has a MVME328 or MVME328S controller, check firmware revision of the controller. If necessary, apply latest FMK to the controller.
- ☐ If problems occur after adding any of the following drives to an external SCSI bus, make sure drives in 954/985 PIO boxes are jumpered for ASYNC:
  - MVME865 - 330 MB drive
  - MVME866 - 520 MB drive
  - MVME867 - 1 GB drive

  In addition, if a SCSI controller shares a common bus with any of these fast drives AND a 985/954 PIO, all drives on that bus must be strapped for asynchronous operation.
- ☐ If you experience such things as incorrect hardware error generation, drive hangs, or Blank Check reports before the end-of-media was reached on a MVME857 DAT drive, upgrade to 4.45, 4.AH, or later firmware. (A special upgrade tape is readily available from any Area Technical Manager (ATM).)
- ☐ If you experience such things as problems with multiple volume backups, drive hangs, airflow, or loading problems on M4 drives, upgrade to 9914 Rev 08, 9905 Rev 08, or later firmware. EWT 668 also describes a calibration procedure for the M4 drive.
- ☐ If you experience hung removable media drives, try the following:
  - Issue the rewind command to the device using `tapectl -r` (R3) or `mt rewind` (R32/R4).
  - DAT and M4 drives - upgrade the firmware to latest revision.
  - Exabyte drives - press the tape eject button on the front of the drive if the firmware is 2600 or 262L.
  - Archive or internal drives - power cycle the device or system.
  - All removable media drives - make sure the OS supports the peripheral.

- ❑ If you experience SCSI bus hangs, excessive resets, or timeouts:
  - Check for a defective peripheral, cable, or terminator.
  - Check to make sure that the tunable driver timeout value is not set too low for the tape drive. Refer to EWT 691 for instructions on how to increase the timeout for tape drives and how to rebuild the kernel.
  - Upgrade drives to the latest firmware release, particularly Seagate ST11200, ST12400, and ST31200 drives.
  - Make sure that you are running an OS release level compatible with the controller board. Refer to EWT 649, the latest *SCSI Newsletter*, or the component Software Release Guide (SRG) for board-specific compatibility information.
- ❑ If you experience intermittent SCSI errors, read failures, or tape drive problems with a MVME327, check to see if it has a WD33C93A chip at location U77—there are known problems with this chip. Also, make sure the firmware revision level is 2.7 or later.
- ❑ If you experience noise problems on the SCSI bus in an M900 chassis using an Archive 525MB drive, you may have to upgrade to the 01-W2024D01E version of the drive.
- ❑ If removable media devices keep failing in a Series 900 chassis, check to make sure all power supply modules are at revision level 01-W2422D01D or higher. (Use the Motorola part number to determine revision level, not the vendor revision printed on the drive.)
- ❑ You cannot use SLICK terminators on a Fujitsu 2.5-inch disk drive. You can only use ACTIVE (ALT-2) termination on this class of low power drive.
- ❑ You cannot use the terminator tester to check a DS954PIO or DS985PIO chassis.
- ❑ Use Seagate ST12400 and ST31200 drives only on SCSI buses that utilize ACTIVE termination.
- ❑ If you are having problems formatting a 2GB Seagate ST12400 drive (MVME868) in a MVME187 system, check the Bug version—the Bug must be version 1.4 or higher.

Be sure to review the Tech Database, TAR Database, or EWT resources for the latest information on known bugs. A fix or patch tape may be available.

Common SCSI Sense Key Errors

The system reports SCSI errors either to the system console or to the on-line error report. Your access to the error report information depends on your operating system, and how your system is configured.

If you use **syslogd**, check the file **/etc/syslog.conf** to determine where the files that contain the actual error messages are located. For R4-based systems, the files are typically in **/var/syslogd**. You can view the files with **pg**, **more**, **view**, or other file perusal commands.

If you use **errpt**, type the following command, and press Return:

```
$ errpt -a | pg
```

When the bug returns "additional status" on a SCSI failure, the first byte of the additional status is the SCSI command that failed and the second byte is the Sense Key.

The most common SCSI Sense Key errors are listed in the following table. Refer to the *Standalone System Interactive Diagnostics (SSID) User's Guide* for the complete error listing.

Common SCSI Sense Key Errors

Error	Description	Corrective Action
Sense = $01	Recovered Error	The command completed successfully with some recovery action (for example, retries).
Sense = $02	Device Not Ready	The logical device cannot be accessed. For removable media devices, verify that the media is properly installed. For disk devices, try multiple accesses to verify that the drive has had time to spin up to operating speed. Replace the device, as a last resort.
Sense = $03	Media error	If one or two bad blocks are reported, redirect the bad spots using `dinit -n` or use one of the diagnostic packages such as GOLD or SSID to redirect the bad spot. If multiple bad tracks are reported, a head crash has most likely occurred and the drive must be replaced. If the device is a removable media type device, clean the drive head and try different media.
Sense = $04	Hardware Error	The target device detected a non-recoverable hardware failure. Update the firmware to the latest revision level. If the message occurs once the firmware has been updated, you may need to replace the drive.

Common SCSI Sense Key Errors

Error	Description	Corrective Action
Sense = $05	Illegal Request	Error may be due to damaged or improper slice table/file system configuration. Before swapping hardware, `fsck` the file systems and compare the slice table information with the information returned by `scsiconfig` or `scsiscan`. Also, check `env` or SST to see if there are any obvious memory problems. Replace the controller, as a last resort.
Sense = $06	Unit Attention	The removable medium may have been replaced or the target device reset. Typically this is a sign of a power on reset, so simply try the operation again. If external SCSI devices are connected, check the termination and length of SCSI cable. If you still experience trouble, you may have a bad target device.
Sense = $07	Data Protect	Remove the write protect device on removable media.
Sense = $08	Blank Check	Blank data block encountered. Removable media may have been erased or incorrectly written.

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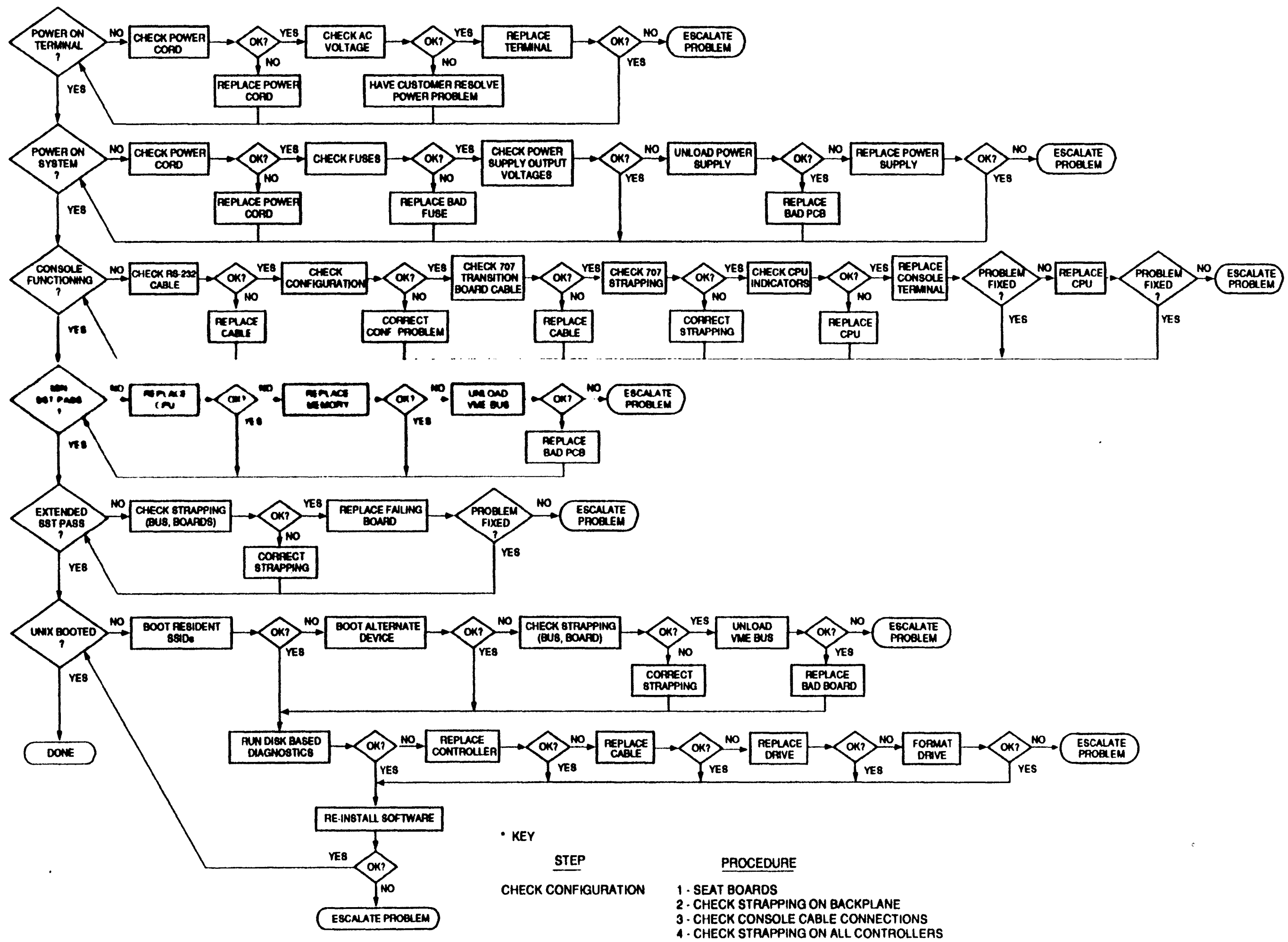
SCSI



* KEY

STEP	PROCEDURE
CHECK CONFIGURATION	1 - SEAT BOARDS 2 - CHECK STRAPPING ON BACKPLANE 3 - CHECK CONSOLE CABLE CONNECTIONS 4 - CHECK STRAPPING ON ALL CONTROLLERS

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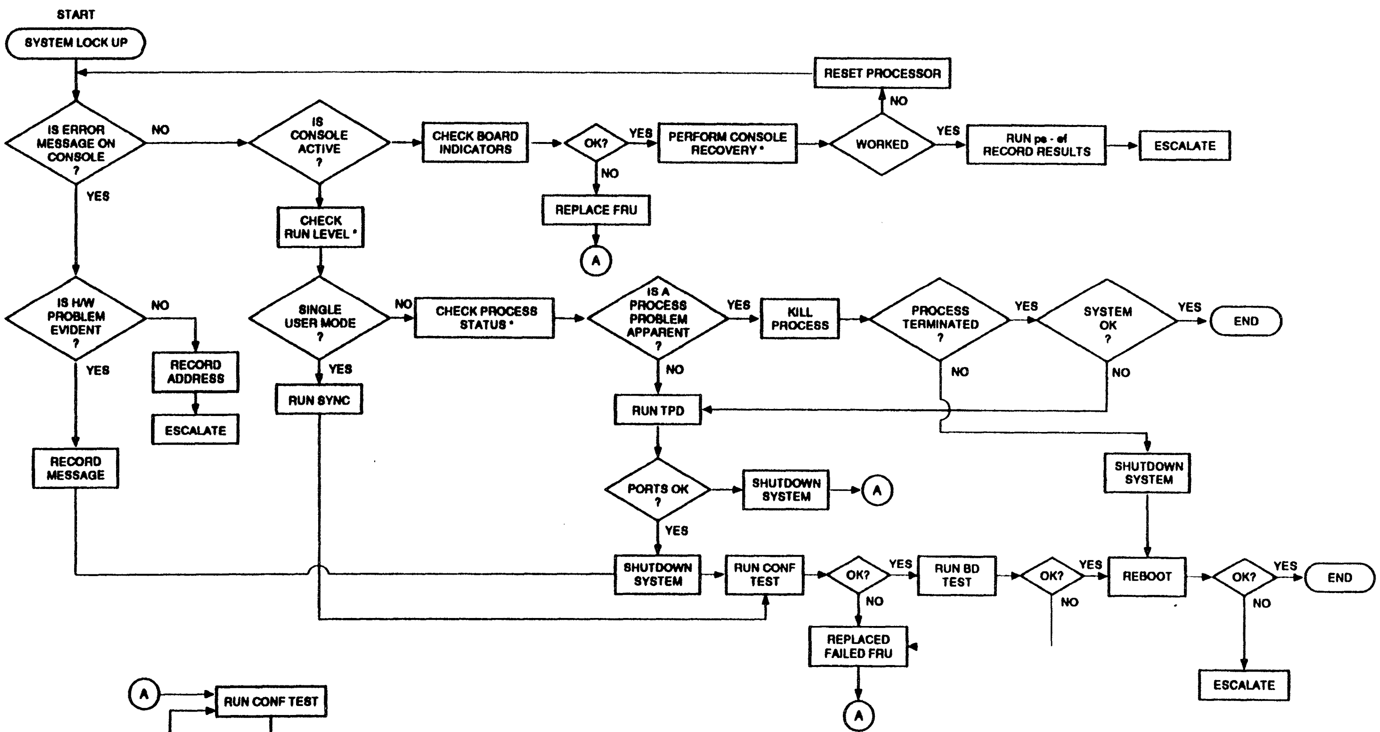
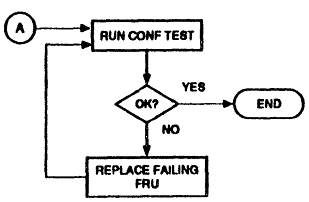
Troubleshooting System Lock-Ups





* KEY

STEP		PROCEDURE
		1- 2- 3-
CONSOLE RECOVERY ROUTINE	=	"CNTL D"/UNPLUG CABLE/TURN CRT ON & OFF
CHECK RUN LEVEL	=	who - r
CHECK RUNNING PROCESS	=	ps - ef

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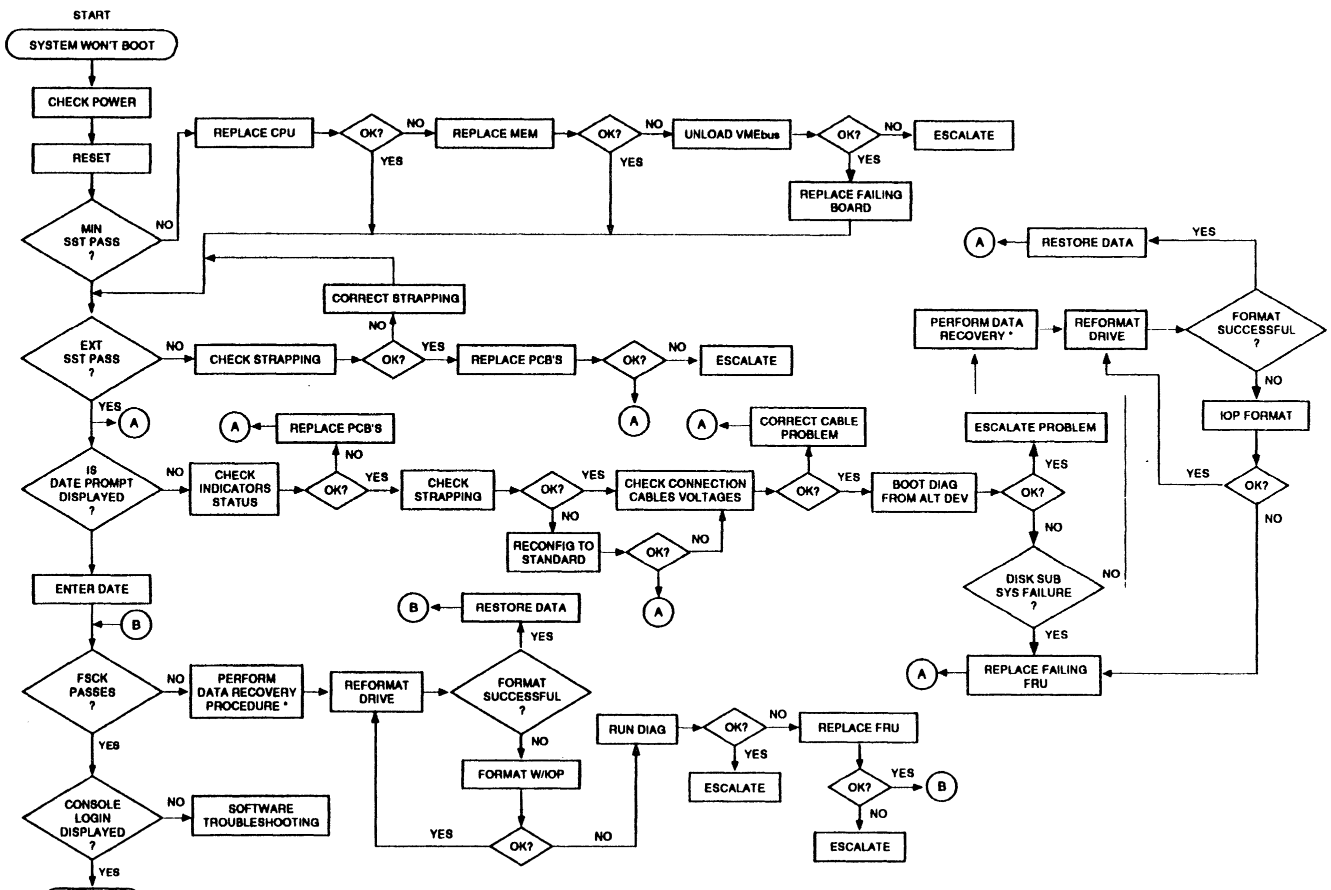
Troubleshooting Systems That Won't Boot



* KEY

CONFIGURATION = STEPS
SEAT BOARDS
CHECK STRAPPING ON BACKPLANE
CHECK CABLE CONNECTIONS
CHECK STRAPPING ON ALL CONTROLLERS

DATA RECOVERY ROUTINE = STEPS
USING STAND ALONE SHELL
MOUNT FILESYSTEMS
BACKUP TO TAPE ALL READABLE DATA

10200 00 9304

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SYSTEM Error Messages

This section documents Base Operating System (BOS) messages for

- ❑ SYSTEM V/88 Release 3.2

Other packages (e.g., NSE, GSE, add-on device drivers) include their own device drivers that print additional messages not listed in this section.

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SYSTEM V88 Error Messages

Message Classes

There are three different classes of SYSTEM V/88 error messages. The type of error, NOTICE, WARNING, or PANIC, typically appears as the first part of the message.

Keep a log of all errors and problems seen on a system. The log should include a record of such things as the date and time, the devices in use and the specific programs running when the errors or problems occur, and the known sequence of events leading up to the problem.

Panic

Panic messages indicate a problem severe enough that the operating system stops. The state of the system, whether caused by a hardware or software problem, is not stable enough to continue processing.

When a PANIC occurs, always attempt to obtain a crash dump for use in determining the root cause of the problem. Typically, the system is configured to automatically save a crash dump; however, you can also use the Tape Dump Utility of the debugger to obtain the dump manually. Refer to **autodump**(8) or the *Dump Memory to Tape* section of the *Debugging Package for Motorola 88K RISC CPUs User's Manual* for more information.

The system tries to correct and recover the file system through **sync**(1M). You should, however, check the file system again using **fsck**(1M) when you bring the system back up. This is done automatically on file systems mounted by **/etc/fstab**.

Warning

Warning messages indicate that the system may stop functioning if you do not take some corrective action.

Notice

Notices provide information on the system status. These messages may help you anticipate and take corrective action on problems before system-down situations occur.

Conventions

The error messages shown in Table 1 may contain occurrences of the "%" character followed by a letter (for example, %s). When printed on your console, these characters are substituted with actual values pertinent to the error as follows:

d a signed decimal

o an unsigned octal

x hexadecimal notation

c a character

s a string of one or more words

Looking Up Error Messages

The error messages are defined alphabetically (without regard to case) in Table 1. Messages that contain numerics or special characters appear first in the alphabetic list.

Many of the error messages provided in Table 1, when printed, contain more information than is shown in the table. In this case, the error messages have been condensed to describe only the part of the message that indicates the actual problem. Write down the ***complete*** message in case you need to call your Service Representative for assistance, but use only the message string to look up the error in Table 1.

For example, when a fatal error for a particular device is encountered, the message starts with a line that prints `FATAL ERROR`, followed by the drive, controller, and slice that has the error. In this case, do not search Table 1 for a message beginning with an 'F'. Instead, look up the error message string that follows the FATAL ERROR line in the printed message.

The format of some of these error messages, as well as the location of the error message string, are described in the following paragraphs.

MVME327 Fatal Errors

The MVME327 driver prints an error message of the following format to the system console whenever a disk device returns fatal error status:

```
FATAL ERROR on MVME327 ctl %d, SCSI ctl %d, drive %d, slice %d
```
(mvme327_error_message)

For streaming tapes it is:

```
FATAL ERROR on MVME327 ctl %d, SCSI ctl %d, Tape drive %d
```
(mvme327_error_message)

For floppy drives it is:

```
FATAL ERROR on MVME327 ctl %d, floppy drive %d, slice %d
(mvme327_error_message)
```

where:

mvme327_error_message

is the string to search for alphabetically in Table 1.

MVME328 Fatal Errors

The MVME328 driver prints an error message of the following format to the system console whenever a disk device returns fatal error status:

```
FATAL ERROR (mvme328_error_message) on %s
slice %d blk %d
mvme328: device=%s Cmd=0x%x SCSI Cmd=0x%x
    Status=0x%x
mvme328: device=%s sense key=0x%x (%s)
```

For a tape device it is:

```
FATAL ERROR (mvme328_error_message) on %s
mvme328: device=%s, Cmd=0x%x, SCSI Cmd=0x%x
    Status=0x%x
mvme328: device=%s, sense key=0x%x (%s)
```

where:

mvme328_error_message

is the string to search for alphabetically in Table 1.

MVME323 Errors

The MVME323 driver prints an error message of the following format to the system console:

```
M323: (mvme323_error_message) on MVME323 ctl %d, drive %d, slice %d
CMD: %s
CSR = 0x%x
```

where:

`mvme323_error_message`

is the string to search for alphabetically in Table 1.

MVME332XT Errors

The MVME332XT driver prints an error message of the following format to the system console:

```
MVME332xt: (mvme332xt_error_message) on controller %d, unit %d
MVME332xt: Controller %x disabled
```

where:

mvme332xt_error_message

is the string to search for alphabetically in Table 1.

MVME350 Errors

The MVME350 driver prints an error message of the following format to the system console:

```
MVME350: Error on controller %d, drive %d
MVME350: %s
MVME350: (mvme350_error_message)
```

where:

mvme350_error_message

is the string to search for alphabetically in Table 1.

MVME355 Errors

The MVME355 driver prints an error message of the following format to the system console:

```
MVME355: cmd=%x, status=%x, error=%x, (mvme355_error_message)
```

where:

mvme355_error_message

is the string to search for alphabetically in Table 1.

Code Module Errors

Many error messages are preceded by a code module name and a colon. Look up the message using the actual error message string that follows the colon, instead of using the module name. For example, if you get the following message, do not search Table 1 for a message beginning with an "S":

```
sd_dump: Cannot dump to sector 0
```

Instead, look up the error in the "C's" using the message string "Cannot dump to sector 0." Use this same search methodology for errors that begin with `DANGER:`, `MTS:`, `KERNEL:`, and `Env Mon Board:`.

Description/Action

The Description/Action column of Table 1 describes why the error message has occurred, followed by the corrective action. Some descriptions include more than one reason that the error has occurred. In these cases, there is also more than one corrective action given. It is not always necessary to perform each corrective action; the first action may isolate the problem.

If an action requires you to perform SCSI or media troubleshooting, details can be found in the SCSI Troubleshooting section of this guide. If an action requires you to perform diagnostics, details can be found in the *Running Diagnostics* subsection following this table..

Table 1. Error Messages

Error Message	Description/Action
.. not a directory	The kernel found that a ".." in some path name is not a directory. Possible disk corruption. Unmount the disk and invoke **fsck**(1M) with the **–D** option.
-1 rdev in ialloc	Possible corrupted file system or bad disk, memory board, or processor board. Run **fsck**(1M) on all file systems. Run diagnostics to determine if you should replace the disk, memory board, or processor board. If problem reoccurs, call your Service Representative.
Acquire Mutex - Spinlock Timeout!	Internal kernel bug or bad processor board. Ignore this message unless it appears as the first PANIC. Treat the first PANIC as the real cause of the problem. Run diagnostics to determine if you should replace the processor board.
Allocated Entry in s5inode free list	File system problem. Reboot. Run **fsck**(1M) on all file systems.
Asserting VME SYSRESET.	Informational message documenting the final steps initiated in a shutdown sequence caused by high temperature or power failure. The Environmental Monitor Board is controlling the SYSRESET signal on the VME bus.
assertion failed: *str*, file: *str* line: #	Your system has **debug** enabled and the debug assertion has failed. Record the complete message and contact your Service Representative.

Table 1. Error Messages (Continued)

Error Message	Description/Action
ATTACH error on SCSI address %d, allstat = 0x%x	The SCSI ATTACH command failed. If message appears during a crash dump, use the Tape Dump Utility of the debugger to dump memory to tape. Otherwise, probable hardware or SCSI bus problem. Perform SCSI troubleshooting. Run diagnostics to determine if you should replace any of the hardware.
Attempt to dump to CDROM at SCSI address %d	You cannot dump the memory image to a CD-ROM (read-only) device. Use **sysgen** to set DMPDEV to disk or tape. See **autodump**(8).
Attempt to dump to device at SCSI address %d	You cannot dump the memory image to an arbitrary SCSI device. Use **sysgen** to set DMPDEV to disk or tape. See **autodump**(8).
Attempting spin up on *name* (disk) (Unprefaced)	Informational message at boot time indicating that the driver has found a disk not ready and is attempting to bring the disk on-line by starting it spinning.
bad # of regions %d	The MVME328 driver setup failed to allocate any scatter gather regions before starting I/O. Kernel was unable to provide the requested MVME328 driver I/O operation. Typically indicates a hardware problem, but can also indicate a software problem. Reseat board, reboot, and try the operation again. Run diagnostics to determine if you should replace any of the hardware; check the controller and processor board.
bad address	A driver request to the kernel for an address translation failed. Typically indicates a processor problem, but can also indicate a software problem. Reboot and try the operation again. Run diagnostics to determine if you should replace any of the hardware. If the system PANICs again, try to get a dump for problem isolation and call your Service Representative.

Table 1. Error Messages (Continued)

Error Message	Description/Action
bad block on bad dev %o(8)	A device block number is outside of valid blocks for the file system or indicates a bad drive. Run **fsck**(1M). Run diagnostics to determine if you should replace the drive.
Bad Device/Drive	A tape drive failed to respond. Ensure cables/cords properly seated and not damaged. Try the operation again. If error persists, run diagnostics to determine if you should replace the drive.
bad format char '%c'	Trying to mount a 68K file system. The system has attempted to convert the super block of the file system that failed. Possible file system corruption. Run **fsck**(1M).
Bad free count on bad dev %o(8)	The super block free count is invalid on the disk. The file system appears full. Use **fsck**(1M) to fix the problem.
Bad pcc2 chip id = %x	The PCC2 chip is unrecognized. Bad MVME1x7 board. Run diagnostics to determine if you should replace the board.
bad pointers on %s	Illegal device pointers specified. You cannot use the peripheral until you modify the device pointers in the **m328space.h** file, build a new kernel, and reboot the system.
Bad Processor ID number %d	Multiprocessor boot message. Two or more processors are reporting a bad ID number.The range should be 0 to 3. Indicates bad hypermodule or brick. Run diagnostics to determine if you should replace the hypermodule or brick.
Bad Unit	A tape drive failed to respond. Ensure cables/cords properly seated and not damaged. Try the operation again. If error persists, run diagnostics to determine if you should replace the drive.

SYSTEM V88

Table 1. Error Messages (Continued)

Error Message	Description/Action
bad vtop_data_type	Internal kernel error. Processor, memory, or device driver problem. Run diagnostics to determine if you should replace the memory or processor board.
blkdev	An i-node is pointing to an invalid device. Indicates bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
blkno (%d) or nblocks (%d) is not a multiple of logical block size	The block number or number of blocks is not a multiple of the logical block size. System memory is not dumped to the device. Use the Tape Dump Utility of the debugger to dump memory to tape. Modify DMPDEV to a number that is compatible with the device you are writing to.
board failed powerup diagnostics	The specified controller failed its power up diagnostic sequence. Indicates controller or SCSI problem. Perform SCSI troubleshooting. Run diagnostics to determine if you should replace the controller.
board OK not found	The specified controller failed its power up initialization sequence. Indicates controller or SCSI problem. Perform SCSI troubleshooting. Run diagnostics to determine if you should replace the controller.
Board not ready	Probable hardware problem. Reseat board. Reboot. Check board addressing, strapping / jumper settings, front panel switches. Run diagnostics to determine if you should replace the controller.
buffer write error	Buffer missing at end of file or media during tape write operation. Indicates bad processor or memory board Run diagnostics to determine if you should replace the processor or memory board.

Table 1. Error Messages (Continued)

Error Message	Description/Action
bumprcnt — region count list overflow	During a swap operation, exhausted region count entries. Indicates bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
bus timeout	Probable hardware problem. Reseat board. Reboot. Check board addressing, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.
Call to internal routine of uninstalled package (%s)	Networking not installed. Verify that the kernel you are running on is the one with Network Services Extension (NSE) installed.
Can't allocate message buffer.	Not enough physical memory to allocate the buffer for IPC messages. Using **swap**(1M), increase swap space or obtain more memory.
Can't allocate proc[0]'s ptr table	Not enough main memory in system. Reset system and check ROM memory size message to ensure system is seeing the correct amount of memory available. May need to add memory. If amount shown is consistent with the amount installed, run memory diagnostics.
Can't allocate proc[0]'s ublock	Not enough main memory in system. Reset system and check ROM memory size message to ensure system is seeing the correct amount of memory available. May need to add memory. If amount shown is consistent with the amount installed, run memory diagnostics.
can't allocate work area	The driver could not allocate cache-inhibited memory for internal data structures. Not enough memory. Add more memory, adjust kernel parameters to reduce the amount of memory used by other parts of the kernel, or remove unused device drivers or software modules from the kernel.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Can't bind processor to proc[0]	Not enough main memory in system or bad processor. Reset system and check ROM memory size message to ensure system is seeing the correct amount of memory available. May need to add memory. If amount shown is consistent with the amount installed, run diagnostics to determine if you should replace the memory or processor board.
Can't fix bad spot	Drive cannot fix bad spot. Back up data and try to reformat the disk. Run diagnostics to determine if you should replace the drive.
Can't get cpages	Not enough main memory in system. Reset system and check ROM memory size message to ensure system is seeing the correct amount of memory available. May need to add memory. If amount shown is consistent with the amount installed, run memory diagnostics.
Can't get double buffers	Not enough main memory in system. Ensure system is seeing the correct amount of memory available using **prtconf**(1M). May need to add memory.
can't push any more modules — check NSTRPUSH	A user or a system application exceeded the number of modules that can be pushed onto a Stream. Increase the NSTRPUSH **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
cannot add page 0x%x to NVRAM	The kernel was trying to unallocate a bad memory page and encountered a full error list or an error reading NVRAM. Use GOLD to test for a bad memory board or to delete entries from memory error list.
cannot allocate double buffer	Not enough main memory in system or hardware problem. Use **prtconf**(1M) to ensure system is seeing the correct amount of memory. May need to add memory. Run diagnostics to determine if you should replace any hardware.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Cannot allocate memory on SCSI tape drive %d	Not enough main memory in system. Ensure system is seeing the correct amount of memory available using **prtconf**(1M). May need to add memory.
cannot allocate stream data blocks	There is not enough contiguous memory to allocate the STREAMS data blocks or there is not enough main memory in system. Ensure system is seeing the correct amount of memory available using **prtconf**(1M) or reduce the NBLK*xx* **sysgen** parameters. May need to add memory.
cannot create channel: %d	Probable hardware problem. Reboot. Try operation again. Try a new tape or drive. Run diagnostics to determine if you should replace any of the hardware.
cannot create dump channel	Communications with the controller failed during a crash dump. Probable hardware problem. Reseat the board and reboot. Try a new tape or drive. If problem persists, run diagnostics to determine if you should replace the controller or the drive. Use the Tape Dump Utility of the debugger to obtain a dump.
Cannot crash dump on full disk slice	The dump device is incorrectly configured to dump to Slice 7, making the disk unbootable. Modify the DMPDEV **sysgen** parameter. See **autodump**(8). Use the Tape Dump Utility of the debugger to obtain a dump.
Cannot dump to sector 0	The dump device is incorrectly configured to dump to Slice 7, making the disk unbootable. Use the Tape Dump Utility of the debugger to dump memory to tape. Modify the DMPDEV **sysgen** parameter. See **autodump**(8).
Cannot GET_INFO from dump device at SCSI address %d	The tape drive is not responding to a dump request. Use the Tape Dump Utility of the debugger to obtain a dump. Bad drive or media problem. Perform media troubleshooting. Run diagnostics to determine if you should replace the drive.

SYSTEM V88

Table 1. Error Messages (Continued)

Error Message	Description/Action
Cannot LOAD dump device at SCSI address %d	The tape drive is not responding to a dump request. Replace tape and use the Tape Dump Utility of the debugger to dump memory to tape. Bad drive or media problem. Perform media troubleshooting. Run diagnostics to determine if you should replace the drive.
cannot mount root	The root file system was corrupted or nonexistent when trying to boot. Reboot from the SYSTEM V/88 installation tape, run **fsck**(1M), and mount the root file system. If reboot fails, boot from installation tape and restore from backup. Possible hardware problem. Run diagnostics to determine if you should replace any of the hardware.
cannot remove address 0x%x	A memory page listed in the NVRAM bad page list has an invalid page number. The memory may have been reconfigured. Use **prtconf**(1M) to verify expected memory size. Run diagnostics to determine if you should replace the processor board. On system reset, check for a Bug message indicating a weak battery.
Cannot Write FM on dump device at SCSI address %d	The tape drive is not responding to a dump request. Replace tape and use the Tape Dump Utility of the debugger to dump memory to tape. Bad drive or media problem. Perform media troubleshooting. Run diagnostics to determine if you should replace the drive.
Cartridge not in place	No tape cartridge in the drive or bad drive. Ensure there is a tape in the drive and that cables/cords are properly seated and not damaged. Reboot. Run diagnostics to determine if you should replace the drive.
cd240 dev = 0x%x doesn't respond in function *str*	Console chip problem. Replace the MVME1*x*7 processor.
CDCLUSTER invalid, setting it to 0	The CDCLUSTER **sysgen** parameter is less than zero; it is automatically set to zero. Modify the parameter (range 0-32) to avoid the message on the next boot. See **ISO9660**(4) in the *Programmer's Reference Manual, Part 2.*

Table 1. Error Messages (Continued)

Error Message	Description/Action
CDCLUSTER too large, setting it to 32.	The CDCLUSTER **sysgen** parameter is invalid; it is automatically set to 32. Modify the parameter to avoid the message on the next boot. See **ISO9660**(4) in the *Programmer's Reference Manual, Part 2.*
cdinit not found in fstypsw	Possible memory corruption. Reboot from the SYSTEM V/88 installation tape and try to rebuild the kernel. Run diagnostics to determine if you should replace the memory board. Contact your Service Representative if the problem reoccurs.
CDMODE invalid, dropping the high order 4 bits	The CDMODE **sysgen** parameter has some invalid bits set. It is automatically masked down to 12 bits. See **ISO9660**(4) in the *Programmer's Reference Manual, Part 2.*
CDROM inode table overflow	No more files can be opened. Reconfigure the system with a bigger i-node table by increasing the NINODE **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
Cluster ran out of rx packets: %d	Informational message indicating the cluster ran out of received packets. This is caused by the MVME336 serial port receiving more data than the system is capable of handling. Use flow control by enabling xoff/xon (**stty**(1)).
ctlr error 0x%x while polling on %s	At initialization, a controller error occurred while polling for devices. Peripheral, controller, power supply, or SCSI problem. Ensure that all cables/cords are properly seated. Perform other SCSI troubleshooting. Run peripheral and controller diagnostics.
CMMU M-bus Error	Data fault at address with bus error. Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.

SYSTEM V88

Table 1. Error Messages (Continued)

Error Message	Description/Action
CMMU *Parity/Bus* Error at *User/Kernel Data/Code* Address :0x%x *Parity/Bus* Error at Physical Address :0x%x	The system detected an access failure due to parity checking or bus timeout. If this occurs frequently, run diagnostics to determine if you have a memory or I/O board failure.
CMMU Snoop Copyback Error	Data snooping cycle data fault. Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
command aborted	Probable hardware problem. Reseat board. Reboot. Check board addressing, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.
command not implemented	Probable hardware problem. Reseat board. Reboot. Check board addressing, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.
command timed out on %s	A command issued to the specified peripheral did not complete within its defined duration. The SCSI bus this peripheral is attached to will reset. Bad hardware or SCSI problem. Perform SCSI troubleshooting (particularly check termination). Run diagnostics to determine if you should replace the controller or peripheral.
Configured value of NOFILES (#) is greater than max (#) NOFILES set to #.	The value of NOFILES in **sysgen** kernel file exceeds the allowed maximum. No immediate action is required; however, to avoid this, decrease the NOFILES **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
Configured value of NOFILES (#) is less than min (#) NOFILES set to #.	The value of NOFILES in **sysgen** kernel file is less than the allowed minimum. No immediate action is required; however, to avoid this, increase the NOFILES **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Console output DISABLED at *time*	Notification that the console messages from the kernel will no longer appear on the screen, but are available in a file (**console_log**(1M)).
Console output ENABLED at *time*	Notification that the console messages from the kernel will appear on the screen.
contmemall - insufficient memory to allocate *xx* pages (system call failed)	Contiguous memory not available at boot time. Reboot and ensure system is seeing the correct amount of memory available using **prtconf**(1M). Check console log for errors. Using **swap**(1M), increase swap space or add memory.
contmemall - insufficient memory to lock *xx* pages (system call failed)	Contiguous memory not available at boot time. Reboot and ensure system is seeing the correct amount of memory available using **prtconf**(1M). Check console log for errors. Using **swap**(1M), increase swap space or add memory.
Controller %x disabled	This message is preceded by a NOTICE indicating the particular problem. The controller is not operational.
Controller Not Available!!! on MVME323 ctl %d, drive %d, slice %d	The controller is either in the process of resetting, running diagnostics, or has failed initialization. Run diagnostics to determine if you should replace the controller.
Converting root filesystem to current superblock format	An outdated file system format was mounted and automatically converted to the new format. Information only; no action required.
could not allocate stream event	A stream event cell could not be allocated. Increase the MAXSEPGCNT **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
could not perform unlink ioctl, closing anyway	A close was performed on the controlling STREAM of a multiplexor driver. Internal software error. Try to get a dump for problem isolation and call your Service Representative.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Create channel error	Probable hardware problem. Reseat board. Reboot. Check board addressing, strapping/jumper settings, front panel switches. If SCSI device, perform SCSI troubleshooting. Run diagnostics to determine if you should replace any of the hardware.
CRBV bit not found, CRSW = 0x%x	The MVME328 controller timed out waiting for a device to complete a command. Bad controller or SCSI problem. Perform SCSI troubleshooting (check specifically SCSI cable, termination, and connector). Run diagnostics to determine if you should replace the controller.
data block on tape is longer than requested	The attempted read from tape failed because the data block is too small. Use longer tape or use larger block size. See **dd**(1).
Data lost on cluster: %d	The system could not process the data from the cluster in enough time and some data was lost. This is caused by the MVME336 serial port receiving more data than the system is capable of handling. Use flow control by enabling xoff/xon (**stty**(1)). If flow control is enabled and message still occurs, contact the vendor of the device attached to the MVME336.
Descendant Mutex Not Acquired!	Internal kernel bug or bad processor board. Ignore this message unless it appears as the first PANIC. Treat the first PANIC as the real cause of the problem. Run diagnostics to determine if you should replace the processor board.
Device not ready	Tape device is not ready. Most likely cause is no tape in the drive, but may also be a problem with an improperly inserted ARCHIVE tape. Ensure there is a tape in the drive. Check the ARCHIVE tape format.

Table 1. Error Messages (Continued)

Error Message	Description/Action
device re-initialize failed on %s	The driver occasionally asks the controller to renegotiate the data transfer speed that a peripheral will use to send data to prevent potential SCSI bus hangs when an external peripheral is turned off and on. In this case, the negotiation failed to properly reinitialize the specified peripheral. Peripheral, power supply, or SCSI problem. Ensure cables/cords properly seated. Perform other SCSI troubleshooting. Run peripheral diagnostics.
Device write protected	Bad drive or media problem. Perform media troubleshooting. Run diagnostics to determine if you should replace the drive.
devtab	Corrupted disk buffer cache during block I/O. Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
DMA buffers discarded	The tape device was open waiting for a write operation, but was interrupted by a new process before the data could be written to the tape. The system discards the retained buffers.
DMA buffers still active.	The last write onto a tape encountered the end of media. The system retains the buffers for subsequent write operations.
DMA failed	Probable hardware problem. Reseat board. Reboot. Check board addressing, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.
Drive fault	Bad drive or loose cables/cords. Ensure cables/cords are properly seated. If SCSI device, perform SCSI troubleshooting. Run diagnostics to determine if you should replace the drive.
Drive initialization error on MVME323 ctl %d, drive %d, slice %d	Probable MVME323 hardware problem. Reseat board. Reboot. Check board addressing, cables, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Drive not online	Bad drive or lock lever is not down. Ensure drive lever is down and that there is a tape in the drive. Ensure cables/cords properly seated and not damaged. Reboot. Run diagnostics to determine if you should replace the drive.
Drive not ready	Bad drive, lock lever not down, or drive not spun up. Ensure drive lever is down. Reboot. Run diagnostics to determine if you should replace the drive.
Drive offline or hardware failure	Bad drive, no floppy in drive, or lock lever is not down. Ensure drive lever is down and that there is a floppy in the drive. Reboot. Run diagnostics to determine if you should replace the drive.
duinit not found in fstypsw	Possible memory corruption. Run diagnostics to determine if you should replace the memory board. Reboot from the SYSTEM V/88 installation tape and try to rebuild the kernel. Contact your Service Representative if the problem reoccurs.
dump address = 0x%x dumpdev = 0x%x dump driver address = 0x%x	The numbers printed represent kernel function addresses and are useful only in debugging dump problems. You can verify the DMPDEV **sysgen** parameter by using **nm**(1) on **/unix** and looking for the addresses to correlate them to kernel/driver function names. See **autodump**(8).
Dump device controller not present	The dump device configured in the kernel is missing. Modify the DMPDEV **sysgen** parameter in the 'kernel' collection to a valid device. See **autodump**(8).
Dump device I/O error	An I/O error occurred while trying to write a crash dump to tape. The dump is unusable. Media problem. Use a different tape and try the crash dump again or use the Tape Dump Utility of the debugger to obtain a dump.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Dump device not initialized	The kernel tried to dump to a device that has not yet been initialized. Try modifying the DMPDEV **sysgen** parameter in the 'kernel' collection. See **autodump**(8).
Dump device write protected	Bad drive or media problem. The crash dump is unusable. Use the Tape Dump Utility of the debugger to obtain the dump. Write enable the device. Perform other media troubleshooting. Run diagnostics to determine if you should replace the drive.
Dump error	A dump error occurred on the named device. The most frequent causes are a bad tape or bad block on the disk, but can indicate problems with cables, terminators, or power supplies. Try dumping to a different tape and ensure cables/cords properly seated.
Dump I/O error on %s	The dump to named device failed. The most frequent causes are a bad tape or bad block on the disk, but can indicate problems with cables, terminators, or power supplies. Try dumping to a different tape and ensure cables/cords properly seated.
Dump rewind operation failed	The tape dump code attempt to rewind the crash dump tape failed. Rewind the tape and try the crash dump again.
dump truncated at end of logical device %d blocks written	Not enough space to dump entire memory image. Use the debugger to obtain this dump or backup your system, boot from tape, then use **msledit**(1M) to enlarge the swap partition to at least the size of RAM + 2 blocks. Modify the DMPDEV and DUMPTYPE **sysgen** parameters. See **autodump**(8).
dumpdev = 0x%x dump device driver not present	The dump device configured in the kernel is missing. Modify the DMPDEV **sysgen** parameter in the 'kernel' collection to a valid device. See **autodump**(8).

Table 1. Error Messages (Continued)

Error Message	Description/Action
Dumping all of memory	The size of swap is greater than the size of physical memory and the user has configured the system to do a full dump. Informational only.
Duplicate Processor ID number %d	Multiprocessor boot message. Two or more processors are reporting the same ID number. Indicates bad hypermodule or brick. Run diagnostics to determine if you should replace the hypermodule or brick.
dupreg - insufficient memory to allocate *xx* pages (system call failed)	Operating system did not have enough virtual memory to run a process. Add memory or use **swap**(1M) to increase swap space.
dupreg - insufficient memory to lock *xx* pages (system call failed)	Operating system did not have enough physical memory to run a process. May need to add memory or reduce processes.
dupreg - pbremove	Paging problem in the operating system. The kernel was trying to remove a page from the page cache but could not find it in the cache. Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
dupreg - swpuse count overflow	Too many processes are trying to share the same page of swap. A copy has been made. No action required.
End of data	Reached logical end of data without encountering the filemark. You are trying to read past end of data or you have a media problem. Perform media troubleshooting.
End of *media/tape*	Encountered end of tape. You need another tape to continue or you have a media problem. Perform media troubleshooting.
error (CRSW 0x%x, status 0x%x) while polling on %s	A peripheral problem occurred while polling for devices. Peripheral, MVME328 controller, power supply, or SCSI problem. Ensure that all cables/cords are properly seated. Perform other SCSI troubleshooting. Run peripheral and controller diagnostics.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Error from dbufopen	Probable hardware or driver software problem. Run diagnostics to determine if you should replace any of the hardware; check the processor and memory boards. Reboot and try the operation again. If the problem reoccurs, try to get a dump for problem isolation and call your Service Representative.
error message(s) via /dev/conslog:	The messages following this NOTICE message came from a process that wrote to the **/dev/conslog** device. By writing to **/dev/conslog** rather than **/dev/console**, the error message gets time stamped and logged.
Error reading SCSI host address from %s NVRAM	During initialization, NVRAM hardware or configuration problem occurred; may not be successful in booting. Invoke the debugger **env** command with the **D** option to load ROM defaults into NVRAM. If this does not work, you may have to replace the processor board.
exec - bad magic	An invalid magic number was detected during an exec system call, which should have been detected earlier by the kernel. Kernel bug, memory, or processor problem. Run diagnostics to determine if you should replace the processor or memory board.
exec - Insufficient memory to allocate # pages - system call failed	System resources are overloaded. Free up resources or try again later.
Executing function <name of function>	Informational message indicating what kernel data is being collected for the dump. This information is useful for crash analysis.
FATAL ERROR on %s Cmd=%x SCSI CMD=%x, *device_name*	A controller error occurred that affected an I/O operation for the specified peripheral. Peripheral, controller, power supply, or SCSI problem. Ensure cables/cords properly seated and proper termination. Perform other SCSI troubleshooting. Run controller and peripheral diagnostics.

SYSTEM V88

Table 1. Error Messages (Continued)

Error Message	Description/Action
Fatal error status: 0x%x	During a disk drive/tape operation, the MVME327 got an unrecoverable error. The most common problems; i.e., drive fault, write protected, drive not ready, end of data, appear in the message. See the *MVME327 Firmware User's Manual* to obtain the meaning of uncommon error status numbers.
FIFO error	Probable hardware problem. Reseat board. Check board addressing, strapping/jumper settings, front panel switches. Reboot. Run diagnostics to determine if you should replace any of the hardware.
File table overflow — check NFILE	Too many files open at the same time caused the system file access table to overflow. Close some files or increase the NFILE **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
Firmware not executing on controller %d, slot %d, port %d	Probable hardware problem. Reseat board. Reboot. Run diagnostics to determine if you should replace the controller.
flushallcache - bad flag	Internal kernel function called with bad argument. Indicates bad kernel, bad memory, or bad code. Run diagnostics to determine if you should replace the memory board. If error reoccurs, call your Service Representative.
fork - Insufficient memory to allocate # pages - system call failed	System resources are overloaded. Free up resources or try again later.
Format failed	Bad drive or media problem. Try another disk. Run diagnostics to determine if you should replace the drive.
FPU Disable Detected pc = 0x%x, ps = 0x%x User process %s, PID %d	The Floating Point Unit was disabled; it is automatically re-enabled. If this message occurs frequently, run diagnostics to determine if you should replace the processor board.
FNET set on non-device file	Indicates file system or memory corruption. Run **fsck(1M)** on each file system. Run system diagnostics.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Free packet pool is empty	Probable hardware or MVME332XT driver problem. Reseat board. Check board addressing, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace the controller. May have to update the controller download and driver.
Full dump configured, dump may be truncated	The system is configured to dump all of memory when a PANIC occurs. Informational message indicating that if there is not enough space on the media you are dumping to, the dump may be truncated. Use **msledit**(1M) to enlarge the swap partition to at least the size of RAM + 2 blocks. Modify the DMPDEV and DUMPTYPE **sysgen** parameters. See **autodump**(8).
getcpages - **waiting for** *nnn* contiguous pages	Contiguous pages not available to run user process. Run the process immediately after reboot when contiguous memory is available. Ensure system is seeing the correct amount of memory available using **prtconf**(1M). May need to add memory to support new device or more processes.
getpages — **pbremove**	The kernel attempted to remove a page from the page cache but could not find it in the cache. Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
getpages - swpuse count overflow	Too many processes are trying to share the same page of swap. A copy has been made. No action required.
getxfile - bad magic	An invalid magic number was detected during an exec system call, which should have been detected earlier by the kernel. Kernel bug, memory, or processor problem. Run diagnostics to determine if you should replace the processor or memory board.
growreg - insufficient memory to allocate *xx* pages (system call failed)	Not enough virtual memory available to run a process. Add memory or use **swap**(1M) to increase swap space.

Table 1. Error Messages (Continued)

Error Message	Description/Action
growreg - insufficient memory to lock *xx* pages (system call failed)	Not enough physical memory to run a process. May need to add memory.
i/o error in swap	An access (read/write) error occurred on the swap device. Reboot. Run disk diagnostics and check for bad blocks on the swap partition. If SCSI device, perform SCSI troubleshooting. Check swap partition to ensure it does not extend the disk slice.
iaddress > 2^24	File control block number in an i-node is out of range. Take the system to single-user mode (Procedure 3.3), and run **fsck**(1M) to check the file system (Chapter 5). Run diagnostics to determine if you should replace a bad memory board or disk drive.
iget - inode table overflow	Out of free slots in the i-node table; no more files can be opened. Reconfigure the system with a bigger i-node table by increasing the NINODE **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
iget — mounted on inode not in mount table.	Encountered dead code that should never be reached. Probable bad processor. Run diagnostics to determine if you should replace the processor board.
Ignored, Flaw in Runt or Out of Range	Bad MVME323 disk drive or media problem. Perform media troubleshooting. Back up data and reformat disk. Run diagnostics to determine if you should replace the drive.
Ignored, Out of Range	A bad spot that is out of range for the MVME323 disk was specified. See **dinit**(1M).
illegal DMA burst count	Bad MVME355 tape drive or loose cables/cords. Ensure cables/cords are properly seated. Run diagnostics to determine if you should replace the drive.

Table 1. Error Messages (Continued)

Error Message	Description/Action
illegal fetch & execute command	Bad MVME355 tape drive or loose cables/cords. Ensure cables/cords are properly seated. Run diagnostics to determine if you should replace the drive.
Illegal Kernel Trap	The kernel was entered through an unknown trap type. This message is followed by a system panic. Run system diagnostics.
illegal memory type	Bad MVME355 tape drive or loose cables/cords. Ensure cables/cords are properly seated. Run diagnostics to determine if you should replace the drive.
Illegal scan on controller %d, slot %d, port %d	Probable hardware problem. Reseat board. Reboot. Run diagnostics to determine if you should replace the controller.
Initialization error on controller %d, slot %d, port %d	Probable hardware problem. Reseat board. Reboot. Run diagnostics to determine if you should replace the controller.
initialization failed	The specified controller failed its secondary initialization sequence. Controller or SCSI problem. Perform SCSI troubleshooting. Run diagnostics to determine if you should replace the controller.
inode was already allocated	Probable file system problem. Take the system to single-user mode (Procedure 3.3), and run **fsck**(1M) to check the file system (Chapter 5). If problem reoccurs, call your Service Representative.
inquiry timeout at SCSI address %d	A device on the SCSI bus was detected but failed to respond to the inquiry command. Probable hardware problem with the device. Perform SCSI troubleshooting.

Table 1. Error Messages (Continued)

Error Message	Description/Action
interrupt mode	Request made to obtain status information from a peripheral using interrupts while in polled mode. Probable MVME328 driver software problem. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
invalid address modifier	Bad MVME355 tape drive or loose cables/cords. Ensure cables/cords are properly seated. Run diagnostics to determine if you should replace the drive.
invalid block size for fixed mode	The MVME328 driver tried to set up a fixed-block tape drive, but the internal drive information was incorrect. Probable software problem. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
invalid command code	Bad MVME355 tape drive or loose cables/cords. Ensure cables/cords are properly seated. Run diagnostics to determine if you should replace the drive.
invalid dev %d	Probable hardware problem. Reboot. If occurs frequently, run diagnostics to determine if you should replace any of the hardware.
invalid entry point	Internal software error. Reboot. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
Invalid fs dependent namei return	Kernel bug in the file system code or bad RAM. Run diagnostics to determine if you should replace the processor or memory board. If okay, reboot.
invalid interrupt level	Bad MVME355 tape drive or loose cables/cords. Ensure cables/cords are properly seated. Run diagnostics to determine if you should replace the drive.

Table 1. Error Messages (Continued)

Error Message	Description/Action
invalid IOPB parameter	Bad MVME355 tape drive or loose cables/cords. Ensure cables/cords are properly seated. Run diagnostics to determine if you should replace the drive.
invalid UIB parameter	Bad MVME355 tape drive or loose cables/cords. Ensure cables/cords are properly seated. Run diagnostics to determine if you should replace the drive.
invalid memory address	Bad tape drive or loose cables/cords. Ensure cables/cords are properly seated. Run diagnostics to determine if you should replace the drive.
invalid record size	The record size requested is not supported by the tape device. Refer to the manufacturer's user manual to determine acceptable record size.
IOPB failed	Probable hardware problem. Reseat MVME355 board. Reboot. Check board addressing, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.
iupdat — fifo iaddress > 2 ^24	Block number in a pipe i-node is too big. Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
iupdat — iaddress > 2 ^24	Block number in i-node is too big. Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
Kernel Code fault	The processor got a code fault accessing kernel code. Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
Kernel data fault	The processor got a data fault accessing kernel data. Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Kernel Divide by zero pc: 0x%x	Kernel mode illegal exceptions. Probable bad processor or chips. Run diagnostics to determine if you should replace the processor board.
Kernel imprecise FP exception	Kernel mode illegal exceptions. Probable bad processor or chips. Run diagnostics to determine if you should replace the processor board.
Kernel precise FP exception	Kernel mode illegal exceptions. Probable bad processor or chips. Run diagnostics to determine if you should replace the processor board.
Kernel stack overflow	Added a driver that uses more stack space than was allocated. You cannot reconfigure the kernel to add stack space. Call your Service Representative.
link table overflow — check **NMUXLINK**	There are more multiplexing STREAMS modules configured than the link table can support. Increase the NMUXLINK **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
load point error	Bad tape drive or controller, or tape improperly loaded. Ensure tape is properly loaded. Run diagnostics to determine if you should replace the drive or controller.
local ECC RAM multiple bit error detected by scrubber in memory line at 0x%x. Orderly system shutdown and reboot is recommended	Encountered multiple bit memory error and the system cannot correct the problem. Shutdown the system (**shutdown**(1M)) to avoid data loss. Reboot. If these messages continue to appear, replace the memory board.
Lock table overflow - check FLCKREC	Not enough room to insert a file lock into the lock table. Increase the FLCKREC **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.

Table 1. Error Messages (Continued)

Error Message	Description/Action
lowered ilev to 5	This is an MVME335 printer port driver error appearing at boot time. Restore the MVME335 description file from backup then run **sysgen -gbi**. Reboot.
m328cstart	The driver controller start routine went into an illegal or undefined state. Probable software problem. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
m328dequeue	The device queue appeared to contain I/O requests, but when an attempt was made to extract one of the requests, the queue was empty. Probable software problem. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
m328known_device_scan problem	The driver tried to poll a known device, but the device no longer exists. Probable software problem. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
m_free() overlapping ram items with different flags. current item addr = %x, size = %x, flag = %x new item addr = %x, size = %x, flag = %x	Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
m_free mem overflow %x. Lost %d items at %d	Memory fragmentation is so great that the system lost track of some of the fragments. Reboot. Run diagnostics to determine if you should replace the memory board.
MACS323 controller %d: Recovered from Lost Interrupt!!!!	The request has finished but an interrupt was never received. Probable MVME323 hardware problem. Check VME backplane IACK jumpers for correct installation. Run diagnostics to determine if you should replace any of the hardware.

Table 1. Error Messages (Continued)

Error Message	Description/Action
main — copyout of icode failed	The kernel was not able to copy the assembly code that is used to start up the system. Probable bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
main — swapadd failed	System could not add default swap area to kernel at boot time. Possible configuration problem, bad disk drive, or disk controller. Check **sysgen** settings of **swapdev** for swap area. Run diagnostics to determine if you should replace the disk drive or controller.
memc040 chip id register (%x) invalid	The operating system does not recognize the hardware. Indicates processor board problem. Run diagnostics to determine if you should replace the processor board.
memory allocation failed	There is not enough system memory at boot time to initialize the buffers required for driver operation. Ensure system is seeing the correct amount of memory available using **prtconf**(1M). May need to add memory. If occurs frequently, run system diagnostics.
Memory Parity Error signal sent to process: %s, PID %d	The system detected a memory failure due to bad parity. The %s is the name of the process that gets the SIGBUS or SIGKILL signal depending on the state of the SIGBUS handler for the process. PID %d is the ID of the process that is getting the signal. The SIGKILL is sent if the SIGBUS is ignored or held. This message is informational and is followed by either a CMMU or VME Bus Error (described elsewhere in this table).
Memory will not fit in swap space	Not enough space to dump entire memory image. Use the debugger to obtain this dump or backup your system, boot from tape, then use **msledit**(1M) to enlarge the swap partition to at least the size of RAM + 2 blocks. Modify the DMPDEV and DUMPTYPE **sysgen** parameters. See **autodump**(8).

Table 1. Error Messages (Continued)

Error Message	Description/Action
mget map overflow %x. Lost %d items at %d	Memory fragmentation is so great that the system lost track of some of the fragments. Reboot. If the message continues to appear, increase the SPTMAP and SMPGMAPSZ **sysgen** parameters. See the *Tunable Parameters* section of the *Performance Management* chapter.
Missed Interrupt!	The request has finished but an interrupt was never received. Probable MVME327 hardware problem. Check VME backplane IACK jumpers for correct installation. Run diagnostics to determine if you should replace any of the hardware.
mmuflush - bad flag	Invalid argument passed to kernel function. Indicates bad kernel, bad memory, or bad code. Run diagnostics to determine if you should replace the disk, processor board, or memory board. If error reoccurs, call your Service Representative.
Mode select failed	The MVME328 tape crash dump routine could not get the tape drive into the correct mode. The crash dump is unusable. Probable hardware problem. Run diagnostics to determine if you should replace the tape drive.
MTS ERROR: reading nvram error list	Processor board or memory error list problem. Use GOLD to read the memory error list. If unsuccessful, replace the processor board.
Multiple extent files not supported	Multiple extent file feature currently not supported in ISO9660.
mutex free pool lock timeout!	Kernel internal resource lock is not freeing up. Probable bad multiprocessor board or memory problem. Run diagnostics to determine if you should replace the multiprocessor or memory board.
mutex free pool overflow!	Internal kernel error. Reboot. Run diagnostics to determine if you should replace the memory or processor board. If problem reoccurs, call your Service Representative.

SYSTEM V88

Table 1. Error Messages (Continued)

Error Message	Description/Action
MVME187 SCSI host address defaulting to 7	The SCSI host address was configured to be outside the valid range of 0 to 7. If 7 is not desired, reconfigure the address to another valid value.
MVME188 ECC CSR addr: 0x%x, value: 0x%x	This message is followed by either another WARNING or a PANIC. Probable bad ECC memory board. Power cycle and reboot. If problem continues, run diagnostics to determine if you should replace the memory board.
MVME188 ECC Memory Write with Bad Bus Parity.	Probable bad processor. For isolated instances, power cycle and reboot. Run diagnostics to determine if you should replace the processor board.
MVME188 ECC Memory Board Sequencer Failed.	Probable bad ECC memory board. Run diagnostics to determine if you should replace the memory board.
MVME188 ECC Uncorrected Memory Double Bit Error	A double bit error, unable to be corrected, was detected. Probable bad ECC memory board. Run diagnostics to determine if you should replace the memory board.
MVME188 ECC Single Bit Error Count Overflow.	The MVME188 status register indicates that the single bit error counter has overflowed. Probable bad ECC memory board. Run diagnostics to determine if you should replace the memory board.
MVME188 Error Status = 0x%x *** MVME188 External Error ***	This message is followed by the PANIC message shown. Probable MVME188 hardware problem. For isolated instances, power cycle and reboot. If it occurs frequently, replace the MVME188.
MVME2x4 Kernel Mode Parity Error; csr addr = 0x%x; value = 0x%x	A parity error was detected while in kernel mode. This message is followed by a kernel data fault that leads to a PANIC. Possible bad processor or memory board. Reboot. If problem occurs frequently, run diagnostics to determine if you should replace the processor or memory board.

Table 1. Error Messages (Continued)

Error Message	Description/Action
MVME2x4 User Mode Parity Error; csr addr = 0x%x; value = 0x%x	A parity error was detected while in user mode. The location is read and written to correct the parity. Possible bad processor or memory board. Reboot. If problem occurs frequently, run diagnostics to determine which board you should replace
newproc — fork failed	Unable to boot critical UNIX processes. Boot backup kernel (**unix.rel**). Check the NPROCS and NREGIONS **sysgen** parameters as documented in the *Tunable Parameters* section of the *Performance Management* chapter. There may not be enough main memory in system. Ensure system is seeing the correct amount of memory available by checking the ROM memory size message. May need to add memory.
newproc — no procs	Unable to boot critical UNIX processes. Boot backup kernel (**unix.rel**). Check the NPROCS **sysgen** parameter as documented in the *Tunable Parameters* section of the *Performance Management* chapter. There may not be enough main memory in system. Ensure system is seeing the correct amount of memory available by checking the ROM memory size message. May need to add memory.
NI_RENAMEDEL failed	The **unlink** phase of the **rename**(2) system call failed to remove the old filename. Run **fsck**(1M). Run diagnostics to determine if you should replace the drive.
No configured driver for SCSI address %d	An unsupported device type resides at the address displayed. If the device is a supported type, perform SCSI troubleshooting.
No data detected	No data detected on tape during a read operation. Ensure you are trying to read the intended tape and that you are not trying to read past the end of the data.

Table 1. Error Messages (Continued)

Error Message	Description/Action
no free envelopes	Probable MVME327 or MVME350 hardware problem. Reseat board. Reboot. Check board addressing, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.
No initialized media present	The system is set up to dump to a MVME328 disk that has not been opened. When system comes up, use any command that opens the device; e.g., sledit, msledit, dinit, scsiconfig.
no IOPB reconnect	The MVME328 controller received completion notification about an I/O request it knows nothing about. Most frequent cause for this message is conflicting SCSI identifiers—each peripheral on the SCSI bus must have a unique address. Can also be loose cables/cords or noise problems on the SCSI bus. Ensure that all cables/cords are properly seated and that all SCSI devices have unique addresses.
no packets	The MVME328 controller could not allocate a packet from the internal driver poll. Probable software problem. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
no space on...	The file system indicated by the rest of the message has run out of space. Remove some files in the file system or move them to another file system. See **find**(1) and **du**(1) for help in identifying files to remove.
no space on bad dev %o(8)	There is no more space on the file system. The system, however, cannot determine which device contains the file system that has run out of space. Probable bad processor or memory board or corrupted file system. Reboot. Run **fsck**(1M) and **df**(1M). Run diagnostics to determine if you should replace the processor or memory board.

Table 1. Error Messages (Continued)

Error Message	Description/Action
No space on dump device	The slice table for the dump device is not big enough to hold the system dump memory image or you have a bad disk. Use the Tape Dump Utility of the debugger to dump memory to tape. Modify the DMPDEV **sysgen** parameter (**autodump**(8)) or increase the swap partition to at least the size of physical memory. If DMPDEV is correct, verify the slice table. Run diagnostics to determine if you should replace the disk.
no space on floppy drive, slice #	The disk is full. Use a new disk or delete some files.
No timeout table allocated	No timeout table allocated at initialization. NCALL is less than or equal to 0. Increase the NCALL **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter
not a valid root	The root file system magic number is incorrect or the root device is improperly specified. Reboot from the SYSTEM V/88 installation tape. If reboot fails, perform a partial restore from the installation tape. Possible hardware problem. Run diagnostics to determine if you should replace any of the hardware
Not at beginning of tape	The tape is not at the beginning of the tape as expected. Rewind the tape and try the operation again.
Not enough memory for page allocation	The kernel tried to allocate more memory for STREAMS event cells. Either add memory or reduce the MAXSEPGCNT **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
not online	Bad MVME350 tape drive or not on-line. Ensure tape drive is on-line and check cables/cords. Run diagnostics to determine if you should replace the drive.

SYSTEM V88

Table 1. Error Messages (Continued)

Error Message	Description/Action
NOT READY dump device at SCSI address %d	The device that is configured for dumping the system memory is not ready (on-line, etc.). The system memory is not dumped. Perform a dump to tape using the debugger.
not ready	Bad drive or loose cables/cords. Check cables/cords or run diagnostics to determine if you should replace the drive.
nswap and swap slice not defined	Swap slice size is zero. Either the slice table is corrupted, or it was manually set to zero. Boot from tape, reformat hard disk, and restore from back up.
NULL fs pointer in s5iput	NULL file system pointer attached to in-core i-node. Indicates bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
Null m_mount in iget mp: %x	Internal system memory failure. Bad processor or memory board. Reboot. Run diagnostics to determine if you should replace the processor or memory board.
NULL mp in s5getinode()	Internal system memory failure. Bad processor or memory board. Reboot. Run diagnostics to determine if you should replace the processor or memory board.
NULL packet func pointer	At MVME328 interrupt time, the I/O packet describing the I/O request contained pointers to information that was NULL and should not be. Probable MVME328 driver problem. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
NULL packet pointer	The MVME328 controller returned an important pointer value that was NULL and should not be. Probable MVME328 hardware or software problem. Reseat board, reboot, and try the operation again. Run diagnostics to determine if you should replace any of the hardware; check the controller, processor or memory boards, or VMEbus.

Table 1. Error Messages (Continued)

Error Message	Description/Action
NULL unit pointer	At interrupt time, the I/O packet describing the I/O request contained pointers to information that was NULL and should not be. Probable MVME328 driver problem. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
null status	Cannot access the MVME350 controller board. Run diagnostics to determine if you should replace the MVME350 controller board.
Obsolete MC88100 CPU %d detected! cr0 = 0x%x	This message is followed by a PANIC. Your hardware revision level is obsolete. Upgrade your processor board.
Obsolete MC88200 *Code/Data* CMMU %d detected! idr = 0x%x	This message is followed by a PANIC. Your hardware revision level is obsolete. Upgrade your processor board.
odd value configured for v.v_nqueue KERNEL: strinit: was %d, set to %d v.v_nqueue, v.v_nqueue-1	Queues are always allocated in pairs, so the value of NQUEUE should be even. To avoid the message, make the NQUEUE **sysgen** parameter an even number. See the *Tunable Parameters* section of the *Performance Management* chapter.
offset > ip->i_size s5readpg: offset=%x ip->i_size == %x	Probable kernel bug in the file system code. Report the problem to your Service Representative.
out of clists	The system ran out of buffers to hold data. If the message occurs occasionally, increase the NCLIST **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter. If the message occurs frequently, check connections and modem settings. Note that the MVME332XT and MVME337 do not use clists.

SYSTEM V88

Table 1. Error Messages (Continued)

Error Message	Description/Action
Out of inodes	There are no more i-nodes on the file system and a new file cannot be created. The system, however, cannot determine which device contains the file system that has run out of i-nodes. Run **df**(1M) to determine which file system is out of i-nodes. Possible bad processor or memory board or corrupted file system. Reboot. Run **fsck**(1M). Run diagnostics to determine if you should replace the processor or memory board.
out of message queues - check MSGMNI	Out of message queues. Increase the MSGMNI **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
out of queues — check NQUEUE	Number of STREAMS queues exceeded. Increase the NQUEUE **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
out of rd_user space - check NRDUSER	Not enough space for another receive descriptor *user* entry. These entries are used during RFS recovery when the network or a client goes down. Increase the NRDUSER **sysgen** parameter. See the *Parameter Tuning* section of the *Remote File Sharing* chapter.
out of semaphore identifiers - check SEMMNI	Out of semaphore identifiers. Increase the SEMMNI **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
out of semaphore map space - check SEMMAP	Out of semaphore map space. Increase the SEMMAP **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
out of semaphore undo structures - check SEMMNU	Out of semaphore undo structures. Increase the SEMMNU **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.

Table 1. Error Messages (Continued)

Error Message	Description/Action
out of shared memory ids - check SHMMNI	Out of shared memory ids. Increase the SHMMNI **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
out of streams — check NSTREAM	Not enough Streams. Increase the NSTREAM **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
Out of swap space.	The process will not wait for swap space. Reboot. Using **swap**(1M), increase swap space or add memory.
out of swap space: needed # blocks	Need more swap space. Using **swap**(1M), increase swap space or run fewer processes.
Out of swap space. Waiting for %d pages.	The process will wait for the swap space. Using **swap**(1M), increase swap space or add memory.
out of transmit packets.	Probable MVME336 hardware problem. Reseat board. Reboot. Check board addressing, cables, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.
page read error on bad dev %o(8)	If using CD-ROM, it has failed to execute the program you are trying to run. Bad drive, media, or SCSI problem. Clean or try another CD. Perform SCSI troubleshooting. Otherwise, disk read error during page fault. Corrupted file system or bad disk drive. Run **fsck**(1M). In both cases, run diagnostics to determine if you should replace the drive.
pfault - ptmemall	Initial debug message that should never occur. Indicates bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.

Table 1. Error Messages (Continued)

Error Message	Description/Action
pinsert — pinsert dup	The kernel attempted to add a page to the page cache, but the page was already there. Possible bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board. If hardware passes diagnostics, contact your Service Representative to report a possible kernel bug.
poll_panic called	The driver called a function that should never be called. Probable software problem. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
PRINTER is deselected on controller %d, unit %d	Informational message alerting you that printer is not selected. Ensure printer cables/cords are seated and check the printer select switch.
PRINTER is out of paper on controller %d, unit %d	Informational message alerting you that the printer is out of paper. Check paper supply.
PRINTER fault for unknown reason on controller %d, unit %d	Indicates a printer error other than the paper out or the deselected printer error conditions. Check the printer cables/cords or refer to the printer manufacturer's user manual.
printer not ready	Ensure printer is on-line. Check printer cables/cords. Power cycle the printer and run the diagnostics supplied with the printer.
Process table overflow — check NPROC	The kernel cannot start another process because there is no more room in the process table. Use **ps**(1) to determine if there are any unexpected processes running. Increase the NPROC **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
queue mode start failed	The specified controller failed to start operating in queued mode. Controller or SCSI problem. Perform SCSI troubleshooting. Run diagnostics to determine if you should replace the controller.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Ran out of packets!	Not enough memory resources. Probable hardware problem. Run diagnostics to determine if you should replace any of the hardware.
Region table overflow — check NREGION	Each text, data, stack, and shmem process segment requires one entry in the region table. The system call that tried to allocate another region failed. Reduce the number of processes, or increase the size of the region table by increasing the NREGION **sysgen** parameter.
Request Sense failed on %s	A peripheral error occurred during polled mode operation and the attempt to obtain more information from the peripheral about the problem failed. Peripheral, controller, power supply, or SCSI problem. Ensure cables/cords properly seated and proper termination. Perform other SCSI troubleshooting. Run peripheral and controller diagnostics.
rem_inode cache hit error	Invalid information found in the Remote File Sharing (RFS) remote i-node cache. Indicates bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
Request TIMED OUT!!	After one minute, disk request has not been completed. Probable disk problem. Run diagnostics to determine if you should replace the disk.
Resetting MVME187 SCSI bus	Severe problem occurred with the specified controller and a reset is required to clear the condition. Probable hardware or SCSI problem. Reboot. Perform SCSI troubleshooting. Run diagnostics to determine if you should replace any of the hardware.
resetting SCSI bus %d on ctlr %d	Severe problem occurred with the specified controller and a reset is required to clear the condition. Probable hardware or SCSI problem. Reboot. Perform SCSI troubleshooting. Run diagnostics to determine if you should replace any of the hardware.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Return to Firmware Requested. System secured for RESET.	Informational message indicating a successful **sysadm firmware** or **uadmin 2 2**.
rmount inode hit	The i-node used for mounting a Remote File Sharing (RFS) file system was already associated with another file system. Indicates bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
rnamei1	The kernel looked up an i-node, found it in an RFS mounted file system, but the internal data was inconsistent. Indicates bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
s5clrfree	The kernel attempted to allocate disk blocks that are outside of the file system. Possible bad hardware or file system corruption. Run **fsck**(1M). Run diagnostics to determine if you should replace any of the hardware.
s5freecache block loss	During a file system unmount operation, the state of the kernel's cache was found to be invalid. Run **fsck**(1M) to check the file system. Ensure system is seeing the correct amount of memory available using **prtconf**(1M). May need to add memory. If occurs frequently, run system diagnostics.
s5init not found in fstypsw	At boot time, the operating system determined that the kernel is corrupted or badly generated. Indicates a memory failure or **sysgen** problem. Run **sysgen -bgi** to regenerate the kernel. Run diagnostics to determine if you should replace the memory board.
s5setfree	The kernel attempted to free disk blocks that are outside of the file system. Possible bad disk hardware or file system corruption. Run **fsck**(1M). Run diagnostics to determine if you should replace any of the hardware.

Table 1. Error Messages (Continued)

Error Message	Description/Action
s5umount dev has Fs2BLK set	Fs2BLK should never be set on a Motorola file system. Indicates memory or disk corruption. Run **fsck**(1M) on all file systems. Run diagnostics to determine if you should replace the disk, processor board, or memory board.
s5write_bit_map #1	There is an inconsistency between the file system size and the number of blocks reserved for the free block bit map. Bad disk drive or controller. Run diagnostics to determine if you should replace the disk drive or controller.
s5write_bit_map #2	A free block was not available for the free block bit map. Bad disk drive or controller. Run diagnostics to determine if you should replace the disk drive or controller.
s5write_free_list	Memory did not yield as many free blocks as the super block indicated. Possible bad hardware or file system corruption. Run **fsck**(1M). Run diagnostics to determine if you should replace any of the hardware.
SBR request sense failed for %s	The driver was not able to clear the reset status from a peripheral affected by a SCSI bus reset. Peripheral or SCSI problem. Ensure that all cables/cords are properly seated. Perform other SCSI troubleshooting. Run peripheral diagnostics.
sched - couldn't get ptbl and dbd for u-block	sched could not allocate two pages to bring in the u-block of a process. Not enough main memory in system or bad memory board. Ensure system is seeing the correct amount of memory available using **prtconf**(1M). May need to add memory. Run diagnostics to determine if you should replace the memory board.
SCSI bus reset failed	The SCSI bus reset command to the controller failed. When a SCSI bus reset is attempted, the driver has detected a SCSI bus hang. The reset should clear the SCSI bus hang. SCSI bus hangs are not normal and should be corrected by performing SCSI troubleshooting.

Table 1. Error Messages (Continued)

Error Message	Description/Action
SCSI bus reset recovery has succeeded for ctlr %d bus %d	Informational message notifying you that the SCSI bus reset sequence succeeded and the driver will attempt normal operation. When a SCSI bus reset is attempted, the driver has detected a SCSI bus hang. The reset should clear the SCSI bus hang. SCSI bus hangs are not normal and should be corrected by performing SCSI troubleshooting.
SCSI Driver Library Initialization failed. Local SCSI bus is not accessible. sdl_init returned 0x%x	An error occurred in the SCSI Driver Library (MVME1x7) and was not able to initialize the local SCSI bus. Perform SCSI troubleshooting.
scsidump called with bad dumpdev == 0x%x	DMPDEV points to a nonexistent device. Modify the DMPDEV **sysgen** parameter. See **autodump**(8).
sd_status: bp == 0	Operating system received an unsolicited status from the SCSI chip or bus. Processor or SCSI problem. Perform SCSI troubleshooting. Run diagnostics to determine if you need to replace the processor board.
setrq — proc on q	Kernel tried to add a process that already exists on the run queue. Initial debug message that should never occur. Indicates bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
setrun - unknown process state %d	The setrun routine contains an unknown value. If this message is encountered during software development, suspect a problem with the new code. Otherwise, run diagnostics to determine if you should replace the memory or processor board.
shmctl - couldn't lock # pages into memory	Not enough main memory in system. Ensure system is seeing the correct amount of memory available using **prtconf**(1M). May need to add memory.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Shutting off external devices.	Informational message documenting the final steps initiated in a shutdown sequence caused by high temperature or power failure. A "power off" signal will be sent to the external devices connected to the Environmental Monitor Board's transition module.
Shutting off internal power.	Informational message documenting the final steps initiated in a shutdown sequence caused by high temperature or power failure. A "power off" signal will be sent to the internal power supply.
signal definition error	Probable hardware problem or loose cables/cords. Run diagnostics to determine if you should replace any of the hardware.
sig access error	The kernel could not create a core file either because the file system is not writable or a "core" already exists but it is not a regular file. This message can also indicate a hardware problem. Run diagnostics to determine if you should replace any of the hardware.
size too large	Problem with the driver software raw buffer size. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
Small page table allocation map is full!	The system is experiencing memory fragmentation. Run **sysgen** and double the SMPGMAPSZ parameter.
sptmemall - insufficient memory to allocate *xx* pages (system call failed)	Operating system did not have enough memory to run a process. Using **swap**(1M), increase swap space or add memory.
sptmemall - insufficient memory to lock *xx* pages (system call failed)	Operating system did not have enough memory to run a process. Increase physical memory.
srmount — cannot mount root	Kernel cannot mount the root file system when booting. Boot from tape and run **fsck**(1M) on the root file system.

SYSTEM V88

Table 1. Error Messages (Continued)

Error Message	Description/Action
srmount - high performance root	Kernel cannot use a high performance file system for the root file system. Boot from tape and remake the root file system using **mkfs**(1M) without the **-h** option. Restore from backup.
srmount — not a valid root	When the root file system was being mounted during the kernel boot, it did not contain the correct "magic number". Boot from tape and run **fsck**(1M) on the root file system.
srmount table overflow - check NSRMOUNT	A remote machine was trying to mount one of this machine's Remote File Sharing (RFS) resources. The mount failed because there are no more remote table entries left on this machine. Increase the NSRMOUNT **sysgen** parameter.
stray fs (inode *) call	Probable hardware problem. Reboot. Run diagnostics to determine if you should replace any of the hardware.
stray fs (int *) call	Probable hardware problem. Reboot. Run diagnostics to determine if you should replace any of the hardware.
stray fs call	Probable hardware problem. Reboot. Run diagnostics to determine if you should replace any of the hardware.
stray interrupt at #	Unexpected interrupt from unknown source or hardware configuration error. Check system controllers, I/O controllers, IACK jumpers. Reboot. Run diagnostics to determine if you should replace any of the hardware.
Stray local interrupt, ISR = #, IMR = #	An unexpected interrupt occurred. Possible bad processor. Run diagnostics to determine if you should replace the processor board.

Table 1. Error Messages (Continued)

Error Message	Description/Action
stream buffers of strmsgsz %d not allocated strinit: strmsgsz reduced to %d	There are less than two STREAMS buffers allocated for block sizes less than the STRMSGSZ **sysgen** parameter. Either allocate more buffers for NBLK's less than STRMSGSZ, or reduce STRMSGSZ. The current value of STRMSGSZ is automatically divided in half. See the *Tunable Parameters* section of the *Performance Management* chapter.
Sum of NLOCAL and NREMOTE exceeds NBUF	Informational message informing you that the kernel's *nlocal* and *nremote* variables are automatically adjusted to one-third of NBUF. If more RFS buffers are required, adjust the NBUF **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
swap - i/o error in swap	An access (read/write) error occurred on the swap device. Reboot. Run disk diagnostics and check for bad blocks on the swap partition. If SCSI device, perform SCSI troubleshooting.
swap space running out: needed # blocks	Contiguous memory is not available to swap out a process. Run fewer simultaneous processes or use **swap**(1M) to increase swap space.
swapdel - too few free pages	An attempt to delete a swap file has failed because it would result in too little remaining space. Try again when fewer processes are running.
sxt cannot allocate link buffers	Cannot allocate memory at initialization. Ensure system is seeing the correct amount of memory available using **prtconf**(1M). May need to add memory.
System Halt Requested. System secured for powerdown.	Informational message indicating a successful **sysadm powerdown** or **uadmin 2 0**.
System Reboot Requested. System secured for RESET.	Informational message indicating a successful **sysadm reboot** or **uadmin 2 1**.

Table 1. Error Messages (Continued)

Error Message	Description/Action
system removing page 0x%x	An unallocatable memory page was saved in NVRAM so that it is automatically removed from the free memory pool on the next boot. Use GOLD to test for a bad memory board.
System V inode table overflow	No more files can be opened. Reconfigure the system with a bigger i-node table by increasing the NINODE **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
Tape not ready	Bad tape drive, not closed/online, or SCSI problem. Ensure tape drive is closed and online or perform SCSI troubleshooting. Run diagnostics to determine if you should replace the drive.
Tape reset did not occur	The controller was not able to reset the tape drive after a reported error. Run diagnostics to determine if you should replace the drive.
tape timeout	Probable hardware problem. Reboot. Try operation again. Try a new tape or drive. Run diagnostics to determine if you should replace the controller.
tape write protected	Bad drive or media problem. Perform media troubleshooting. Run diagnostics to determine if you should replace the drive.
This system requires CMMU upgrade to Mask D.0	You have obsolete hardware, contact your Service Representative to upgrade the processor board.
This system requires CPU upgrade to Mask E.2	You have obsolete hardware, contact your Service Representative to upgrade the processor board.
time out on rewind	Probable hardware problem. Reboot. Try operation again. Try a new tape or drive. Run diagnostics to determine if you should replace the drive or controller.

Table 1. Error Messages (Continued)

Error Message	Description/Action
timeout error on %s	Illegal timeout parameters for the specified device. You cannot use the peripheral until you modify the timeout values in the **m328space.h** file, build a new kernel, and reboot the system.
Timeout	Probable hardware problem. Reboot. Try operation again. Try a new tape or drive. Run diagnostics to determine if you should replace the controller.
Timeout table overflow	Timeout request overflow while trying to add another entry to the table. Increase the NCALL **sysgen** parameter. See the *Tunable Parameters* section of the *Performance Management* chapter.
timeout while waiting for completion	Probable hardware problem. Reboot. Try operation again. Try a new tape. Run diagnostics to determine if you should replace the drive or controller.
Too Many Imprecise Exceptions	More than nine imprecise exceptions were nested. Indicates bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
Too many MVME2x4 memory boards, expecting up to %d	Indicates memory problem or too many memory boards installed. Reboot. Run memory tests using the debugger. Run diagnostics to determine if you should replace the memory board.
Transfer not a multiple of the block size	The requested read or write operation is incompatible with the record size of the tape drive. Bad drive, incorrect byte specification, or SCSI problem. Perform SCSI troubleshooting. If you are trying to write data to an Exabyte drive, make sure the tape utility specifies the data byte length as a multiple of 1024. Run diagnostics to determine if you should replace the drive.
unable to *getcbytes/getcpages*	Not enough main memory in system. Reset system and check ROM memory size message to ensure system is seeing the correct amount of memory available. May need to add memory.

Table 1. Error Messages (Continued)

Error Message	Description/Action
uncorrectable data error	Bad drive or media problem. Perform media troubleshooting. Run diagnostics to determine if you should replace the drive.
unexpected SCSI interrupt	The kernel received an interrupt from a SCSI interface but the SCSI device driver was not initialized. Probable bad processor board. Run diagnostics to determine if you should replace the board.
Unexpected VME IACK vector, vect = 0x%x	Vector is not initialized to the driver. Indicates bad hardware, a board was added without configuring the driver, or an IACK jumper was incorrectly installed or missing. Check driver configuration and IACK jumper installation. Run diagnostics to determine if you should replace any of the hardware.
unformatted sector size 0 cannot calculate slip sector	Disk format problem. Reformat the disk drive.
Unit not initialized	Bad drive, loose cables/cords, or lock lever not down. Ensure drive lever is down and cables/cords are properly seated. Run diagnostics to determine if you should replace the drive.
Unit not ready	Tape device is not ready. Most likely cause is no tape in the drive, but may also be a problem with an improperly inserted ARCHIVE tape. Ensure there is a tape in the drive. Check the ARCHIVE tape format.
unknown command	The controller build function could not create the expected SCSI command to the peripheral. Probable software problem. Reboot and try the operation again. If the system panics again, try to get a dump for problem isolation and call your Service Representative.
unknown error	Probable hardware problem. Reseat board. Reboot. Check board addressing, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.

Table 1. Error Messages (Continued)

Error Message	Description/Action
Unknown function code.	Using invalid argument with **uadmin**(1M). Refer to the manual page for valid arguments.
unknown level in cmn_err (level = %d, msg = %s)	The common error software was invoked to process an error, but given an invalid severity level. This problem is secondary; the actual problem is given by the message string. May indicate bad processor or memory board. Run diagnostics to determine if you should replace the processor or memory board.
Unknown interrupt on controller %d, unit %d	Probable hardware problem. Reseat board. Reboot. Run diagnostics to determine if you should replace the controller.
unknown process state %d	The setrun routine contains an unknown value. If this message is encountered during software development, suspect a problem with the new code. Otherwise, run diagnostics to determine if you should replace the memory or processor board.
Unknown Trap Type = 0x%x	Illegal instruction or bad pointer encountered in kernel mode. Probable bad processor board. Run diagnostics to determine if you should replace the processor board.
unknown variation/firmware	The driver does not recognize the controller type or the controller has firmware that the driver does not recognize. Upgrade the firmware on the controller board with a version the driver recognizes.
Unrecoverable data error	Probable drive or media problem. Reboot and try the operation again. Perform media troubleshooting. Run diagnostics to determine if you should replace the drive.
unremio failed: err=%d	An error occurred copying data from a local disk to a Remote File Sharing (RFS) client. The error value is in **errno**. See **intro**(2) for a description.

Table 1. Error Messages (Continued)

Error Message	Description/Action
unsupported configuration, check board revisions m323: at least one controller disabled	Indicates an unsupported configuration of two MVME323 boards. Both boards need to be the same revision level. For example, your system cannot have an MVME323-1 board with an MVME323-2 board.
Unsupported ether driver option: *SO_OWNALLOC/SO_OWNCOPYIN*	You are trying to add an unsupported driver. Use the driver at your own risk. If it is a supported driver, run diagnostics to determine if you should replace the processor or memory board.
unswap - premove	Page unlink kernel function failed to find page in the links. Indicates bad kernel, bad memory, or bad processor board. Run diagnostics to determine if you should replace the memory or processor board. If error reoccurs, call your Service Representative.
unswap - ptmemall	Unable to allocate a page when trying to swap. Indicates bad memory or processor board. Run diagnostics to determine if you should replace the memory or processor board.
User Score Board Hang Detected pc = 0x%x, ps = 0x%x User process %s, PID %d KILLED	The 88100 score board (internal instruction scheduling hardware) has hung. The user process will be killed with a SIGFPE. 88100 chip failure. See **fdivfix**(1). Run diagnostics to determine if you should replace the processor board.
useracc - couldn't lock page	Insufficient main memory available to lock a user data page in memory to service a read or write system call to a raw device. Reduce system load, reduce size of raw I/O buffer in user program, or add more main memory.
valid not set on %s	The device driver could not mark an identified peripheral as valid. Internal driver problem. Contact your Service Representative for assistance.

Table 1. Error Messages (Continued)

Error Message	Description/Action
vfault — bad dbd_type	Unrecognized page type in fault handler. Indicates bad memory or processor board. Run diagnostics to determine if you should replace the memory or processor board.
VME bus error	Probable hardware problem. Reseat board. Reboot. Check board addressing, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.
VME Bus Error at *User/Kernel Data/Code* Address :0x%x Bus Error at Physical Address :0x%x	The system detected an access failure due to VME bus timeout. If this occurs frequently, run diagnostics to determine if you have a VME bus I/O board failure.
VME IACK TIMEOUT, level = 0x%x, isr = 0x%x	Interrupt from a board that does not give a vector. Indicates bad hardware or an IACK jumper was incorrectly installed or missing. Check IACK jumper installation. Run diagnostics to determine if you should replace any of the hardware.
VME System Fail Status Detected	This message appears on the console every five minutes indicating a failed board. Check boards for failure indicator lights.
VME181 local RAM Parity Error	Preceded by a WARNING message containing the program counter and the address of the register save area. Reboot. Run diagnostics to determine if you should replace the processor or memory board. If problem persists or occurs more than three times in a month, consider replacing the processor board.
VME187 local ECC RAM Multiple Bit Error	Preceded by a WARNING message containing the program counter, the address of the register save area, and the memory address of the error. Reboot. Run diagnostics to determine if you should replace the processor or memory board. If problem persists or occurs more than three times in a month, consider replacing the processor board.

Table 1. Error Messages (Continued)

Error Message	Description/Action
VME187 local RAM Parity Error	Preceded by a WARNING message containing the program counter and the address of the register save area. Reboot. Run diagnostics to determine if you should replace the processor or memory board. If problem persists or occurs more than three times in a month, consider replacing the processor board.
VME188 VME Bus Arbiter Timeout	MVME188 board interrupt occurred. Run VMEbus disk diagnostics to determine if you should replace the processor board.
VME336: error: port: %d, cmd %x, data: %x	The MVME336 driver does not recognize the status from the cluster controller. Probable hardware problem. Reseat board. Reboot. Check board addressing, strapping/jumper settings, front panel switches. Run diagnostics to determine if you should replace any of the hardware.
VMERAM *Kernel/User* Mode Uncorrectable Error: csr addr = 0x%x; value = 0x%x	Indicates bad memory board or VME bus problem. Use the csr address to identify the board encountering the error. Run diagnostics to determine if you should replace any of the hardware.
waitchan free pool lock timeout!	Kernel internal resource lock is not freeing up. Probable bad multiprocessor board or memory problem. Reboot. Run diagnostics to determine if you should replace the multiprocessor or memory board. If problem reoccurs, call your Service Representative.
waitchan free pool overflow!	Internal kernel error. Reboot. Run diagnostics to determine if you should replace the processor or memory board. If error reoccurs, call your Service Representative.
wakeup p_stat	Process not asleep or stopped; however, it is in the sleep queue. Kernel bug, memory, or processor problem. Run diagnostics to determine if you should replace the memory or processor board.

Table 1. Error Messages (Continued)

Error Message	Description/Action
work queue initialization failed	The controller failed to initialize internal work queues. Controller or SCSI problem. Perform SCSI troubleshooting. Run diagnostics to determine if you should replace the controller.
Write error on SCSI address %d, allstat = 0x%x	If encountered during a system dump, indicates an error occurred trying to write to the dump device. Use the Tape Dump Utility of the debugger to dump memory to tape. Perform SCSI troubleshooting. Otherwise, indicates a write error on a SCSI device. Perform SCSI and/or media troubleshooting.
Write posting error: PC=0x%x, regp=0x%x	Bus error occurred during a delayed write. Run diagnostics to determine if you have a device or processor board problem.
Write protected	Bad drive or media problem. Perform media troubleshooting. Run diagnostics to determine if you should replace the drive.
WRITE PROTECTED dump device at SCSI address %d	You are trying to dump to a device that is write protected. Write enable the device or reconfigure the DMPDEV **sysgen** parameter to a writable device. Use the Tape Dump Utility of the debugger to recover the dump.
xalloc — bad magic	An invalid magic number, which should have been detected earlier by the kernel. Kernel bug, memory, or processor problem. Run diagnostics to determine if you should replace the memory or processor board.

Running Diagnostics

Diagnostic programs are available for R32-based systems. This section gives a brief overview for each diagnostic product. For detailed information, refer to the specific user manual for the product.

ROM Debuggers

Each CPU board has a debugger programmed into the on-board firmware. The debugger contains a set of diagnostic routines to test and diagnose the CPU board including the peripheral controller devices on the board itself; for example, the LAN and SCSI chips on a MVME187 board.

MVME181BUG

The MVME181BUG debugging package, 181bug™, supports tests for:

- CPU confidence
- Memory
- Serial I/O
- Cache/Memory Management Units

The MVME181BUG is documented in the *MVME181BUG 181Bug Debugging Package User's Manual* (MVME181BUG).

MVME187BUG

The MVME187BUG debugging package, 187bug™, supports tests for:

- CPU confidence
- Local RAM and Static RAM
- Real Time Clock
- Peripheral Channel Controller
- ECC Memory Boards
- MEMC040 Memory Controller
- Serial I/O
- Cache/Memory Management Units
- VME Interface
- LAN Coprocessor
- SCSI I/O Processor

In addition to testing on-board firmware, you can use the 187bug™ to troubleshoot SCSI device problems. You can use the debugger to scan the SCSI bus for devices visible to the CPU board. Refer to the **iot** command in the documentation.

The MVME187BUG features are also available in the M8120 systems and uses the same documentation.

The MVME187BUG is documented in the *MVME187BUG 187Bug Debugging Package User's Manual* (MVME187BUG).

MVME188BUG

The MVME188BUG debugging package, 188bug™, supports tests for:

- CPU confidence
- Local RAM
- ECC Memory Boards
- Static RAM
- Real Time Clock
- Address Decoder
- Interrupts
- Serial I/O
- VME Interface
- Counter/Timer
- Cache/Memory Management Unit

The MVME188BUG is documented in the *MVME188BUG 188Bug Debugging Package User's Manual* (MVME188BUG).

Standalone System Interactive Diagnostics (SSID)

SSID is a set of system level tests and fault isolation diagnostics that execute on a VME-based system. SSID runs in a stand-alone environment; it does not interact with the operating system at any time. SSID is selected at system boot time in place of the operating system and has complete control over all hardware and peripherals.

SSID supports tests for:

- Quick system confidence check with and without communication
- CPU, memory, disk, tape, communication fault test suites

- M8120 System
- MVME188 Multiprocessor
- MVME181 CPU
- MVME187 Single Board Computer
- Various Memory Boards
- MVME393 Graphics controller
- MVME395 Graphics controller
- MVME050 Tape controller
- MVMEenv Environmental Monitor Board
- MVME320 Winchester/floppy disk controller
- MVME323 ESDI disk controller
- MVME327 SCSI disk controller
- MVME328 SCSI disk controller
- MVME350 streaming tape controller
- MVME355 9-track tape controller
- MVME360 SMD disk controller
- MVME330 LAN controller
- MVME31/MVME332 Asynchronous communications controllers
- MVME333/MVME333X25 WAN controllers
- MVME332XT Asynchronous communications controller
- MVME355 Asynchronous communications controller
- MVME336 DeltaLINK Asynchronous communications controller
- MVME337/MVSB741 I/O Engine
- MVME374 Multi-protocol Ethernet Interface
- MVME376 Ethernet Controller

SSID is documented in the *Standalone System Interactive Diagnostics User's Guide* (SSIDUG).

General On-Line Diagnostics (GOLD)

The GOLD package is a set of menu-driven diagnostic procedures that can be performed without disabling normal use of the system.

GOLD supports tests for:

- Network
- SCSI bus and devices
- System memory
- CPU floating point unit
- Tape drives
- Disk drives
- Serial I/O

In addition, GOLD provides an interface to display system console messages and extract and display messages from a system core dump. It also provides an interface for managing defective blocks on disk drives.

The GOLD package is documented in *SYSTEM V/68 Release 3 and SYSTEM V/88 Release 3.2 General On-Line Diagnostics (GOLD) User's Guide* (R3GOLDUG).

SYSTEM V88

Call Error Messages

A system call that is unsuccessful returns an impossible value to the calling process. This impossible value is almost always a -1. When a system call is successful, a value of 0 is returned to the calling process. Any time a system call is unsuccessful, an external variable called *errno* is set to one of the numbers in the following table.

When a -1 value is returned, the *errno* variable contains the number corresponding to the reason of the failure. The *errno* variable is only valid immediately after a system call failure. It is not cleared on successful system calls. These error numbers are defined in the **/usr/include/sys/errno.h** header file.

Table 2. Error Codes

Error		Description
Number	**Name**	
1	EPERM	**Not Owner.** Typically this error indicates an attempt to modify a file in some way forbidden except to its owner or superuser. It is also returned for attempts by ordinary users to do things allowed only to the superuser.
2	ENOENT	**No such file or directory.** This error occurs when a file name is specified and the file should exist but does not, or when one of the directories in a path name does not exist.
3	ESRCH	**No such process.** No process can be found corresponding to that specified by **pid** in **kill** or **ptrace**.
4	EINTR	**Interrupted system call.** An asynchronous signal (e.g., interrupt or quit), which the user has elected to catch, occurred during a system call. If execution is resumed after processing the signal, it appears as if the interrupted system call returned this error condition.
5	EIO	**I/O error.** Some physical I/O error. This error may in some cases occur on a call following the one to which it actually applies.
6	ENXIO	**No such device or address.** I/O on a special file refers to a subdevice that does not exist, or beyond the limits of the device. It may also occur when, for example, a tape drive is not online or no disk pack is loaded on a drive.

Table 2. Error Codes (Continued)

Error Number	Error Name	Description
7	E2BIG	**Arg list too long**. An argument list longer than 5,120 bytes is presented to a member of the *exec* family.
8	ENOEXEC	**Exec format error**. A request is made to execute a file which, although it has the appropriate permissions, does not start with a valid magic number (see **a.out**(4)).
9	EBADF	**Bad file number**. Either a file descriptor refers to no open file, or a read (respectively write) request is made to a file which is open only for writing (respectively reading).
10	ECHILD	**No child processes**. A **wait**, was executed by a process that had no existing or unwaited-for child processes.
11	EAGAIN or EWOULDBLOCK	**No more processes**. A **fork** failed because the systems process table is full or the user is not allowed to create any more processes.
12	ENOMEM	**Not enough space**. During an **exec**, **brk**, or **sbrk**, a program asks for more space than the system is able to supply. This is not a temporary condition; the maximum space size is a system parameter. The error may also occur if the arrangement of text, data, and stack segments requires too many segmentation registers, or if there is not enough swap space during a **fork**.
13	EACCES	**Permission denied**. An attempt was made to access a file in a way forbidden by the protection system.
14	EFAULT	**Bad address**. The system encountered a hardware fault in attempting to use an argument of a system call.
15	ENOTBLK	**Block device required**. A non-block file was mentioned where a block device was required, e.g., in **mount**.
16	EBUSY	**Mount device busy**. An attempt to mount a device that was already mounted or an attempt was made to dismount a device on which there is an active file (open file, current directory, mounted-on file, active text segment). It also occurs if an attempt is made to enable accounting when it is already enabled.

SYSTEM V88

Table 2. Error Codes (Continued)

Error		Description
Number	Name	
17	EEXIST	**File exists.** An existing file was mentioned in an inappropriate context, e.g., **link**.
18	EXDEV	**Cross-device link.** A link to a file on another device was attempted.
19	ENODEV	**No such device.** An attempt was made to apply an inappropriate system call to a device; e.g., read a write-only device.
20	ENOTDIR	**Not a directory.** A non-directory was specified where a directory is required, for example in a path prefix or as an argument to **chdir**(2).
21	EISDIR	**Is a directory.** An attempt to write on a directory.
22	EINVAL	**Invalid argument.** Some invalid argument (e.g., dismounting a non-mounted device; mentioning an undefined signal in **signal**, or **kill**, reading or writing a file for which **lseek** has generated a negative pointer). Also set by the math functions described in the (3M) entries of the *Programmer's Reference Manual.*
23	ENFILE	**File table overflow.** The systems table of open files is full, and temporarily no more **opens** can be accepted.
24	EMFILE	**Too many open files.** An attempt was made to open more files than a user is allowed to have open simultaneously. The number of files a user can have open simultaneously is a parameter that can be changed through **sysgen.** If the user uses **fopen**(3S) to open files, the maximum number of files that can be opened is the lesser of the value established via **sysgen**, and _NFILE (see **<stdio.h>**).
25	ENOTTY	**Not a typewriter.**
26	ETXTBSY	**Text file busy.** An attempt to execute a pure-procedure program that is currently open for writing (or reading). Also, an attempt to open for writing a pure-procedure program that is being executed.

Table 2. Error Codes (Continued)

Error		Description
Number	**Name**	
27	EFBIG	**File too large**. The size of a file exceeded the maximum file size (1,082,201,088 bytes) or ULIMIT; see **ulimit**(2).
28	ENOSPC	**No space left on device**. During a write to an ordinary file, there is no free space left on the device.
29	ESPIPE	**Illegal seek**. An **lseek** was issued to a pipe.
30	EROFS	**Read-only file system**. An attempt to modify a file or directory was made on a device mounted read-only.
31	EMLINK	**Too many links**. An attempt to make more than the maximum number of links (1000) to a file.
32	EPIPE	**Broken pipe**. A write on a pipe for which there is no process to read the data. This condition normally generates a signal; the error is returned if the signal is ignored.
33	EDOM	**Math argument**. The argument of a function in the math library (3M) is out of the domain of the function.
34	ERANGE	**Result too large**. The value of a function in the math package (3M) is not representable within machine precision.
35	ENOMSG	**No message of desired type**. An attempt was made to receive a message of a type that does not exist on the specified message queue (see **msgop**(2)).
36	EIDRM	**Identifier removed**. This error is returned to processes that resume execution due to the removal of an identifier from the file system's name space (see **msgct**(2), **semctl**(2), and **shmctl**(2)).
37	ECHRNG	Channel number out of range.
38	EL2NSYNC	Level 2 not synchronized.
39	EL3HLT	Level 3 halted.
40	EL3RST	Level 3 reset.

SYSTEM V88

Table 2. Error Codes (Continued)

Error		Description
Number	Name	
41	ELNRNG	Link number out of range.
42	EUNATCH	Protocol driver not attached.
43	ENOCSI	No CSI structure available.
44	EL2HLT	Level 2 halted.
45	EDEADLK	Deadlock condition.
46	ENOLCK	No record locks available.
50	EBADE	Invalid exchange.
51	EBADR	Invalid request descriptor.
52	EXFULL	Exchange full.
53	ENOANO	No anode.
54	EBADRQC	Invalid request code.
55	EBADSLT	Invalid slot.
56	EDEADLOCK	File-locking deadlock error.
57	EBFONT	Bad font file fmt.
60	ENOSTR	Device not a stream.
61	ENODATA	No data (for no-delay i/o).
62	ETIME	Timer expired.
63	ENOSR	Out of streams resources.
64	ENONET	Machine is not on the network.
65	ENOPKG	Package not installed.
66	EREMOTE	The object is remote.
67	ENOLINK	The link has been severed.

Table 2. Error Codes (Continued)

Error		Description
Number	Name	
68	EADV	Advertise error.
69	ESRMNT	srmount error.
70	ECOMM	Communication error on send.
71	EPROTO	Protocol error.
74	EMULTIHOP	Multihop attempted.
76	EDOTDOT	Cross mount point (not really error).
77	EBADMSG	Trying to read unreadable message.
78	ENAMETOOLONG	Filename too long.
80	ENOTUNIQ	Given log.name not unique.
81	EBADFD	f. d. invalid for this operation.
82	EREMCHG	Remote address changed.
83	ELIBACC	Cannot access a needed shared library.
84	ELIBBAD	Accessing a corrupted shared library.
85	ELIBSCN	The .lib section in a.out corrupted.
86	ELIBMAX	Attempting to link in too many libraries.
87	ELIBEXEC	Attempting to exec a shared library.
89	ENOSYS	System call not supported.
90	ELOOP	Too many levels of symbolic links.
91	ERESTART	Unsupported file system operation.
128	EINPROGRESS	Operation now in progress.
129	EALREADY	Operation already in progress.
130	ENOTSOCK	Socket operation on non-socket.

Table 2. Error Codes (Continued)

Error		Description
Number	Name	
131	EDESTADDRREQ	Destination address required.
132	EMSGSIZE	Message too long.
133	EPROTOTYPE	Protocol wrong type for socket.
134	ENOPROTOOPT	Protocol not available.
135	EPROTONOSUPPORT	Protocol not supported.
136	ESOCKTNOSUPPORT	Socket type not supported.
137	EOPNOTSUPP	Operation not supported on socket.
138	EPFNOSUPPORT	Protocol family not supported.
139	EAFNOSUPPORT	Protocol family does not support address family.
140	EADDRINUSE	Address already in use.
141	EADDRNOTAVAIL	Cannot assign requested address.
142	ENETDOWN	Network is down.
143	ENETUNREACH	Network is unreachable.
144	ENETRESET	Network dropped connection on reset.
145	ECONNABORTED	Software caused connection abort.
146	ECONNRESET	Connection reset by peer.
147	ENOBUFS	No buffer space available.
148	EISCONN	Socket is already connected.
149	ENOTCONN	Socket is not connected.
150	ESHUTDOWN	Cannot send after socket shutdown.
151	ETOOMANYREFS	Too many references: cannot splice.
152	ETIMEDOUT	Connection timed out.

Table 2. Error Codes (Continued)

Error		Description
Number	Name	
153	ECONNREFUSED	Connection refused.
156	EHOSTDOWN	Connection refused.
158	ENOTEMPTY	Directory not empty.

Firmware Error Messages

The firmware mode is the state your computer must be in for you to interface with several software programs. If a problem occurs while in this state, a firmware error message displays on the console terminal.

LP Print Service Error Messages

This section provides a description of the error messages that are associated with LP commands. The following variables are used in the error messages:

file(s)	Indicates the file or files that are to be printed.
dest	Indicates the name of the destination printer.
printer-id	Indicates the request identification number of the printout. For example, *dqp10_2-46* is the printer name followed by the request identification number.
printer-name	Indicates the name of the printer.
program-name	Indicates the program name that was executed.
user	Indicates the user who requested the printout.
xx	Indicates a variable string or numeric.

Following each message is an explanation of the probable cause of the error and the corrective action to take. If you are not able to correct all the error conditions you encounter, call your Service Representative for assistance.

Errors messages that begin with a variable are listed at the beginning of the table.

Table 3. LP Command Error Messages

Error Message	Description/Action
file is a directory	The file name you typed is a directory and cannot be printed.
"*filename*" is empty No (or empty) input files	You specified an invalid or empty file name. Nothing is printed from this request.
"*printer-id*" is not a request id or printer	You are attempting to cancel a request that does not exist. You may have given the wrong printer name or wrong request id number or the request may have finished printing.
xx is not a request id or a printer	The argument you used with the **cancel** command is not a valid request identification number or a printer name. Use the **lpstat -t** command to give you all the printers and requests waiting to get printed.
xx is not a request id	The request identification number you used with the **lpmove** command is not a valid request identification number. To find out what requests are valid, use the **lpstat -u** command.

Table 3. LP Command Error Messages (Continued)

Error Message	Description/Action
xx isn't a request ID or destination	You used an invalid request identification number or destination with the **lpstat** command. Use the **lpstat -p all -c all** command to get a list of valid destinations. Use the **lpstat -o all** command to get a list of outstanding print requests.
dest not accepting requests since *date*	Requests to the printer that you are trying to use have been stopped by the **reject** command.
acceptance status of destination "*printer-name*" unknown	Use the **accept** command to enable the printer so it will accept requests.
Can't create class "*xx*"-it is an existing printer name	The class name you are trying to use has already been given to a printer. You will have to use another name or remove the printer to use the class name.
Can't create printer the "*printer-name*" - it is an existing class name	The printer-name you are trying to use has already been used as a class name. You will have to assign another name for the printer.
Can't establish contact with the LP print service	The scheduler may not be running. Use the **lpstat -t** command to find out more information.
Can't find the user "lp" on this system!	You must have an entry in the **/etc/passwd** file for "lp," and you must belong to the group "bin."
Can't open file "/usr/spool/lp/SCHEDLOCK" (No such file or directory)	The directory **/usr/spool** has been removed. You must use the **mkdir** command to restore the directory. This has probably removed some of the necessary LP files. You must reinstall the LP commands.
Cannot access the file: "*xx*"	The mode could be wrong on your directory or the file that you are trying to access.
cannot create temp file *filename*	The system may be out of free space on the usr file system. Use the command **df /usr** to determine the number of free blocks. Several hundred blocks are required to insure that the system performs correctly.
Destination *dest* is an illegal destination name	The *dest* you used is not a valid destination name. Use the **lpstat -p** command to list valid destination names.

SYSTEM V88

Table 3. LP Command Error Messages (Continued)

Error Message	Description/Action
Destination *"dest"* does not exist.	The destination printer you specified as an argument to the **lpadmin** command is not a valid destination name, or it has been removed since the scheduler was started.
Destination *"printer-name"* was already accepting requests	The destination printer was already accepting requests. Once a printer is accepting requests, other **accept** commands are ignored.
Destination *"printer-name"* was already not accepting requests	A **reject** command was already sent to the printer. Use the **accept** command to allow the printer to start accepting requests again.
destination printer-name is not accepting requests move in progress...	The destination printer is not accepting requests and the requests are being moved to another printer.
disabled by Spooler: login terminal	The login terminal has been disabled by the LP scheduler. The printer can be reenabled by using the **enable** command.
error in printer request *printer-id*	*Printer-id* is the actual request identification number. The error was most likely due to an error in the printer. Check the printer, and reset it if needed.
Error reading printer information for *"print-name"* (No such file or directory)	*Printer-name* is the name of a printer that has been removed since the scheduler has been started. Use **lpadmin** *-xprinter-name* to properly remove the printer.
Failed to fork child process *process-id*	You either have several processes running and are not allowed to run anymore, or the system has all the processes running that it can handle. You will have to rerun this command later.
Failed to allocate message FIFO	The system has the maximum number of files open that are allowed at any time. Try the command at a later time.
Missing -U or -v option	A printer must have the **-v** option for a port or **-U** option for dial-out instructions. For more information on these options, refer to the **lpadmin(1M)** manual page.

Table 3. LP Command Error Messages (Continued)

Error Message	Description/Action
No default destination	The default destination is not assigned or the mode on the file **/usr/spool/lp/default** is incorrect. Make sure the mode is 644. Use the **lpadmin -d** *dest* command to set up a default destination or set LPDEST to the value of the destination.
out of memory	Implies the system is in trouble. The message implies that there is not enough memory to contain the text to be printed. Reboot to free up memory.
Printer "*printer-name*" does not exist.	The printer specified in the **lpstat** command does not exist. Use the **lpstat -p all** command to list the printers known to the system.
printer "*printer-name*" was not busy	The printer is not printing a request at this time. Either the request you wanted to cancel is finished printing or you have specified the wrong printer.
Request *printer-id* doesn't exist	The request identification number you used with the **lpmove** command is not a valid request identification number. To find out what requests are valid, use the **lpstat -u** command.
Requests for destination "*dest*" aren't being accepted.	The printer has been disabled using the **reject** command. The printer can be reenabled using the **accept** command.
The model "*xx*" does not exist	The name that you are using for a model interface program is not a valid one. A list of valid models is in the **/usr/spool/lp/model** directory.
The options -e, -i, and -m are mutually exclusive	These options to the **lpadmin**(1M) command cannot be used together. Refer to the manual page for more information on usage.
The printer "*printer-name*" is already a member class "*class*"	The printer you are trying to move to class *xx* is already in that class. You cannot move a printer to a class that it is already in.
There are jobs currently queued for destination "*dest*"	You tried removing a printer that still has jobs queued. Use **lpmove** to assign them to another printer or wait until they finish printing before trying to remove the printer.

Table 3. LP Command Error Messages (Continued)

Error Message	Description/Action
unknown option "*xx*"	This message displays in response to an invalid option supplied to the **disable**, **lpstat**, or **reject** commands. See the manual pages for all the correct usages.
Unrecognized option "*xx*"	An invalid option, *xx*, was used with the **lp** or **lpadmin** command. See the manual page for the correct options.
usage: disable [-c] [-r[reason]] printer	The syntax for the **disable** command is not correct. The valid options are: **-c** to cancel the currently printing request, and **-r** followed by the reason that you are disabling the printer.
usage: reject [-r[reason]] dest...	The syntax for the **reject** command is not correct. The proper format is to specify the reason why the printer is not taking any more print requests and to identify the destination printer.
usage: accept dest	The syntax for the **accept** command is to specify a destination printer. You are setting up a printer to accept requests, and you did not specify what printer should accept requests.
usage: enable printer	The syntax for the **enable** program is to specify a destination printer.
usage: cancel id... printer...	The syntax for the **cancel** command is not correct. The proper format is to specify the request identification number or the printer name.
usages: lpadmin -pprinter [-vdevice] [-cclass] [-rclass] [-eprinter | -iinterface | -mmodel] [-h | -l] -or- lpadmin -d[destination] -or- lpadmin -xdestination	The correct syntax for the **lpadmin** command is to specify at least one of the options referenced here.
You aren't allowed to do that.	The **lpsched** and **lpadmin** commands can only be used when you are logged in as "lp"or "root."
You must be "lp" or "root" to run this program	This command is restricted to someone logged in as root or lp.

Table 3. LP Command Error Messages (Continued)

Error Message	Description/Action
your request *printer-id* destined for "*printer-name*" was cancelled by the administrator.	The printer request did not finish printing because the administrator cancelled it. Typically, you get this message in your mail.

Basic Networking Utilities Error Messages

This section lists the error messages associated with Basic Networking Utilities. There are two types of error messages. ASSERT errors are recorded in the **/usr/spool/uucp/.Admin/errors** file. STATUS errors are recorded in individual machine files found in the **/usr/spool/uucp/.Status** directory.

BNU ASSERT Error Messages

When a process is aborted, ASSERT error messages are recorded in **/usr/spool/uucp/.Admin/errors**. These messages include the file name, sccsid, line number, and the text listed below. In most cases, these errors are the result of file system problems. The "errno" (when present) should be used to investigate the problem. If "errno" is present in a message, it is shown as () in the following table.

Table 4. BNU Errors

Error Message	Description
CAN'T OPEN	An **open()** or **fopen()** failed.
CAN'T WRITE	A **write()**, **fwrite()**, **fprintf()**, failed.
CAN'T READ	A **read()**, **fgets()**, etc. failed.
CAN'T CREAT	A **creat()** call failed.
CAN'T ALLOCATE	A dynamic allocation failed.
CAN'T LOCK	An attempt to make a LCK (lock) file failed. In some cases, this is a fatal error.
CAN'T STAT	A **stat()** call failed.
CAN'T CHMOD	A **chmod()** call failed.
CAN'T LINK	A **link()** call failed.
CAN'T CHDIR	A **chdir()** call failed.
CAN'T UNLINK	A **unlink()** call failed.
WRONG ROLE	This is an internal logic problem.
CAN'T MOVE TO CORRUPTDIR	An attempt to move some bad C. or X. files to the **/usr/spool/uucp/.Corrupt** directory failed. The directory is probably missing or has wrong modes or owner.

Table 4. BNU Errors (Continued)

Error Message	Description
CAN'T CLOSE	A **close**() or **fclose**() call failed.
FILE EXISTS	The creation of a C. or D. file is attempted, but the file exists. This occurs when there is a problem with the sequence file access. Usually indicates a software error.
No uucp server	A tcp/ip call is attempted, but there is no server for UUCP.
BAD UID	The uid cannot be found in the **/etc/passwd** file. The file system is in trouble, or the **/etc/passwd** file is inconsistent.
BAD LOGIN_UID	Same as previous.
ULIMIT TOO SMALL	The ulimit for the current user process is too small. File transfers may fail, so transfer is not attempted.
BAD LINE	There is a bad line in the **Devices** file; there are not enough arguments on one or more lines.
FSTAT FAILED IN EWRDATA	There is something wrong with the ethernet media.
SYSLST OVERFLOW	An internal table in gename.c overflowed. A big/strange request was attempted. Contact your Service Representative.
TOO MANY SAVED C FILES	Same as previous.
RETURN FROM fixline ioctl	An **ioctl**, which should never fail, failed. There is a system driver problem.
BAD SPEED	A bad line speed appears in the **Devices/Systems** files (Class field).
PERMISSIONS file: BAD OPTION	There is a bad line or option in the **Permissions** file. Fix it immediately!
PKCGET READ	The remote machine probably hung up. No action.
PKXSTART	The remote machine aborted in a non-recoverable way. This can generally be ignored.

Table 4. BNU Errors (Continued)

Error Message	Description
SYSTAT OPEN FAIL	There is a problem with the modes of **/usr/lib/uucp/.Status**, or there is a file with bad modes in the directory.
TOO MANY LOCKS	There is an internal problem! Contact your Service Representative.
XMV ERROR	There is a problem with some file or directory. It is likely the spool directory, since the modes of the destinations were suppose to be checked before this process was attempted.
CAN'T FORK	An attempt to fork and exec failed. The current job should not be lost, but will be attempted later (**uuxqt**). No action need be taken.

BNU STATUS Error Messages

STATUS error messages are messages that are stored in the **/usr/spool/uucp/.Status** directory. This directory contains a separate file for each remote machine that your computer attempts to communicate with. These individual machine files contain status information on the attempted communication, whether it was successful or not. What follows is a table of the most common error messages that may appear in these files.

Table 5. BNU Status Errors

Error Message	Description/Action
OK	Things are OK.
NO DEVICES AVAILABLE	There is currently no device available for the call. Check to see that there is a valid device in the **Devices** file for the particular system. Check the **Systems** file for the device to be used to call the system.
WRONG TIME TO CALL	A call was placed to the system at a time other than what is specified in the **Systems** file.
TALKING	Self explanatory.

Table 5. BNU Status Errors (Continued)

Error Message	Description/Action
LOGIN FAILED	The login for the given machine failed. It could be a wrong login/password, wrong number, a very slow machine, or failure in getting through the Dialer-Token-Pairs script.
CONVERSATION FAILED	The conversation failed after successful startup. This usually means that one side went down, the program aborted, or the line (link) was dropped.
DIAL FAILED	The remote machine never answered. It could be a bad dialer or the wrong phone number.
BAD LOGIN/MACHINE COMBINATION	The machine called us with a login/machine name that does not agree with the **Permissions** file. This could be an attempt to masquerade!
DEVICE LOCKED	The calling device to be used is currently locked and in use by another process.
ASSERT ERROR	An ASSERT error occurred. Check the **/usr/spool/uucp/.Admin/errors** file for the error message and see the section *BNU ASSERT Error Messages*.
SYSTEM NOT IN Systems	The system is not in the **Systems** file.
CAN'T ACCESS DEVICE	The device tried does not exist or the modes are wrong. Check the appropriate entries in the **Systems** and **Devices** files.
DEVICE FAILED	The open of the device failed.
WRONG MACHINE NAME	The called machine is reporting a different name than expected.
CALLBACK REQUIRED	The called machine requires that it calls your computer.

Table 5. BNU Status Errors (Continued)

Error Message	Description/Action
REMOTE HAS A LCK FILE FOR ME	The remote site has a LCK file for your computer. They could be trying to call your machine. If they have an older version of Basic Networking, the process that was talking to your machine may have failed leaving the LCK file. If they have the new version of Basic Networking, and they are not communicating with your computer, then the process that has a LCK file is hung.
REMOTE DOES NOT KNOW ME	The remote machine does not have the node name of your computer in its **Systems** file.
REMOTE REJECT AFTER LOGIN	The login used by your computer to login does not agree with what the remote machine was expecting.
REMOTE REJECT, UNKNOWN MESSAGE	The remote machine rejected the communication with your computer for an unknown reason. The remote machine may not be running a standard version of Basic Networking.
STARTUP FAILED	Login succeeded, but initial handshake failed.
CALLER SCRIPT FAILED	This is usually the same as "DIAL FAILED." However, if it occurs often, suspect the caller script in the **dialers** file. Use **uutry** to check.

Address and Vector Assignments

This section contains VMEbus Vector and Short I/O Memory assignments, as well as VMEbus Shared Ram assignments.

The vector assignments for all of the boards are dynamically assignable in SYSTEM V R40V4.1 and later versions. Vector assignments are no longer made for any board and those listed in this map are provided for reference only.

Short I/O and Vector Map for SYSTEM V			
Board Type	Vector Number		Board Address
	HEX	ADDRESS	
MVME050 (SIO #1)	80	200	$xxFF1001
MVME050 (SIO #2)	81	204	$xxFF1041
MVME050 (PIO)	84	210	$xxFF1081
MVME204 #1	-	-	$xxFFBE01
MVME204 #2	-	-	$xxFFBE03
MVME204 #3	-	-	$xxFFBE05
MVME204 #4	-	-	$xxFFBE07
MVME300 #1	B0	2C0	$xxFF0400
MVME300 #2	B1	2C4	$xxFF0440
MVME320 #1	FD	3F4	$xxFFB0xx
MVME320 #2	FC	3F0	$xxFFACxx
MVME321 #1	E1	384	$xxFF05xx
MVME321 #2	E0	380	$xxFF06xx
MVME323 #1	C9	324	$xxFFA0xx
MVME323 #2	C8	320	$xxFFA2xx
MVME327 #1 (disk)	A0	280	$xxFFA6xx
MVME327 #2 (disk)	A1	284	$xxFFA7xx
MVME327 #1 (tape)	A2	288	$xxFFA6xx
MVME327 #2 (tape)	A3	28C	$xxFFA7xx
MVME328 #1	CB	32C	$xxFF9000
MVME328 #2	CA	328	$xxFF9800
MVME328 #3	C7	31C	$xxFF4800
MVME328 #4	D6	358	$xxFF5800
MVME328 #5	D7	35C	$xxFF7000
MVME328 #6	DF	37C	$xxFF7800

Short I/O and Vector Map for SYSTEM V			
Board Type	Vector Number		Board Address
	HEX	ADDRESS	
MVME330 #1	C0	C0	($00DE0000)
MVME330 #2	C1	C1	($00??0000)
MVME331/2 #1	EF	3BC	$xxFF30xx
MVME331/2 #2	EE	3B8	$xxFF31xx
MVME331/2 #3	ED	3B4	$xxFF32xx
MVME331/2 #4	EC	3B0	$xxFF33xx
MVME331/2 #5	EB	3AC	$xxFF34xx
MVME331/2 #6	EA	3A8	$xxFF35xx
MVME333 See Note 1,2	-	-	-
MVME334/334A See Note 1,2	-	-	-
MVME335 #1 (PIO)	DC	370	$xxFF36xx
MVME335 #1 (SIO)	DD	374	$xxFF36xx
MVME335 #1 (SIO)	DE	378	$xxFF36xx
MVME335 #2 (PIO)	D8	360	$xxFF37xx
MVME335 #2 (SIO)	D9	364	$xxFF37xx
MVME335 #2 (SIO)	DA	368	$xxFF37xx
MVME336	88-8F	220-23C	
MVME336	94-97	250-25C	($EFFC0000)
MVME336	A4-AF	290-2BC	
MVME337 #1	-	-	$xxFFE260
MVME337 #2	-	-	$xxFFE240
MVME337 #3	-	-	$xxFFE220
MVME337 #4	-	-	$xxFFE200
MVME337A #1	-	-	$xxFFE2E0
MVME337A #2	-	-	$xxFFE2C0
MVME337A #3	-	-	$xxFFE2A0
MVME337A #4	-	-	$xxFFE280

Note 1: For SNA, X.25, and ISDN usage refer to the "**SNA, X.25, ISDN Software Configuration**" tables.

Note 2: For CE III usage refer to the "**CE III Software Configuration**" table.

Address and Vector

Short I/O and Vector Map for SYSTEM V			
Board Type	Vector Number		Board Address
	HEX	ADDRESS	
MVME350 #1 MVME350 #2	F3 F2	3CC 3C8	$xxFF50xx $xxFF51xx
MVME355 #1	F5	3D4	$xxFF08xx
MVME370 MVME37x #1 MVME37x #2 MVME37x #3 MVME37x #4 MVME37x #5 MVME37x #6	- BA BB BC BD BE BF	- 2E8 2EC 2F0 2F4 2F8 2FC	$xxFF40xx (shared ram) (shared ram) (shared ram) (shared ram) (shared ram) (shared ram)
MVME375 #1 MVME375 #2 MVME375 #3 MVME375 #4	F6 F7 F8 F9	3D8 3DC 3E0 3E4	$xxFF28xx $xxFF20xx $xxFF18xx $xxFF68xx
MVME376 #1 MVME376 #2 MVME376 #3 MVME376 #4 MVME376 #5 MVME376 #6	82 83 86 87 C6 C5	208 20C 218 21C 318 314	$xxFF12xx $xxFF14xx $xxFF16xx $xxFF54xx $xxFF56xx $xxFFA4xx
MVME380 See Note 1,2	-	-	-
MVME385 #1 MVME385 #2	F1 F0	3C4 3C0	$xxFF52xx $xxFF02xx
MVME391 #1	90	240	$xxFF60xx
MVME393 #1 MVME393 #2 MVME393 #3 MVME393 #4 MVME393 #5 MVME393 #6 MVME393 #7 MVME393 #8	98 99 9A 9B 9C 9D 9E 9F	260 264 268 26C 270 274 278 27C	$xxFFA800 $xxFFA810 $xxFFA820 $xxFFA830 $xxFFA840 $xxFFA850 $xxFFA860 $xxFFA870

Note 1: For SNA, X.25, and ISDN usage refer to the "**SNA, X.25, ISDN Software Configuration**" tables.

Note 2: For CE III usage refer to the "**CE III Software Configuration**" table.

Short I/O and Vector Map for SYSTEM V			
Board Type	**Vector Number**		**Board Address**
	HEX	**ADDRESS**	
SYSTECH 6945 #1	C2	308	($EFF7C000)
SYSTECH 6945 #2	C3	30C	($EFF78000)
SYSTECH 6945 #3	C4	310	($EFF74000)
SYSTECH 6945 #4	DB	36C	($EFF70000)
SYSTECH 6945 #5	E2	388	($EFF6C000)
SYSTECH 6945 #6	E8	3A0	($EFF68000)
SYSTECH 6945 #7	91	244	($EFF64000)
SYSTECH 6945 #8	92	248	($EFF60000)
See Note 3			
MVMEPDL #1	D0	340	$xxFF80xx
MVMEPDL #2	D1	344	$xxFF84xx
MVMEPDL #3	D2	348	$xxFF88xx
MVMEPDL #4	D3	34C	$xxFF8Cxx
Delta Monitor	F4	3D0	$xxFFA9xx
Ciprico TM3000 #1	-	-	$xxFFAAxx
Ciprico TM3000 #2	-	-	$xxFFABxx
MVIP599 (VIPC610)	-	-	$xxFF80xx

Note 3: The SYSTECH 6945/6245 are also known as the MVME338/339.

Short I/O and Vector Map for SYSTEM V		
Board Type	**Address Range**	**Notes**
MVME10x	$xxFF8000-$xxFF8EFF	30 slots at 128 bytes each
MVME135/6	$xxFFC000-$xxFFC3DF	31 slots at 32 bytes each
MVME135/6	$xxFFC3E0-$xxFFC3FF	Reserved for broadcast
MVME141	$xxFFC400-$xxFFC5FF	30 slots at 16 bytes each
MVME143	$xxFFFF00-$xxFFFFFF	16 slots at 16 bytes each
MVME147	$xxFF0000-$xxFF00FF	15 slots at 16 bytes each
MVME162	$xxFFD200-$xxFFD3FF	30 slots at 16 bytes each
MVME165	$xxFFCA00-$xxFFCBFF	30 slots at 16 bytes each
MVME166/167	$xxFFCC00-$xxFFCDFF	30 slots at 16 bytes each
MVME187	$xxFFCE00-$xxFFCFFF	30 slots at 16 bytes each
MVME188	$xxFFC800-$xxFFC9FF	32 slots at 16 bytes each
MVME197	$xxFFD000-$xxFFD1FF	30 slots at 16 bytes each

SYSTEM V/68, SYSTEM V/88
SNA, X.25, ISDN Software Configuration (MVME333, MVME334, MVME334A)

R3 and R32		MVME333				MVME334		MVME334A		
VECTOR	VECTOR OVERLAP	BPP BD#	X25 BD#	SIO ADDRESS	ADDRESS OVERLAP	BD #	MEMORY ADDRESS	BD #	SIO ADDRESS	MEMORY ADDRESS
39C		1		FFFF3800						
398		2		FFFF3900						
394		3		FFFF3A00						
390		4		FFFF3B00						
38C		5		FFFF3C00						
388	SYSTECH #5	6		FFFF3D00						
3A0	SYSTECH #6	7		FFFF3E00						
308	SYSTECH #1	8		FFFF3F00						
30C	SYSTECH #2	9	8	FFFF4000	MVME370	8	FD700000	8		FB400000
310	SYSTECH #3	10	7	FFFF4100		7	FD720000	7		FB800000
3BC	MVME331 #1	11	6	FFFF4200		6	FD740000	6		FBC00000
3B8	MVME331 #2	12	5	FFFF4300		5	FD760000	5		FC000000
3B4	MVME331 #3	13	4	FFFF4400		4	FD780000	4		FC400000
3B0	MVME331 #4	14	3	FFFF4500		3	FD7A0000	3		FC800000
3AC	MVME331 #5	15	2	FFFF4600		2	FD7C0000	2		FCC00000
3A8	MVME331 #6	16	1	FFFF4700		1	FD7E0000	1		FD000000

SYSTEM V/68, SYSTEM V/88 SNA, X.25, ISDN Software Configuration (MVME333, MVME334, MVME380)												
R3 and R32		MVME333				MVME334		MVME380				
VECTOR	VECTOR OVERLAP	BPP BD#	X25 BD#	SIO ADDRESS	ADDRESS OVERLAP	BD #	MEMORY ADDRESS	BD #	SIO ADDRESS	MEMORY ADDRESS		
39C		1		FFFF3800								
398		2		FFFF3900								
394		3		FFFF3A00								
390		4		FFFF3B00								
38C		5		FFFF3C00								
388	SYSTECH #5	6		FFFF3D00								
3A0	SYSTECH #6	7		FFFF3E00								
308	SYSTECH #1	8		FFFF3F00								
30C	SYSTECH #2	9	8	FFFF4000	MVME370	8	FD700000					
310	SYSTECH #3	10	7	FFFF4100		7	FD720000					
3BC	MVME331 #1	11	6	FFFF4200		6	FD740000					
3B8	MVME331 #2	12	5	FFFF4300		5	FD760000					
3B4	MVME331 #3	13	4	FFFF4400		4	FD780000	4	FFFFC630	ECC00000		
3B0	MVME331 #4	14	3	FFFF4500		3	FD7A0000	3	FFFFC620	EC800000		
3AC	MVME331 #5	15	2	FFFF4600		2	FD7C0000	2	FFFFC610	EC400000		
3A8	MVME331 #6	16	1	FFFF4700		1	FD7E0000	1	FFFFC600	EC000000		

SYSTEM V/68, SYSTEM V/88 CE III Software Configuration		
VECTOR	**VECTOR OVERLAP**	**CE-III BD#**
374	MVME335 #1	1
378	MVME335 #1	2
360	MVME335 #2	3
364	MVME335 #2	4
368	MVME335 #2	5
370	MVME335 #1	6
354		7
350		8
34c	MVMEPDL #4	9
348	MVMEPDL #3	10
344	MVMEPDL #2	11
340	MVMEPDL #1	12
33C		13
338		14
334		15
330		16

SHARED RAM PERIPHERALS in SYSTEM V			
Board Type	**RAM Size**	**A24 Default**	**A32 Default**
MVME332XT #8	64k	$EF0000	$FF7F0000
MVME332XT #7	64k	$EE0000	$FF7E0000
MVME332XT #6	64k	$ED0000	$FF7D0000
MVME332XT #5	64k	$EC0000	$FF7C0000
MVME332XT #4	64k	$EB0000	$FF7B0000
MVME332XT #3	64k	$EA0000	$FF7A0000
MVME332XT #2	64k	$E90000	$FF790000
MVME332XT #1	64k	$E80000	$FF780000
(available)	512k	$E00000	$FF700000
MVME373	512k	$D00000	$FF680000
reserved for MAP	512k	N/A	$FF600000
reserved for MAP	1024k	N/A	$FF500000
MVME374	1024k	$D00000	$FF400000
MVME372	128k	$C00000	$FF000000
MVME372	1024k	$C00000	$FF000000
MVME372	4096k	N/A	$FF000000
MVME374	4096k	N/A	$FDC00000
MVME393 #1	512k	N/A	$FDB80000
MVME393 #2	512k	N/A	$FDB00000
MVME393 #3	512k	N/A	$FDA80000
MVME393 #4	512k	N/A	$FDA00000
MVME393 #5	512k	N/A	$FD980000
MVME393 #6	512k	N/A	$FD900000
MVME393 #7	512k	N/A	$FD880000
MVME393 #8	512k	N/A	$FD800000

SHARED RAM PERIPHERALS in SYSTEM V			
Board Type	**RAM Size**	**A24 Default**	**A32 Default**
MVME334 #1	128k	N/A	$FD7E0000
MVME334 #2	128k	N/A	$FD7C0000
MVME334 #3	128k	N/A	$FD7A0000
MVME334 #4	128k	N/A	$FD780000
MVME334 #5	128k	N/A	$FD760000
MVME334 #6	128k	N/A	$FD740000
MVME334 #7	128k	N/A	$FD720000
MVME334 #8	128k	N/A	$FD700000
MVME376 #1	256k	N/A	$FD6C0000
MVME376 #2	256k	N/A	$FD680000
MVME376 #3	256k	N/A	$FD640000
MVME376 #4	256k	N/A	$FD600000
MVME376 #5	256k	N/A	$FD5C0000
MVME376 #6	256k	N/A	$FD580000
(available)	1536k	N/A	$FD400000
MVME334A #1	4096k	N/A	$FD000000
MVME334A #2	4096k	N/A	$FCC00000
MVME334A #3	4096k	N/A	$FC800000
MVME334A #4	4096k	N/A	$FC400000
MVME334A #5	4096k	N/A	$FC000000
MVME334A #6	4096k	N/A	$FBC00000
MVME334A #7	4096k	N/A	$FB800000
MVME334A #8	4096k	N/A	$FB400000
(available)	4096k	N/A	$FB000000
MVME336	256k	N/A	$EFFC0000
(available)	256k	N/A	$EFF80000
SYSTECH 6945 #1	16k	N/A	$EFF7C000
SYSTECH 6945 #2	16k	N/A	$EFF78000
SYSTECH 6945 #3	16k	N/A	$EFF74000
SYSTECH 6945 #4	16k	N/A	$EFF70000
SYSTECH 6945 #5	16k	N/A	$EFF6C000
SYSTECH 6945 #6	16k	N/A	$EFF68000
SYSTECH 6945 #7	16k	N/A	$EFF64000
SYSTECH 6945 #8	16k	N/A	$EFF60000

SHARED RAM PERIPHERALS in SYSTEM V			
Board Type	**RAM Size**	**A24 Default**	**A32 Default**
(available)	128k	N/A	$EFF40000
FV 5300 #1	256k	N/A	$EFF00000
FV 5300 #2	256k	N/A	$EFEC0000
FV 5300 #3	256k	N/A	$EFE80000
FV 5300 #4	256k	N/A	$EFE40000
(available)	10496k	N/A	$EF400000
MVME337 #1	1024k	N/A	$EF300000
MVME337 #2	1024k	N/A	$EF200000
MVME337 #3	1024k	N/A	$EF100000
MVME337 #4	1024k	N/A	$EF000000
MVME337A #1	4096k	N/A	$EDC00000
MVME337A #2	4096k	N/A	$ED800000
MVME337A #3	4096k	N/A	$ED400000
MVME337A #4	4096k	N/A	$ED000000
MVME380 #1	4096k	N/A	$EC000000
MVME380 #2	4096k	N/A	$EC400000
MVME380 #3	4096k	N/A	$EC800000
MVME380 #4	4096k	N/A	$ECC00000
(available)	8192k	N/A	$E8800000
CHI-HIPPI	8192k	N/A	$E8000000
MVME162LX 2M SRAM	2M	N/A	$E1000000
MVME188 ECC #1	4096k	N/A	[$E0C00000]
MVME188 ECC #2	4096k	N/A	[$E0800000]
MVME188 ECC #3	4096k	N/A	[$E0400000]
MVME188 ECC #4	4096k	N/A	[$E0000000]
EVSB	4096k	N/A	[$E0000000]

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MFSG/D2A1
September 1995

Update Package for the Motorola Field Service Guide

The following pages are replacements and additions to the *Motorola Field Service Guide*. They add new information to the MFSG/D2 version of the guide.

Please replace or add the pages according to the following table and place this page behind the cover page to record the change.

Remove Old	Replace With New	Add New
Title page, Preface, and Safety Summary (located in front of the Table of Contents tab)	Title page, Preface, and Safety Summary, pp. a — f	
Table of Contents, pp. vii — x	Table of Contents, pp. vii — xii	
Systems section, pp. 1— 28	Systems section, pp. 1 — 90	
System Components section	System Components section	
Board Placement section, pp. 1 — 2 and 25 — 30	Board Placement section, pp. 1 — 2 and 25 — 30	
		Wide SCSI article to the Miscellaneous section, pp. 35 — 38
SCSI Troubleshooting, pp. 1 — 6 (in the Troubleshooting section)	SCSI Troubleshooting, pp. 1 — 16 (in the Troubleshooting section)	

The update version number (MFSG/D2A1) appears on the bottom of each changed or additional page.

In addition, we have included two publications in this update package. We recommend that you put these documents in the front pocket of the FSG binder. These publications are:

AIX System Diagnostics (ASD) Quick Reference (AXASDA/QR1)
Guide to System Information (PSEASYA/MP1)

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