MWS-E and OWS-E Hardware Maintenance Manual

CMM-1122-0C0

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Each time this manual is updated with a change packet, a change to part of a text page is indicated by a change bar in the margin directly opposite the change. A change bar in the footer of a text page indicates that most, if not all, of the text is new. A change bar in the footer of a page composed primarily of a table and/or figure may indicate that a change was made to that table/figure or, it could indicate that the entire table/figure is new. Change packets are assigned a numerical designator, which is indicated in the publication number on each page of the change packet.

Each time this manual is fully revised and reprinted, all change packets to the previous version are incorporated into the new version, and the new version is assigned an alphabetical revision level, which is indicated in the publication number on each page of the manual. A revised manual does not usually contain change bars.

REVISION	DESCRIPTION
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A	January 1992. Reprint with revision. Technical additions, changes, and corrections were incorporated. Section 6, “Ampex 230 Terminal Operation,” was added.
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B	January 1993. Reprint with revision. Information describing the new 32-Mbyte CPU, split-panel error logger faceplate, type-5 keyboard, and Falco terminal was added. OLNET loop-back test procedures were also added. Part numbers and preventive maintenance procedures were also updated. Change bars have been added to indicate new information or information that has changed.
C	July 1994. Reprint with revision. This revision includes references to the alternate SCSI hard disk; updated backplane configurations; and other minor technical additions, changes, and corrections. Part numbers have been verified and revised as appropriate.

PREFACE

This manual describes installation and maintenance procedures for the model E operator workstation (OWS-E) and model E maintenance workstation (MWS-E). This manual is intended for field support personnel and any other Cray Research personnel responsible for maintaining, troubleshooting, or repairing a CRAY Y-MP or CRAY C90 computer system.

Refer to the *MWS-E User Guide*, publication number CDM-1123-0B0, for information describing operating procedures and functions that are most frequently used for typical day-to-day operations of the MWS-E.

The manual is divided into the following seven sections:

- Section 1, "Workstation Overview," provides a description of the workstation hardware including the peripheral expansion chassis (PEC-3) and a brief operational overview of the system.
- Section 2, "Installation and Configuration," provides board and peripheral installation and removal procedures and board strapping information.
- Section 3, "Workstation Diagnostic Tests," provides directions on running diagnostic tests to test boards and components in the MWS-E and OWS-E.
- Section 4, "Preventive Maintenance," describes the preventive maintenance notification program (`pmnotify`) and includes maintenance procedures for both workstations.
- Section 5, "Part Numbers," lists part numbers for all assemblies and components in the MWS-E and OWS-E workstations.
- Section 6, "AMPEX 230 Terminal Operation," provides instructions for viewing, modifying, and changing operating parameters for the AMPEX 230 terminal.

- Section 7, “Falco Terminal Setup,” provides instructions for viewing, modifying, and changing operating parameters for the Falco terminal.

Notational Conventions

The following conventions are used throughout this manual:

- The base of a number is decimal unless otherwise stated.
- `Courier` font indicates directory path names, file names, commands, utilities, window names, and screen output.
- **`Courier bold`** font indicates commands, options, and field inputs that you should enter.
- The following conventions are used for command usage descriptions:
  - *Italic* font indicates a variable or user-supplied entry.
  - Commands must be entered as shown in the command syntax. Spaces must be included or left out as shown; do not use tabs.
  - Square brackets [ ] indicate an optional entry.
  - Angle brackets < > indicate a required entry.
  - A vertical bar | indicates a choice.

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1 WORKSTATION OVERVIEW

The maintenance workstation model E (MWS-E) and operator workstation model E (OWS-E) are supplied with Cray Research computer systems using the input/output (I/O) subsystem model E (IOS-E). The MWS-E and OWS-E cabinets look similar, but have different hardware components and serve different purposes as described later in this section. Figure 1-1 shows the MWS-E and OWS-E workstation chassis.

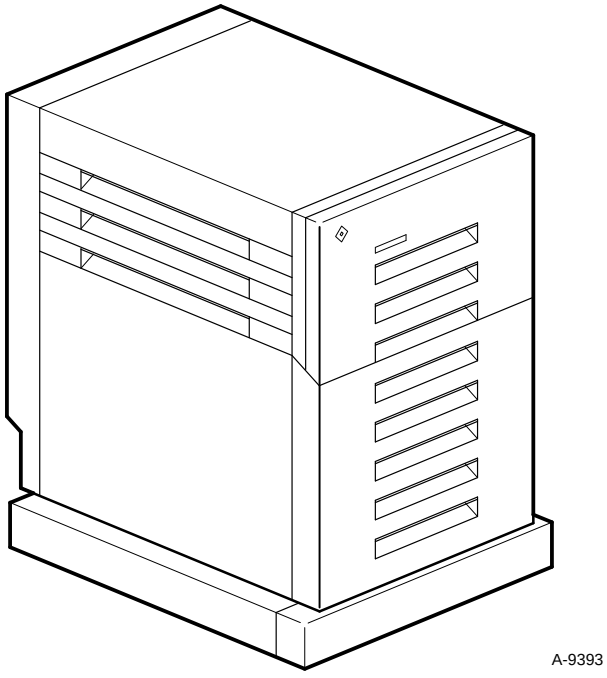


Figure 1-1. MWS-E and OWS-E Workstation Chassis

The MWS-E and OWS-E are based on a Sun 4/370 SPARCstation, 12-slot chassis. The SPARC (Scalable Processor ARChitecture) is a Sun version of the reduced instruction set computer (RISC) architecture. A VMEbus is provided in slots 4 through 12 of original design workstations and in slots 1 through 12 of revised design workstations; refer to ‘‘Backplane and VMEbus Layout’’ on page 2-8 of this manual for details.

The OWS-E is part of the Cray Research, Inc. (CRI) computer system. The MWS-E is owned by Cray Research; it enables CRI engineers to perform system maintenance independent of any customer activity on the CRI computer system.

The model-E workstations are a next-generation model following the original Motorola-based MWS and OWS models that run UNIX System V operating system software. CRAY Y-MP and CRAY X-MP systems with IOS models C and D use the Motorola-based MWS and OWS. Cray Research computer systems with Motorola-based workstations cannot be upgraded to model-E workstations. The MWS-E and OWS-E are currently available only with Cray Research computer systems that include an IOS-E. Cray Research will continue to support the Motorola-based MWS and OWS workstations.

Workstation Functions

This subsection lists the functions provided by the MWS-E and OWS-E.

MWS-E Functions

The MWS-E provides an intelligent and dedicated platform for performing hardware maintenance, monitoring, and support of CRI computer systems.

The MWS-E is used to perform the following functions:

Offline diagnostic testing. Offline tests for the mainframe, IOS-E, SSD solid-state storage device model E (SSD-E), and peripheral devices are loaded on the MWS-E. These diagnostics are used to verify proper hardware operation, to reproduce failures, and to isolate failures to the lowest replaceable component.

Offline diagnostic listings. Listings are available online to assist CRI engineers in performing maintenance. Refer to ‘‘Printing Online Diagnostic Listings’’ in Section 4 of the *MWS-E User Guide*, publication number CDM-1123-0B0.

System deadstart and master clear.

IOS-E status. The MWS-E can read IOS-E status, read or write to local memory in an IOS-E processor (EIOP), and perform maintenance features such as deadstarting or master clearing an EIOP.

Hardware error logging. The `xelog` program records errors received through mainframe, IOS, and SSD error channels. `xelog` displays logged errors in an understandable format. The MWS-E also monitors system error channels to detect and log system errors such as double-bit memory errors.

NOTE: The `xelog` program, originally included in the ME-Y2.1 and ME-C1.1 releases, replaces the `elog` program. Refer to the "xelog" section in *xelog, xcfg, and nwacs User Information*, publication number HDM-012-0, for information on using `xelog`.

Environmental monitoring. The MWS-E monitors the warning and control system (WACS) and responds to abnormal conditions. It signals the CRI system to shut down for serious conditions and logs environmental variances that can be used for future failure analysis. Refer to the appropriate mainframe power and distribution maintenance manual for WACS information on power-up and power-down sequencing, monitoring features, theory of operation, and manual operation of the WACS control console.

NOTE: **T**he ME-Y2.0 release contains two different sets of WACS software programs: `wacs` and the OpenWindows based `nwacs` (new wacs). Refer to Section 7, ''WACS User Information,'' or the "nwacs" section in *xelog, xcfg, and nwacs User Information*, publication number HDM-012-0, for information about using `nwacs`.

Remote support. The Remote Support system provides a network connection to a remote location through a Telebit NetBlazer and Microcom high-speed modem, allowing support personnel to dial into the site, log on the MWS-E, run maintenance tools, and monitor the CRI computer system. The Remote Support system is described in the *Remote Support System Guide*, publication number CDM-1125-000.

Standalone disk testing (DD-40s, DD-41s, DD-60 series, and RDS-5s). The MWS-E serves as a standalone disk maintenance system for several disk drives sold with CRI computer systems. A disk drive supported in this manner can be removed from the system and serviced without the aid of system resources.

Standalone SSD-E testing. The data test channel that connects the MWS-E to the SSD-E enables you to test the SSD-E by using the low-speed (LOSP) data test channel. This channel enables you to test the

SSD-E without using the high-speed (HISP) or very high-speed (VHISP) channels that are dedicated to customer use and are normally connected to the mainframe and I/O subsystem.

SMARTE platform. The System Maintenance And Remote Testing Environment (SMARTE) is an online maintenance system package used to perform hardware verification, error detection, error isolation, and automated degradation of faulty hardware components. SMARTE is documented in *The System Maintenance and Remote Testing Environment (SMARTE) Users Guide*, publication number SPM-1017 2.0.

OWS-E Functions

The OWS-E provides a dedicated workstation that CRI analysts and customer operators use to operate, administrate, and monitor a CRI computer system. The OWS-E is also used for system boot, dump, and clear operations and for software and upgrade support.

Workstation Components

This subsection lists the hardware components of the MWS-E and OWS-E systems as shown in Figure 1-2.

Basic Workstation Components

The basic components for both MWS-E and OWS-E systems are:

- Sun SPARCstation workstation chassis
- Module assemblies:
  CPU (8 or 32 Mbytes of memory)
  CG6 graphics frame buffer
  8-Mbyte memory expansion (included with systems shipped with the 8-Mbyte CPU)
- Sony color graphics display monitor
  (Refer to Figure 1-5 on page 1-14)
- Keyboard, mouse, and pad

- Small Computer System Interface (SCSI) devices
  (Refer to Figure 1-7 and Figure 1-8):

  150-Mbyte embedded streaming tape drive
  669-Mbyte or 1.3-Gbyte removable embedded hard disk drives
  CD-ROM player (read only)

- FEI-3 board set(s)
  The OWS-E contains two FEI-3 board sets. An MWS-E in a CRAY Y-MP 2E system contains one FEI-3 board set; an MWS-E in larger CRAY Y-MP systems contains two FEI-3 board sets. The second set provides a standalone testing channel. A CRAY C90 series system contains up to four FEI-3 board sets for IOS-E WIN, C90 maintenance, SSD, and error logger channels.

OWS-E System Components

The OWS-E system consists of the following equipment in addition to the basic workstation system:

HP LaserJet III/IV Printer. This printer is cabled to CPU serial port A on the OWS-E. You can send jobs from the MWS-E through the Control Subsystem Network and OWS-E to the laser printer.

PEC-3 Cabinet and TELEX 9-track Tape Drive (optional). The PEC-3 is a standalone cabinet in which the TELEX 9-track tape drive is mounted. The drive is connected to a controller board in slot 8 of the OWS-E. Cables connecting a PEC-3 to a Motorola OWS differ than those for a Sun OWS-E as described on page 1-13.

MWS-E System Components

The MWS-E system consists of the following equipment in addition to the basic workstation system:

Error Logger. The MWS-E contains an error logger board that provides connections for up to 8 channels to the CRI mainframe and SSD-E. The SSD-E has an option to log errors over an error logger channel or over the SSD-E maintenance channel. The error logger channels are used exclusively for error logging purposes.

Control Subsystem Network. This connection is part of the MWS-E system; it enables network communication between the OWS-E and MWS-E (and the Telebit NetBlazer for sites using Remote Support). The

Control Subsystem Network consists of an Ethernet cable (three cable lengths are available), connected taps and transceivers, and uses the TCP/IP protocol. The MWS-E can send information through the OWS-E to the laser printer, and can be used to transfer files between the two workstations.

IOS-E Maintenance Channel. This connection starts at the FEI-3 board set in the MWS-E that connects through a low-speed (LOSP) channel pair to a workstation interface (WIN) in the IOS-E. There is one WIN connection per workstation (MWS-E and OWS-E) that is unique to that workstation. The WIN connects to cluster interfaces (CINs). There is one CIN per cluster (up to 8 CINs). The CIN connects to all processors in the cluster. Any combination of processors and clusters can be selected when performing maintenance testing. WIN 1 connects to channel pair 24/25 of all processors for the MWS-E and WIN 0 connects to channel pair 22/23 for the OWS-E.

WACS. The warning and control system channel is an RS-232 cable link connecting the WACS control panel to the CPU serial port B, C, or D on the MWS-E. The WACS is used to monitor and control refrigeration and power distribution. Each power distribution unit (PDU) is connected to a CPU serial port on the MWS-E. Serial ports B, C, and D provide WACS connections for up to three PDUs, depending on system configuration.

Microcom Modem. This modem is supplied to enable CRI to provide support and service from an off-site location. This modem will provide high-speed transmissions in full-duplex mode with a maximum serial port speed of 38.4 Kbps.

Telebit NetBlazer. The Telebit NetBlazer is a device used with the Microcom modem and Remote Support software. This system provides a Transmission Control Protocol/Internet Protocol (TCP/IP) network connection between the MWS-E and a remote workstation at an off-site service location. The Telebit NetBlazer is included as an option in the maintenance spare parts kit for the MWS-E. Refer to the "*Remote Support System Guide*," publication number CDM-1125-000, for complete remote support information.

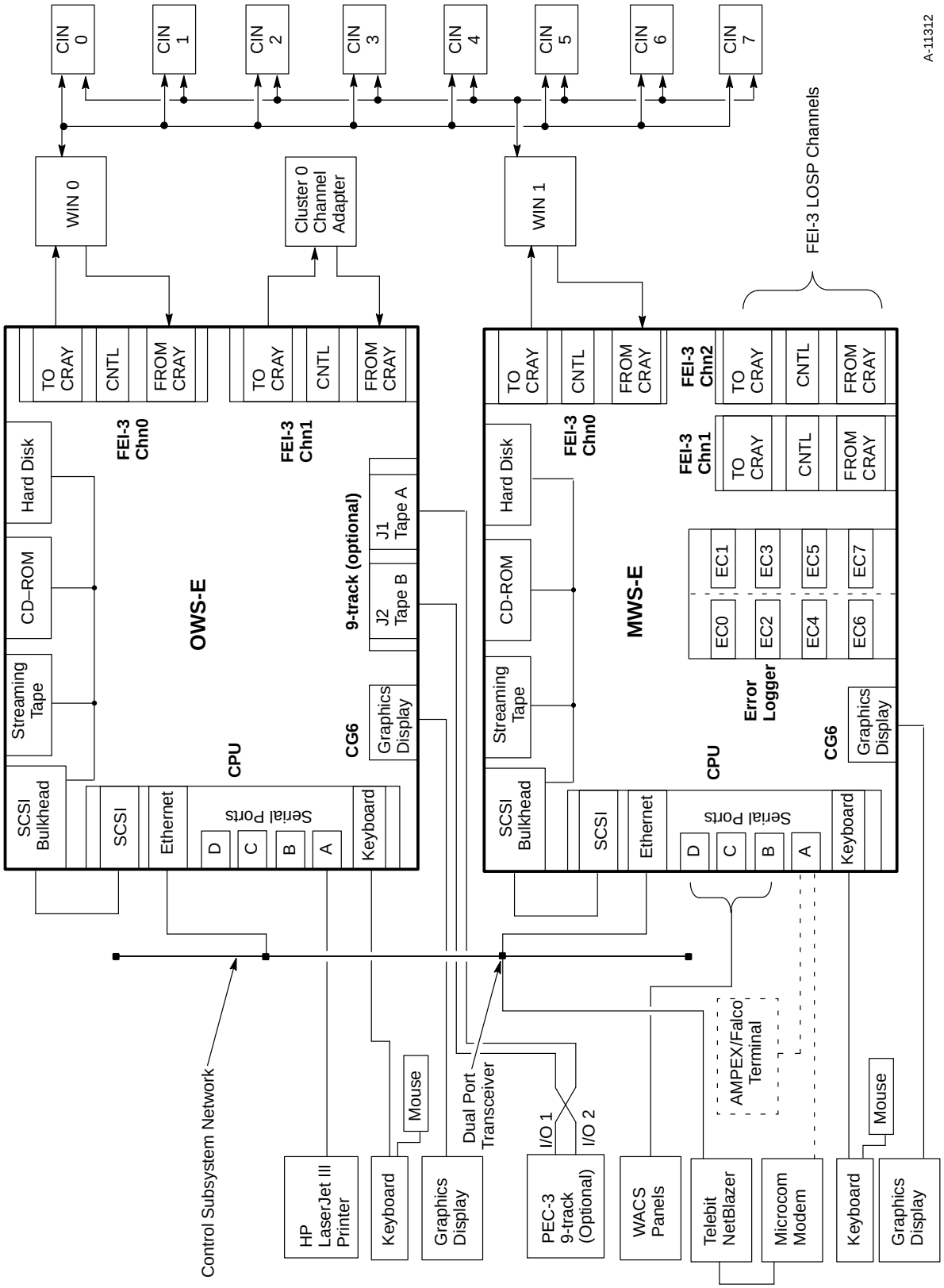


Figure 1-2. MWS-E and OWS-E Components and Connections

Sun Boards

This subsection summarizes the primary information on the three Sun boards in the MWS-E and OWS-E. These boards are documented in the following Sun manuals, supplied with each MWS-E and OWS-E. Refer to ‘‘Documentation’’ on page 1-21 for a list of all documentation supplied with each workstation.

- *Sun 4300 CPU Board Installation Manual*
- *Sun MG3/MG4/CG6 Frame Buffer Board Installation Manual for the 3400 and 4300 CPU boards*
- *SPARCsystem 370/390 Memory Expansion Board Configuration Procedures*

4300 CPU Board

A new 32-Mbyte 4300 CPU (P/N 01774200) is being shipped with MWS-E and OWS-E systems. The original 4300 CPU (P/N 01496100) has 8 Mbytes of memory. The new CPU is fully backward compatible. If your workstation uses the original CPU and memory expansion board, you should still order CPU P/N 01496100 and memory expansion board P/N 01496300 as replacements. The new CPU can be used with or without the memory expansion board; the workstation has 40 Mbytes of memory when the new CPU and memory expansion boards are installed. New workstation shipments do not include a memory expansion board.

The 4300 CPU board is placed into slot 4 in the MWS-E and OWS-E. The CG6 graphics board is connected to the CPU through the P4 connector on the side of the CPU; the CG6 board fills slot 5. The CPU and CG6 boards are connected and the 2-mm mounting screws on both board panels must be removed to take them out of the board rack.

The CPU has a socketed ID programmable read-only memory (PROM) that contains a code for the machine model (2300xxxx), a serial number, and an Ethernet address. The ID PROM is the only chip on the CPU with a bar code label. Each MWS-E and OWS-E has a unique host ID number. The host ID number is composed of the machine model code followed by a 4-digit serial number in hex notation. The host ID number is used by Sun Microsystems, Inc. to allow only licensed use of its software. The ID PROM on the CPU must stay with the workstation (refer to ‘‘Workstation Maintenance Policy’’ on page 1-19).

8-Mbyte Memory Expansion Board

The 8-Mbyte memory expansion board has been eliminated from the MWS-E and OWS-E workstation assemblies. New workstation shipments do not include a memory expansion board; all memory now resides on the CPU. The memory expansion board uses bank 0 of the six available banks. Memory is composed of eight 1-Mbyte single inline memory modules (SIMMs). When the workstation is powered up, the hardware automatically assigns memory locations.

CG6 Graphics Accelerator Board

The CG6 graphics accelerator (GX) combines a CG6 frame buffer and a graphics processor. The GX logic offers fast window and text processing capabilities. The CG6 board communicates with the 4300 CPU through the P4 bus and extends into slot 5 of the workstation chassis. The CG6 frame buffer provides memory space for graphics display information; it displays both monochrome and color graphics.

NOTE: There is a mylar strip on the CG6 board that must separate the board from the springfinger on the board panels. A mylar strip that is not positioned properly will render the workstation inoperative.

Cray Research Boards

This subsection describes the following CRI boards:

- FEI-3 board set
- Hardware error logger board (only in the MWS-E)
- 9-track controller board (only in the OWS-E)

FEI-3 Board Set

The FEI-3 board set provides an interface between the VMEbus on the MWS-E and OWS-E and LOSP channels. The FEI-3 control board is connected to LOSP channels by a 50-ft cable assembly or a new 125-ft cable. The new 125-ft cable has a 50-pin D-subminiature connector on one end and a 51-pin micro connector on the other end (refer to Section 5, “Part Numbers” for cable part numbers).

The FEI-3 consists of two double-height circuit boards: a control board and a buffer board. The control board contains logic for address decode operations, data transfer requests, address generations, interrupt signals,

and ready-resume operations. It also contains a number of registers that can be loaded only by the VME system. Once these registers are loaded, the control board, working in conjunction with the buffer board, controls all direct memory access (DMA) data transfers between VME memory and the channels.

The buffer board contains the logic required to convert the emitter-coupled logic (ECL) voltage levels used by the channels to the transistor-transistor logic (TTL) voltage levels used by the VME system. Data transfers on both the input and output channels can occur simultaneously.

Board Adapters

The MWS-E/OWS-E chassis is designed to accept standard 9U format, (triple-height) boards with three connectors (P1, P2, and P3) rather than two connectors (P1 and P2) used by the FEI-3 boards as shown in Figure 1-3.

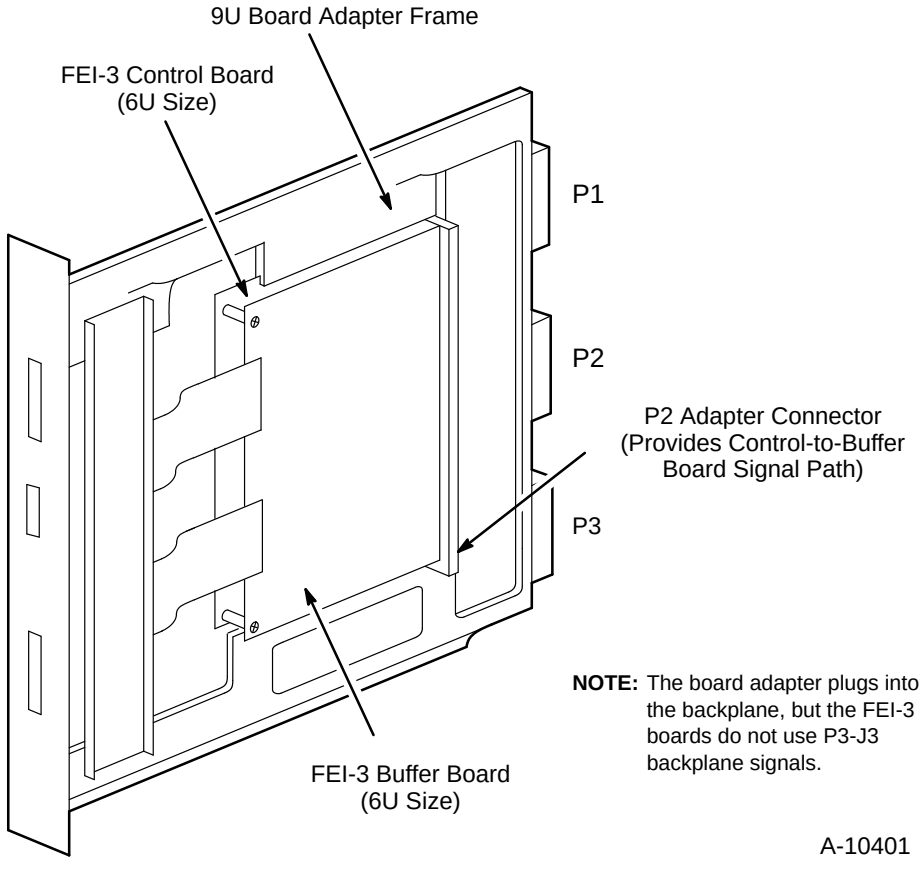


Figure 1-3. FEI-3 Board Set

The FEI-3 is housed in a 9U-sized adapter board that connects only to the top two VMEbus connectors: P1 and P2. The bottom connector, P3, is not used. The control board has different electrical connections to the VMEbus backplane than the buffer board. The adapter board allows both the double-height FEI-3 control and buffer boards to be mounted into the 9U triple-height board rack in the MWS-E and OWS-E.

Using only the top two connectors may cause the buffer board to pull away from the connectors because of the downward tension of the channel cables. To compensate for the downward tension, CRI mounts the control and buffer boards on an adapter, which uses the bottom card guide for the P3 connector as a support. The adapter clamps the I/O cables at the front of the card rack, reducing the cable tension.

FEI-3 Board Configuration

Each board contains switches and/or jumpers (called headers) that are used to configure board addresses and bus priority. The FEI-3 board set base address in the MWS-E and OWS-E is E000. Refer to ‘‘Board and Backplane Jumpering” on page 2-8 for switch setting and jumpering information. FEI-3 control boards connect to the backplane in slots 10 through 12 as described in ‘‘Backplane and VMEbus Layout’’ on page 2-8. The buffer board is connected to the control board by a special P2 connector.

Hardware Error Logger Board

The error logger board is mounted in the MWS-E and is used for hardware error-recording purposes. This board monitors up to eight error channels for mainframe and SSD memory errors. It uses a flat cable with a single connector on the VME board end and splits into eight connectors that connect to a panel covering slots 7 and 8 in the back of the MWS-E chassis.

The new split-panel faceplate assembly has two separate faceplates which are bolted together. The new faceplate enables a CRAY C90 engineer to use a single-faceplate error logger and use the extra slot for installing a third FEI-3 board set. Each of the split-panel faceplates has its own radio-frequency interference (RFI) springfingers. The new assembly has the same 12121800 part number as the original double-wide faceplate assembly; the same error logger board is used with both faceplate assemblies.

Error logger board configurations and error channels are hardware controlled and may vary for each computer system installation. This information is shipped with each MWS-E. The error logger board is mounted in a 9U format adapter board and is plugged into slot 7 of the backplane.

9-track Tape Drive Controller Board

The optional 9-track controller board is mounted in slot 8 of the OWS-E and connects to a TELEX 9-track tape drive. The TELEX tape drive is mounted into a peripheral expansion chassis-3 (PEC-3) as shown in Figure 1-4.

The PEC-3 is a standalone cabinet for mounting peripheral devices. The TELEX 9-track tape drive can be accessed by swinging the tape unit forward, which allows it to be serviced from the front.

The PEC-3 has a rear-hinged door and latched side covers that can be removed for maintenance on the peripheral equipment. To remove the side covers, locate the latches mounted flush with the covers and press the square notch by each handle.

The PEC-3 has a cooling fan unit mounted in the bottom front of the chassis that contains a squirrel-cage blower assembly. The PEC-3 has no power supply. A power ON/OFF switch located at the bottom rear of the cabinet illuminates when AC power is applied. Several outlets located inside the cabinet are controlled by the power ON/OFF switch.

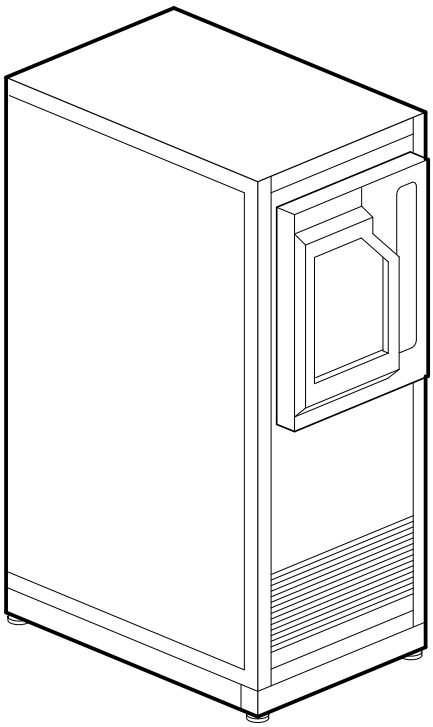


Figure 1-4. PEC-3 Cabinet

9-track Cabling

Cables connecting the PEC-3 to a Motorola-based OWS are not compatible with the 9-track controller in the OWS-E. If a site already has a PEC-3, new cables must be ordered separately from the 9-track controller board; cables are not included with the controller board (refer to "Part Numbers" in Section 5 of this manual). Cable the 9-track board as shown in Figure 1-2.

Color Graphics Display

Figure 1-5 shows the color graphics display terminal, keyboard, and mouse supplied with each workstation. Refer to Section 3, ‘‘User Environment’’ in the *MWS-E User Guide*, publication number CDM-1123-0B0, for information describing how to use various user interfaces on the MWS-E.

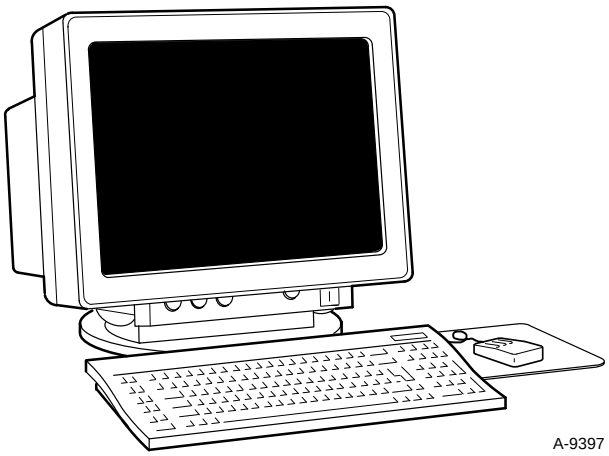


Figure 1-5. Graphics Display, Keyboard, and Mouse

Type 5 Keyboard

MWS-E and OWS-E systems are now being shipped with a Sun type 5 keyboard. The type 5 keyboard is the latest model and replaces the type 4 keyboard. To use the type 5 keyboard, you must have the following software versions installed on your system:

- SunOS 4.1.2 (Solaris 1.0.1) or later
- OpenWindows 3.0 or later

Patches for earlier versions of the above two software revisions are available as described in the *Sun Type 5 Keyboard Product Notes* document included with each type 5 keyboard. However, the ME-Y2.0 and ME-C1.0 releases support only these latest software revisions, which are included with these ME releases. Systems with type 4 keyboards can run the SunOS 4.1.2 and OpenWindows 3.0 without any problems.

Chassis Components

Snap-off covers on the workstation chassis cabinet allow access to the VME chassis. These covers are removed by hand or with a flat-bladed screwdriver.

The following paragraphs describe the major components of the VME chassis.

Board Rack

The 4/370 SPARCstation 12-slot board rack is located at the back of the chassis. Slots in the board rack are numbered 1 through 12 from left to right as shown in Figure 1-6. The backplane for the board rack is accessed from the front of the workstation. Board locations are described in ‘‘Board Placement’’ in Section 2.

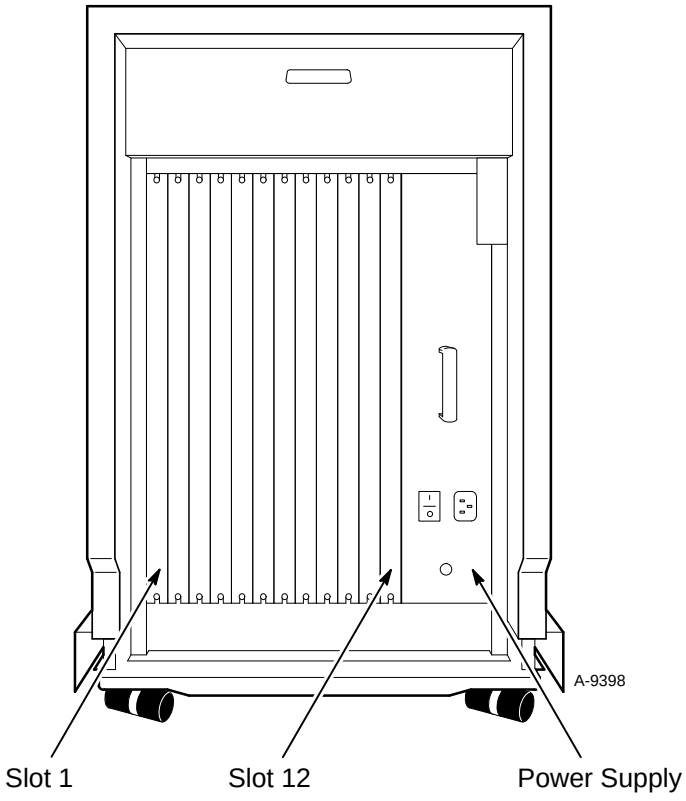


Figure 1-6. Slot Numbering

Power Supply

The power supply, located in the right rear of the chassis, provides DC power to the logic boards and all peripheral devices installed within the workstation chassis. None of the peripheral devices have their own power supplies. The power supply has an AC connector with a detachable cord. The power supply can operate at either 115 Vac, 60 Hz or 230 Vac, 50 Hz; voltage selection is automatically set by the power supply.

Fan Tray

The workstation chassis has nine fans mounted in a tray that slides into the bottom front of the chassis. The fans draw air from the top of the chassis and expel it at the bottom. Filters are not used with the cooling fans. The fan tray should be removed and cleaned approximately every 6 months (refer to Section 4, ‘‘Preventive Maintenance’’).

VME Boards

The VME boards are standard 9U format, triple-height boards: 14.4 in. (366 mm) by 15.7 in. (400 mm) as shown in Figure 1-3. Built-in board ejector handles at the top and bottom of each board allow easy removal. Each board is held firmly in place by 2-mm hex-head retaining screws, one at the top and one at the bottom of each board.

All VME boards require some form of pin jumpering. Jumpering is explained in the ‘‘Board and Backplane Jumpering’’ subsection of Section 2 of this manual.

Hard Disk Drive

Each workstation has a 669-Mbyte or a 1.3-Gbyte 5-1/4 in. embedded SCSI hard disk drive as shown in Figure 1-7. (Embedded means the drive and drive controller are contained in one unit.) This drive is mounted in a removable steel tray located in the top left front side of the workstation chassis. The drive is accessed by pressing up the release lever in the top ventilation louver of the front cover. A solenoid latch prevents the tray from being removed while the workstation DC power switch is in the On position.

Streaming Tape Drive

The OWS-E and MWS-E each have a 150-Mbyte, 5-1/4 in. embedded SCSI streaming tape drive installed in the top right front side of the workstation chassis. The streaming tape drive is used to load and back up workstation software. This drive uses 1/4-in. cartridge tapes and is driven by an intelligent controller on a 5-1/4 in. half-high form factor board. This tape drive is shown in Figure 1-8. The tape drive is accessed by pressing up the release lever in the top ventilation louver of the front cover. The built-in controller board in the streaming tape drive cannot be replaced in the field.

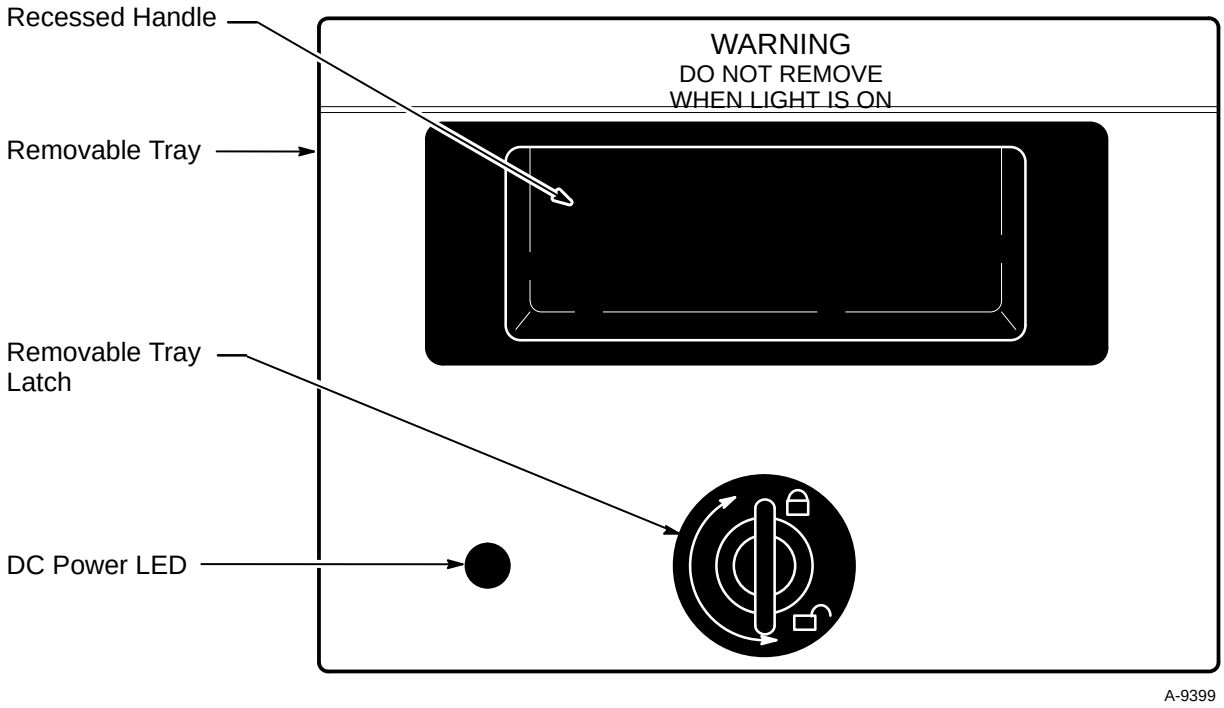


Figure 1-7. Hard Disk Drive

CD-ROM Player

The compact disc read-only memory (CD-ROM) player is a read-only peripheral with an embedded SCSI interface. The CD-ROM player is shown in Figure 1-8. It is accessed by pressing up the release lever in the top ventilation louver of the front cover.

The CD-ROM reads digital data from 4 1/4 - in. (120-mm) compact discs that hold between 550 and 644 Mbytes of data. Compact discs store data on one side of the disc. A compact disc is inserted in a plastic case called a caddy as shown in Figure 1-9.

Sun Microsystems, Inc. distributes its software on compact disc; the CD-ROM players on the MWS-E and OWS-E will enable users to load SunOS software.

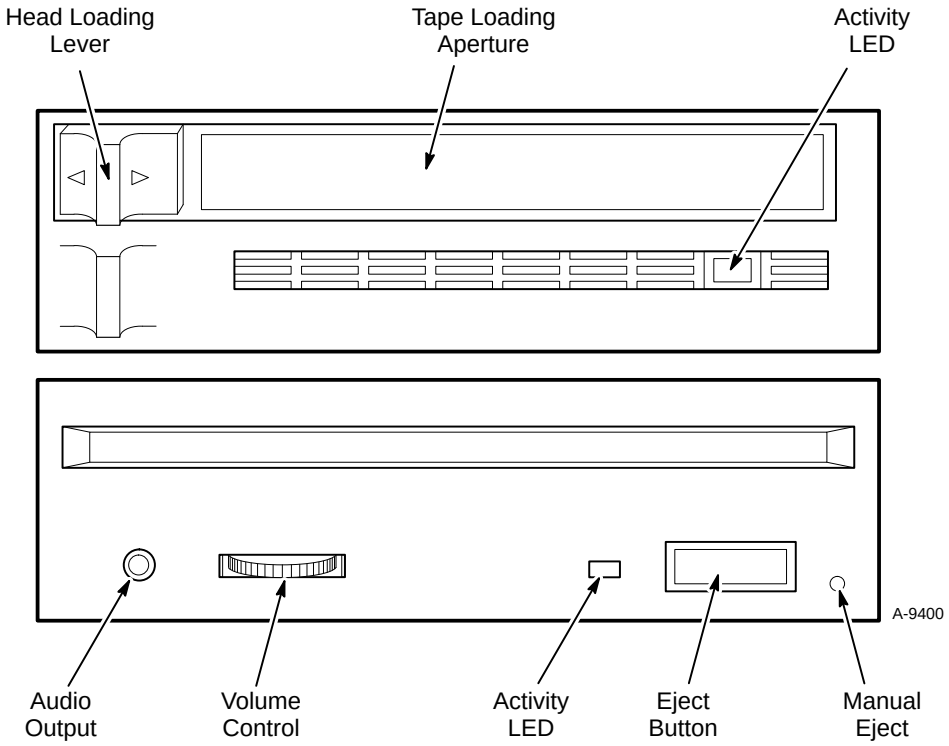


Figure 1-8. Streaming Tape Drive (Top) and CD-ROM Player (Bottom)

CAUTION

A compact disc must be inserted into a caddy as shown in Figure 1-9 before inserting it into the CD-ROM player. The label "THIS SIDE FACES FORWARD" must face up. The plastic lid on the caddy must be completely closed before inserting it into the CD-ROM player. Inserting a compact disc without a caddy can damage the disc and the CD-ROM player.

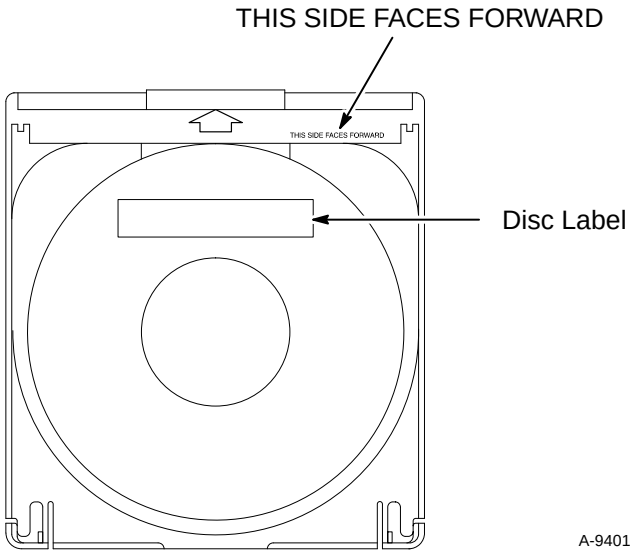


Figure 1-9. Compact Disc Caddy

Workstation Maintenance Policy

The Hardware Product Support (HPS) department provides hardware support for the MWS-E and OWS-E. The HPS maintenance strategy is to isolate workstation hardware failures to field replaceable units (FRUs). Order replacement FRUs from and return defective units to the Logistics department. Part numbers are listed in Section 5, ‘‘Part Numbers.’’

The following components are considered FRUs:

- All VME boards
- Power supply
- Cooling fan tray
- Laser printer
- All SCSI drives: hard disk drive, streaming tape drive, and CD-ROM player
- Graphics display, keyboard, and mouse
- Microcom Modem
- Telebit NetBlazer

The OWS-E is a critical part of the CRAY Y-MP or the CRAY C90 computer system. The MWS-E can be used as a temporary spare for the OWS-E in emergency situations. If MWS-E hardware fails, order replacement parts from Cray Research Logistics.

NOTE: If the workstation CPU board must be replaced, the ID PROM on the CPU must be removed and installed on the replacement board. Refer to Figure 2-14 on page 2-20. If you damage the ID PROM, a temporary replacement can be ordered from Logistics. Logistics will order a permanent replacement ID PROM for your workstation from Sun Microsystems, Inc.

Workstation Diagnostic Tests

Several software packages are available for diagnosing problems on MWS-E/OWS-E systems. Procedures for running these tests are described in Section 3, ‘‘Workstation Diagnostics.’’

Sun Diagnostic Tests

The following diagnostic test packages are provided in SunOS 4.1.*x* to test the operation of the workstation CPU, graphics board, and memory board:

- Normal power-up CPU tests
- Extended diagnostic mode power-up tests
- SunDiag tests

CRI Diagnostic Tests

The following tests are available for CRI boards. Refer to Section 3, ‘‘Workstation Diagnostics,’’ for further details and test procedures.

FEI-3 Board Test

- OLNET. The OLNET test has been updated for use with the new `fy` driver for the FEI-3 board set. OLNET replaces the ASYNC and VCI tests for workstations using the `fy` driver.

Error Logger Board Tests

- ELBD. The error logger board diagnostic (ELBD) test is used to test the error logger board. The error logger loopback cable (P/N 1216-8900) must be connected between the output of the FEI-3 and the error logger serial port being tested.

Channel Tests

- `/usr/etc/spray`. This test sends data packets to a specified host name and reports the percentage of packets received and the packet transfer rate.

- `/usr/etc/ping`. This test sends data packets between the MWS-E and OWS-E over the Control Subsystem Network (or to other host machines on a network), and echoes back the packets. The `ping` test checks whether the packets transmitted and received match.

Documentation

Documentation provided with each MWS-E system is divided into the following categories:

- CRI manuals
- Sun online documentation system (AnswerBook compact disc)
- Sun hardware manuals
- SunOS 4.1.2 manuals
- NeWSprint manuals

Contact one of the following sources to obtain any of the Sun Microsystems documents listed below:

- Sun Microsystems Telemarketing, 1-800-USA-4SUN

- Sun Microsystems Account Manager for Cray Research 1-612-832-5050

CRI Manuals

MWS-E and OWS-E Hardware Maintenance Manual CMM-1122-0C0

MWS-E User Guide CDM-1123-0B0

Sun Online Documentation System

Sun Microsystems, Inc. has developed AnswerBook: an online document retrieval system that is stored on a CD-ROM diskette. AnswerBook contains SunOS 4.1.2, OpenWindows, and OPEN LOOK user interface documentation sets. MWS-E systems receive the AnswerBook CD and

the four Sun hardware manuals listed below. OWS-E systems receive the entire hardcopy documentation set in addition to the AnswerBook system.

The AnswerBook system consists of the following parts:

Sun AnswerBook System Software	794-1171-01
(Includes the following items:)	
Solaris 1.0.1 (SunOS 4.1.2 and OpenWindows)	
AnswerBook (CD-ROM)	704-3018-10
Installation Instructions (jewel case insert)	800-6094-10
Using the AnswerBooks	800-6908-10

Sun Hardware Manuals

Sun 4300 CPU Board Installation Manual	800-3119-10
Sun 12-Slot Office Pedestal Installation Manual	800-3104-11
Sun MG3/MG4/CG6 Frame Buffer Board Installation for the 3400 and 4300 CPU boards	800-3485-12
SPARCsystem 370/390 Memory Expansion Board Configuration Procedures	813-2083-12

SunOS 4.1.2 Manuals

The following Sun manuals can be ordered from a local Sun Microsystems, Inc. office. Order number SX-09 includes all of the following manual sets: SX9A through SX9E. Binder titles appear in underlined text; the binder number includes the binder and listed manuals.

User's Guides (SX-9A) 851-1028-01

SunOS 4.1.2 User's Guides (set of 6 books):	825-1204-02
Getting Started	800-3830-10
Doing More with SunOS	800-3833-10
Basic Troubleshooting	800-3834-10
SunView User's Guide	800-3831-10
Customizing Your Environment	800-3835-10
SunDiag User's Guide	800-3818-10

System Administration Manuals (SX-9B) 851-1243-01

System and Network Administration	800-3805-10
System and Network Administration	825-1243-01

SunOS Reference Manuals (SX-9C) 851-1018-02

SunOS Reference Manual	825-1244-01
The SunOS Reference Manual (3 volumes) (Same as SunOS online manual pages)	800-3827-10
SunOS Documentation Tools	825-1247-01
Editing Text Files	800-1754-11
Using TROFF and NROFF	800-1755-11
Formatting Documents	800-1756-11
Global Index	825-1284-01
Global Index	800-4778-10

Programmer's Guides (SX-9D) 825-1019-02

Programmer's Language Guides	825-1205-02
C Programmer's Guide	800-3844-10
Assembly Language Reference Manual for Sun-3	800-3807-10
Assembly Language Reference Manual for Sun-4	800-3806-10
A RISC Tutorial	800-1795-10
Porting Software to SPARC Systems	800-1796-10
Debugging Tools Manual	800-3849-10
Programmer's Overview Utilities and Libraries	825-1250-01
System Services Overview	800-3846-10
Programming Utilities & Libraries	800-3487-10
Network Programming Guide	825-1251-01
Network Programming Guide	800-3850-10
Writing Device Drivers/STREAMS Programming	825-1252-01
Writing Device Drivers	800-3851-10
STREAMS Programming	800-3826-10
SunView Programmer's Guide	825-1253-01
SunView Programmer's Guide	800-1783-11
SunView 1.80 Update Appendix	800-4738-10

SunView System Programmer's Guide/Pixrect Reference	825-1249-01
SunView System Programmer's Guide	800-1784-11
Pixrect Reference Manual	800-4835-10

SunOS Release Manuals (SX-9E)

SunOS 4.1.2 Release Manuals	851-1380-02
Open Issues	800-6643-10
SunOS 4.1.2 Publications Roadmap	800-6640-10
Reference Manual Pages for SunOS 4.1.2	800-6641-10
SunOS Release & Install	825-1408-02
SunOS 4.1.2 Release Manual	800-6645-10
Installing the SunOS 4.1.2 System Software	800-6646-10
OpenWindows Version 3 End User's Manuals	851-1390-01
OpenWindows Version 3 User's Guide	800-6618-10
OpenWindows Version 3 DeskSet Environment Reference Guide	800-6231-10
OpenWindows Version 3 Release Notes	800-6006-10
OpenWindows Version 3 Installation & Start-Up Guide	800-6029-10

NeWSprint 2.0 Documentation 825-1463-01

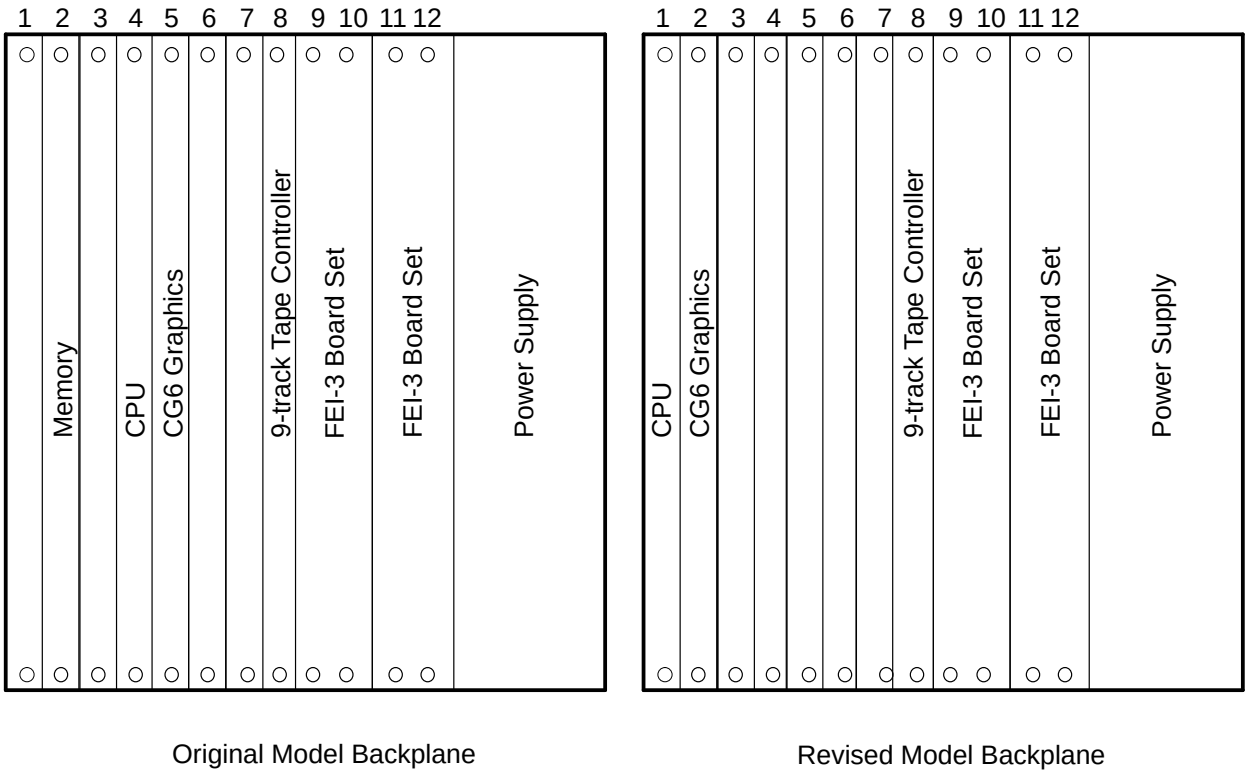
NeWSprint 2.0 Manual Set	825-1463-01
NeWSprint Installation and Administration Guide	800-6625-10
PreLimn User's Guide	800-6626-10
NeWSprint Developer's Guide	800-6627-10
NeWSprint 2.0 Release Notes (Included in NeWSprint CD jewel case)	800-6628-10

2 INSTALLATION AND CONFIGURATION

This section includes information needed to install, configure (jumper), and cable all components of the MWS-E and OWS-E systems.

Board Placement

Figures 2-1 and 2-2 show the board placement assignments for the MWS-E and OWS-E. The FEI-3 control board connects to the backplane in slots 5, 7, 9, or 11 in the MWS-E and OWS-E. The FEI-3 buffer board connects to the control board through a special J2 connector on the FEI-3 adapter board; the buffer board does not connect directly to the backplane.



Original Model Backplane

Revised Model Backplane

Figure 2-1. OWS-E Board Placement, Chassis Rear View

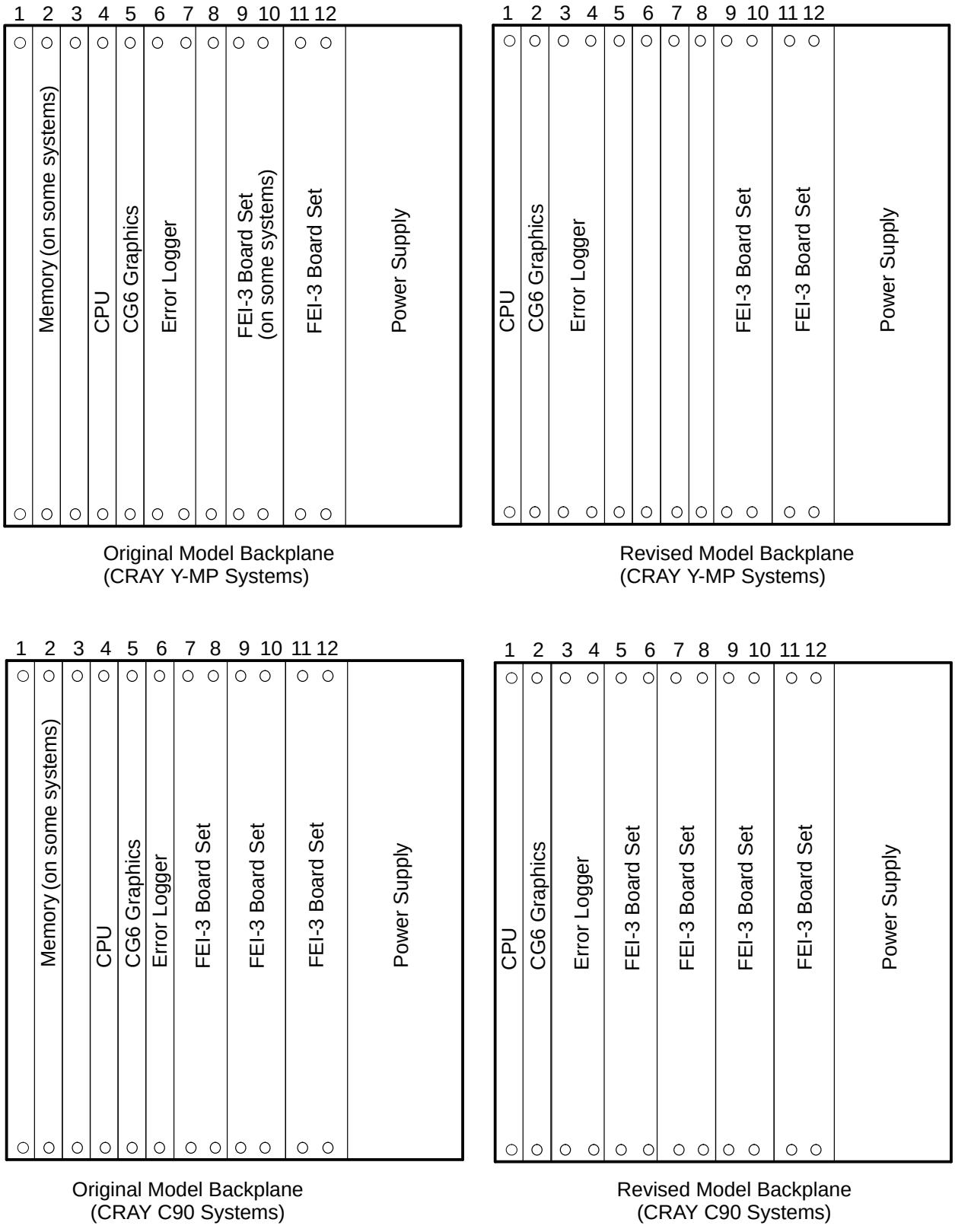


Figure 2-2. MWS-E Board Placement, Chassis Rear View

Workstation Chassis Parts

Figure 2-3 illustrates the chassis parts on the MWS-E and OWS-E workstations. Use this figure as a reference before removing chassis covers or accessing the backplane.

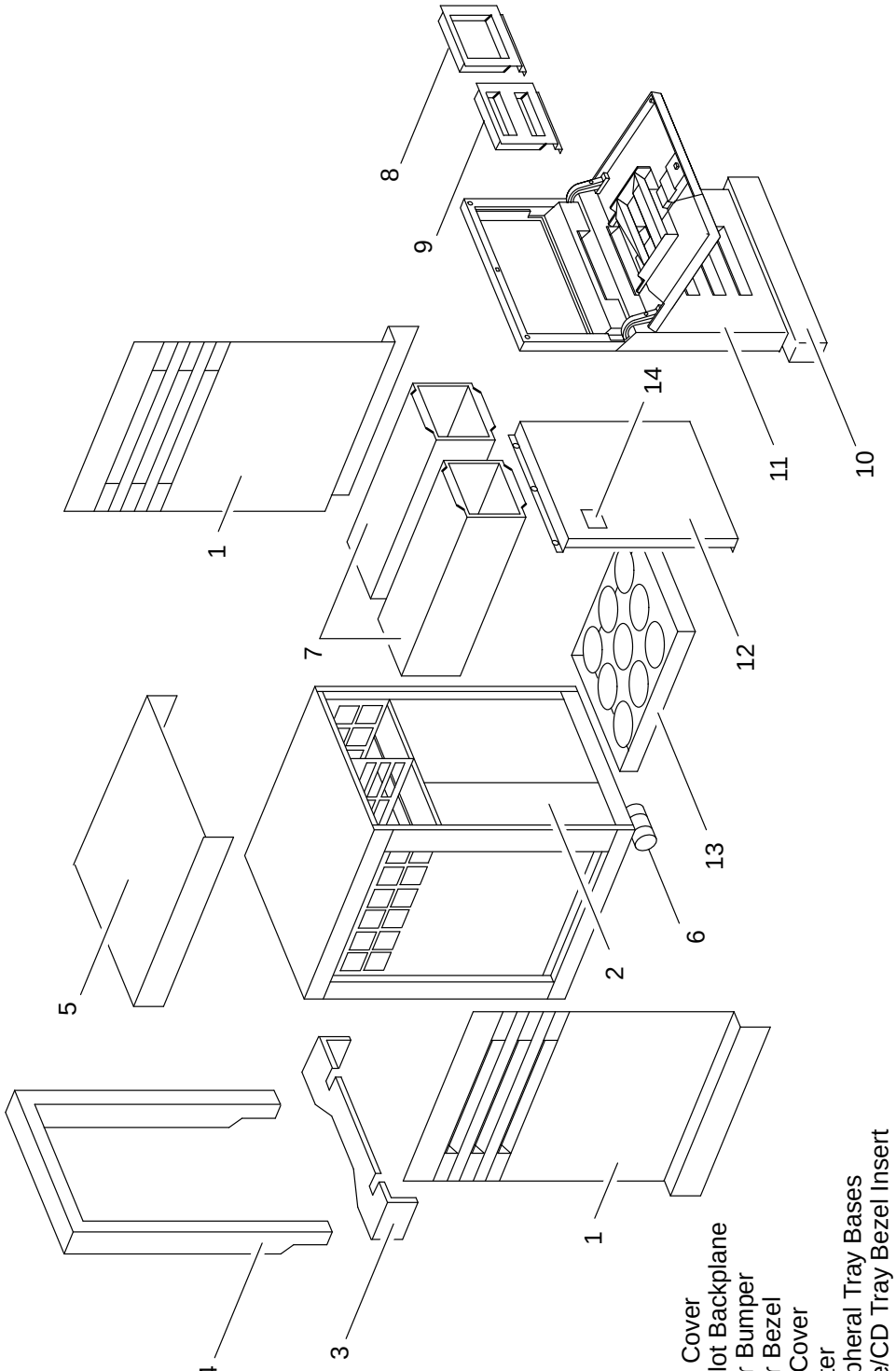


Figure 2-3. MWS-E and OWS-E Chassis Parts

Board Installation and Removal

The procedure in this subsection provides generic instructions for removing/installing boards in the 12-slot board rack of the MWS-E and OWS-E. Read and follow the instructions in the following precaution paragraphs before removing or installing any boards in the 12-slot board rack. Before installing a replacement board, check the board jumpering as illustrated in this section.

ESD Precautions. All printed circuit boards contain components that are sensitive to electrostatic discharge (ESD). You should always ground yourself to the workstation chassis by using a wrist strap and wrist grounding cord and by wearing ESD shoes. Handle all boards by the edges and store boards in the antistatic bag provided.

Springfingers Precautions. Springfingers are serrated metal strips that are installed between the edge of the PC board and the outer panel of the board (refer to Figure 2-4). The metal fingers are designed to reduce radio-frequency interference (RFI). Boards installed without springfingers can impede the performance of the workstation. Slots without boards should be filled with a blank filler panel with attached springfingers. If a filler panel resides next to the slot of a board to be removed or installed, it may be easier to remove the filler panel before removing or installing the board.

Refer to the *Sun 4300 CPU Board Installation Manual* for additional information on prerequisites and procedures for installing and removing the CPU board. This information applies to all boards in the workstation.

Required Tools

You will need the following tools when removing and installing boards in the MWS-E or OWS-E workstations:

- 2-mm Allen-head wrench
- Small flat-bladed screwdriver
- Needle-nose pliers
- Antistatic wrist strap and grounding cord (also wear ESD shoes)

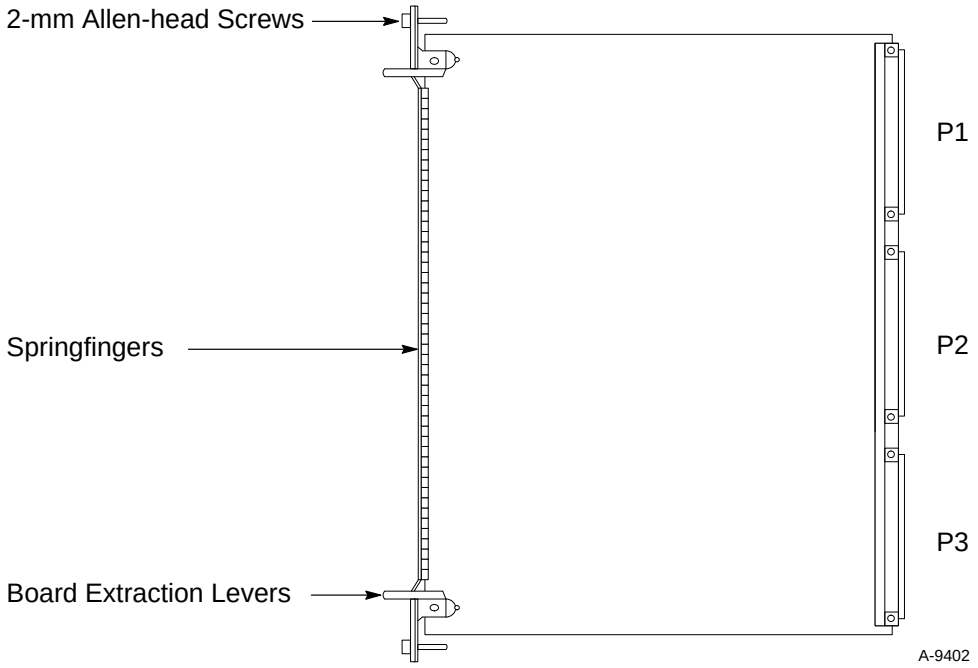


Figure 2-4. Board Springfingers and Extraction Levers

Removal Procedure

Use the following procedure to remove boards in the MWS-E or OWS-E workstations.

1. Log on the workstation as **`root`** or enter **`su`** to gain superuser privileges.
2. Enter the root password.
3. Enter the following command to complete all disk drive write operations and bring the system down to monitor mode:

```
mws1234# shutdown –h now
```

The following message is displayed:

```
Syncing disks. . . done
Halted

>
```

The > prompt indicates that the system is in monitor mode.

4. Turn the DC power off by pressing the power switch on the front of the workstation.

5. Press the AC power switch on the back of the chassis to the OFF position.

6. Disconnect the power supply cable and any other attached cables.

7. Unscrew the 2-mm Allen-head screws.

8. Use the extraction levers to release the board.

9. Carefully slide the board out of its slot.

Installation Procedure

Use the following procedure to install boards in the MWS-E or OWS-E workstations.

1. If the system is powered on, follow Steps 1 through 6 of the ‘‘Removal Procedure.’’

2. Unscrew the 2-mm Allen-head screws in the filler panel in the slot where the board will be installed.

3. Check that the board is jumpered properly as illustrated in the appropriate jumpering figure in this section.

4. Slide the board into the board rack.

Because there are 96 pins on each of the three connectors on the backplane, it may require some force to fully seat the board. However, you must be careful not to bend any of the connector pins.

5. After the board is fully seated, insert and tighten the Allen-head screws.

6. Attach any needed cables.

7. Power up the workstation and log on. Refer to Section 2, ‘‘System Startup and Shutdown’’ in the *MWS-E User Guide* for assistance.

Board and Backplane Jumpering

The VME backplane, boards, and peripheral devices are properly jumpered when the workstations are shipped to your site. Replacement boards and devices should be jumpered properly from the factory or from CRI. However, it is suggested that you always check for proper jumpering when replacing any component.

NOTE: When removing backplane jumpers, you may want to rotate the jumper horizontally and hang it on one of the two pins. This leaves the jumper readily available if needed later.

Steps to Access the Backplane

The following procedure explains how to access the workstation backplane. Refer to Figure 2-3 when following this procedure.

1. Power down the workstation.
2. Unplug the AC cord from the power supply J1 connector on the back of the workstation.
3. Remove the front cover and bumper.
4. Remove the 3 securing screws from the top of the electromagnetic interference (EMI) shield.
5. Remove the EMI shield. Pull the top of the EMI shield out and then pull the cover up to clear the tabs at the bottom of the cover.

Backplane and VMEbus Layout

The 12-slot backplane consists of a printed circuit board with three rows of 96-pin connectors: J1, J2, and J3. Each 96-pin connector consists of three columns of pins labeled A, B, and C. These pins are connected (bussed) together for each of the bus architectures in the backplane. Two backplane configurations exist in the field. In the original backplane design, on row P1, pins A1 of VMEbus slots 4 through 12 are connected, as are pins A2, B3, and so on. In the revised backplane design, on row P1, pins A1 of VMEbus slots 1 through 12 are connected. Voltage, data, and control signals are distributed across these connected pins to all boards in the particular bus architecture. Each backplane employs several bus architectures as shown in Figure 2-5 and Figure 2-6.

Because the VMEbus has over 96 signals, the VMEbus is supplied on the P1 connectors, slots 12 through 4 (original backplane design) or slots 12 through 1 (revised backplane design), and row B of the P2 connectors (corresponding slots).

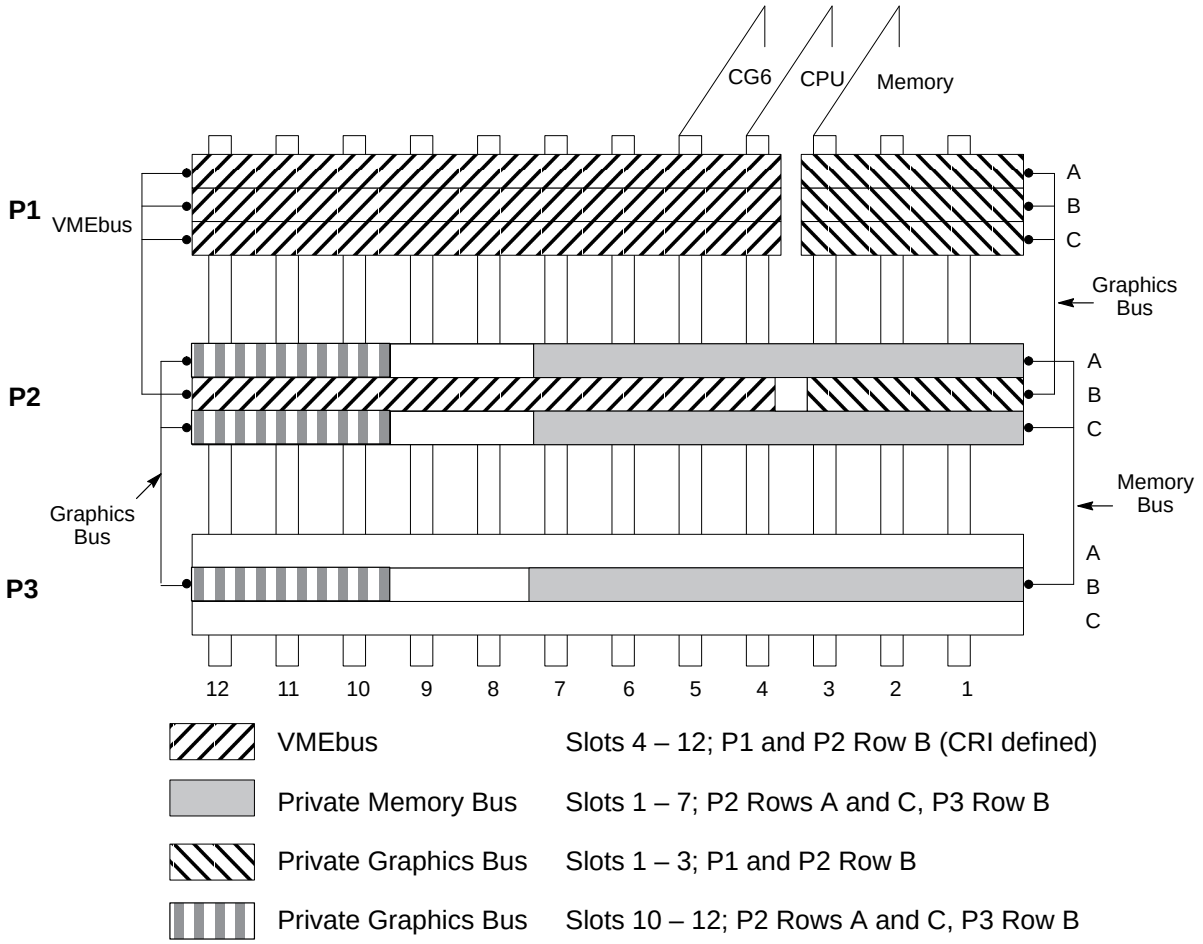


Figure 2-5. Original Backplane Bus Connections

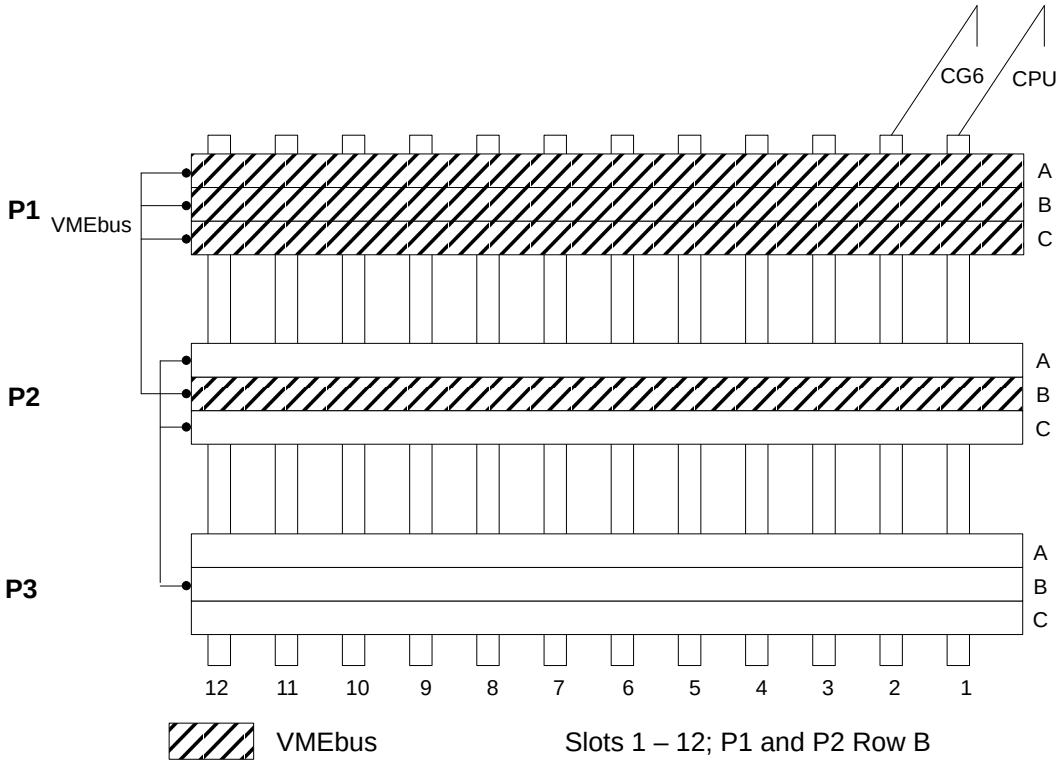


Figure 2-6. Revised Backplane Bus Connections

VMEbus Backplane Jumpering

The J1 bus on the original backplane has the following VMEbus signal levels for rows 12 through 4 across the backplane:

P1200 - P400 = BG0 (Bus Grant)
P1201 - P401 = BG1
P1202 - P402 = BG2
P1203 - P403 = BG3
P1204 - P404 = IACK (Interrupt Acknowledge)

Figure 2-7 and Figure 2-8 show the original backplane jumpering.

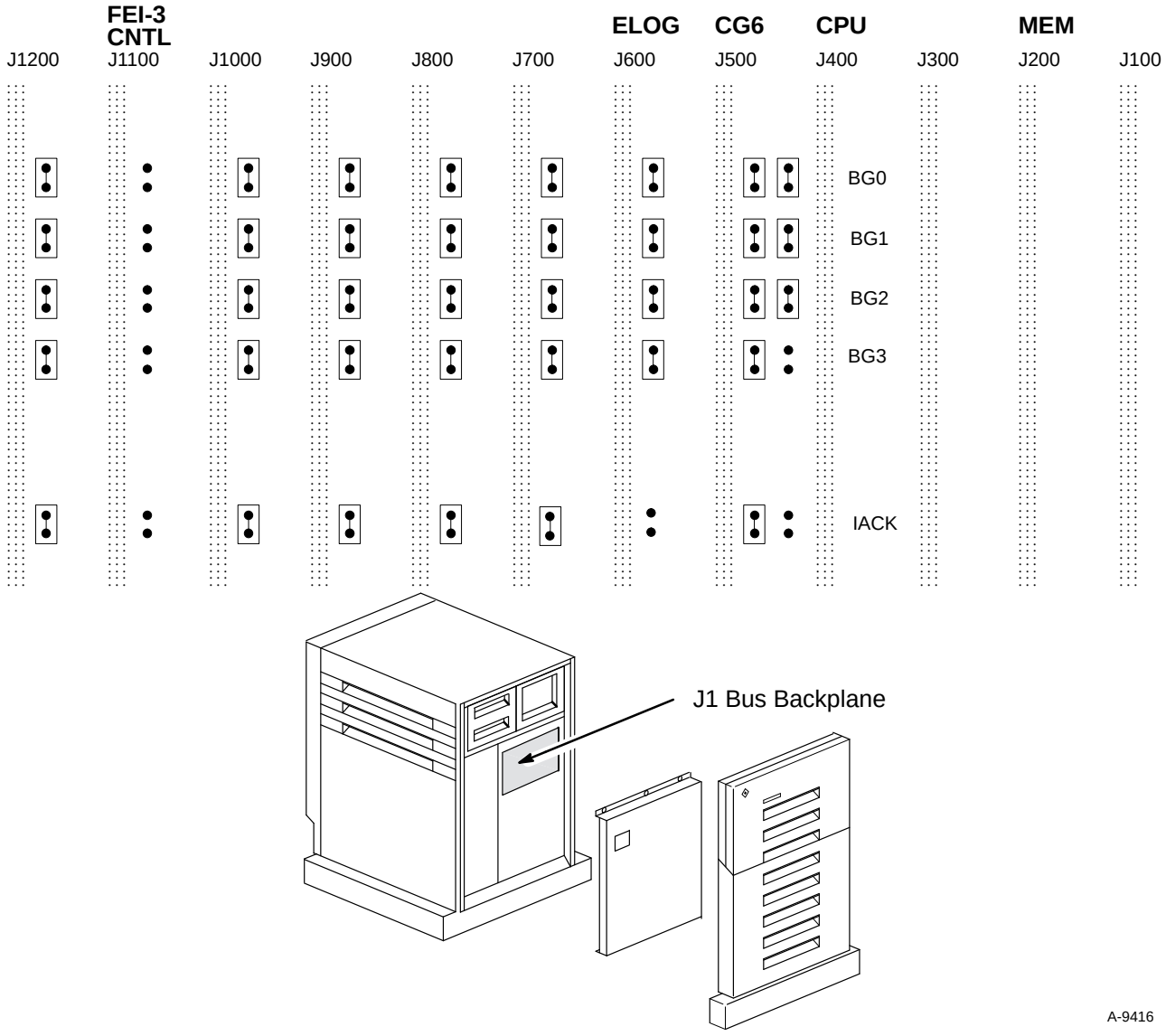
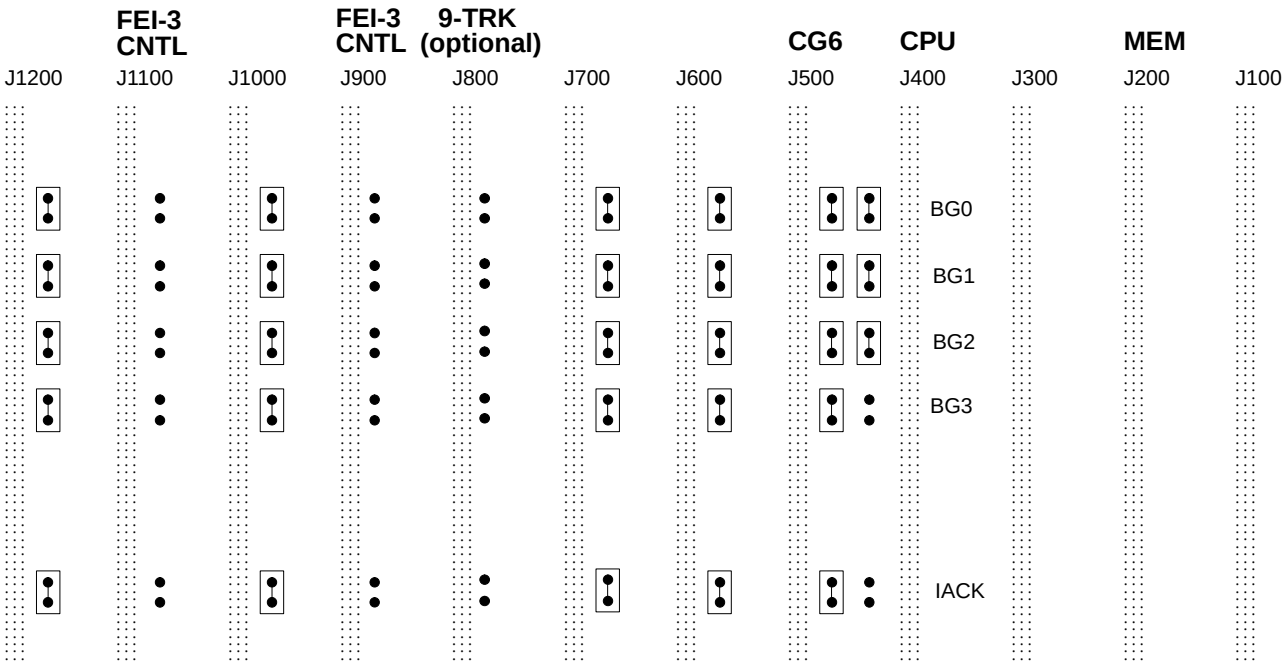


Figure 2-7. MWS-E with Original FEI-3 Backplane Jumpering



NOTE: If the optional 9-track controller board is not used, BG0 through BG3 and IACK (P800 though P804) should be jumpered.

A-9419

Figure 2-8. OWS-E with Original FEI-3 Backplane Jumpering

The J1 bus on the revised backplane has the following VMEbus signal levels for rows 12 through 1 across the backplane:

P1200 - P100 = BG0 (Bus Grant)
P1201 - P101 = BG1
P1202 - P102 = BG2
P1203 - P103 = BG3
P1204 - P104 = IACK (Interrupt Acknowledge)

Figure 2-9 and Figure 2-10 show the revised backplane jumpering.

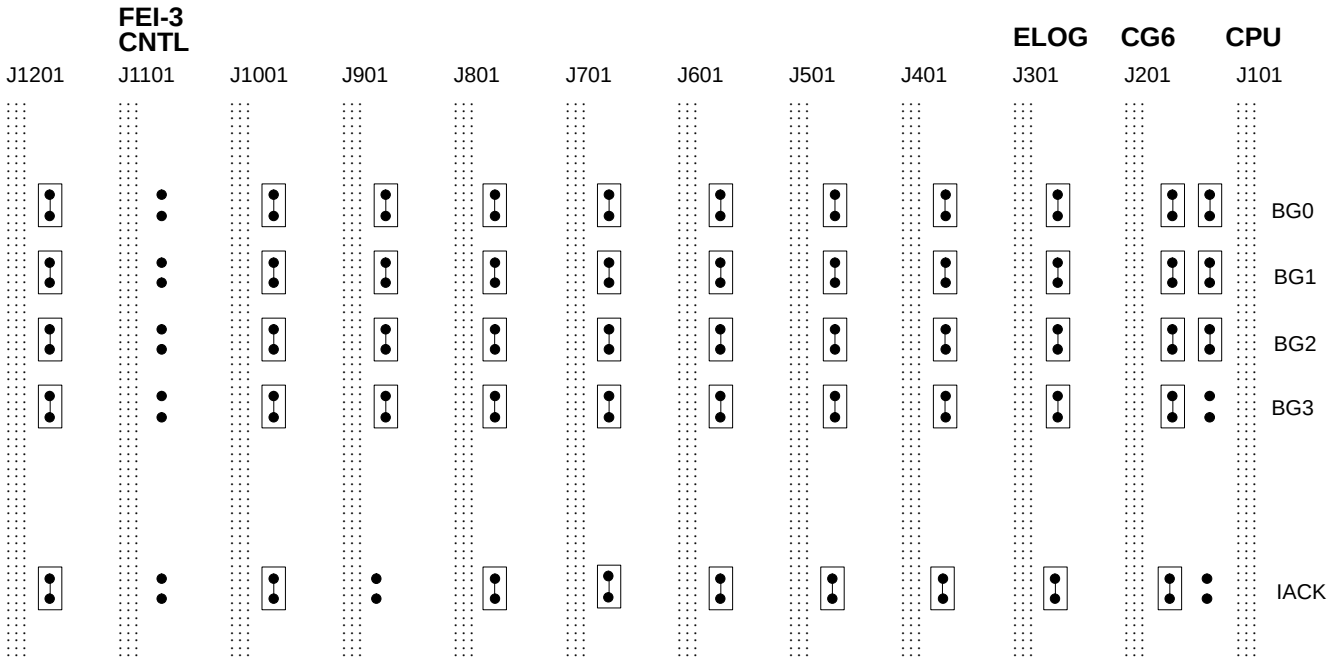


Figure 2-9. MWS-E with Revised FEI-3 Backplane Jumpering

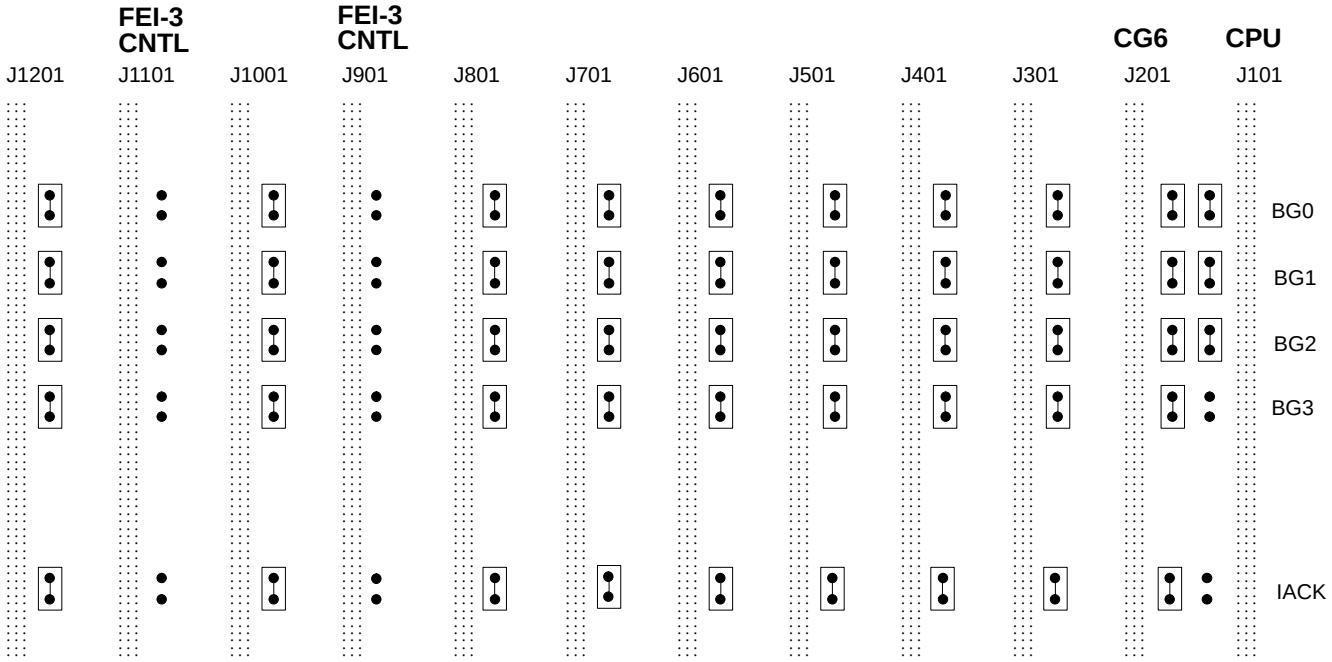


Figure 2-10. OWS-E with Revised FEI-3 Backplane Jumpering

FEI-3 Control Board

The FEI-3 control board (MWS-E and OWS-E) has the following switch and jumper settings as listed in Table 2-1 and shown in Figure 2-11. Jumpers W1, W2, and W3 are set for bus priority level 3.

The FEI-3 control board communicates with the buffer board through a special J2 connector that is part of the FEI-3S adapter board.

NOTE: Off = 1, On = 0.

Jumper	Pins	Description
W1	2, 4, 6, and 7	Bus Grant In
W2	2, 4, 6, and 7	Bus Grant Out
W3	4	Bus Grant

Table 2-1. FEI-3 Control Board Switch Settings

Switch	Description	Factory Setting			
SW1-1	Address modifier bit 4	Off			
SW1-2	Address modifier bit 3	Off			
SW1-3	Address modifier bit 2	Off			
SW1-4	Address modifier bit 1	On			
SW1-5	Address modifier bit 0	Off			
SW1-6	Compare address modifier 2D	Off			
SW1-7	Compare address modifier 29	Off			
SW1-8	Not used	Off			
SW2-1	Output master clear	Off			
SW2-2	Input master clear	On			
SW2-3	Not used	Off			
SW2-4	Not used	Off			
SW2-5	Not used	Off			
SW2-6	Fast DTACK mode	On			
SW2-7	6-Mbyte (on) or 12-Mbyte mode	On			
SW2-8	16-bit (off) or 32-bit (on) mode	Off			
		First FEI-3 (Chn0)	Second FEI-3 (Chn1)	Third FEI-3 (Chn2)	Fourth FEI-3 (Chn3)
SW3-1	Compare address modifier 15	Off	Off	Off	Off
SW3-2	Compare address modifier 14	Off	Off	Off	Off
SW3-3	Compare address modifier 13	Off	Off	Off	Off
SW3-4	Compare address modifier 12	On	On	On	On
SW3-5	Compare address modifier 11	On	On	On	On
SW3-6	Compare address modifier 10	On	On	Off	Off
SW3-7	Compare address modifier 09	On	Off	On	Off
SW3-8	Not used	On	On	On	On

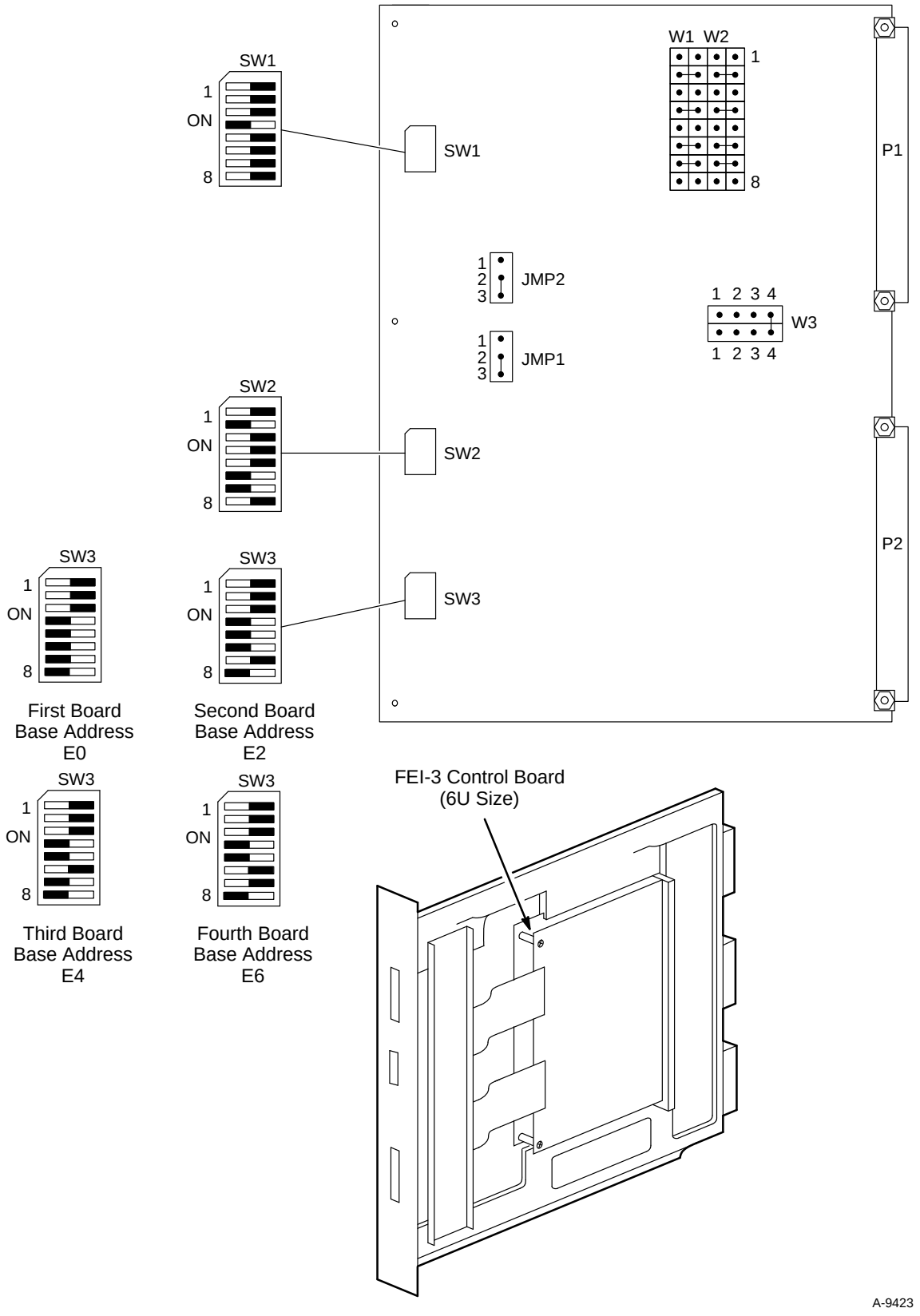


Figure 2-11. FEI-3 Control Board Jumper Configuration

FEI-3 Buffer Board

The FEI-3 buffer board in the MWS-E and OWS-E is jumpered as shown in Figure 2-12.

Jumper	Pins	Setting	Description
W1-W2	1-2	Out	Clock Tuning
JMP1	2-3	In	Bidirectional Master Clear
JMP2	2-3	In	Bidirectional Master Clear

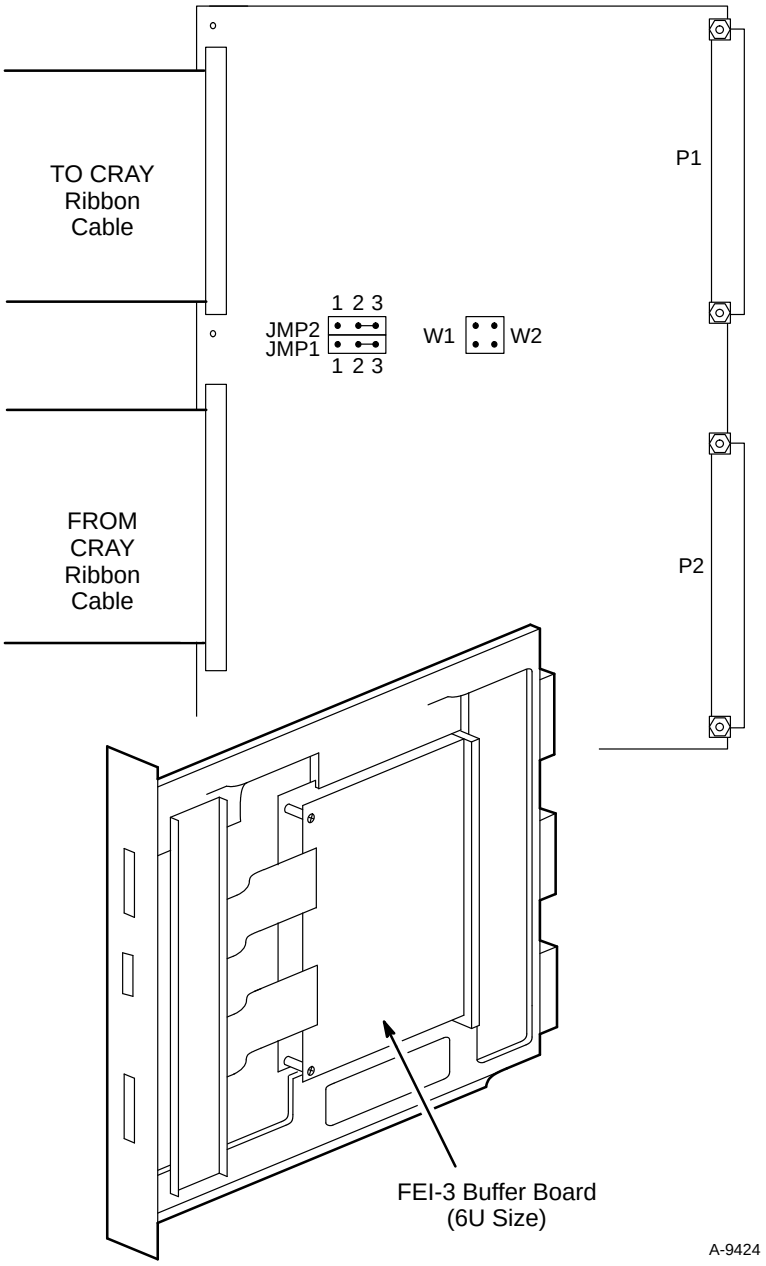


Figure 2-12. FEI-3 Buffer Board Jumper Configuration

Error Logger Board

The error logger in the MWS-E is mounted on a 9U format adapter board. The error logger board slides into two plastic retaining sleeves and is held in place by two screws on each sleeve. The error logger board occupies slot 6 and the double-wide face plate covers slots 6 and 7. Assemblies with the split-panel faceplate can use one or both panels as needed.

The error logger board is jumpered as shown in Figure 2-13.

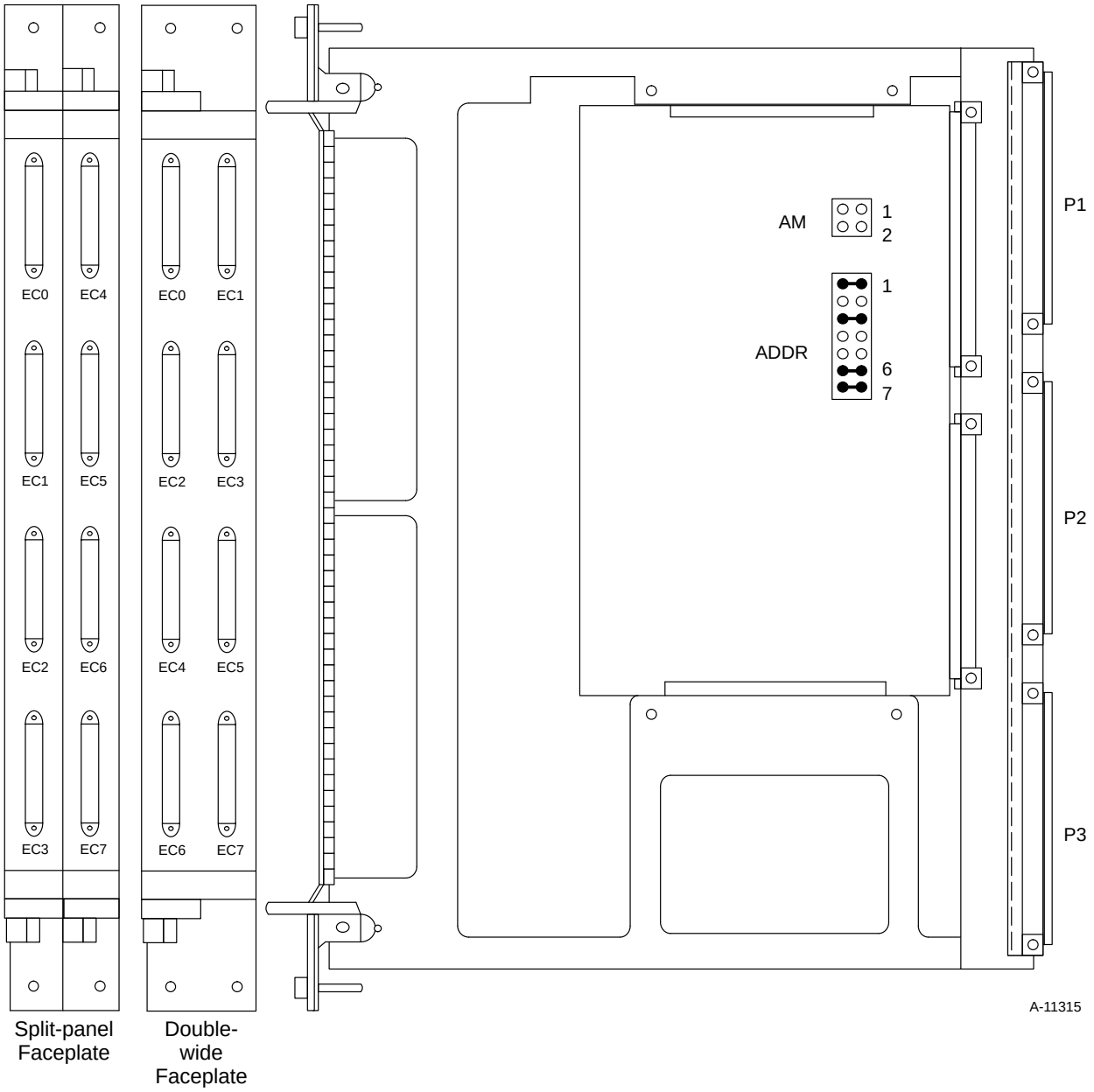


Figure 2-13. MWS-E Error Logger Jumper Configuration

4300 CPU Board

The jumper pin settings for the 4300 CPU board are identified in Table 2-2 and shown in Figure 2-14.

Table 2-2. 4300 CPU Jumper Settings

Jumper	Pins	Setting	Description
J0200	1-2 3-4 5-6	In In Out	FPC normally low FPC normally low FPC normally high
J0900	1-2	In	Enable system clock
J1900	1-2	In Out	Set for 1-Mbyte SIMMs Set for 4-Mbyte SIMMs
J2100 J2101	1-2 1-2	In Out	Enable 27512 Boot PROM Enable 27256 Boot PROM
J2302	1-2	In	Set protocol for ports A and B Pins 1-2 for RS-232C, +/- 12 V Pins 2-3 for RS-423, +/- 5 V
J2303	1-2	In	Set protocol for ports A and B Pins 1-2 for RS-232C, +/- 12 V Pins 2-3 for RS-423, +/- 5 V
J2400	1-2	In	Enable serial port clock
J2402	1-2 2-3	Out In	Set keyboard on transit mouse Set keyboard on ground
J2502	1-2	In	Set protocol for ports C and D Pins 1-2 for RS-232C, +/- 12 V Pins 2-3 for RS-423, +/- 5 V
J2503	1-2	In	Set protocol for ports C and D Pins 1-2 for RS-232C, +/- 12 V Pins 2-3 for RS-423, +/- 5 V
J2701	1-2	Out	Disable VME loopback
J2800	1-2	In	Enable VME reset Out
J2801	1-2	In	Enable VME arbiter
J2803	1-2	Out	Enable VME reset In
J2900	1-2	In	Enable 16-MHz clock to backplane
J3001	1-2 3-4 5-6 7-8 9-10 11-12 13-14 15-16	Out In In In In In In In	Not used Enable VME interrupt level 1 level 2 level 3 level 4 level 5 level 6 level 7
J3100	1-2	In	Enable 32-MHz clock
J3101	1-2	In	Enable 48-MHz clock

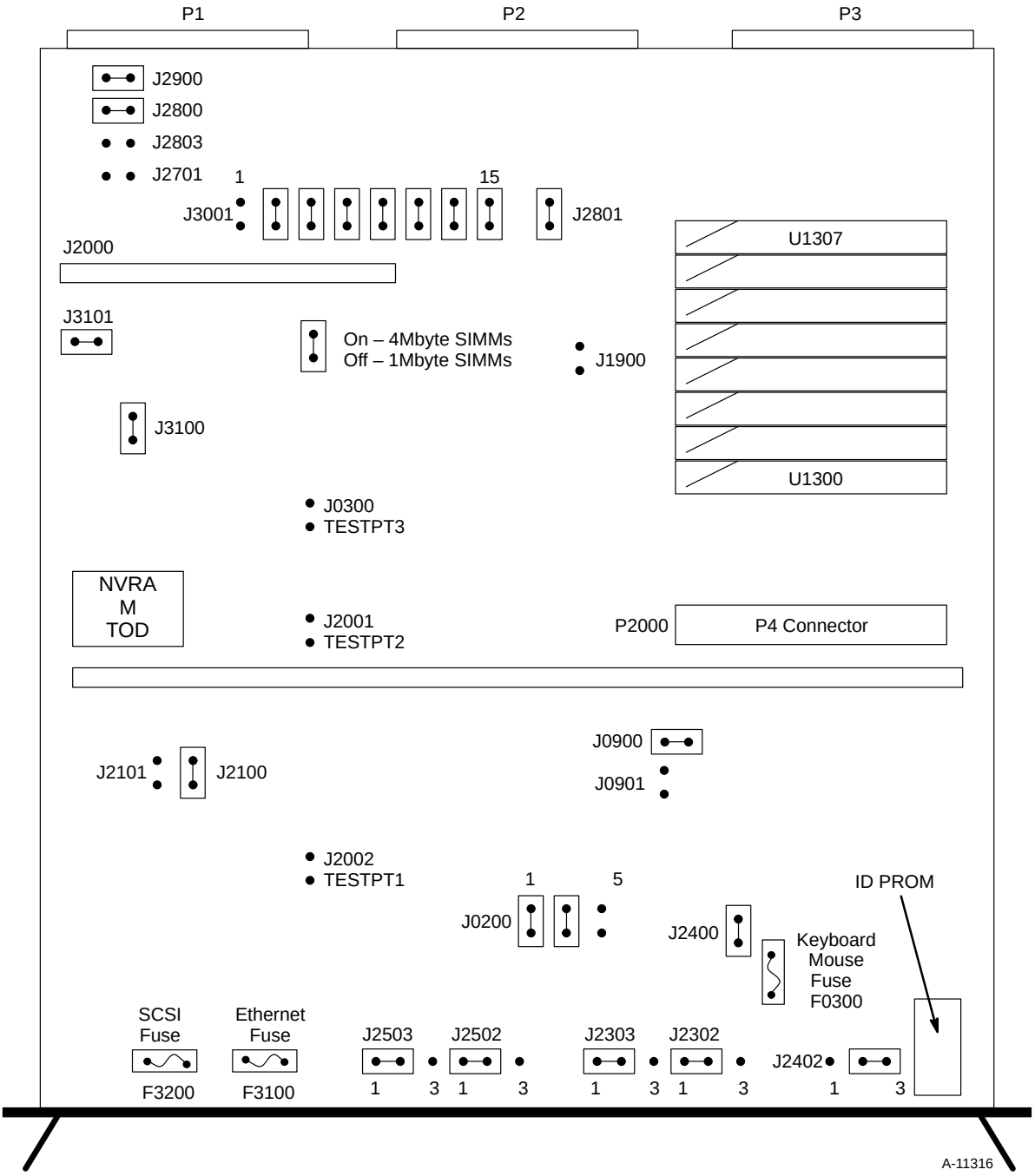


Figure 2-14. 4300 CPU Board Jumper and Fuse Locations

NOTE: The ID PROM on the 4300 CPU must stay with the workstation. If a replacement CPU board is needed, remove the ID PROM and re-install it in the replacement board. Replacement CPU boards are shipped without an ID PROM chip.

Memory Expansion Board

The jumper pin settings for the memory expansion board are described in the following list and are shown in Figure 2-15. The CONF jumpers are used to determine how many of the memory banks are populated.

Jumper	Setting	Description
J2304	In	Bus Grant 0 (BG0)
J2305	In	Bus Grant 1 (BG1)
J2306	In	Bus Grant 2 (BG2)
J2307	In	Bus Grant 3 (BG3)
J2308	In	Interrupt Acknowledge (IACK)
J2309	Out	Memory style In = 4-Mbyte SIMMs Out = 1-Mbyte SIMMs
J2310	In	CONF 0
J2311	In	CONF 1
J2312	In	CONF 2

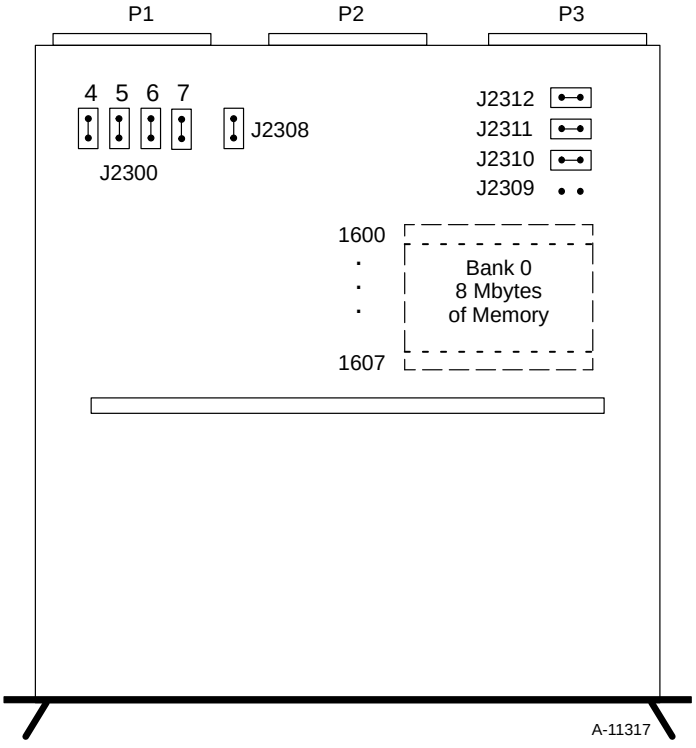


Figure 2-15. Memory Board Jumper Locations

CG6 Graphics Board

The CG6 graphics board has the following pins jumpered as shown in Figure 2-16:

Jumper	Pins	Setting
J100	1-2	Out
J500	1-2	In
J501	1-2	Out
J900	1-2	In

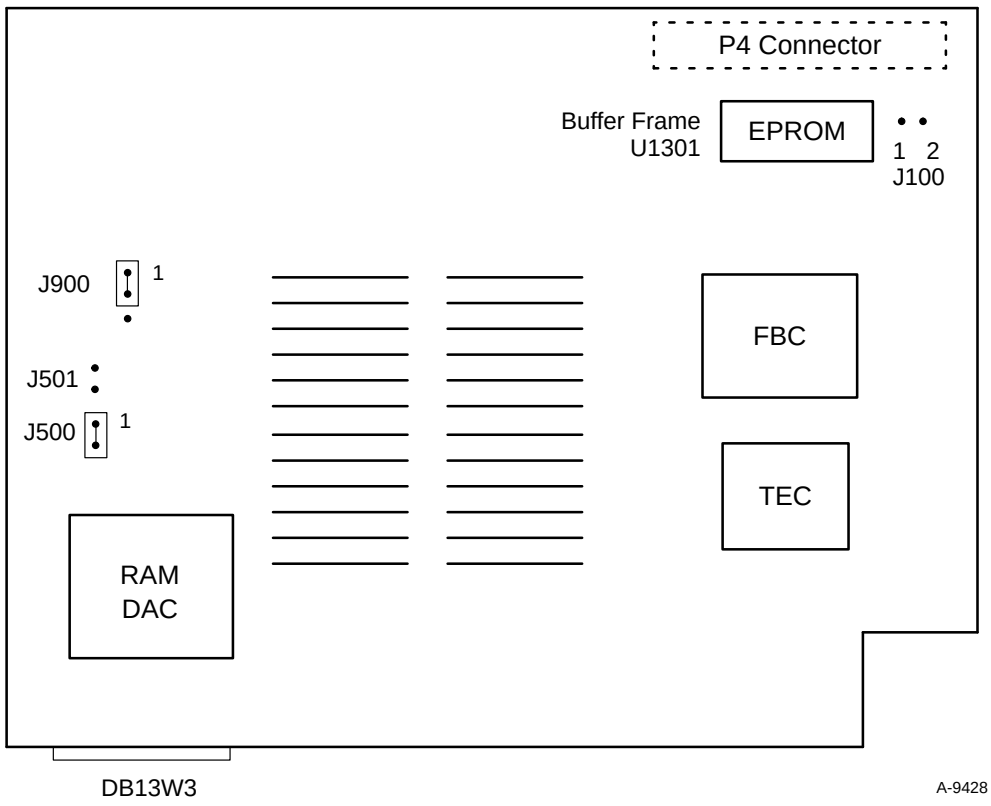


Figure 2-16. CG6 Graphics Board Jumper Setting

Streaming Tape Drive

Figure 2-17 shows the jumper configuration block located beneath the power connector on the rear of the drive. The jumper block provides for nine possible connector pairs.

Jumper	Description
Diag	Not used.
Parity	Not used. With jumper pins connected, enables parity checking.
CF2-CF0	Set disconnect transfer size to 32 Kbytes.
SCSI Controller ID	ID2 is jumpered. The ID is set to match the SCSI target device for the streaming tape drive. The ID determines the priority of the controller during bus arbitration phases, with ID0 representing the lowest priority.

NOTE: When replacing the streaming tape drive, make sure the antistatic pad is placed between the streaming tape drive and CD-ROM player.

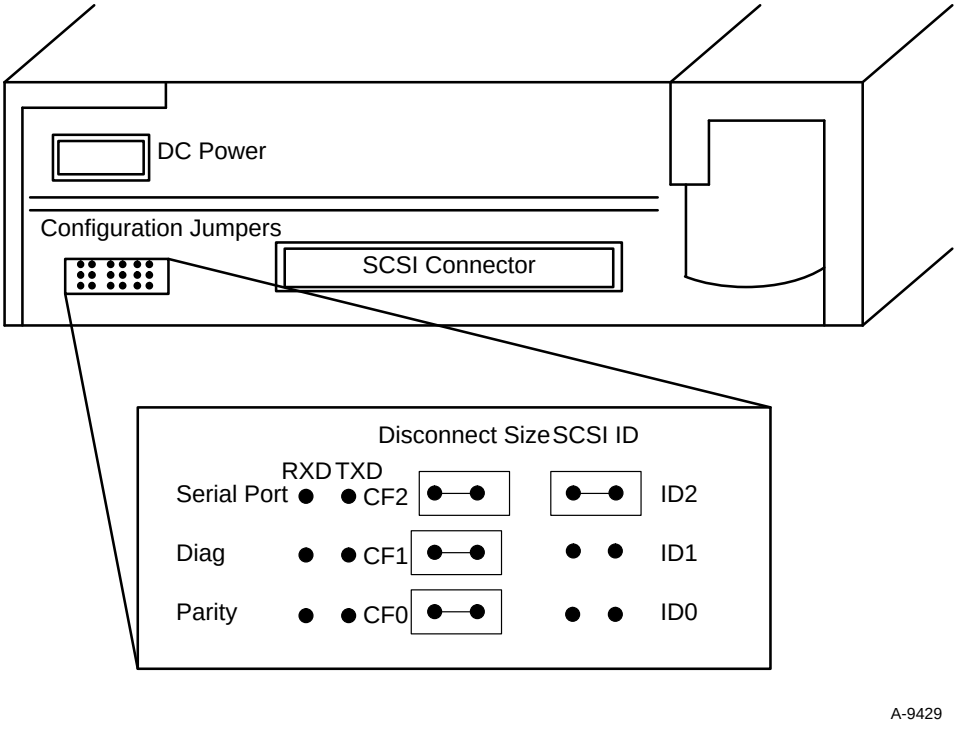


Figure 2-17. Streaming Tape Jumper Location

Hard Disk Drive

Pins on the hard disk drive are described in the following list. Jumper the drive as shown in Figure 2-18:

Jumper	Setting	Description
W1	In	Drive provides termination power from the disk drive power connector.
W2	Out	Host provides internal terminator option.
W2 and W11	In	Drive provides internal and bus terminator power.
W4	Out	Bus parity check option enabled. Error detection performed on a per-byte basis.
W5	Out	Spindle control option starts spindle at power on.
W11	Out	+5 V to Bus Option.
W28	Out	Frame-to-logic ground option. In = grounded, Out = not grounded.

NOTE: All jumpers other than the ones shown in Figure 2-18 are set by the manufacturer; do not change jumpers set by the manufacturer.

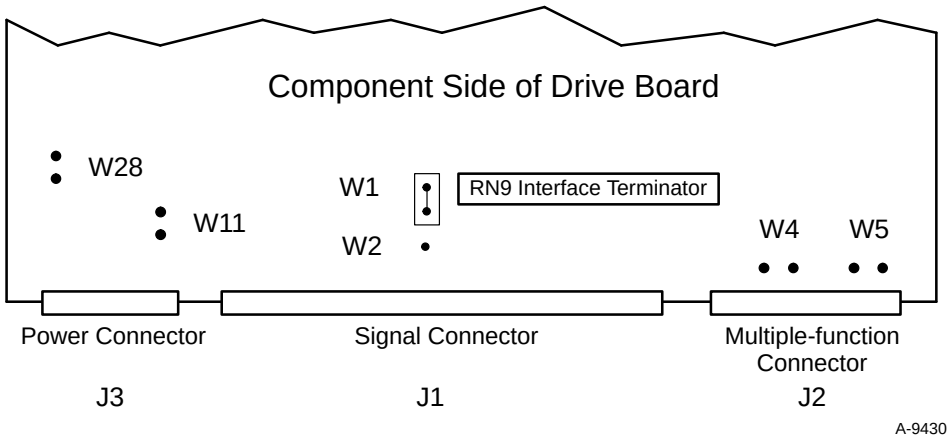


Figure 2-18. Hard Disk Drive Jumper Locations

CD-ROM Player

Jumper pins on the CD-ROM player are shown in Figure 2-19.

NOTE: When replacing the CD-ROM player, make sure the antistatic pad is placed between the streaming tape drive and CD-ROM player.

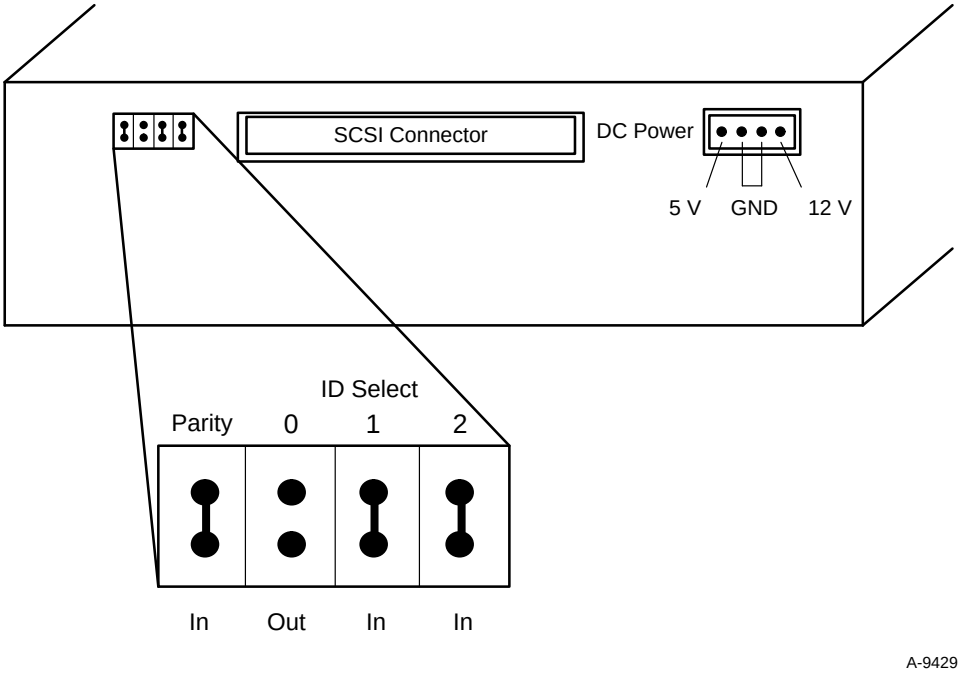


Figure 2-19. CD-ROM Player Jumper Locations

9-track Controller Board

The 9-track controller board should be jumpered as shown in Figure 2-20. This board is manufactured by Ciprico Inc. Refer to the Ciprico reference manual provided with the controller board for more information on the 9-track controller board.

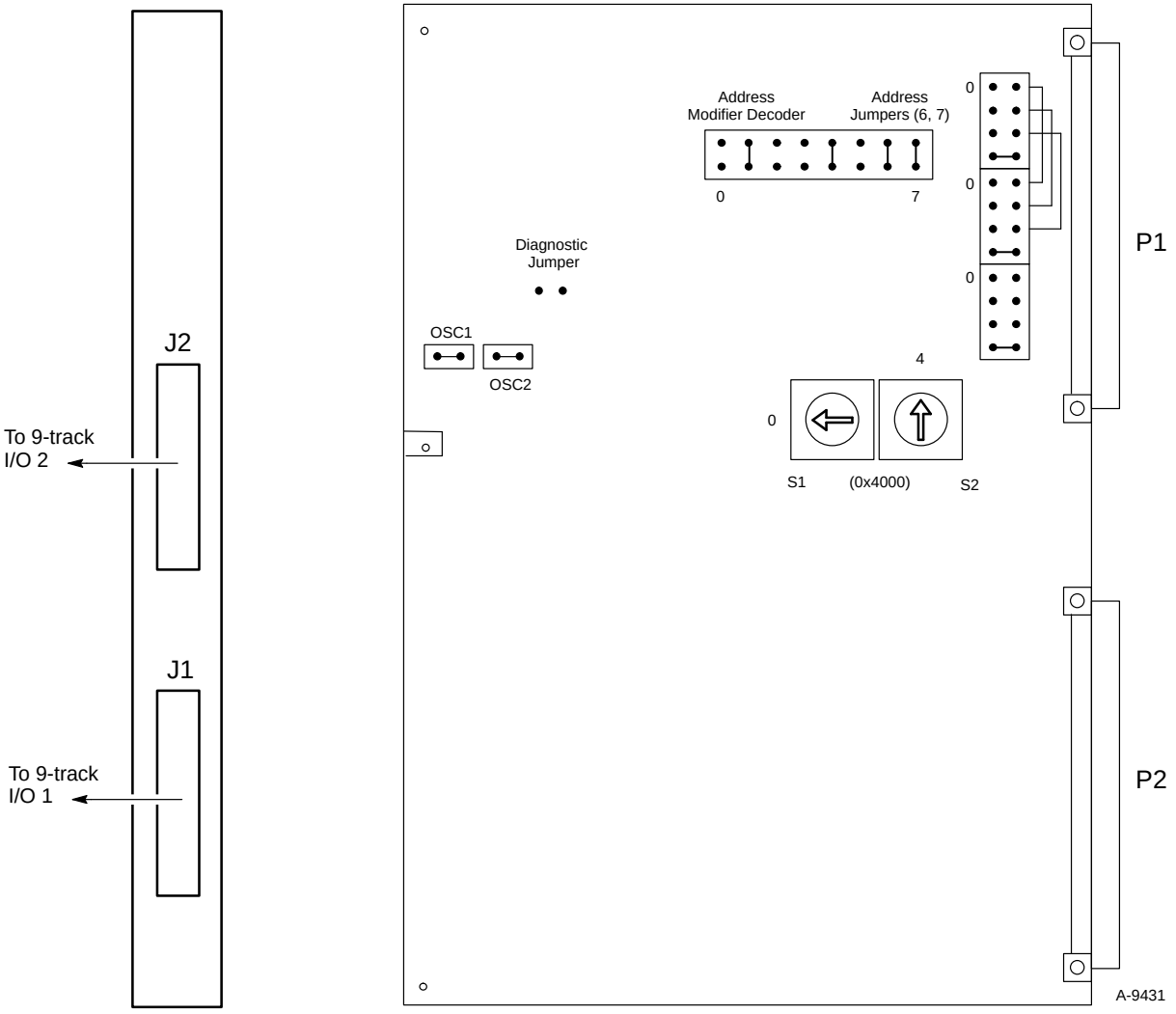


Figure 2-20. 9-track Controller Board Jumper Configuration

Power Supply Installation and Removal

The power supply for the MWS-E and OWS-E is a field replaceable unit (FRU). The power supply is installed and removed from the back of the chassis. The following procedures describe how to remove and replace the power supply.

Removal

1. Power down the system by using the **`shutdown`** command. Refer to ‘‘MWS-E Shutdown Procedure’’ in the *MWS-E User Guide*.

2. After the system is shut down, press the DC power switch on the front of the workstation to the Off position.

3. Press the S1 power supply switch to the Off position. Refer to Figure 2-21.

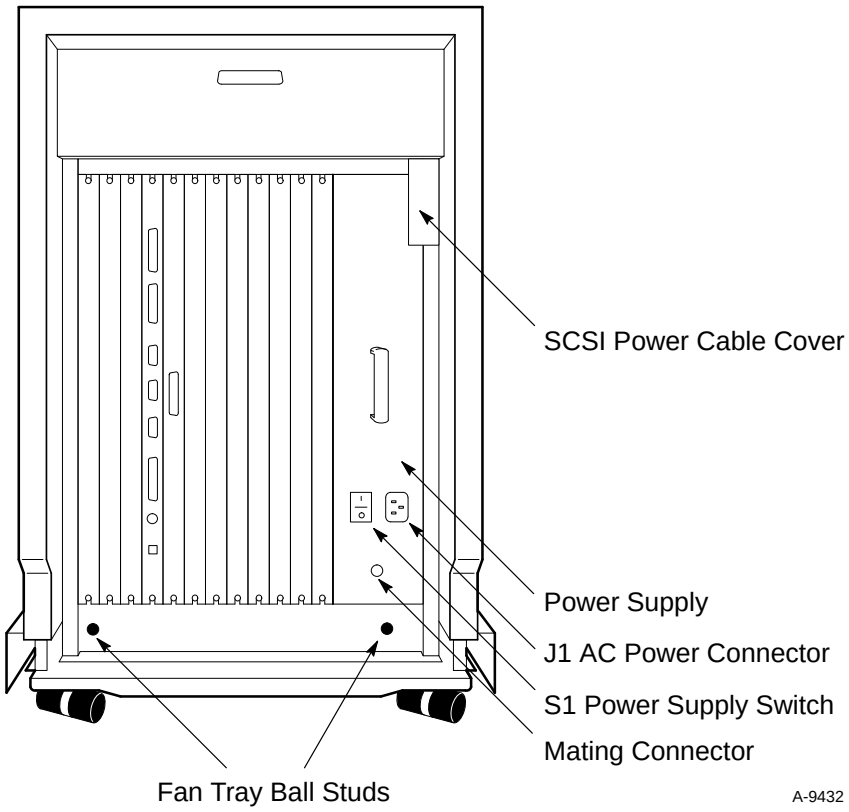


Figure 2-21. Power Supply Connections

4. Disconnect the AC power cord from the J1 connector.
5. Remove the SCSI power cable cover (two Phillips screws).
6. Remove the four retaining screws from the power supply (two on top and two on the bottom).
7. With a large flat-head screwdriver, turn the mating connector counter-clockwise (out) to disconnect the power supply from the backplane. This action will pivot the bottom of the power supply out and away from the chassis.

CAUTION

When removing and installing the power supply, be careful that the SCSI power cables do not get caught on the top right corner of the power supply.

8. Grasp the power supply handle and pull the power supply out of the chassis.

Installation

1. Slide the power supply into the chassis. The power supply will not fit flush to the chassis until you tighten the mating connector.
2. Push in and turn (clockwise) the mating connector until the power supply fits flush to the chassis.
3. Install the four power supply retaining screws.
4. Install the SCSI power cable cover (two screws).
5. Connect the AC power cord to the J1 connector.
6. Check that all cables to all boards on the back of the workstation chassis are connected.
7. Press the power supply S1 switch to the On position.
8. Power up the workstation by pressing the DC power switch on the front of the workstation to the On position. Refer to ‘‘MWS-E Startup Procedure’’ in the *MWS-E User Guide*.

Fan Tray Installation and Removal

The fan tray in the base of the workstation chassis contains nine 12 V fans. The fan tray should be cleaned periodically; refer to Section 4, ‘‘Preventive Maintenance’’ for details. Procedures for removing and installing the fan tray are as follows:

Removal

1. Power down the system.
2. After the system is shut down, press the DC power switch on the front of the workstation to the Off position.
3. Remove the front bumper and cover and the EMI shield. Refer to Figure 2-3 on page 2-4.
4. Disconnect the fan tray wire harness from the bottom center of the backplane.
5. To remove the fan tray:

WARNING

Wear protective eye glasses when using a hammer and drift punch to remove the fan tray.

The fan tray is connected to the back of the chassis by two ball studs as shown in Figure 2-21. You must disengage these studs to remove the fan tray; use a small hammer and drift punch to do this. Then, grasp the fan tray handle and pull the tray straight out of the chassis.

Installation

1. Slide the fan tray into the front of the chassis.
2. Make sure the ball studs on the fan tray protrude the back of the chassis (you may need to use a small hammer to do this). The fan tray must be fully seated to ensure that maximum air flow is drawn through the chassis.
3. Connect the fan tray wire harness.
4. Replace all chassis covers.

Fan Operation Checkout

The following procedure describes how to check whether all nine of the fans in the fan tray are operating. Note that a fan will usually squeak or grind before failing. You should replace the entire fan tray if any of the fans are not operating.

1. Power down the system.
2. After the system is shut down, press the DC power switch on the front of the workstation to the Off position.
3. Remove the front bumper and cover and the EMI shield.
4. Disconnect the fan tray wire harness.
5. Remove the fan tray from the chassis.
6. Rotate the front of the fan tray and prop it up on the fan tray opening at the front of the workstation. This will enable the fans to blow air down and around the tray.
7. Connect the fan tray wire harness.

CAUTION

The fan tray should be tested for only 1 or 2 seconds. Testing the fans for a longer period will cause the system to start the boot process and may also cause heat damage to components in the chassis.

8. *Briefly,* switch the DC power switch On and then Off. This will send a short burst of power to the fan tray. Check to see that all nine fans in the tray spin freely.
9. Disconnect the fan tray wire harness.
10. If needed, clean the fan tray.
11. Reinstall the fan tray (refer to ‘‘Fan Tray Installation and Removal’’).
12. Reinstall the chassis covers.

DC Voltage Test Points

The MWS-E and OWS-E have DC voltage test points as shown in Figure 2-22. You must remove the front cover and bumper and the EMI shield to access the test points. (Refer to Figure 2-3 on page 2-4.) The -5.2 V level is labeled (silk-screened) as -5 V for test point 6. You cannot adjust any DC voltage levels; the power supply voltage level is automatically set.

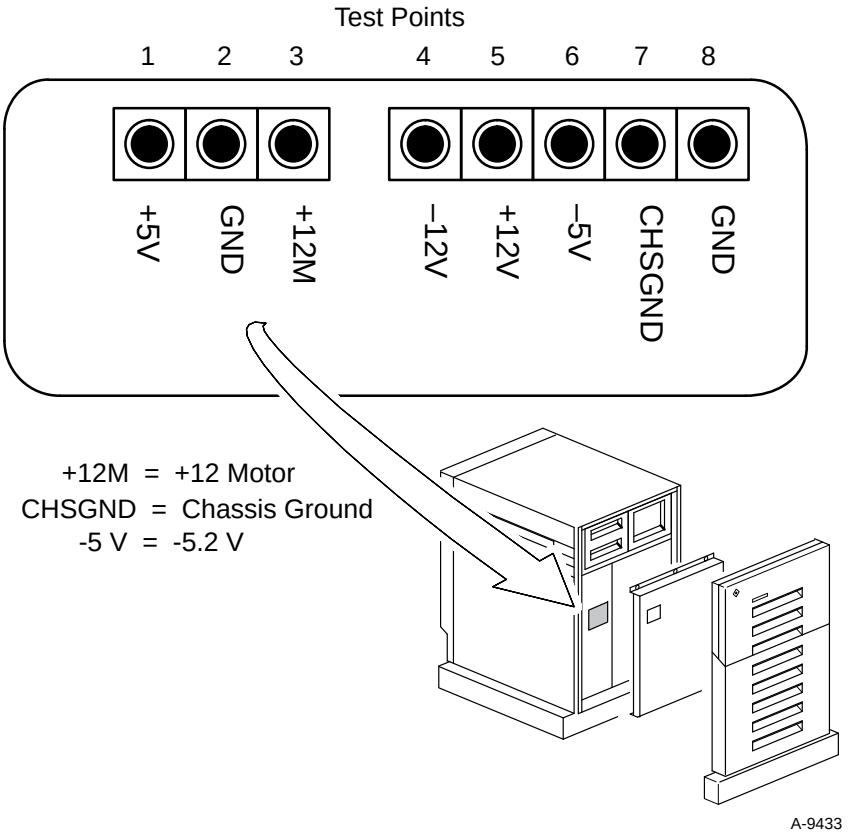


Figure 2-22. DC Voltage Test Points

The DC voltage tolerances are as follows:

Minimum	Nominal	Maximum
+4.95	+5.00	+5.05
11.76	+12.00 analog	12.24
11.52	+12.00 motor	12.48
-11.76	-12.00	-12.24
-5.10	-5.20	-5.30

Cabling

Figure 2-23 shows cable connections for the MWS-E. Cable distances are limited to the length of CRI supplied cables; cable distances longer than those supplied with the workstation system are not supported. Figure 1-2 on page 1-7 shows cable connections for both workstations.

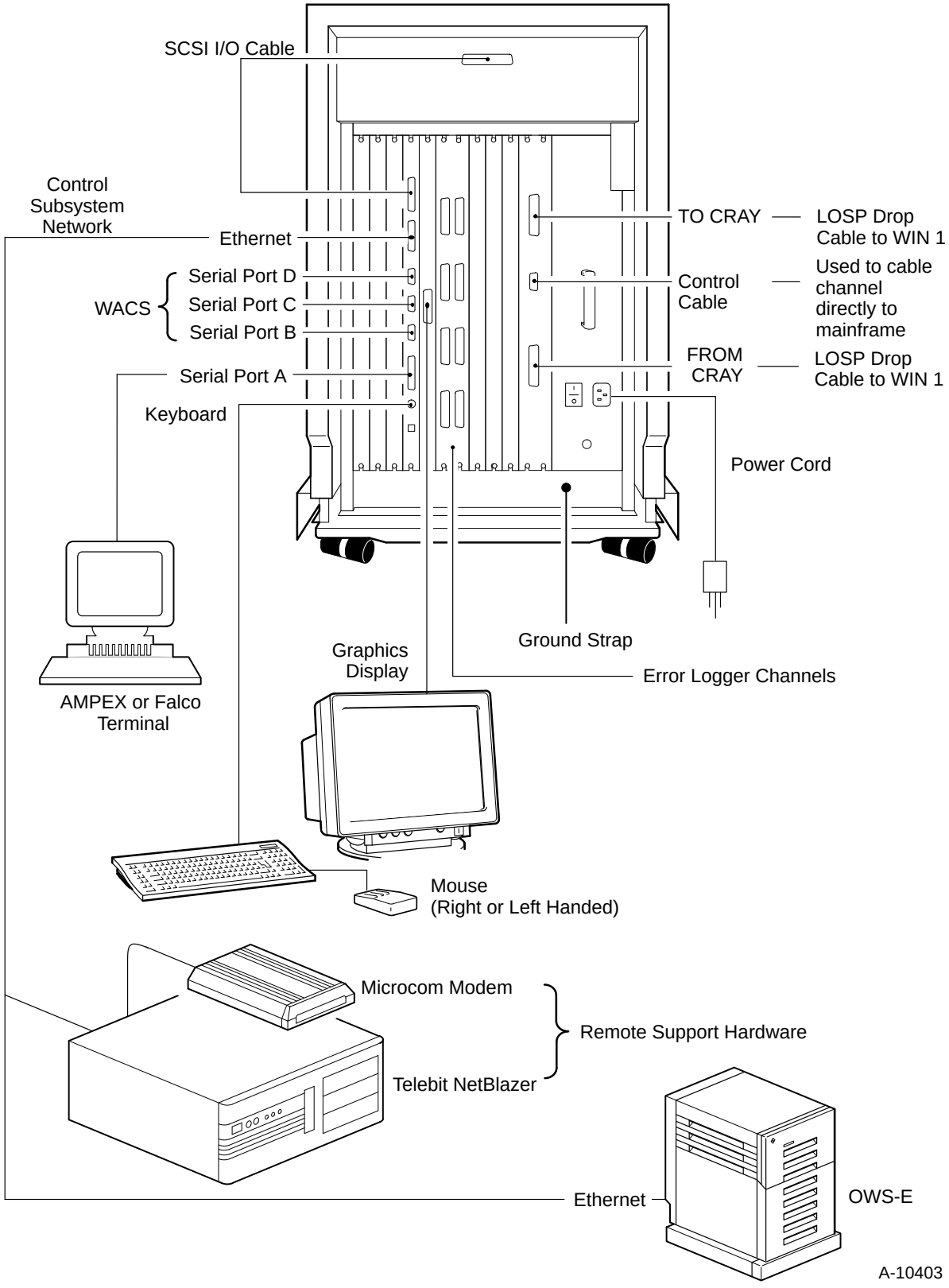


Figure 2-23. MWS-E Cable Connections

3 WORKSTATION DIAGNOSTIC TESTS

This section describes diagnostic tests and procedures for testing components in the maintenance workstation model E (MWS-E) and operator workstation model E (OWS-E). Procedures for the following tests are included in this section:

- Power-up Tests
- SunDiag - Sun Microsystems, Inc. system testing environment
- OLNET - FEI-3 Test
- ELBD - Error logger board test
- Network Tests
  - Spray - Network packet test
  - Ping - Network packet test

Power-up Tests

The following power-up tests are available on the MWS-E and OWS-E:

- Normal power-up CPU tests
- Extended diagnostic mode power-up tests

Normal Power-up CPU Tests

These tests determine whether CPU logic and main memory functions needed for program loading and execution are functioning properly. They are run during a normal power-up by setting the DIAG/NORM switch on the CPU to NORM. While these tests are running, eight LEDs on the CPU light in various binary patterns corresponding to the test that is running or the test that failed. These tests also test all 16 Mbytes of memory.

Extended Diagnostic Mode Power-up Tests

These extended diagnostic tests are more extensive than the normal power-up tests and test the quantity of memory configured in the EEPROM address 015 (normally 16 or 32 Mbytes of memory). To run these tests, connect an AMPEX or Falco terminal to CPU serial port A, disconnect the graphics keyboard, set the DIAG/NORM switch on the CPU to DIAG, and power-cycle the workstation. Use cable 12191000 to connect the terminal to serial port A. The terminal should be set to full duplex, 9600 baud, XON/XOFF, 8 bits/1-stop bit, and no parity. Refer to Section 6, "AMPEX 230 Terminal Operation," or Section 7, "Falco Terminal Setup" for terminal set-up procedures and descriptions.

SunDiag Diagnostic Testing System

SunDiag is used to verify the configuration, functionality, and reliability of hardware controllers and devices installed in your MWS-E or OWS-E workstation. These diagnostic program tests are run under root login. SunDiag probes the operating system kernel for hardware devices. SunDiag then displays these devices in the control window panel of the SunDiag window.

This subsection is designed to introduce SunDiag and to provide a basic procedure for employing all available SunDiag tests on the MWS-E or OWS-E workstation. SunDiag is described in detail in the *SunDiag User's Guide*; refer to that manual for more information.

SunDiag Files

The following files have complete path names that are used to run SunDiag tests:

File	Description
`/usr/diag/sundiag`	Directory containing all available tests that run under SunDiag.
`/usr/diag/sundiag/sundiag`	SunDiag program and menus code.
`/var/adm/sundiaglog/sundiag.err`	Error file containing SunDiag testing errors.

`/var/adm/sundiaglog/sundiag.info`	Information file containing SunDiag startup and shutdown information.
`/var/adm/sundiaglog/options`	User defined option files directory. These files can be loaded and run at user-specified times.

SunDiag Procedure

The following items are needed before starting the SunDiag procedure:

- Any compact disc (CD) loaded into a disc carrier (caddy).
- Blank streaming tape
- 9-pin loopback connector (P/N 12804600)
- 25-pin loopback connector (P/N 12804700)

The following procedure describes how to load and run all applicable SunDiag tests under the `mws` user environment on the MWS-E. This procedure is divided into five parts.

Part 1: Starting SunDiag

1. Log on as **`mws`**.
2. Use the **`su`** command to gain super-user (root) privileges.
3. Load a CD into the CD-ROM player.
4. Load a blank tape into the streaming tape drive.
5. Connect the 9-pin loopback connector to port B on the CPU.
6. Connect the 25-pin loopback connector to port A on the CPU.
7. Enter the following command to start SunDiag:

```
mws1234# /usr/diag/sundiag/sundiag
```

The following message is displayed:

```
Sundiag:  Starting probing routine, please wait ...
```

You will get the following error messages if you forgot to load a CD and streaming tape. You can proceed with the SunDiag procedure; however, you will not be able to test the CD-ROM and streaming tape drives.

```
03/12/91 15:41:43 mws1234 probe INFO: st0: tape offline, can’t get info.
03/12/91 15:41:45 mws1234 probe INFO: /dev/rsr0 not ready: I/O error.
```

The SunDiag window similar to Figure 3-1 will appear.

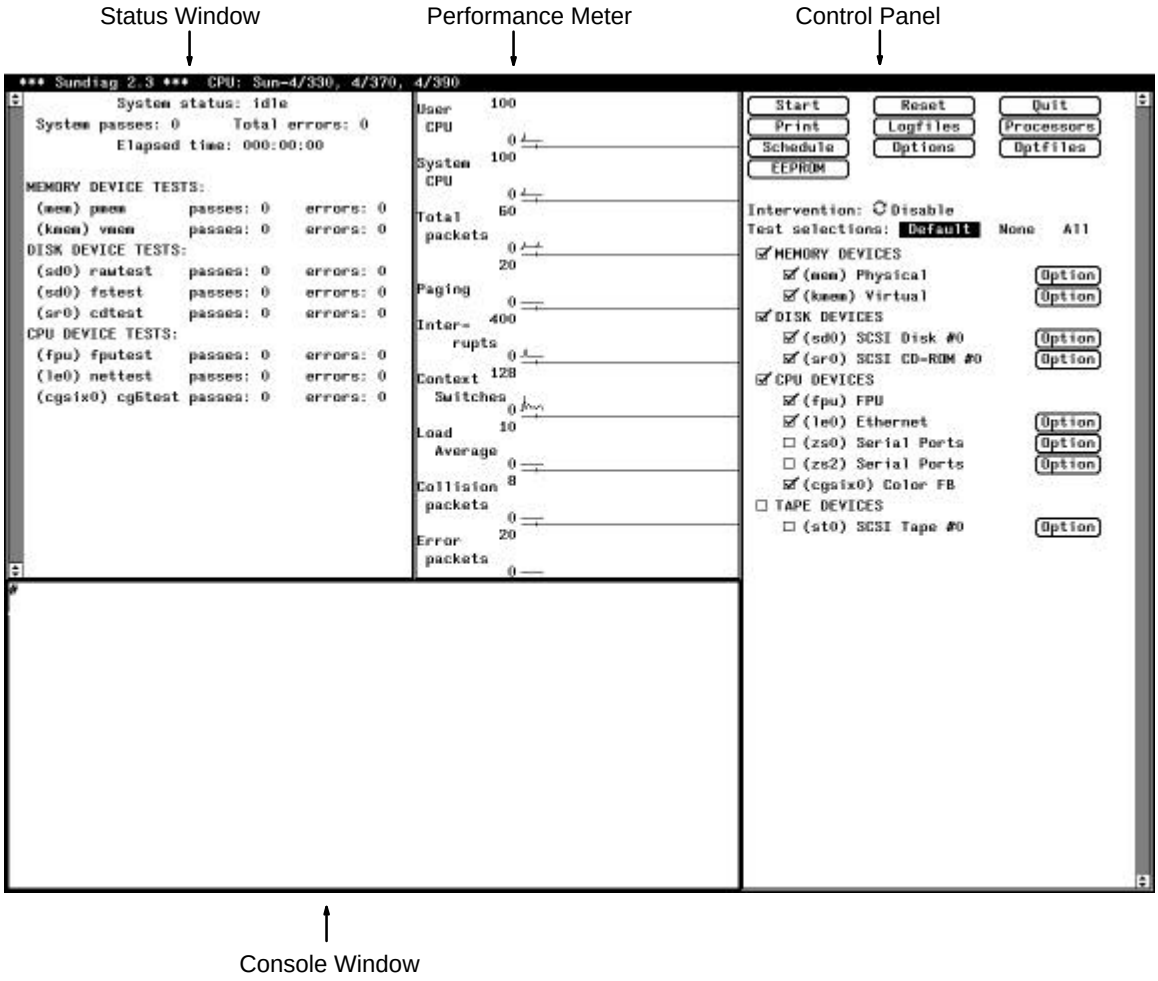
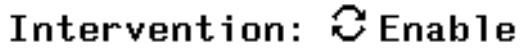


Figure 3-1. SunDiag Status Window

Part 2: Selecting Test Options

8. Move the mouse arrow to the Control Panel.

9. Click SELECT (the left mouse button) on the `Intervention` parameter to set the `Enable` mode (for testing serial ports and streaming tape drive).



10. Click SELECT on the following `Option` button to display the SCSI CD-ROM options window as shown in Figure 3-2.

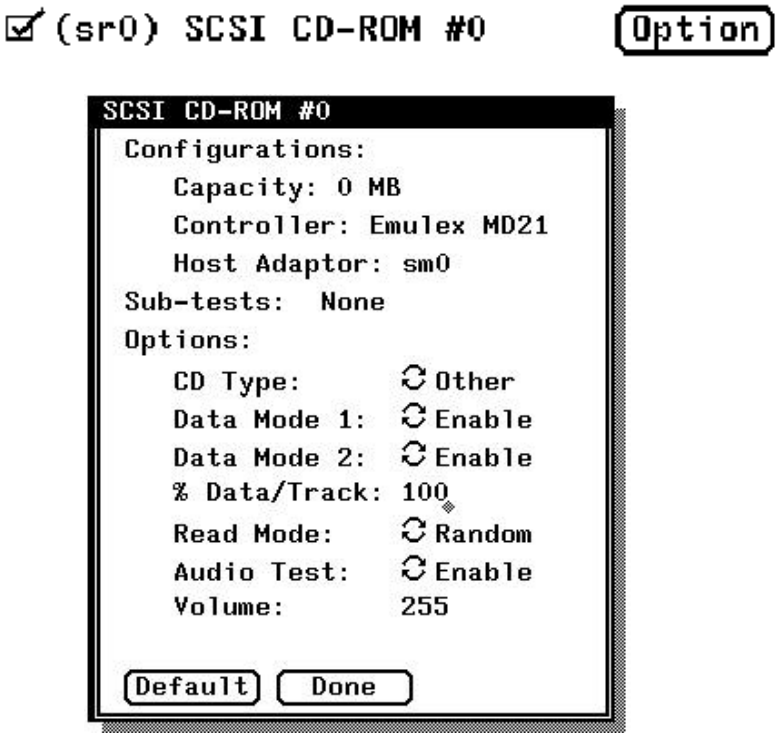


Figure 3-2. SCSI CD-ROM Options

11. Check to see that the `Emulex MD21` controller type is specified in the SCSI CD-ROM option window. If the controller type is `unknown`, you will not be able to test the CD-ROM player. You must exit SunDiag, insert a compact disc, and restart SunDiag.

12. Select the following `Option` button to display the On-Board TTY Ports window shown in Figure 3-3:

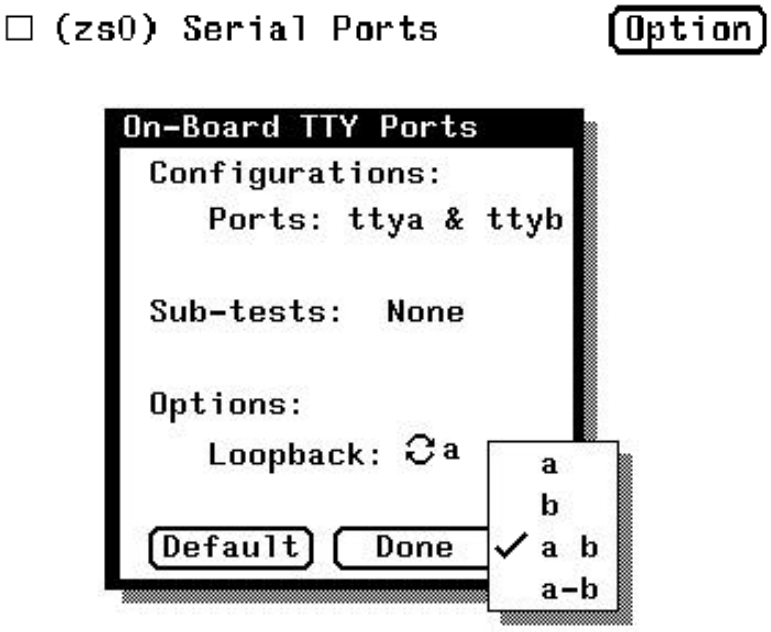


Figure 3-3. On-Board TTY Ports Window

13. Press MENU to display the loop-back test menu shown in Figure 3-3. Choose the `a b` option as shown.

    The test will be added to the status window. (The `a b` option tests both port a to port a and port b to port b. The `a-b` option tests port a to port b; do not select option `a-b`.)

NOTE: Because you only have one 9-pin loopback connector, you can only test one set of serial ports (b, c, or d) at a time. To test serial ports C and D you must select the appropriate loop-back test under the `zs2` option.

14. Click SELECT on the `Done` button to close the option menu.

15. Click SELECT on the following `Option` button. The `SCSI Tape #0` window appears as shown in Figure 3-4:

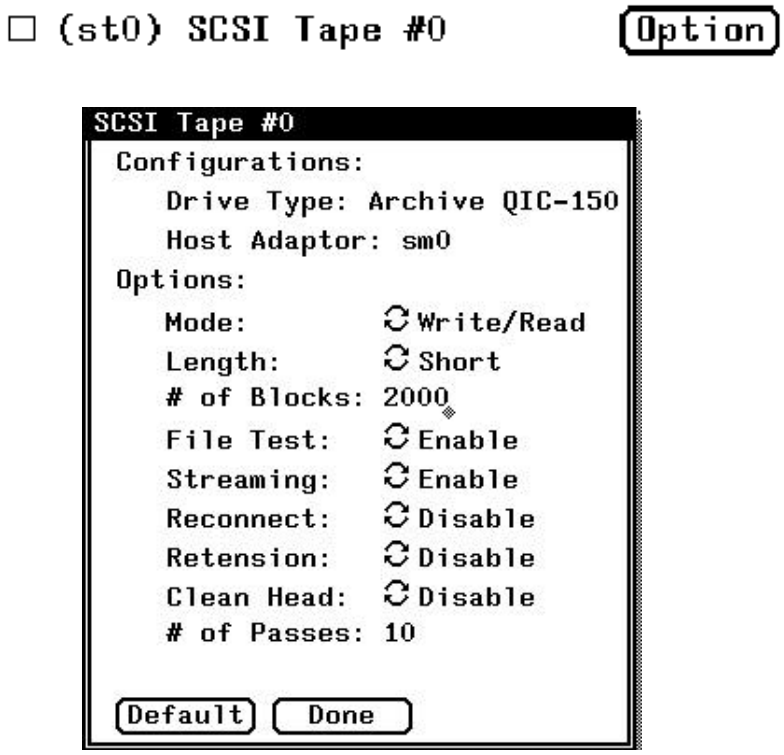


Figure 3-4. SCSI Tape #0 Window

16. Check to see that the `Archive QIC-150` type is specified in the `SCSI Tape #0` window. If the drive type is `unknown`, you will not be able to test the streaming tape drive. You must exit SunDiag, insert a blank tape, and restart SunDiag.

17. Click SELECT on the appropriate options to match those shown in Figure 3-4:

18. Click SELECT on the `Done` button to close the window.

19. Click SELECT on the following option box (check marks should appear in the tape devices and st0 boxes):

☐ TAPE DEVICES

20. Verify that all device-type boxes in the Control Window have check marks, except the `(zs2) Serial Ports` option. Your Control window should look like Figure 3-5.

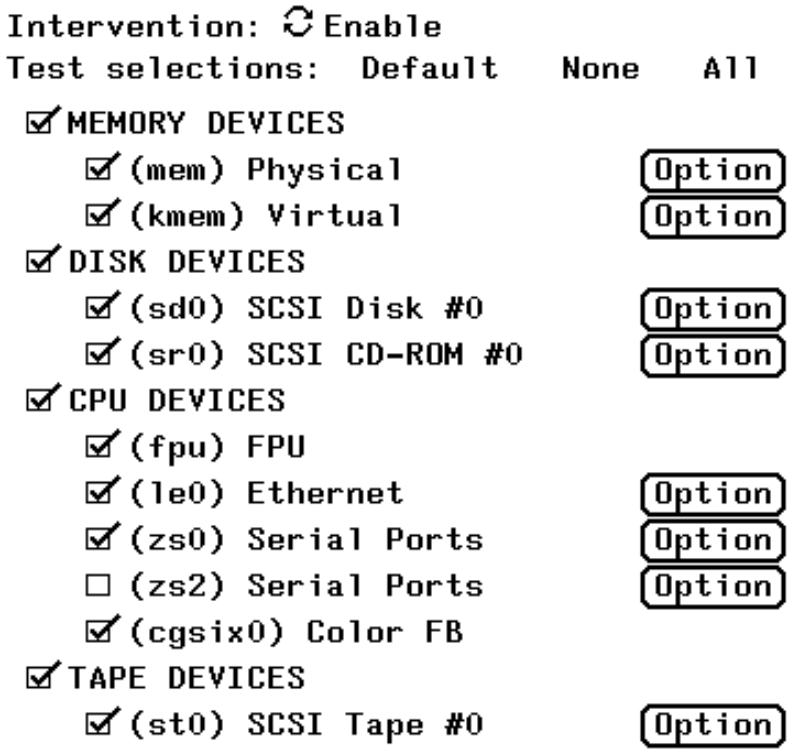
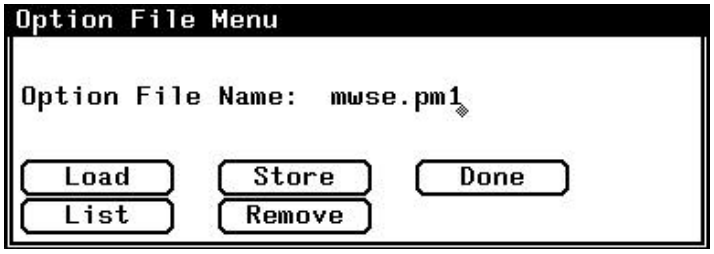


Figure 3-5. Device Option Selections

Part 3: Saving Selected Options to a File

You can save all the options you selected to a file. The next time you run SunDiag, you can load and run this file later. (You will not have to manually select various options.) The following steps describe how to save your options:

21. Click SELECT on the `Optfiles` button at the top of the Control Panel to display the following Option File Menu:



22. Type in an Option File Name (**`mwse.pm1`** in this example).

23. Click SELECT on the `Store` button to save the file into the `/var/adm/sundiaglog/options` directory.

24. Click SELECT on the `Done` button to close the `Option File Menu`.

Part 4: Running Selected SunDiag Tests

25. Select the `Start` button on the top of the Control Panel to run all selected options.

    When you select Start, SunDiag runs all selected tests and places an asterisk by each test in the Status Window after the test is completed. The System status indicator in the top of the Status Window will change to `testing` after you select the Start button. You can select Stop the tests; this changes the System status back to `idle` mode. Tests that are running are indicated by an asterisk (`*`) in the Status window.

Part 5: Exiting SunDiag

26. Select the `Stop` button on the top of the Control Panel (this will stop any tests that are running).

27. Select the `Quit` button.

28. Select `Confirm` from the exit window that is displayed.

29. Remove the streaming tape from the drive.

30. Remove the CD by pressing the eject button on the drive or by entering the following command:

```
mws1234# /usr/bin/eject /dev/rsr0
```

31. Remove the loopback connectors and recable the workstation.

Automated SunDiag Sessions

You can set up a file containing selected SunDiag tests and options that will automatically run at a specified time. The easiest way to explain this may be in an example.

Example: Your goal is to set up a file that would run SunDiag at 3:00 a.m., when you are home and the CRI system is not as active. You select most of the SunDiag tests and options described in the preceding procedure. However, you do not select any of the serial port loop-back tests because the MWS-E is still cabled to the system. Next, you set up the date and time in the `Test Schedule Menu` shown in Figure 3-6. Select `Schedule` at the top of the Control Panel and make sure you `enable` the schedule feature. Note that you must use colons (:) between time elements and slashes (/) between date elements.

After setting the time, you save the file and name it (`mwse.pm1` for example) as described in Part 3 of the procedure. You must also set the `Run Time`, which is the difference between the `Start Time` and the `Stop Time` (8 minutes in the example shown in Figure 3-6). Next, check to see that the `Elapsed time` total in the upper-left corner of the SunDiag status window (Figure 3-1) is set to `000:00:00`. If the `Elapsed time` is not 0, then click SELECT on the `Reset` button to reset the time to 0.

Finally, you load a CD and blank streaming tape into the MWS-E drives. When you arrive the following morning, check the log files called out on page 3-2 for error information.

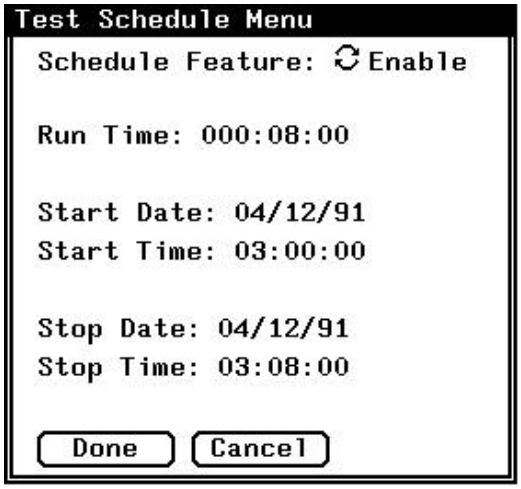


Figure 3-6. Test Schedule Menu Window

Online Network Diagnostic Program (OLNET)

The OLNET online network communications program detects and isolates faults in the communications link between a Cray Research, Inc. (CRI) computer system and a front-end computer system. The `fy` device drivers used with the OLNET program are listed in Table 3-1.

Table 3-1. OLNET Device Driver Path Names

Device Driver	Description
`/dev/fy0`	This directory contains numerous device drivers used by the OWS-E WIN/CIN interface.

`/dev/fyc1_00`
`/dev/fyc1_01`
`/dev/fyc1_02`
`/dev/fyc1_03`
	These files are character-special interface devices used by the `fy` driver. This definition may not mean much for most people other than software developers. For OLNET testing, use one of these paths to test the `fy` driver, the networking path, and the networking software. The term `fyc1` indicates the paths for channel `1`. The numbers `00` through `03` indicate four logical paths that have been defined for each channel; any of the logical paths (`00`, `01`, `02`, and `03`) can be used.

`/dev/fyct1`*x*	The OLNET program does not use these device drivers. These driver files are restricted for root user to prevent the OLNET user from accidently corrupting a channel interface; this is why you receive the `Permission denied` message in the OLNET VME Device Path Menu shown in Figure 3-9.

`/dev/fymc0`
`/dev/fymc1`
`/dev/fymc2`
`/dev/fymc3`
	These files are maintenance-character device drivers used by the MWS-E. The numbers `0` through `3` correspond to FEI-3 channels. When you use these devices, the OLNET loop-back tests test the FEI-3 hardware. These drivers were created for other purposes. They also enable OLNET to replace the VCI test for FEI-3 board sets.

NOTE: The `olnet` program can be run in command-input or interactive modes. The command-input mode enables you to enter a string of commands separated by commas. For example, the command `olnet vt,dv,/dev/fyc1_02` sets the `olnet` test to the VME test mode for FEI-3 channel 1 using the `/dev/fyc1_03` logical device path. The following procedures use the interactive mode. Once you use and become familiar with using `olnet` in interactive mode, use of the command-input mode should be easier and faster.

Loop-back fymc Driver Test Procedure

This subsection contains an example of a VME loop-back `fymc` driver test of an FEI-3 LOSP channel in an MWS-E or OWS-E workstation. Refer to Table 3-1 for device path descriptions. You will need an FEI-3 loopback cable (P/N 12166400) to perform these tests.

1. Log on to MWS-E as **`mws`**.

2. Connect the loop-back cable to the TO CRAY and FROM CRAY channels on the FEI-3 board set.

3. Enter the following command to start OLNET:

```
mws1234$ olnet
```

NOTE: You can enter OLNET commands in upper, lower, or mixed case. In this procedure, commands are shown in lowercase letters.

The OLNET main menu is displayed as shown in Figure 3-7.

```
              OLNET A.1 MAIN MENU

 YOUR SYSTEM:  NAME = SunOS, NODE NAME = mws1234, RELEASE = 4.1.2,
               VERSION = 2, MACHINE = sun4

     COMMAND     DESCRIPTION
     -------     -----------
        VT – Call the VME test.
        HELP – Get HELP information about this menu.
        QT – Quit OLNET.

    OLNET IS A PROPRIETARY PRODUCT OF CRAY RESEARCH INC.

Enter a command:
```

Figure 3-7. OLNET Main Menu Display

4. From the main menu, enter **vt** to display the VME test menu as shown in Figure 3-8.

```
      ********** VME TEST INITIAL MENU ***********

 VME INITIAL MENU COMMANDS          Current Value(if applicable)
 ------------------------           ----------------------------
  DV – Device path ----------------->  undefined
  DPM  – VME Device Path Menu

  HELP – Get HELP information about this menu.

  TMM – Select the OLNET VME Test Mode Menu.

  RT – Return to the OLNET Main menu.

Enter a command:
```

Figure 3-8. VME Test Menu Display

5. Enter **dpm** to display the device path menu as shown in Figure 3-9.

   NOTE: You can also enter the dv command following by the device name to define the device path (for example, **dv, fyc1_01**).

```
 Select no.   Pathname            status
     1 –   /dev/fy0/   Is a directory
     2 –   /dev/fyc1_00   AVAILABLE
     3 –   /dev/fyc1_01   AVAILABLE
     4 –   /dev/fyc1_02   AVAILABLE
     5 –   /dev/fyc1_03   AVAILABLE
     6 –   /dev/fyctl0   Permission denied
     7 –   /dev/fymc0   AVAILABLE
     8 –   /dev/fyctl1   Permission denied
     9 –   /dev/fymc1   AVAILABLE
    10 –   /dev/fyctl2   Permission denied
    11 –   /dev/fymc2   No such device

 Choose one of the following:
  o – Enter a number to select/open a device path.
  o – Enter help.
  o – Press <CR> to exit this routine.

  Enter a command:
```

Figure 3-9. VME Device Path Menu

6. Enter a number for one of the AVAILABLE fymc*x* path names: fymc0 for FEI-3 channel 0, fymc1 for FEI-3 channel 1, and so on. The VME test menu reappears.

7. Enter **tmm** to display the test VME configuration menu as shown in Figure 3-10.

```
   Configuration information for VME
  ----------------------------------------
   Local path(hex) = 10

   Test Parameter Commands          Value
   -----------------------          -----
    PC – Pass count -------------->  1
    MP – Messages pass ----------->  10
    AL – Associated data length -->  100
    PT – Pattern type------------->  ADDRESS
    RA – Remote path ------------->  undefined
    TM – Test mode --------------->  fymc test
   Execute & miscellaneous commands
   -------------------------------
    EX – Execute: Active mode for VME.
    TR – VME driver trace:  DISABLED
    RT – Return to the Initial Menu.

Enter a command:
```

Figure 3-10. VME Configuration Menu

8. Enter **tm** to display the test mode menu as shown in Figure 3-11.

```
The current test mode is: Active mode.
Select one of the following or press <CR> to
  leave the value unchanged:

     Command        Description
     -------        -----------
       FY ------>   fymc test
       CC ------>   Control Cable test
       AM ------>   Active mode
       PM ------>   Passive mode
       AA ------>   Aysnc active mode
       AP ------>   Async passive mode
       CL ------>   Cable loopback

Enter a command:
```

Figure 3-11. Test Mode Menu

9. Enter **fy** to select the `fymc` test.

10. Enter **pc,100** to set the pass count to 100.

11. Enter **ex** to run the fymc test. During the test, OLNET displays messages similar to the output shown in Figure 3-12.

```
 OLNET mode ----------> fymc test
 Current pass count -->      11
 Passes remaining ---->      9

Wed Oct 14 12:56:00 1992

    Test passes have completed for /dev/fymc0
    fymc test

    Total bytes transmitted =             8000
    Total bytes received    =             8000

    Elapsed time(HH:MM:SS)  = 00:00:23
    Transfer rate  =   16000 bytes/second

           Press <CR> to continue.
```

Figure 3-12. Loop-back Test Messages

12. Press the **Return** key to return to the configuration menu display.
13. Enter **rt** to return to the initial menu.
14. Enter **rt** to return to the main menu.
15. Enter **rt** to quit OLNET.

Control Cable Loop-back Test Procedure

This subsection contains an example of a control cable loop-back test of an FEI-3 LOSP channel in an MWS-E or OWS-E workstation. You will need an FEI-3 DS test cable (P/N 12168800) to perform these tests.

1. Log on to MWS-E as **mws**.
2. Connect the loop-back cable to the CNTL and FROM CRAY channels on the FEI-3 board set.
3. Enter the following command to start the OLNET test and display the available device paths:

```
mws1234$ olnet vt, dpm
```

The following device path menu is displayed:

```
Select no.   Pathname            status
    1 –   /dev/fy0/   Is a directory
    2 –   /dev/fyc1_00   AVAILABLE
    3 –   /dev/fyc1_01   AVAILABLE
    4 –   /dev/fyc1_02   AVAILABLE
    5 –   /dev/fyc1_03   AVAILABLE
    6 –   /dev/fyctl0   Permission denied
    7 –   /dev/fymc0   AVAILABLE
    8 –   /dev/fyctl1   Permission denied
    9 –   /dev/fymc1   AVAILABLE
   10 –   /dev/fyctl2   Permission denied
   11 –   /dev/fymc2   No such device

Choose one of the following:
 o – Enter a number to select/open a device path.
 o – Enter help.
 o – Press <CR> to exit this routine.

 Enter a command:
```

4. Enter the number that corresponds to the LOSP channel you are testing. The `/dev/fymc 0` through `2` files correspond to FEI-3 LOSP channels 0 through 2. The VME menu reappears.

5. Enter **`tmm`** to display the configuration menu.

6. Enter **`tm,cc`** to select the `Control Cable Loopback` test.

7. Enter **`pc,20`** to set the pass count to 20.

8. Enter **`ex`** to run the loopback test. OLNET displays messages similar to the output shown in Figure 3-12.

```
 OLNET mode ----------> Control Cable Loopback
 Current pass count -->      3
 Passes remaining ---->      17

Thu Oct 29 02:56:00 1992

    Test passes have completed for /dev/fymc0
    Control Cable test

    Total bytes transmitted =             8000
    Total bytes received    =             8000

    Elapsed time(HH:MM:SS)  = 00:00:14
    Transfer rate  =   16000 bytes/second

           Press <CR> to continue.
```

9. Press the **Return** key to return to the VME menu display.
10. Enter **rt** to return to the initial menu.
11. Enter **rt** to return to the main menu.
12. Enter **qt** to quit the OLNET program.

Error Logger Board Test

The CRI error logger board (ELBD) test consists of ten test sections. This test was designed for use on the MWS-E. Sections 2 through 10 of this test require a special loop-back cable (CRI P/N 12168900). This 3-ft (0.9 m) cable has a round 55-pin connector on one end and an RS-232 connector on the other end, and connects the input channel which connects to the VME interface board set, and the error channel port being tested.

ELBD Commands

There are seven commands displayed on the top part of the screen for each test section as shown in Figure 3-13. These commands have the following descriptions:

Command	Description
g	Go - begins test execution.
h	Halt - stops the test.
c	Continue - restarts the test section.
e	Error - enables or disables the stop-on-error function.

s	Select - allows the selection of a subsection within the test section: 1 enables the subsection; 0 disables the subsection.
n	Next - advances to the next test section.
p	Previous returns to previous test sections. There are four additional functions listed in the upper right-hand corner of the screen.

These functions have the following descriptions:

Command	Description
CNTL Z	Repaints the screen.
l	Loop - allows loopback on an error condition.
:	Snap - allows the screen display to be printed.
q	Quit - exits the ELBD test and returns to the UNIX command line.

Error Logger Board Test Procedure

Use the following procedure to test the error logger board on the MWS:

1. Log on to the MWS-E console as **mws**.

2. Enter the **pwd** command to verify that you are in the `/cri/mws` directory.

3. Enter the following command to run the error logger board test on error logger board 0 with FEI-3 board set 0. The 0 may be changed to test any error logger board or FEI-3 board set you are using.

   ```
   elbd elb0 chn0
   ```

   The Section 0 Interrupt Register Read/Write and Master Clear Test is displayed as shown in the following screen display.

```
  Rev. 2.0          ERROR LOGGER BOARD TEST
                         (waiting for input)          ^Z=repaint  :=snap
                                                       l=loop     q=quit
g=go  h=halt  c=cont e=clr-errstp  s=select  n=next

Interrupt Register Read/Write and Master Clear Test
 select
    1   Interrupt Control Register:             Pass:00000  Fail:00000
                Expected:0x00  Actual:0x00

    1   Interrupt Vector Register:              Pass:00000  Fail:00000
                Expected:0x00  Actual:0x00

   1   Master Clear Interrupt Control Register: Pass:00000  Fail:00000
                Expected:0x00  Actual:0x00

   1   Master Clear Interrupt Vector Register:  Pass:00000  Fail:00000
                Expected:0x00  Actual:0x00

   1   Interrupt Registers retain Value:        Pass:00000  Fail:00000
                Function:
```

Figure 3-13. Error Logger Section 0 Test Display

4. Enter **g** to run the test; run the test for 2 minutes and then go to the next section. Enter **h** to halt the test and then **n** to go to the next section. The following test is displayed:

   `Valid Error Detection Test`

5. Run section 1 for 2 minutes, halt, and go to the next section by entering **n**.

6. Connect the error logger loop-back cable, P/N 12168900, between the FEI-3 Cray input connector and channel 0 (EC0) of the error logger board. This connection is needed to run section 2.

7. Enter **g** to run section 2. Repeat Steps 6 and 7 for each error logger channel that your MWS-E is using.

   Sections 3 through 10 are error channel tests.

8. Connect the error logger loopback cable to channel 0. The following test is displayed in the upper-left corner of the screen: `Channel 0`.

9. Run the test for 1 minute.

10. Enter the halt and next commands to advance to the channel 1 test.

    `Channel 1` is displayed in the upper-left corner of the screen.

11. Move the RS-232 end of the error logger cable to channel 1 and run the test for 1 minute.

12. Repeat Steps 10 and 11 for the remaining error logger channels.

ELBD Test Section

The ELBD test contains the following 11 sections:

Test Section	Description
0	Interrupt register read/write and master clear test. This test section has four subsections. Each subsection can be enabled or disabled by using the **s** command. Section 0 tests the control and vector. A pass and fail count is provided for each subsection. The loop-back cable is not required for section 0.
1	Valid error detection test. Section 1 tests the on-board data for all eight of the error channels. Each error channel has its own pass and fail count. Each of the eight error channels can be enabled or disabled by using the **s** command. The loop-back cable cannot be used for section 1.
2	Scanner and interrupter test. Section 2 has seven subsections. Subsections 1, 2, 4, 6, and 7 can be enabled or disabled by using the **s** command. Section 2 tests one channel at a time, and the channel under test must be looped back on the VME interface and LOSP channel. Each channel must be individually tested by inserting the loop-back cable. Only the channel with the loop-back cable is tested. A pass and fail count is given for each of the seven subsections.
3 through 10	Sections 3 through 10 test the channels as follows: 3 error channel 0 4 1 5 2 6 3 7 4 8 5 9 6 10 7

Each channel is tested by using the **n** command to enable the test section and then installing the loop-back cable on the channel number that is displayed in the upper left corner of the display screen. These test sections check out the following portions of the error logger board:

- Status register
- Data
- Fast data check
- Interrupts

NOTE: If changes other than the parameter options in the menu are required, modify the C source code and recompile it.

Network Tests

Two SunOS network tests are available: spray and ping. Use these tests to test the Control Subsystem Network or to test network connections to other host machines.

Spray

The `/usr/etc/spray` command sends a one-way stream of data packets to a specified host. Spray reports the number of packets received and the transfer rate. Spray uses the remote procedure call (RPC), a routine that enables communication between two remote programs.

Example: The following command sends 1162 data packets from mws1234 to ows1234 with a 2-microsecond delay between each packet.

```
mws1234: spray -d 2 ows1234
sending 1162 packets of lnth 86 to ows1234 ...
        in 11.6 seconds elapsed time,
        no packets dropped
        99 packets/sec, 8.4K bytes/sec
mws1234:
```

The packets sent had a default length of 86 bytes; the entire transfer took 11.6 seconds. Refer to the `spray` manual page for more detail on the `spray` command.

Ping

The `/usr/etc/ping` test can be used to check whether another machine on the network is running. When operating the MWS-E, the ping test can also be used to test whether the Control Subsystem Network to the OWS-E is operating properly.

The basic ping test has the following syntax:

```
/usr/etc/ping remote_host <timeout_in_seconds>

/usr/etc/ping <-s> host <packetsize> <count>
```

The time-out parameter is optional and has a default of 20 seconds.

Examples:

If you enter the basic ping command:

```
mws1234: ping ows1234
```

You receive the following message, if the remote host is running:

```
mws1234: ows1234 is alive
```

You receive the following message, if the remote host is not running:

```
mws1234: no answer from ows1234
```

You can receive more information by using the **`-s`** option and specifying the size and number of data packets as shown in the following example.

```
mws1234: ping -s ows1234 56 10
PING ows1234: 56 data bytes
64 bytes from mws1234 (181.8.111.4): icmp_seq=0. time=9. ms
64 bytes from mws1234 (181.8.111.4): icmp_seq=1. time=8. ms
64 bytes from mws1234 (181.8.111.4): icmp_seq=2. time=10. ms
64 bytes from mws1234 (181.8.111.4): icmp_seq=3. time=6. ms
64 bytes from mws1234 (181.8.111.4): icmp_seq=4. time=8. ms
64 bytes from mws1234 (181.8.111.4): icmp_seq=5. time=7. ms
64 bytes from mws1234 (181.8.111.4): icmp_seq=6. time=9. ms
64 bytes from mws1234 (181.8.111.4): icmp_seq=7. time=9. ms
64 bytes from mws1234 (181.8.111.4): icmp_seq=8. time=8. ms
64 bytes from mws1234 (181.8.111.4): icmp_seq=9. time=7. ms
----mws1234 PING Statistics---- 10 packets transmitted, 10 packets
received, 0% packet loss round-trip (ms)  min/avg/max = 6/8/10
```

The ping command sends data packets to the specified remote host and echoes back the data packets. You will receive the following unknown host message when running the ping test if the host (bobcat in this example) is not in your `/etc/hosts` file.

```
mws1234: ping bobcat
ping: unknown host bobcat
```

You can check to see whether a host is in your `/etc/hosts` file by entering the following command (searching for ows1234 in this example). Note that the `/etc/hosts` is a large file that you would not want to view with the `cat` or page (`pg`) commands.

```
mws1234: grep ows1234 /etc/hosts
181.8.111.4 ows1234 ows1234.cray.com
mws1234:
```

4 PREVENTIVE MAINTENANCE

This section provides preventive maintenance information and procedures for both the MWS-E and OWS-E.

Preventive Maintenance Notification Program

The preventive maintenance notification (`pmnotify`) utility notifies an operator using the `mws` login of scheduled system maintenance activities by sending E-mail messages.

The `pmnotify` command has the following syntax (only one frequency option [`d`, `w`, `m`, `q`, `s`, or `a`] may be specified):

```
pmnotify [-dwmqsa] [-E email_address] [-F file_name]
```

Option	Description
-d	Daily notification of maintenance tasks.
-w	Weekly notification of maintenance tasks.
-m	Monthly notification of maintenance tasks.
-q	Quarterly notification of maintenance tasks.
-s	Semi-annual notification of maintenance tasks.
-a	Annual notification of maintenance tasks.
-E	Specifies an alternate E-mail address for E-mail reminders; the default E-mail address is the `mws` login. You can specify multiple E-mail addresses by enclosing each address in double quotes and separating each quoted address with a space.
-F	Specifies an alternate file name for listing scheduled maintenance activities for `pmnotify` to use when generating E-mail reminder messages (the default file name is `/cri/mws/pmnotify.msg`).

pmnotify Files

The following files are part of the pmnotify utility:

/cri/mws/bin/pmnotify
This is the pmnotify executable utility.

/cri/mws/pmnotify.cron
This file contains the crontab entries to invoke the pmnotify utility at the appropriate maintenance time interval. This file contains a crontab entry so that the pmnotify utility runs at each of the six standard maintenance frequencies.

NOTE: The entries in the pmnotify.cron file are set to run at 3:00 a.m. to ensure that pmnotify does not run more than once when daylight savings time (DST) ends.

/cri/mws/pmnotify.msg
This file lists all scheduled maintenance activities. Refer to your CRI system preventive maintenance manual for task procedures. The entries in this file are divided into the following three fields:

frq:subsystem:task

Field	Description
frq	Frequency specifying option (d, w, m, q, s, or a)
subsystem	Cray Research computer system component
task	Text description of the maintenance task

Enabling and Disabling pmnotify

A standard pmnotify configuration is supplied in the model E maintenance diagnostic (ME) release. During the installation of the ME release, the user is asked if he or she wants to enable the pmnotify utility. If pmnotify was not enabled during the installation, enter **crontab pmnotify.cron** to enable pmnotify to run the six standard maintenance frequencies. To disable all pmnotify frequencies, log on as root and enter **crontab –r mws** to delete the mws user's crontab file. Note that this command will disable pmnotify and remove all other cron jobs that the mws user had defined. For more

information on `crontab` files, including a safe procedure on how to change `crontab` files, refer to "Crontab Files" in Section 5 of the *MWS-E User Guide*, publication number CDM-1123-0B0.

Customized pmnotify Files

A standard `pmnotify` configuration is supplied in the model E maintenance diagnostic (ME) release. You can modify this configuration; however, the Offline Diagnostic Systems department (DSD) only supports the configuration supplied with the ME diagnostic release.

You may create your own file containing site-specific maintenance activities and add the appropriate `pmnotify` command entries to your UNIX `crontab` file. Your maintenance message file should be organized like the `/cri/mws/pmnotify.msg` file by grouping the tasks by subsystem and then by frequency. It may help to use a copy of the `/cri/mws/pmnotify.msg` file as a guide in creating your customized file. The length of each line in the message file cannot exceed 510 characters.

FEI-3 Maintenance Kit

An FEI-3 maintenance kit for the OWS-E and MWS-E workstations was developed to provide additional test equipment. This kit includes loop-back test cables and an Ampex display monitor. Refer to Section 5, ''Part Numbers,'' for kit components and part numbers.

System Reporting

A configurations database and incident reporting system is available on the `techops` computer system at the Technical Operations building in Chippewa Falls; this system is supported by the Computer Information Services (CIS) department. This system records serial numbers and revision levels for the boards in the workstation system. Failure reports include field replaceable units (FRUs), diagnostic tests used, and software revision levels. The incident reporting (IR) system tracks all FRUs of the MWS-E and OWS-E.

The IR system is documented in the *Incident Reporting System User Guide (Version 6.0)*, publication number COM-9980-0A0.

Maintenance Procedures

The following preventive maintenance (PM) activities should be performed on a weekly basis, depending on usage:

Streaming Tape Drive

The recommended cleaning schedules for the streaming tape drive are as follows:

- The recording head should be cleaned after each initial pass with a new tape cartridge or after 2 hours of read, write, or erase operations.
- The sensor openings and cartridge cavity should be cleaned whenever dust or debris is visible inside the cartridge cavity.

Cleaning Procedure

1. Inspect the interior of the tape loading aperture for dirt and dust. Use a dust-removing aerosol can to carefully blow dirt and dust off the tape sensory holes and tape heads.
2. Use a head-cleaning cassette to clean the head assembly.
3. Turn off power to the drive.
4. Push the head loading lever to the right to extend the heads into the tape cartridge aperture.
5. Clean the head assembly with a swab moistened with cleaning fluid.

   Wipe the head in the direction the tape travels. Do not use circular, scrubbing motions to clean the head assembly. The swab should be damp, but not dripping with fluid.
6. Clean the head assembly again with a clean swab.
7. Wipe the head assembly with a dry swab.
8. Push the head loading lever to the left to retract the heads.
9. Return power to the drive unit.

9-track Tape Drive

Operator maintenance is limited to cleaning the tape path and reel hubs.

Cleaning the Tape Path

The tape path must be kept free of oxide, dust, and foreign matter that can cause data dropouts or excessive wear of tape path components.

1. Unload the tape and remove the file reel.
2. Power down the drive unit.
3. Open the vacuum door.
4. Wipe clean the following components with a lint-free cloth moistened with cleaning fluid (P/N 01641400). Do *not* use alcohol.

   - Vacuum columns and glass covers (upper and lower)
   - Tape treading path
   - Capstan wheel
   - Tape lifter

5. With a foam swab moistened with cleaning fluid, clean the tape cleaner, magnetic head, and corners at the guides and bearing.
6. Close the vacuum column door.
7. Clean the reel hubs and deck plate with a cloth. Do not use cleaning fluid on the reel flanges or the reel and vacuum column doors.
8. Let the tape transfer components dry before loading a tape.

Cleaning Reel Hubs

Once a week, use a foam swab moistened with cleaning fluid to clean the rubber ring on the file reel hub. Be careful not to spill cleaning fluid inside the hub.

Mouse

Clean the mouse pad with a lint-free cloth.

Occasionally a mouse will fail to enable both horizontal and vertical cursor movement. If this happens, temporarily swap the other workstation's mouse to check whether a different mouse works on the workstation.

Semi-annual Maintenance

The following preventive maintenance (PM) activities should be performed every six months:

System Integrity Check

1. Run the SunDiag tests to verify the system.
2. Connect the maintenance terminal to CPU port A, set the DIAG/NORM switch to DIAG, and power cycle the workstation to run self diagnostic tests.
3. Run the offline channel tests that are described in Section 3, ''Workstation Diagnostics.''

System Fan Tray and Cooling Check

The fan tray in the base of the workstation chassis contains nine fans mounted in a tray. This tray should be cleaned to ensure proper cooling. Refer to ''Fan Tray Installation and Removal'' in Section 2.

Clean the fan tray by checking for dirt and dust. You can clean the tray by using a small vacuum cleaner or a soft brush.

Cleaning Peripheral Trays

Excess dust can build up on the MWS-E and OWS-E disk and tape peripheral trays. Excess dust can lead to read and write problems when trying to read tapes and back up the file system. This dust problem results from the the fan drawing air in from the front of the chassis and exhausting it through the bottom. A semi-annual cleaning should be done on the MWS-E and OWS-E by performing the following steps:

1. Power the workstation off.

2. Remove the front cover and bezel inserts as shown in Figure 4-1.

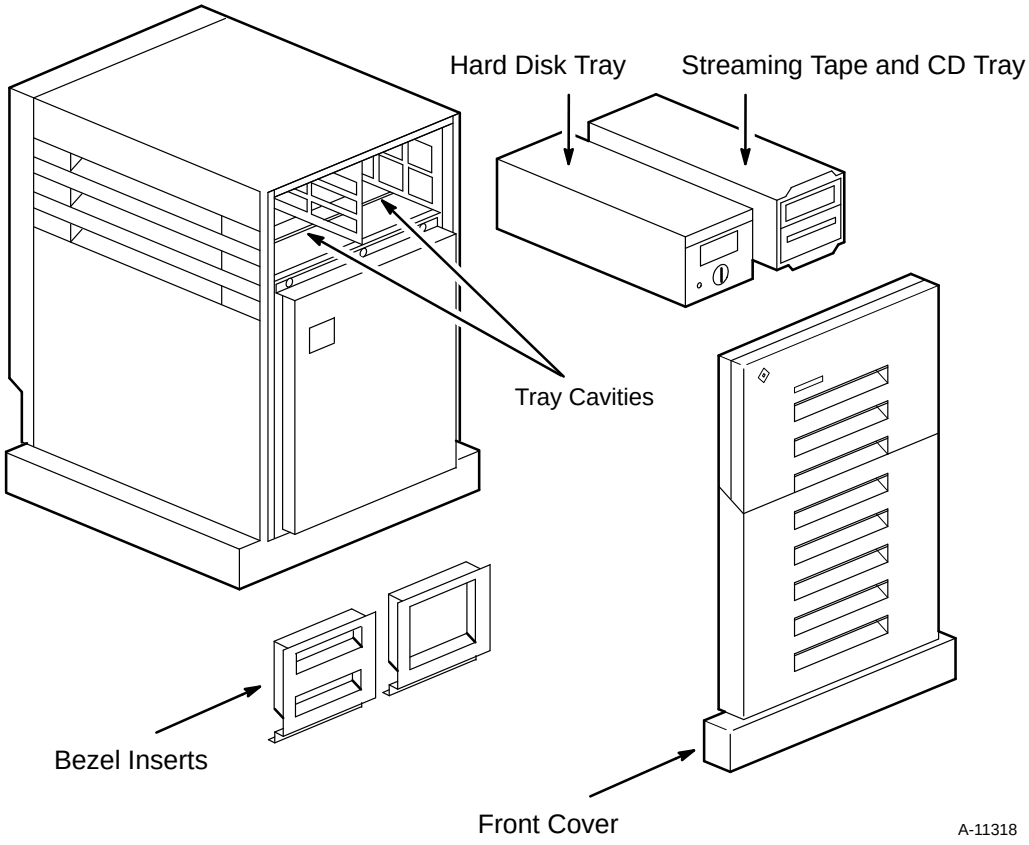


Figure 4-1. Peripheral Tray Cleaning

3. Remove the hard disk tray from the system.

4. Remove the four screws securing the streaming tape drive; remove the streaming tape and and hard disk trays.

5. Vacuum all dust and debris off the tape/CD and hard disk trays. Also vacuum the tray cavities in the workstation chassis.

6. Reinsert the peripheral trays; replace the four screws in the streaming tape drive tray.

7. Replace the front cover and bezel inserts.

8. Power up the workstation.

Cable Strain Relief Check

Verify proper strain relief on all cables to prevent irregular cable wear.

Power Check

Verify that voltage levels and ripples are within tolerance. Refer to ‘‘DC Voltage Test Points’’ on page 2-31 of this manual for DC voltage tolerance levels. Voltage levels are not adjustable; if any voltage level is out of the specified range, reseat all boards in the chassis and retest all voltage levels. If any voltage level is out of range after reseating and retesting, the voltage supply should be replaced.

5 PART NUMBERS

This section lists all part numbers for all assemblies and components in the MWS-E and OWS-E systems.

Part	Part Number
Workstation Assembly OWS-E	12280100
Workstation Assembly MWS-E	12280200
CPU with eight 4MB SIMMS (32MB)	01774200
Color Graphics Module	01496200
Power Supply	01496400
Power Cord, 6 ft, Chassis	01496800
Ground Strap, 3 ft, Chassis	01496900
Color Graphics Display, Dual Scan	01826400
Color Graphics Display Cable, 12 ft	01497200
Keyboard	01497300
Mouse and Pad	01820600
Printer with Serial Cable, HP LaserJet IV	01827900
Ethernet Trunk Cable (77 ft, 114 ft, 230 ft, or 384 ft, specify length when ordering)	01398701
Error Logger Module Assembly	12121800
Error Logger Channel Board	31231102
Error Logger Cable Assembly	10551901
9U Adapter Board, Error Logger	01497700
Cable from Device, 50 ft	12127701
Cable to Device, 50 ft	12127601
VMEbus Backplane Jumpers (5)	01327600
WACs Cable, MWS-E and OWS-E	12166500
Streaming Cartridge Tape, 1/4 inch, 620 ft	01389801
Modem Kit	11138100
Modem, 38.4 Kbps, Microcom (Model QX4232hs)	01677300
Modem Cable, 5 ft	10569300

SCSI Devices and Cables

150-Mbyte Streaming Tape Drive	01496500
669-Mbyte Hard Disk Drive Assembly (includes rack, Hard disk drive, controller, and cable)	01496600
669-Mbyte Hard Disk Drive	01496700

Part	Part Number
1.3-Gbyte Hard Disk Drive Assembly	
(includes rack, Hard disk drive, controller, and cable)	01811000
1.3-Gbyte Hard Disk Drive	01809800
CD-ROM Player	01680700
CD-ROM Disk Carrier (Caddy)	01708800
SCSI I/O Cable	01497000

Control Subsystem Network

Three Control Subsystem Network Assemblies are available:

Control Subsystem Network Assembly	
(3 Ethernet Cables, 50 ft, 77 ft, or 114 ft, order length needed)	12058400
(Ethernet Cable, 230 ft)	12058401
(Ethernet Cable, 384 ft)	12058402

Each of the three Control Subsystem Network assemblies contain the following five parts:

Connector, Ethernet Trunk	01398300
Terminator, Ethernet	01398400
Transceiver with Tap, Ethernet, IEEE 802.3	01705100
Receiver and Tap, Ethernet	01398500
Drop Cable, 10 ft	01398600

NetBlazer and Modem Part Numbers

The following Telebit NetBlazer and Microcom parts, boards, and cables are available from the Logistics department:

Modem Kit	11138100
Modem, 38.4 KBPS, Microcom (Model QX/4232bis)	01677300
Telebit NetBlazer, 2 RS-232 Ports (Sites)	01714800
Ethernet AUI Drop Cable, XCVR/NetBlazer Connectors	01398600
Modem 5ft Cable Assembly	12171100
Modem Male/Female Cable Assembly	12210900
2 Female DB9-pin to Male DB25-pin, 6 ft, ASY 01	01750900
Female DB25-pin to Male DB25-pin, 5 ft, ASY 00	01751000
Female-to-Female DB25-pin Gender changer	01751100
Modem Adapter Cable, Dumb Terminal to ASY 00	01751200

Part	Part Number
Telebit NetBlazer, 2 Ports (Sites)	01714800
Telebit NetBlazer, 10 Ports (Service Centers and Hubs)	01714900
Dual Port Ethernet Transceiver	01721800
Ethernet Drop Cable	01398600
Single Port Ethernet Transceiver	01705100
Dual Port Ethernet Transceiver	01721800
Null Modem Cable Adapter, Female to Male, Dumb Terminal to ASY 00	01751200
Ethernet Adapter, CNet CN300E	01751300
8-port, RS232 board, up to 3 per NetBlazer	01781800

Workstation Chassis Parts

Workstation chassis parts are illustrated in Figure 2-3 on page 2-4; the numbers in the Figure are enclosed in parentheses in the following list. The part numbers are Sun Microsystems, Inc.'s part numbers for parts made with Cray Research colors. Contact the Account Manager for Cray Research accounts at Sun Microsystems, Inc. at 1-612-832-5050 for replacement parts.

Side Cover (1)	540-2054-01
12-slot Backplane (2)	501-1832-01
Rear Bumper (3)	540-2065-01
Rear Bezel (4)	540-2064-01
Top Cover (5)	340-2436-01
Caster (6)	340-2129
Peripheral Tray Base (7)	340-1903
Tape/CD Tray Bezel Insert (8)	330-1334-01
Disk Tray Bezel Insert (9)	330-1341-01
Front Bumper and Front Cover, One Piece (10 and 11)	540-2053-01
EMI Shield (12)	340-1871
Fan Tray (13)	540-1751
Switch Assembly (14)	540-1748

FEI-3 Model E Maintenance Test Kit

Test Kit, Model E Workstations, FEI-3	11139700
Toner Cartridge, HP LaserJet III Printer	01790800
Error Logger Test Cable Assembly	12168900
FEI-3 Loop-back Cable Assembly	12166400
FEI-3 DS Test Cable Assembly	12168800

Part	Part Number
DB 25-pin, I/O Serial Port Loop-back Connector	12804700
DB 9-pin, I/O Serial Port Loop-back Connector	12804600
2 Amp, 125 V Fuses (2)	01687300
VMEbus Backplane Jumpers (5)	01327600
WACS Cable Assembly, MWS-E and OWS-E	12166500

FEI-3 Kits

• FEI-3S Channel Kit	11141200
FEI-3S Module Assembly	12174400
FEI-3 Cable Assembly, Input (from device), Model E	12159600
FEI-3 Cable Assembly, Output (to device), Model E	12159800
• FEI-3S Maintenance Channel Kit	11141300
FEI-3S Module Assembly	12174400
FEI-3 Cable Assembly, Input (from device), Model E	12159600
FEI-3 Cable Assembly, Control, Model E	12159700
FEI-3 Cable Assembly, Output (to Device), Model E	12159800
• 125ft LOSP Cables, FEI-3, 51-pin Micro to 50-pin Dsub	
FEI-3 Cable, Input (from device), Model E, 125ft	12159603
FEI-3 Cable, Control, Model E, 125ft	12159703
FEI-3 Cable, Output (to Device), Model E, 125ft	12159803
• FEI-3S Module Assembly	12174400
FEI-3S Interface Kit	12032700
Board Adapter	01691700
6U PC Board, P2	12829300
96-pin DIN Connector Housing	01691300
96-pin DIN x .520 Connector, Pkg. 2	01691400
96-pin DIN x .209 Connector, Pkg. 2	01691500
Screw, 2-56 THD x .5, Pkg. 4	01514306
Hex Nut, 2-56 NC-2B, Pkg. 4	01511102
Spacer, RND 4-40 THD x .75, Pkg. 2	01515903
Screw, 4-40 THD x .25, Pkg. 4	01508102
Jackpost, Connector Mating, Pkg. 3	01139500
Cable Assembly, VME Out	12112001
Cable Assembly, VME In	12112101
Lockwasher, Spring, Stainless Steel, Pkg. 4	01511402

6 AMPEX 230 TERMINAL OPERATION

This section provides instructions for entering the set-up mode and for viewing, modifying, and changing operating parameters. Perform the instructions outlined in this section when using the AMPEX 230 terminal connected to serial port A on the MWS-E or OWS-E.

Set-up Mode

The operating parameters for the AMPEX 230 terminal may be selected while in the set-up mode. When set-up mode is entered, set-up lines containing default operating parameters are displayed.

Entering Set-up Mode

To enter the set-up mode, enter the following command that signals (activates the XOFF signal or deactivates the DTR signal) the host computer to stop data transmission.

- SHIFT/SETUP

When the set-up mode is exited, an appropriate signal (XON or DTR activated) is sent to the host computer to resume transmission.

CAUTION

Wait until all data transmissions in progress are complete before entering the set-up mode; data could become distorted.

Exiting Set-up Mode

The set-up mode is exited when any of the following key combinations are pressed:

- SHIFT/S (save newly selected parameters)
- SHIFT/D (use default parameters)

- SHIFT/R (recall most recently saved parameters)

Exiting the set-up mode effects the following two reactions:

- The cursor returns to its original position on the screen that was displayed before the set-up mode was entered.
- A signal is sent to the host computer allowing the data transmission to resume.

Viewing Set-up Lines

After entering the set-up mode, the first of 7 set-up lines is displayed on the bottom of the screen. Set-up lines are displayed in half-intensity reverse video format unless the data area is set to reverse video format. In reverse video format, the set-up lines are displayed in normal video at half intensity.

Different fields and set-up lines can be viewed by pressing the following keys:

Key	Action
Space bar	Displays the next selection for the field.
Right arrow	Cursor moves to the next field in the line.
Left arrow	Displays the previous field.
Down arrow	Displays the next line.
Up arrow	Displays the previous set-up line.

The following procedure describes how to view the available selections of the first field of the set-up lines:

1. Press the space bar. The next selection for that field is displayed. After CONV (conversation mode) appears, the word BLOCK is displayed. Continue viewing selections in this manner.
2. Exit the field and go on to the next field by pressing the right arrow key. The cursor moves to the next field on the current line, in this case the FDX field.
3. Press the space bar to view the field's other selections.

Modifying Parameters

To modify the existing parameters, move the cursor to the parameter needing modification, using either the left arrow or right arrow keys. Use the following procedure to modify the parameter when the cursor is on the appropriate parameter:

1. Press the space bar until the desired selection is displayed.
2. Press the **SHIFT** and **S** keys.

   The selection is saved and the terminal exits to the set-up mode. Selections may be saved individually or several at a time.

Use the following procedure to save multiple parameter selections:

1. Move the cursor to the fields that you want to change.
2. Press the space bar until the desired selections are displayed.
3. Press the **SHIFT** and **S** keys after all changes are completed.

   Result: This action saves all changes and causes the terminal to exit set-up mode. These changes will still be in effect when you power up the MWS.

Retrieving Default Parameters

To return all of the parameters to their original default status, press the **SHIFT** and **D** keys. This command also causes the terminal to exit the set-up mode.

Recalling Most Recently Saved Parameters

To recall the most recently saved parameters, press the **SHIFT** and **R** keys. The most recently saved changes are in effect and the terminal exits the set-up mode.

AMPEX 230-to-MWS-E Set-up Lines

Figure 6-1 illustrates the proper parameter selections for set-up lines 1 through 7 for connecting the AMPEX 230 terminal to the MWS-E. You have a choice of acceptable parameters for the blank parameters indicated in the following set-up lines. Parameters and selections are described for each line in Tables 6-1 through 6-7.

Set-up Line 1

CONV	FDX	A230	USA	STAT ON	NOR VID	BLK CUR					60 HZ

Set-up Line 2

SAVE ON	WRAP ON		SCROLL ON	JUMP ON	FLIP OFF		GRAPH OFF

Set-up Line 3

DUPE	KLIK OFF	RPT ON	BELL OFF	UPCS		CR=CR	KEY ON	NONEMB	TIME: 08-00

Set-up Line 4

HOST XMIT = 9600	RECEIVE = XMIT	BIT 8 =0	STOP 1	PAR OFF	NO PARCHK	DTR ONLY

Set-up Line 5

AUX BAUD 9600	BIT 8 =0	STOP 1	PAR OFF	DTR ONLY	AUX ON	

Set-up Line 6

FIELD = $^{F}_{S}$	HEOL = $^{U}_{S}$	STPROT = $^{E}_{C}$	ENPROT = $^{E}_{C}$	HEOM = $^{C}_{R}$	ANSWER BACK X,X,X

Set-up Line 7

12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789

Figure 6-1. AMPEX 230-to-MWS-E Set-up Line Parameters

Set-up Line Parameter Descriptions

The following Tables 6-1 through 6-7 describe the AMPEX 230 set-up line default parameters and corresponding parameters.

Table 6-1. Set-up Line 1 Parameter Description

Default Parameters	Other Parameters	Field Descriptions
CONV	BLOCK LOCAL	Defines the mode of communication with the host computer. Select: • CONV (conversation) - To transmit data to the host computer as soon as it is entered at the keyboard. • BLOCK - To enter data, edit data locally, and then transmit to the host. • LOCAL - To enter data and commands locally, without transmitting to the host.
FDX	HDX	Indicates the method of conversing with the host. Select: • FDX (full duplex) - To receive data on the screen after it is echoed back from the host. • HDX (half duplex) - To send data to the screen and to the host simultaneously.
A230	D175 D150E TV950 TV924 WY-50	Indicates the terminal model being emulated. Models include: AMPEX 230, D175, and D150E, TeleVideo 950 and 924/914, and Wyse WY-50.
USA	FRE UK GER SWD NOR DAN SPN ITY	The type of national character set currently utilized by the keyboard. Selections include: FRE-French, UK-United Kingdom, GER-German, SWD-Swedish, NOR-Norwegian, DAN-Danish, SPN-Spanish, and ITY-Italian. All AMPEX 230 terminals are supplied with the standard US/UK keycap set. Contact an AMPEX video display terminal dealership for information and instructions concerning other national character sets.
STAT ON	STAT OFF	Indicates whether a status line is displayed during normal operation.
NOR VID	REV VID	Normal and reverse video screen display.

Table 6-1. Set-up Line 1 Parameter Description (continued)

Default Parameters	Other Parameters	Field Descriptions
BLK FLH	BLK CUR UDL FLH UDLCUR CUR OFF	Indicates the cursor configuration. Selections: BLK FLH - Cursor appears as flashing block (default). • BLK CUR - Cursor appears as steady block. • UDL FLH - Cursor appears as a flashing underline. • UDL CUR - Cursor appears as a steady line. • CUR OFF - No cursor.
PROT=H.I.	PROT = REV PROT = NORM PROT = BOTH	Indicates the protected character attributes: • PROT = H.I. - Protected characters display in half-intensity. • PROT = REV - Protected characters display in reverse video. • PROT = NORM - Protected characters display in normal video. • PROT = BOTH - Protected characters display in both reverse video and half-intensity.
LN ATB	PG ATB	The selection of LN ATB, will cause any visual attribute(s) to affect one line. The other selection, PG ATB, will cause any attribute(s) to affect the entire screen of data.
EDTL	EDTP INSL INSP	Selections: • EDTL - Allows you to change text on a line-by-line basis. • EDTP - Allows you to change text on a page-by-page basis. • INSL - Allows you to insert text on a line-by-line basis. • INSP - Allows you to insert text on a page-by-page basis.
80 COL	132 COL	Indicates the number of columns per display page.
65 HZ	60 HZ	Indicates the terminal's screen refresh rate. Use 65-Hz power for most applications. In the event of electro-magnetic interference from a 60-Hz power source, select 60-Hz power to reduce the effects of that interference.

Table 6-2. Set-up Line 2 Parameter Description

Default Parameters	Other Parameters	Field Descriptions
SAVE ON	SAVE OFF	The SAVE ON parameter activates the screen saver feature. This feature causes data displayed on the screen to disappear (if no data is received from the keyboard or host) after a period of about 10 minutes in order to prolong the life of the video display. Pressing any key or receiving data from the host causes the display to reappear. The SAVE OFF parameter disables this feature.
WRAP ON	WRAP OFF	If the cursor is at the last column of a line and data is entered, the WRAP ON parameter causes the cursor and exceeding data to wrap around to the start of the next line. If the WRAP OFF parameter is selected, the cursor will not move from the last column.
AUTO TAB ON	AUTO TAB OFF	These parameters only pertain to TeleVideo 924 emulation. The AUTO TAB ON parameter enables auto tab mode if protect mode is off. Permits the cursor to move to the next typewriter tab stop on the next or previous line.
SCROLL ON	SCROLL OFF	Indicates the terminal's scrolling status. The SCROLL ON parameter causes all data lines to move up when the last line on the screen is exceeded in order to make room for the next line. The SCROLL OFF parameter causes all data lines to remain stationary when data entered exceeds the last line of the screen. Excessive data will cause the cursor to return to the HOME position and overwrite existing lines.
JUMP ON	SM-1 ON SM-2 ON SM-4 ON SM-8 ON	This parameter indicates scrolling mode. When set to the JUMP ON parameter, the data scrolls vertically on the screen as it is received from the host computer. Other selections are as follows: • SM-1 ON - Data scrolls approximately 1 line per second. • SM-2 ON - Data scrolls approximately 2 lines per second. • SM-4 ON - Data scrolls approximately 4 lines per second. • SM-8 ON - Data scrolls approximately 8 lines per second.
FLIP OFF	FLIP ON	This parameter indicates auto paging status. Selections are as follows: • FLIP OFF - Auto flip mode is disabled. Data scrolls up when the data exceeds the last line of the page. • FLIP ON - Enables auto flip mode. When the data exceeds the end of the page, the display shows the first 24 lines of the next page.

Table 6-2. Set-up Line 2 Parameter Description (continued)

Default Parameters	Other Parameters	Field Descriptions
24 LN/PG	48 LN/PG	The AMPEX 230, in 80-column mode, contains 48 lines of screen memory (or two 24-line pages). Select either 24 LN/PG or 48 LN/PG. Select 96 LN/PG only if additional screen memory has been installed. Screen memory may be divided into four 24-line pages, two 48-line pages, or one 96-line page. The 132-column mode utilizes one screen (24 lines) of data only.
GRAPH OFF	GRAPH MON	This parameter enables/disables special graphics mode. When the GRAPH ON parameter is selected, block and line graphic characters may be displayed.

Table 6-3. Set-up Line 3 Parameter Description

Default Parameters	Other Parameters	Field Descriptions
DUPE	LOCE	These parameters indicate the communications mode of edit keys with the host computer: • DUPE - Codes will be transmitted to the host computer as text is edited. • LOCE - Editing is done locally; codes will not be transmitted to the host computer.
KLIK ON	KLIK OFF	When the KLIK ON parameter is designated, an electronically synthesized click sounds whenever a key is pressed. Select the KLIK OFF parameter if the click sound is not desired.
RPT ON	RPT OFF	Repeating keys will repeat when pressed for any length of time if the RPT ON parameter is selected. These keys will not repeat if the RPT OFF parameter is selected. Keys that never repeat are as follows: LOC ESC/ESC CTRL CAPS LOCK SHIFT CE RESET SETUP/NO SCROLL FUNCT CLEAR/HOME SEND BREAK
BELL OFF	BELL ON	If the BELL ON parameter is selected, a bell sounds whenever the cursor reaches column 72. This bell indicates that you are nearing the right margin when entering data.
LWCS	UPCS	These parameters indicate the shifted state of the alpha keys at power-on: • UPCS - Indicates uppercase letters • LWCS - Indicates lowercase letters If UPCS is selected, or if the CAPS LOCK key is pressed, then the message, “CAPS,” is displayed in the lower left-hand corner of the screen.
DOWN ^/V	DOWN ^/J	These parameters only apply to TeleVideo 924 emulation: • DOWN ^/V - CTRL/V moves the cursor down 1 line • DOWN ^/J - CTRL/J moves the cursor down 1 line
CR = CR	CR = CRLF	These parameters indicate the cursor’s response to a carriage return received from the keyboard or host: • CR = CR - Cursor returns to the first position of the current line when the carriage return key is pressed • CR = CRLF - Cursor moves to the first position of the next line when the carriage return key is pressed

Table 6-4. Set-up Line 4 Parameter Description

Default Parameters	Other Parameters	Field Descriptions
HOST XMIT = 9600	19200 38400 50 75 110 150 300 600 1200 1800 2400 3600 4800 7200	This parameter indicates the speed of data transmission (in bits per second) to the host computer.
RECEIVE = XMIT	19200 38400 50 75 110 150 300 600 1200 1800 2400 3600 4800 7200 9600	This parameter indicates the speed of transmission that data is received from the host computer. If the default parameter, RECEIVE = XMIT, is selected, then the receiving rate will be the same as that selected for sending to the host. Receiving rates may be different from sending rates.
BIT 8 = 0	BIT 8 = 0 7BITS	This parameter determines the data word configuration and the contents of bit 8 when sending/receiving data to and from the host computer.
STOP1	STOP2	This parameter indicates the stop bit configuration for sending/receiving data to and from the host computer.
PAR OFF	PAR ODD PAR EVEN	This parameter indicates the type of parity needed for transmission to and from the host computer.
NO PARCHK	PARCHECK	This parameter selects PAR CHECK if the host computer requires the terminal to check parity.
DTR ONLY	XON ONLY DTR & XON MODEM	The following parameters indicate the transmission protocol: • DTR ONLY - Data terminal ready only • XON ONLY - XON/XOFF protocol only • DTR & XON - Data terminal ready and XON/XOFF protocol • MODEM - Modem transmission

Table 6-5. Set-up Line 5 Parameter Description

Default Parameters	Other Parameters	Field Descriptions
HOST XMIT = 9600	19200 38400 50 75 110 150 300 600 1200 1800 2400 3600 4800 7200	This parameter indicates the speed of data transmission (in bits per second) to the host computer.
BIT 8 = 0	BIT 8 = 1 7 BITS	This parameter determines the data word configuration and the contents of bit 8 for sending data to the printer port.
STOP 1	STOP 2	This parameter indicates the stop bit configuration for sending data to the printer port.
PAR OFF	PAR ODD PAR EVEN	This parameter indicates the type of parity needed for transmission of data to the printer port.
DTR ONLY	XON ONLY DTR & XON	The following parameters indicate the transmission protocol: • DTR ONLY - Data terminal ready only • XON ONLY - XON/XOFF protocol only • DTR & XON - Data terminal ready and XON/XOFF protocol
AUX OFF	AUX ON TRP ON	The following parameters indicate the status of the printer port: • AUX OFF - Data received from the host computer will be sent to the screen only. • AUX ON - Data received from the host computer will be sent to both the screen and the printer simultaneously. • TPR ON - Data received from the host computer will be directed to the printer only.
BDIR OFF	BDIR ON	This parameter indicates whether the direction of data transmission from the printer port to the host computer is enabled. If the BDIR ON parameter is selected, then print information will be bidirectional.

Table 6-6. Set-up Line 6 Parameter Description

Default Parameters	Field Descriptions
FIELD = FN SU	This parameter indicates the character(s) representing (in place of) a protocol field during a send transmission. Default characters are FS (field separator) and null.
HEOL = UN SU	This parameter indicates the host's end of line terminator. Any two ASCII characters may be entered. Default characters are a US (unit separator) and null.
STPROT = E C	This parameter indicates the start of a protected field (delimiter) during a send transmission. Any two ASCII characters may be entered. Default characters are EC (escape) and ")" (a right parenthesis).
ENPROT =	This parameter indicates the end of a protected field during a send transmission. Any two ASCII characters may be entered.
HEOM = CN RU	This parameter indicates the host's end of message terminator. Any two ASCII characters may be entered. Default characters are carriage return (CR) and null.
ANSWER BACK =	This is a 20-character field for entering a message that specifically identifies a particular terminal to the host computer. The first and last character entered must be the same in order to act as message delimiters (message delimiters are not transmitted). Use a cursor key to exit this field before performing a save function. Issuing a CTRL/E command causes the message to be transmitted to the host computer. The default entry is 1.1, 2 which indicates the firmware version level 1.1 and 2 pages of screen memory.

Table 6-7. Set-up Line 7 Parameter Description

Default Parameters	Field Descriptions
T2345678T0123 456T8901234T6 78 . . .	Set-up line 7 acts as an indicator only and cannot be altered when in set-up mode. Tab stops are indicated by the letter T. These tab stops may be altered or cleared by entering an ESC 1 command (to set a tab stop), ESC 2 command (to clear a tab stop), and ESC 3 command (to clear all tab stops). Set-up line 7 reflects any changes made to the default tab stops.

7 FALCO TERMINAL SETUP

The AMPEX 230 video display terminal is no longer being manufactured. Cray Research Logistics now stocks the Falco series 5000 video display terminal as a replacement to the AMPEX terminal. Installation and operation instructions are documented in the *Falco Quick Setup Manual* included with each Falco display. However, the set-up manual does not describe the proper set-up parameters that must be used with UNICOS and various maintenance applications. Proper set-up parameters are provided in the remainder of this section.

How to Display and Program Set-up Screens

Use the following steps to display and program the proper operating parameters for Falco set-up screens:

1. Press the `Setup` key to display the `Setup Directory` screen.
2. Use the arrow keys to move to different parameter fields and lines.
3. Press the `Linefeed` key to scroll through other options within a highlighted field.
4. Press the `Next Scrn` key to move to the next set-up screen.
5. After you have defined the proper set-up parameters, press the `Setup` key again to save your choices and exit the set-up screens.

Screen Parameters for all Terminals

Figure 7-1 through Figure 7-12 show the proper parameter selections for all Falco set-up screens. Look for the set-up screen name (upper-left corner) and check the figure title for the type of terminal operation you will be running before you program any parameters. Several set-up screens may be programmed for use with all operations, while others need different parameters. These different parameters are indicated in the figures by boxes with darker edges.

NOTE: The ACT and TTT offline diagnostic tests do not run properly from a Falco terminal. Also, there may be graphical display irregularities when running some offline diagnostic tests such as DCU5 and BMCT. These irregularities affect only the appearance of screen output and should not affect diagnostic test operations. If you should encounter any problems, please report them to the Hardware Product Support department in Chippewa Falls.

CAUTION

Falco terminal display errors can occur if unique tset variables (such as /ucb/tset –Q) exist in your .profile startup file.

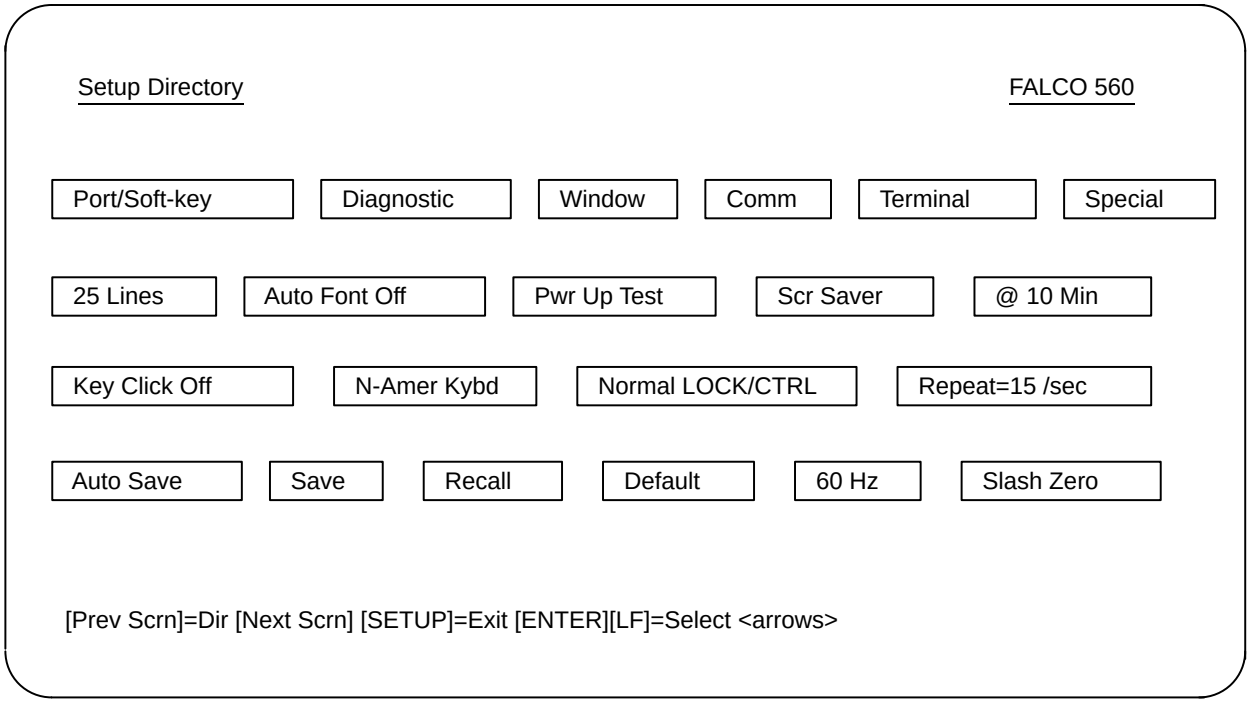


Figure 7-1. Set-up Directory Parameters for all Terminals

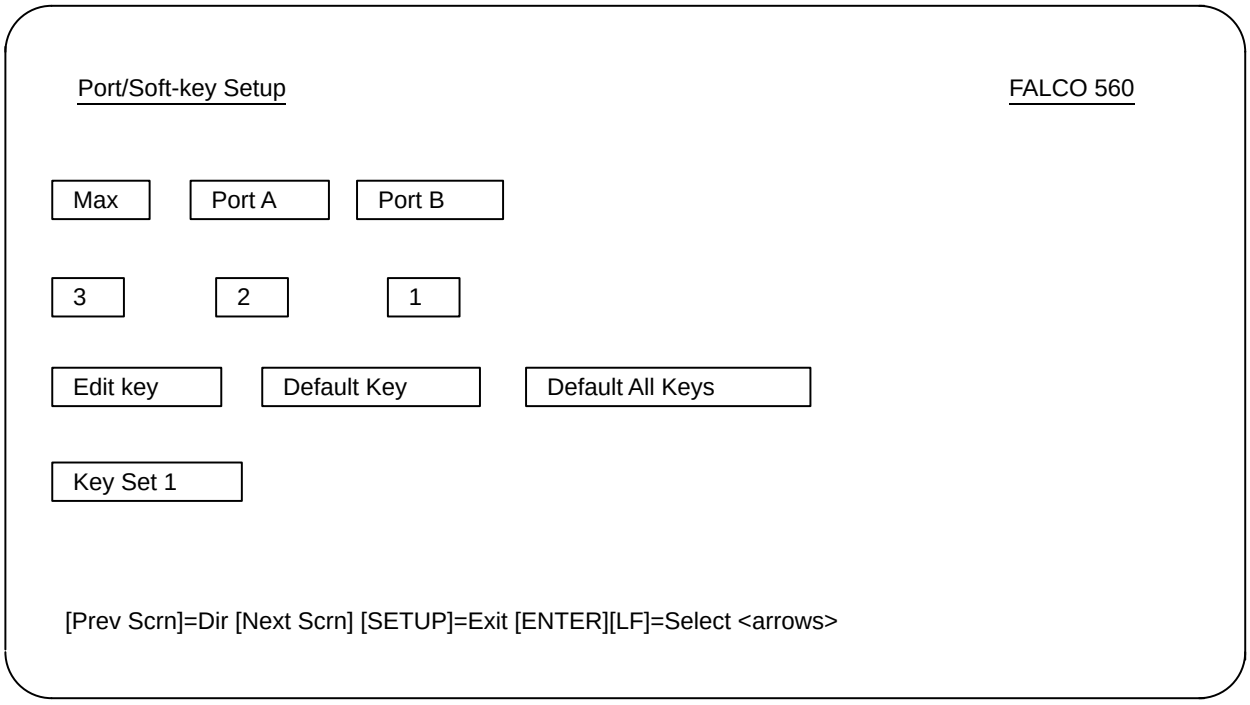


Figure 7-2. Port/Soft-key Set-up Parameters for all Terminals

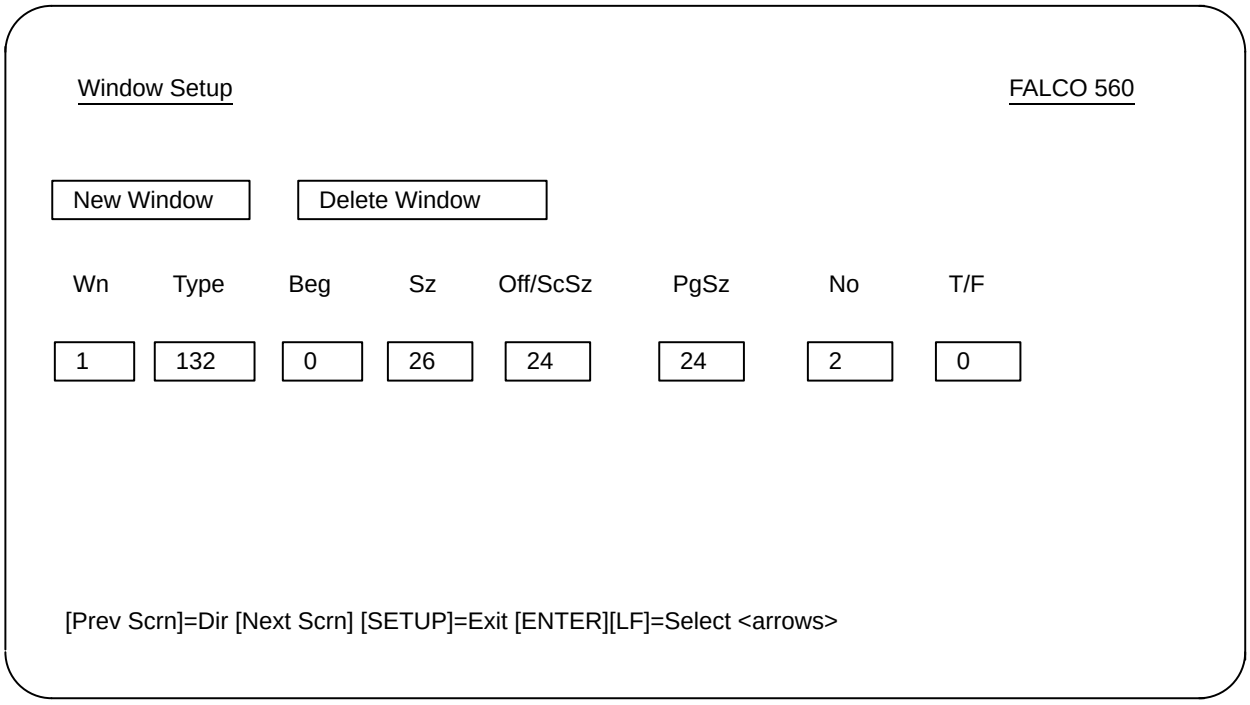


Figure 7-3. Window Set-up Parameters for all Terminals

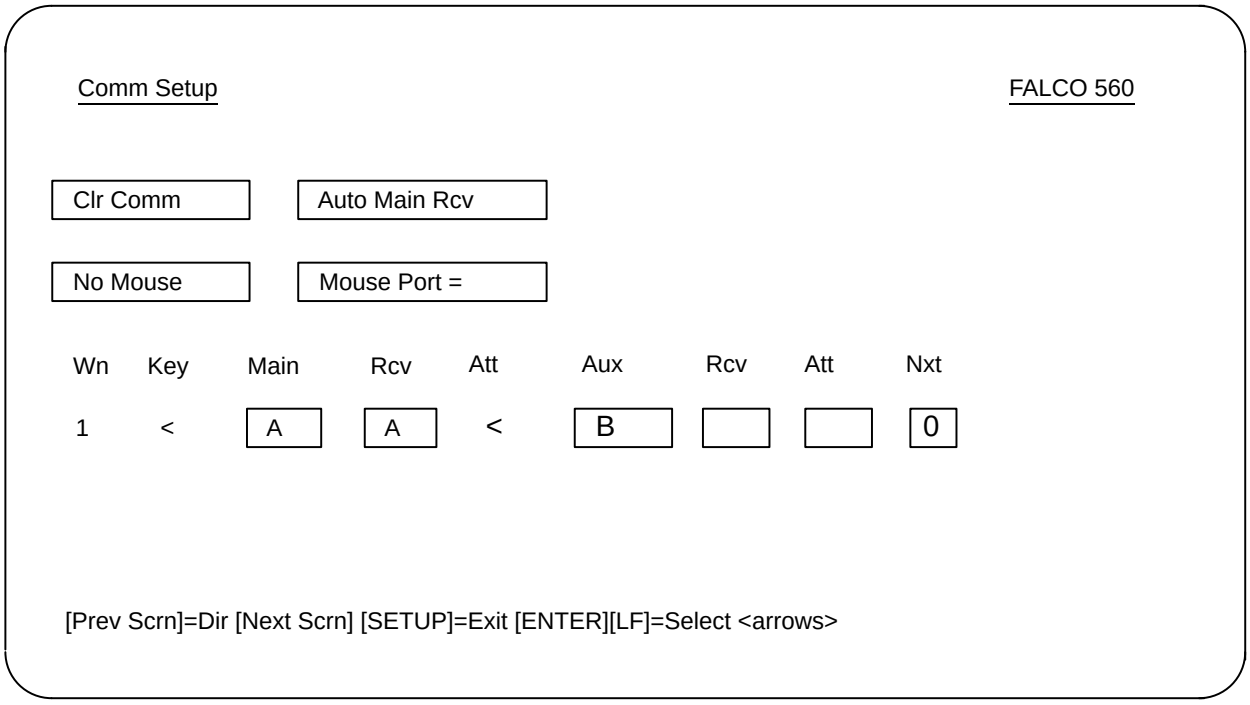


Figure 7-4. Communications Set-up Parameters for all Terminals

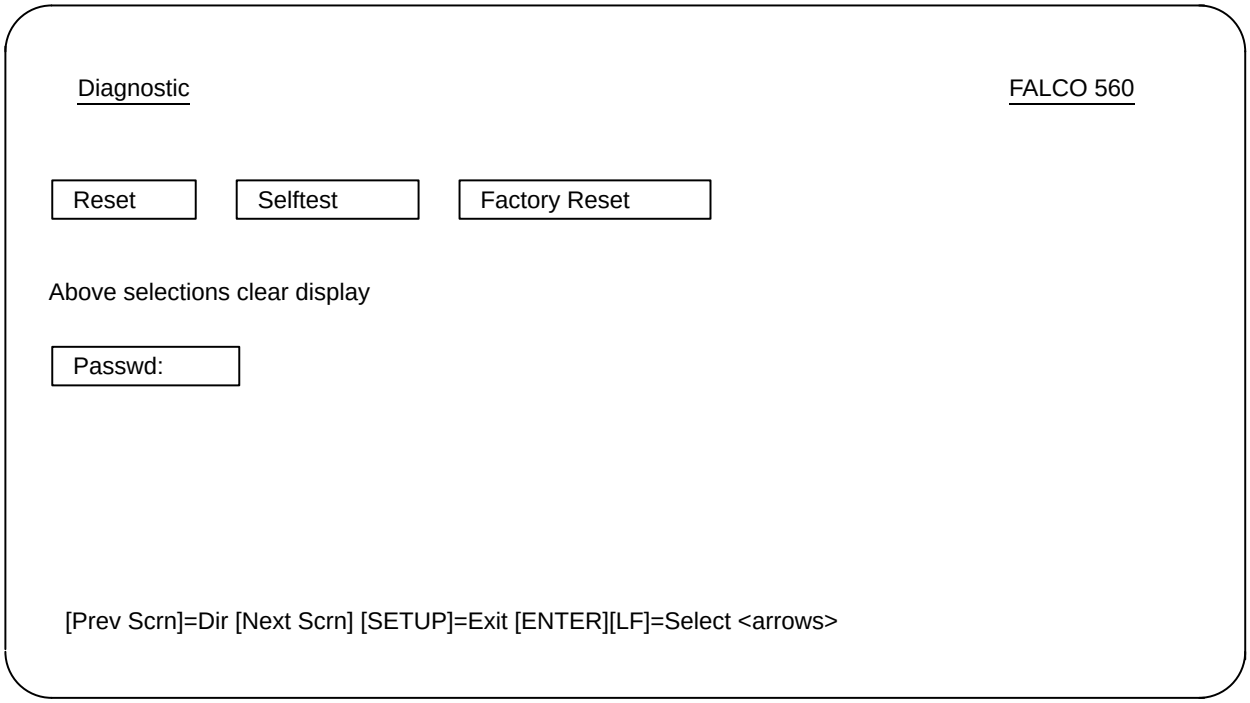


Figure 7-5. Diagnostic Screen Parameters for all Terminals

Port A Screen Set-up Parameters

Port A screen parameters are shown in Figure 7-6 and Figure 7-7.

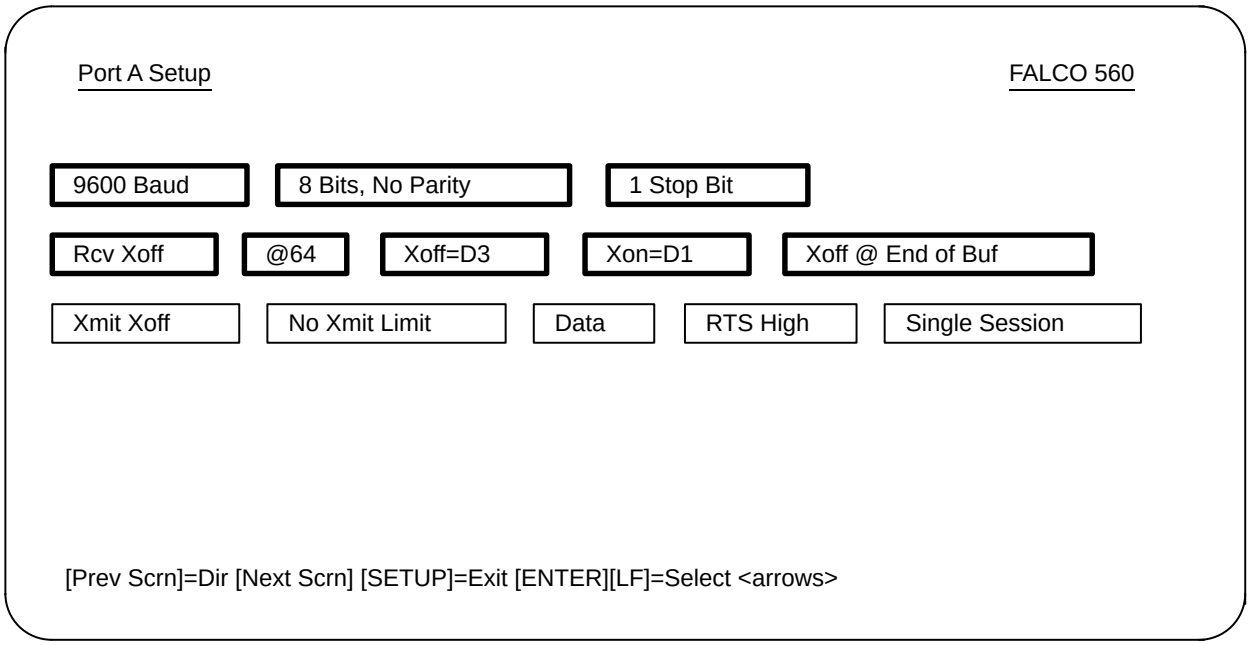


Figure 7-6. Port A Set-up Parameters for VME, IMS, and CMS Operation

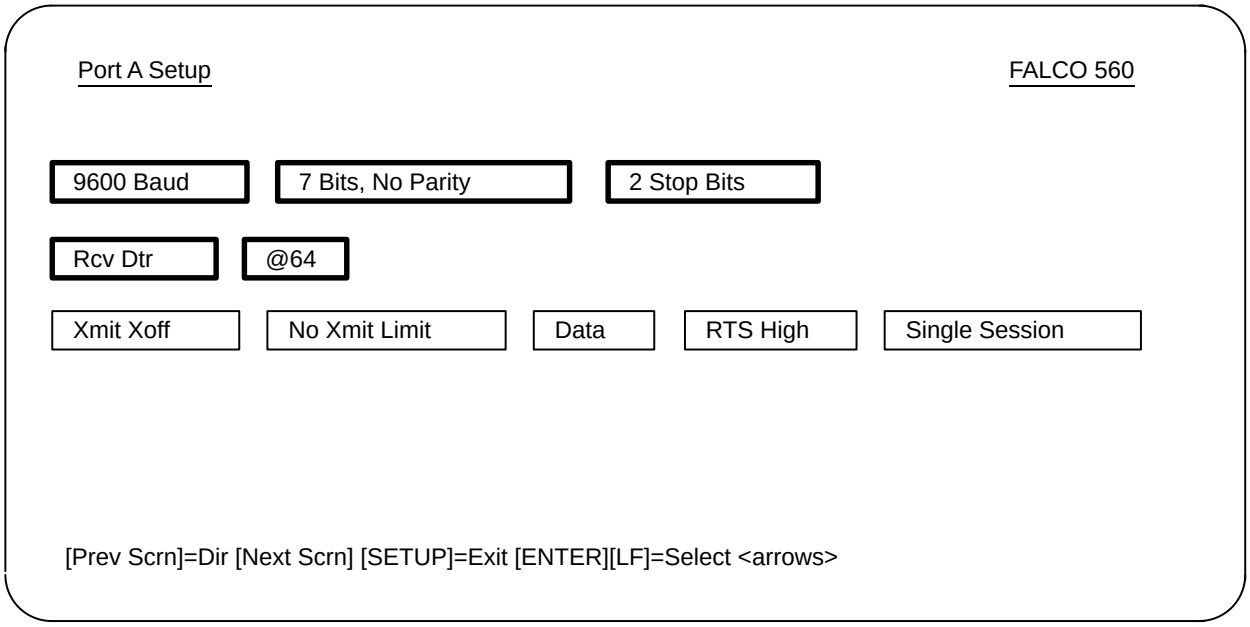


Figure 7-7. Port A Set-up Parameters for COS, CMOS, and UNICOS Operation

Falco Screen Set-up Parameters

Falco special screen parameters are shown in Figure 7-8 and Figure 7-9.

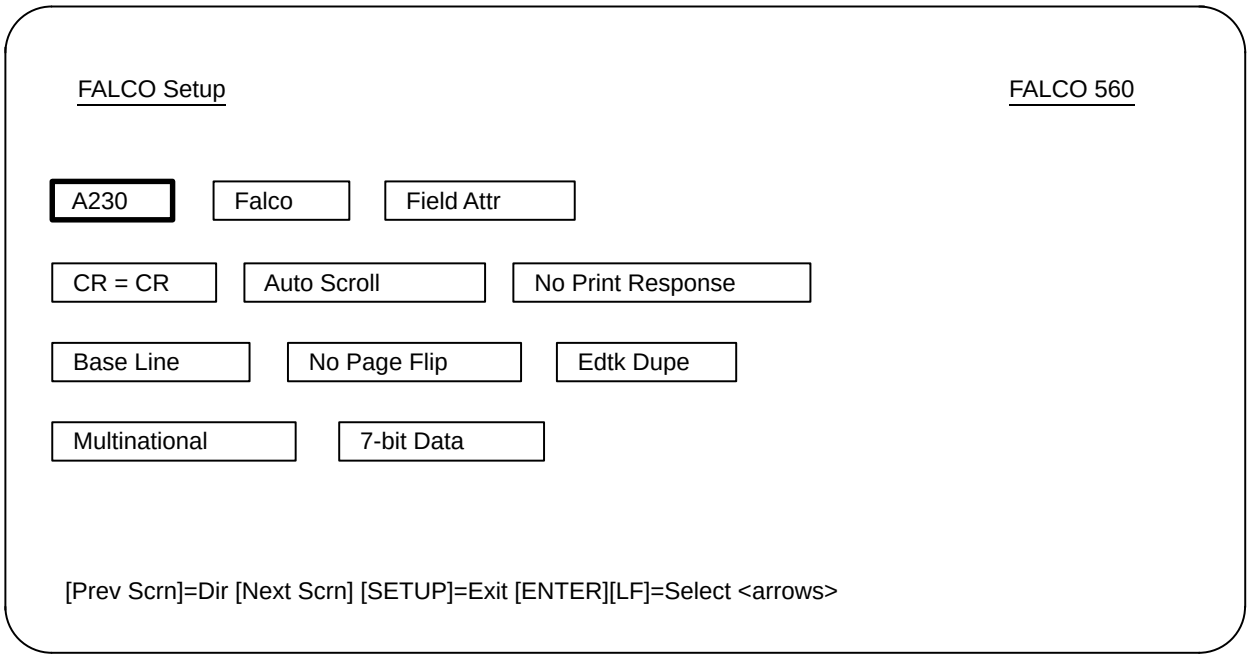


Figure 7-8. Falco Set-up Parameters for VME, IMS, CMS, and UNICOS Operation

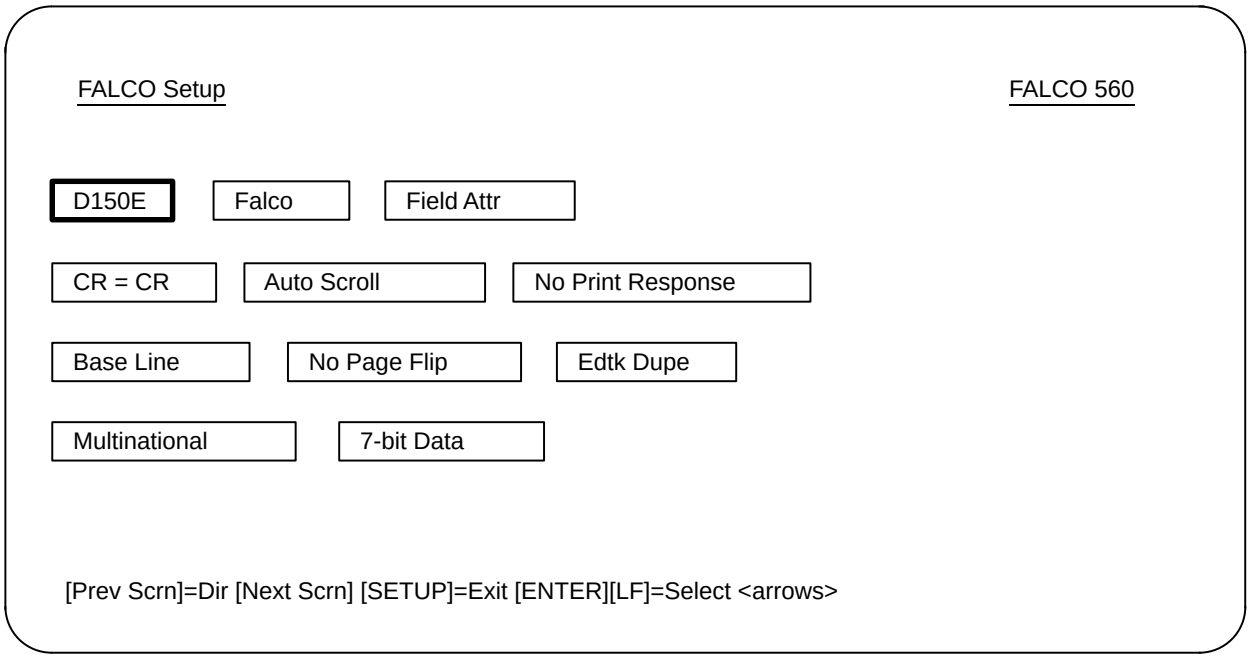


Figure 7-9. Falco Set-up Parameters for COS and CMOS Operation

Terminal Screen Set-up Parameters

Terminal screen parameters are shown in Figure 7-10, Figure 7-11, and Figure 7-12.

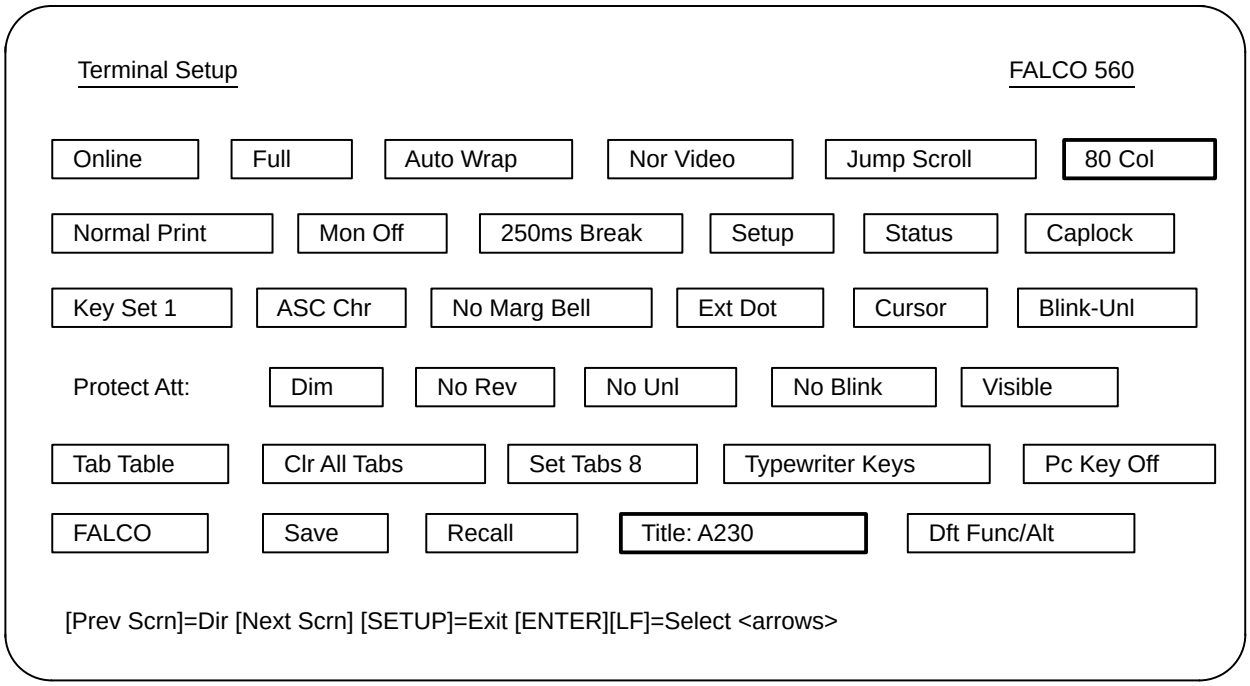


Figure 7-10. Terminal Set-up Parameters for VME, IMS, and CMS Operation

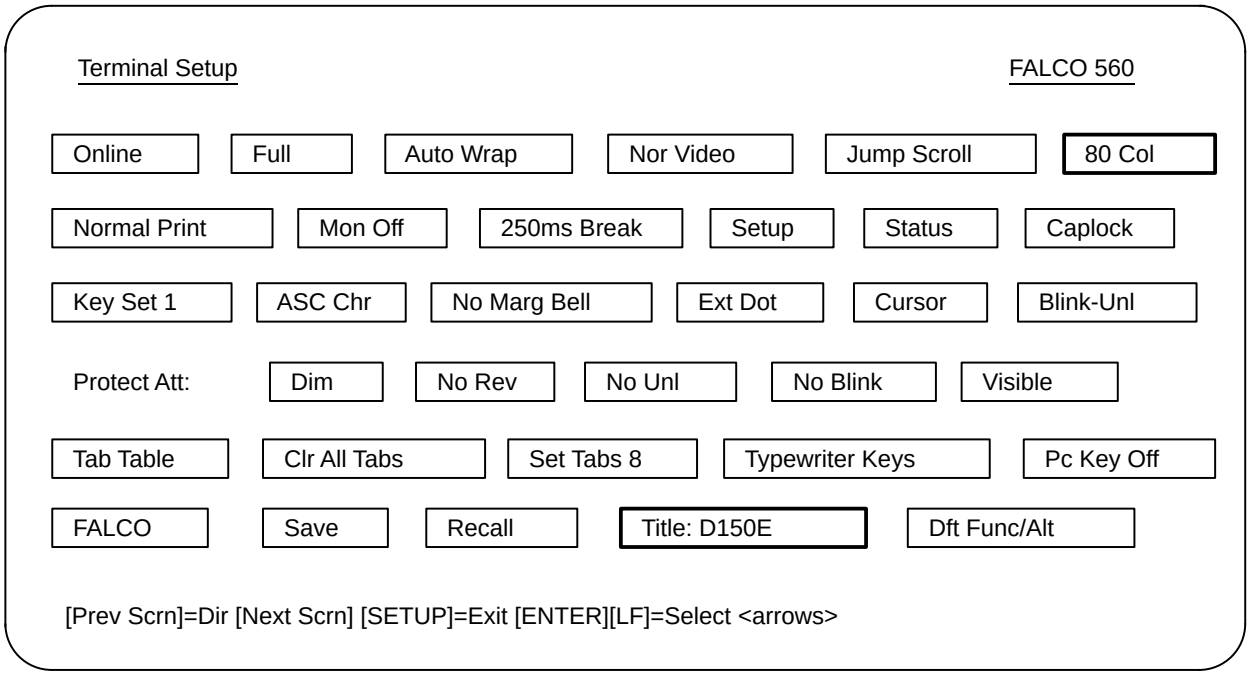


Figure 7-11. Terminal Set-up Parameters for COS and CMOS Operation

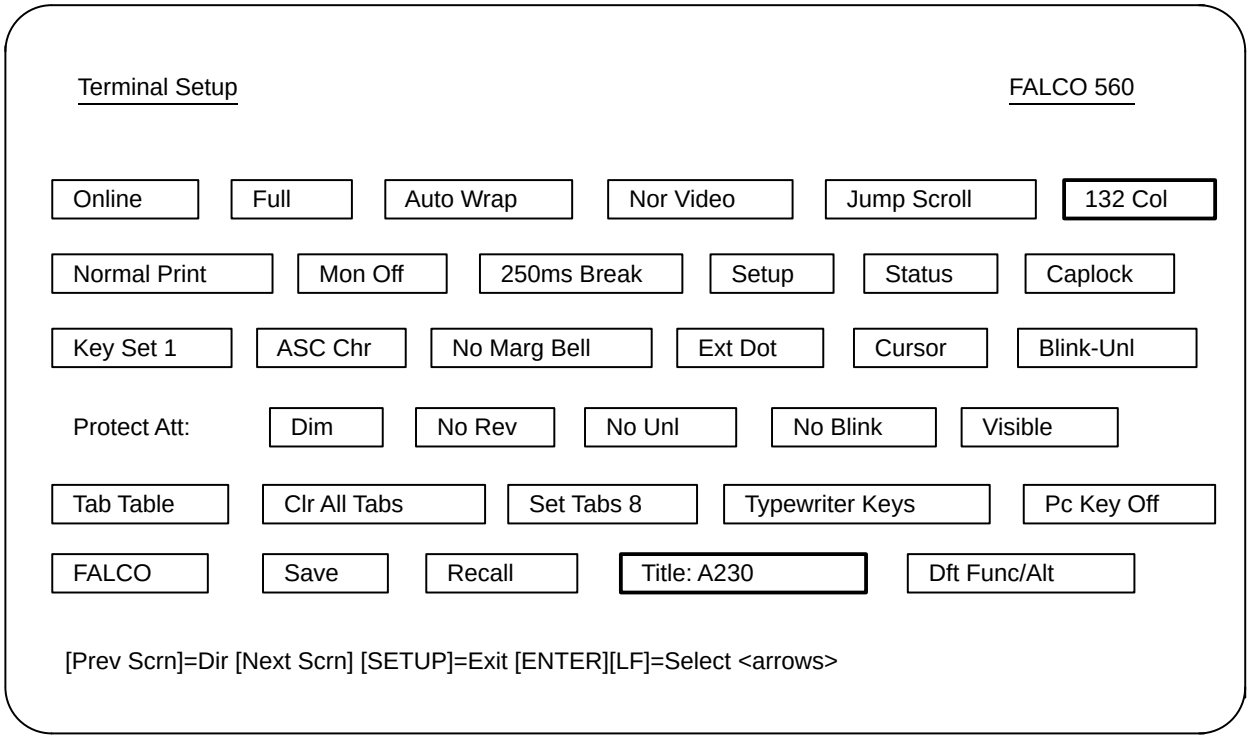


Figure 7-12. Terminal Set-up Parameters for UNICOS Operation

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