PSX1000™ and PSX500™

Parallel Programmers

User Manual

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Acknowledgments:

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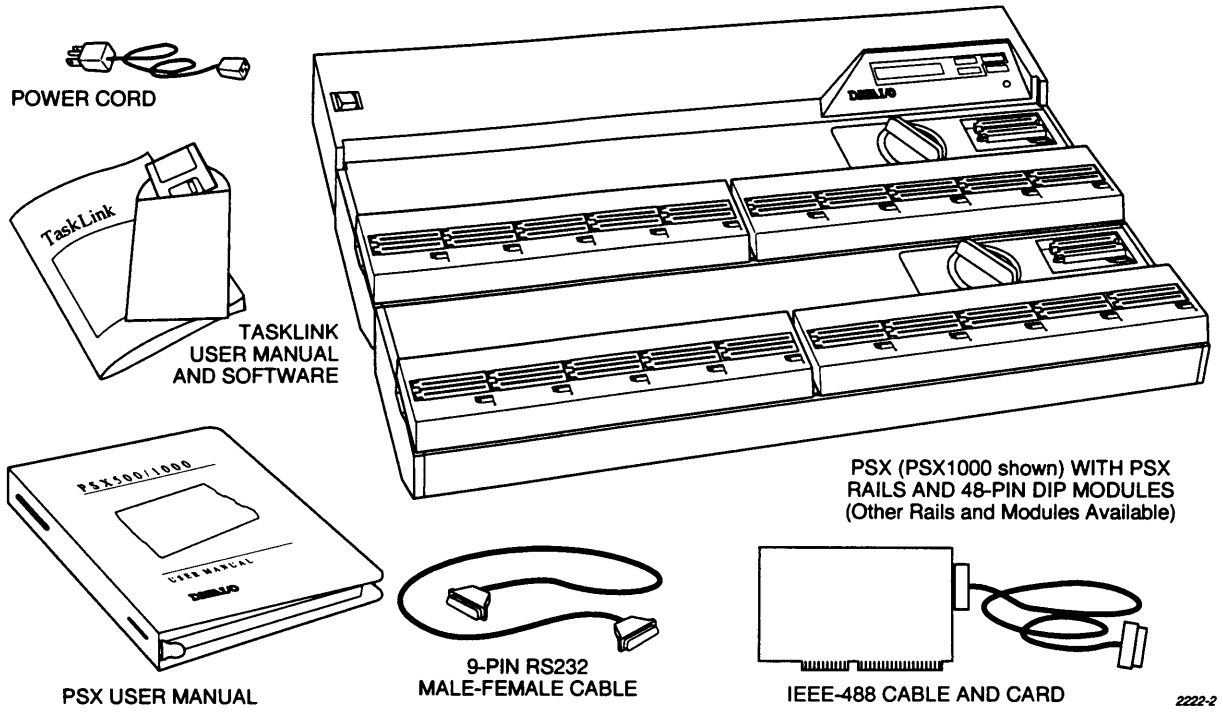
Before You Begin

Before you start setting up or using your PSX™ programmer, read the information presented in this section to become familiar with the PSX package and this User Manual.

Package Contents

The items that are included in the PSX package are shown below. The 9-pin RS232 cable is used with the standard PSX (serial) configuration.



Product Definition

The PSX Parallel Programmer is a menu-driven production programmer designed for fast programming and continuous, reliable operation. The PSX programmer can program the following:

Device types

- MOS and CMOS one-time programmable (OTP) PROMs
- EPROMs and EEPROMs
- FLASH

- Microcontrollers—(microprocessors with on-chip programmable memory)

Package Types

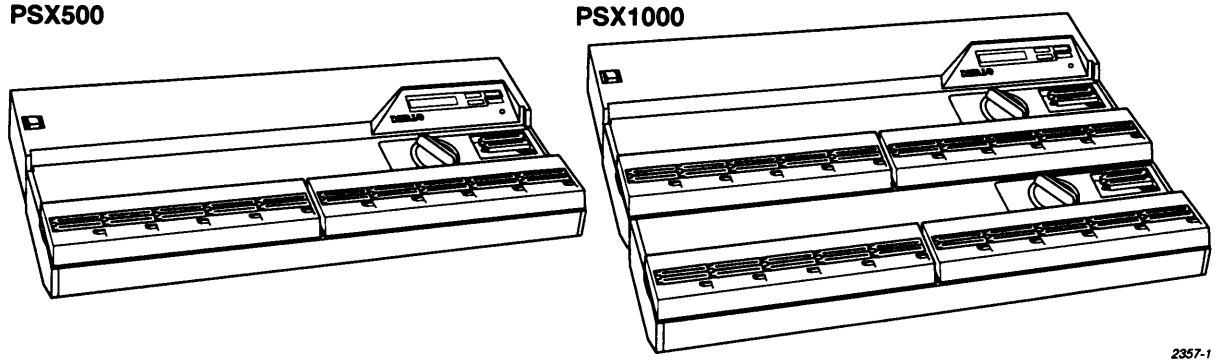
- PCMCIA standard 68-pin memory cards
- PLCCs, SOICs, DIPs, TSOPs, VSOPs, SSOPs, and QFPs

The PSX programmer can be configured as follows:

- **Standard PSX**—Processes devices in local (stand-alone) mode or in remote mode (attached to a PC using a RS232 9-pin serial cable).
- **IEEE-488 PSX**—Allows the PSX to use the high-speed downloading capabilities of an IEEE-488 interface to a PC. (See "Set Port Options" on page 4-34 for information on using the PSX's IEEE-488 port.)

PSX Systems

Data I/O offers a series of parallel programmers, including the high-end (20-socket) PSX1000 programmer, the 10-socket PSX500 programmer and the 8-socket PSX400 programmer (not shown).



Control Modules

The PSX1000 programmer consists of a PSX1000 control module, which can hold one or two rails.

The PSX500 programmer consists of a PSX500 control module, which holds a single rail. The PSX500 is not upgradeable to a two-rail system (PSX1000).

Rails

Special Note: The generic term "PSX Rail" is used throughout this manual. It refers to the rail formerly called a Memory Rail as well as to the new PSX Rail 5V/3V.

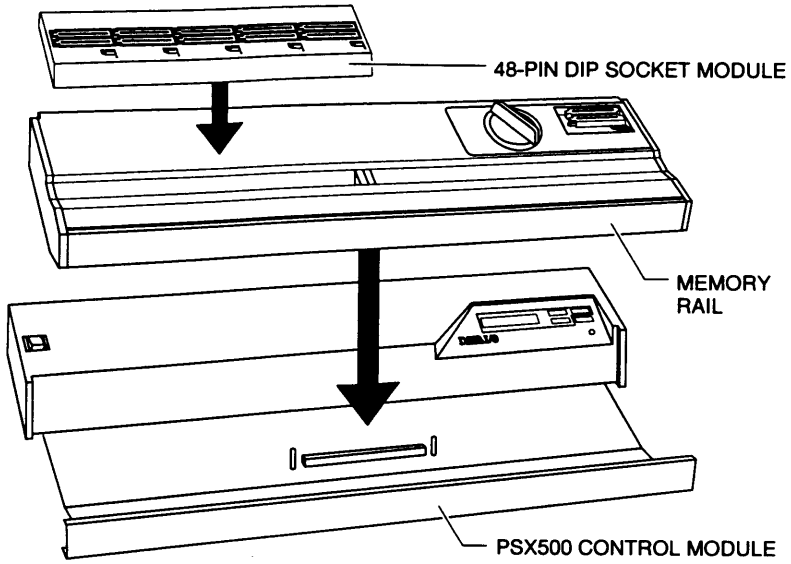
The PSX Rail 5V/3V requires socket modules (socket modules are installed into the rail and devices are inserted into the socket modules). Many socket modules are available for programming devices of different package types. For a description of available rails, refer to "Rails and Socket Modules" on page xiii.

Socket Modules

Socket modules (which are installed on the PSX Rails) are designed to interface the PSX with specific devices and device types. For example, the 28-pin SOIC module supports operations with 28-pin SOIC devices. For a list of available socket modules, refer to the "Rails and Socket Modules" section on page xiii.

Putting the Pieces Together

The illustration below shows how a socket module and PSX Rail fit onto the control module (a PSX500 control module with a PSX Rail and one 48-pin DIP socket module is shown).



How the PSX Works

The basic function of the PSX programmer is to copy data from one or more master devices to blank devices. The typical steps in this process are:

1. Load the data from one or more master devices inserted in module sockets, starting with socket 1. The data is loaded into the programmer's RAM.
2. Remove the master device(s).
3. Insert (install) the blank device(s), starting with socket 1.

4. Program the blank devices from the data in the programmer's RAM. You can program a set of up to 20 devices.
5. Compare the checksum value of the programmed device(s) to the master device(s) to verify that the operation was successful.

In addition, for DIP devices, you can copy data directly from a master device inserted in the master socket to other DIP devices (see page 3-2 for an illustration of the position of the PSX master socket).

The PSX supports several other operations that are described later in this manual.

Device Support

PSX Rails, and the socket modules installed on them, are designed to interface the PSX with specific devices and device types. For example, the 48-pin DIP module supports operations with 28-, 32-, and 48-pin DIP devices. Refer to the "Rails and Socket Modules" section on page xiii for a list of available rails and socket modules.

Many different rails and socket modules are available for programming devices. For a list of supported devices and the rail or socket module required for specific devices, refer to the **Device List**. For instructions on how to access the Device List, refer to the "Using the Device List" section on page 3-4. To order additional socket modules, contact your nearest Customer Support office as listed in Appendix A.

Specifications and Factory Settings

See Appendix C for the PSX product line specifications. See page 4-4 for factory default settings.

Safety Information

Definitions

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

CAUTION statements identify conditions or practices that could result in damage to equipment or other property.

Additional Safety Information

See the "Safety Summary" in Appendix C.

Options

The PSX product line offers the following options, which are described in the following paragraphs:

- Variable parameters
- RAM upgrade
- Updates
- Rails and Socket Modules
- Spare Parts

To order any available option, contact your nearest Customer Support office as listed in Appendix A.

Variable Parameters

The Variable Parameters option enables you to modify algorithm-related parameters for programming devices that need more rigorous programming and/or verification.

RAM Upgrade

The PSX is shipped to you with 8 MB of RAM (two 4 MB SIMMs). Upgrades to 64 MB are available. To order a RAM upgrade, contact your nearest Customer Support office as listed in Appendix A.

Updates

As new device programming capabilities become available, Data I/O offers user-installable update kits for the PSX programmers. These update kits include firmware PROMs.

Data I/O also offers a selection of update contracts and Full Service Agreements, which provide automatic shipment of updates, plus performance verification and repair of your equipment. For information on purchasing support contracts, contact your nearest Customer Support office as listed in Appendix A.

Rails and Socket Modules

To increase the number or types of devices that your PSX can program, you can purchase additional rails and socket modules. New rails and socket modules may become available periodically.

Note: Rails are interchangeable between the PSX1000 and PSX500. The only difference is that the PSX1000 can hold two rails and the PSX500 can hold only one rail.

Supported Rails

The PSX supports the PSX Rail, which requires two socket modules, each of which has five sockets, and programs memory devices and microcontrollers (see the following "Socket Modules" section). In addition to the PSX Rail, the following rails are supported for backwards compatibility:

- **Micro Rails** —Two rails are available. Each contains ten microprocessor sockets.

  MICRORAIL-DIP for programming 40-pin DIPs
  MICRORAIL-44P for programming 44-pin PLCCs

- **28-pin Rail** —The SR28 contains 15 DIP sockets and programs 24- or 28-pin EPROMs.

- **40-pin Rail** —The SR40 contains 10 DIP sockets and programs 32- or 40-pin EPROMs and microcontrollers.

Supported Socket Modules

Socket Module	Description
DIP48	Programs 48-pin DIP devices
32PLCC(28)	Programs 32-pin PLCC devices derived from a 28-pin DIP (push/pop sockets)
32PLCC(28)HT	Programs 32-pin PLCC devices derived from a 28-pin DIP (hinged top sockets)
32PLCC(32)	Programs 32-pin PLCC devices derived from a 32-pin DIP (push/pop sockets)
32PLCC(32)HT	Programs 32-pin PLCC devices derived from a 32-pin DIP (hinged top sockets)
44PLCC	Programs 44-pin PLCC devices (push/pop sockets)
44PLCCHT	Programs 44-pin PLCC devices (hinged top sockets)
68MEMCARD	Programs 68-pin PCMCIA memory cards
28SOIC-300	Programs 28-pin EPROM/EEPROM SOICs with 0.300-inch wide packages (28-pin DIP equivalents only)
28SOIC-330	Programs 28-pin EPROM/EEPROM SOICs with 0.330-inch wide packages (28-pin DIP equivalents only)
32SOIC-440	Programs 32-pin EPROM/EEPROM SOICs with 0.440-inch wide packages (32-pin DIP equivalents only)
40SOIC-450	Programs 40-pin EPROM/EEPROM SOICs with 0.450-inch wide packages (40-pin DIP equivalents only)
44SOIC-530	Programs 44-pin EPROM/EEPROM SOICs with 0.530-inch wide packages
28TSOP	Programs 28-pin TSOPs in either the forward or reverse pinout
32TSOP	Programs 32-pin TSOPs in either the forward or reverse pinout

40TSOP	Programs 40-pin TSOPs in either the forward or reverse pinout
48TSOP-F	Programs 48-pin TSOPs in the forward pinout
56TSOP	Programs 56-pin TSOPs in either the forward or reverse pinout
MICRO-DIP	Programs up to 48-pin DIP micro-controller devices
MICRO-44PLCC	Programs 44-pin PLCC micro-controller devices
MICRO-52PLCC	Programs 52-pin PLCC micro-controller devices
MICRO-64QFP	Programs 64-pin QFP micro-controller devices
40VSOP	Programs 40-pin VSOP (.5" TSOP) devices in either the forward or reverse pinout
56SSOP	Programs 56-pin SSOP devices

For a complete and current listing of available options and configurations, contact your nearest Customer Support office as listed in Appendix A.

Replacement Sockets

User-installable socket replacement kits are available from Data I/O.

When the sockets have reached the warranted number of insertion cycles per socket, the PSX generates a message. You should replace the sockets at this interval (for example, all DIP sockets, including rail and socket module sockets, are warranted for 25,000 insertion cycles). See the "Socket Warranty and Replacement" section on page D-2 for socket replacement kit part numbers, socket warranties, and socket replacement instructions.

Spare Parts

Spare parts are available from Data I/O. Call the Service Dispatch Group at 800-735-6070 to request spare parts.

Typographic Conventions

Throughout this manual, different typographic conventions represent different cases of input and output.

Programmer Keys

The PSX programmer keys, **ENTER**, **EXIT**, ∧ and ∨, appear throughout the manual as they do here.

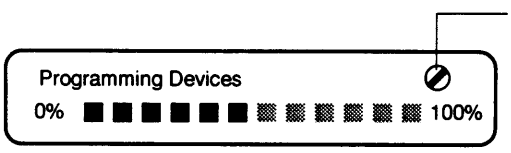
Displayed Text

Text displayed on an LCD or screen appears in a typewriter-like typeface.

```
You will see this text displayed on the screen.
```

Action Symbol (*)

The asterisk included in displayed text represents the action symbol seen on the LCD display, as shown in the following figure.



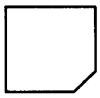
ACTION SYMBOL — A circle with a rotating line that appears while the programmer is processing devices, represented in this manual by an asterisk (*). 2660-1

Programmer Symbols

This symbol on equipment indicates that the user should consult the manual for further detail.

This symbol stands for V ac, for example, 115V ∿ = 115V ac.

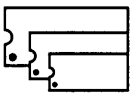
This symbol denotes a ground connection for a signal or for an antistatic wrist strap with impedance of 1 MΩ (minimum) to 10 MΩ (maximum).



This symbol describes how to insert devices into PLCC sockets. Insert the device label-side up with the notched corner in the lower right.

This symbol describes how to insert devices into PLCC sockets. Insert the device label-side up with the notched corner in the upper right.

Note: When inserting a device, always follow the orientation symbol pictured on your module. This orientation symbol always overrides any device orientation directions given in the manual text.



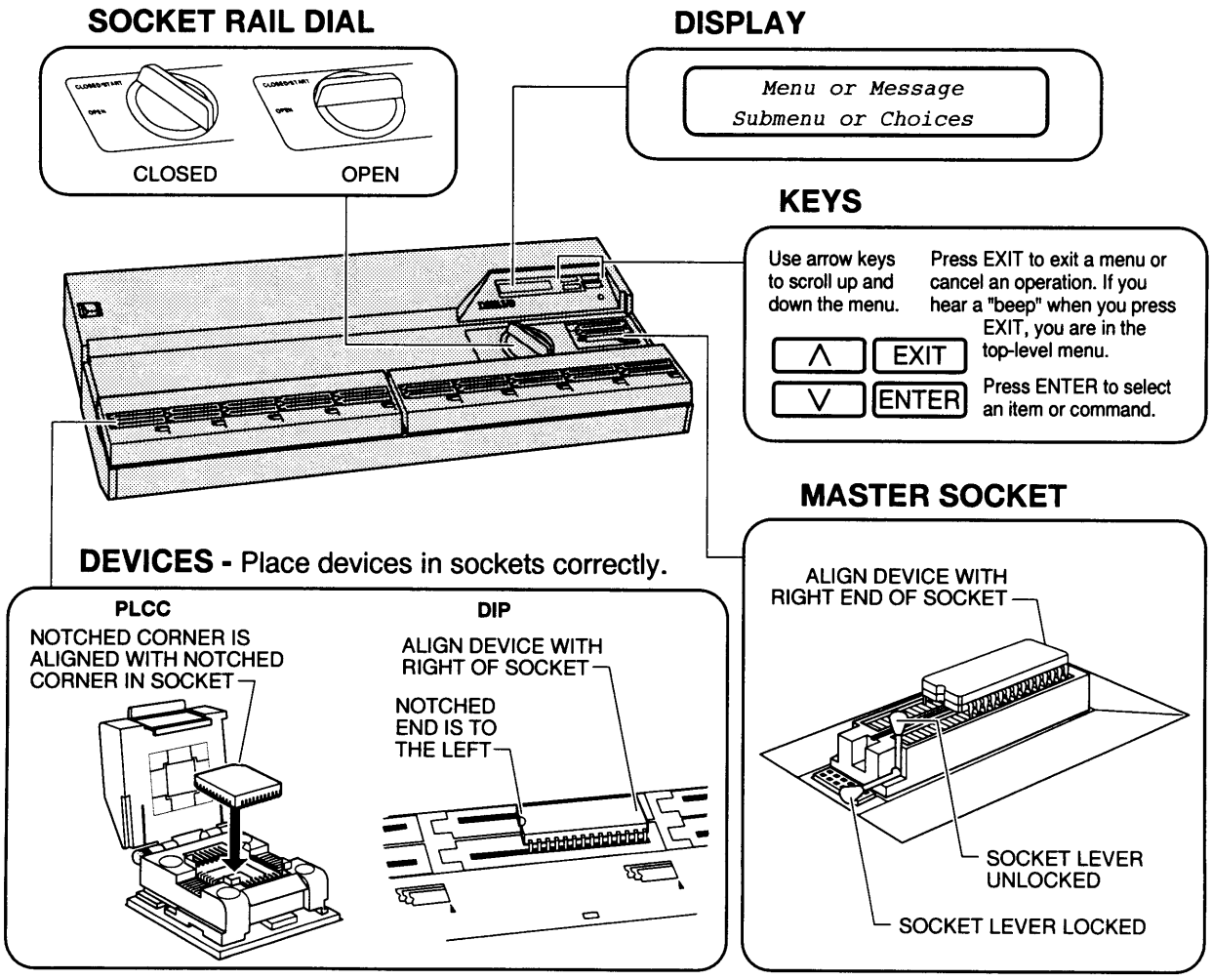
This symbol describes how to insert devices into DIP sockets. Insert the device into the socket so that the notched end is on the left and so that the device is aligned with the right side of the socket.

1 Getting Started

This chapter introduces the PSX and briefly describes how to use it for **local (stand-alone) operation**. (To set up the PSX for use with a PC, see Chapter 2, "Setup.")

- **New Users:** After reading this chapter, refer to Chapter 2 for detailed setup procedures and Chapter 3 for tutorials on how to operate the PSX in local mode.
- **Experienced programmer users:** To quickly get up and running, follow the steps in the Quick Start Setup and Quick Start Operation sections in this chapter. For more detailed information, see Chapter 2, "Setup," and Chapter 3, "Operation."

Getting to Know the PSX

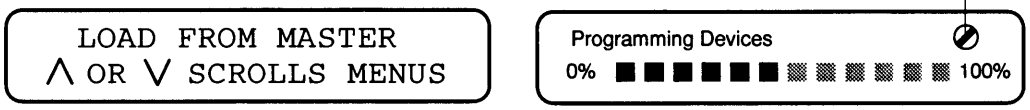


Using the Display, Keyboard, and Menus

The PSX's display, keyboard, and scrolling menus are described in the illustration below.

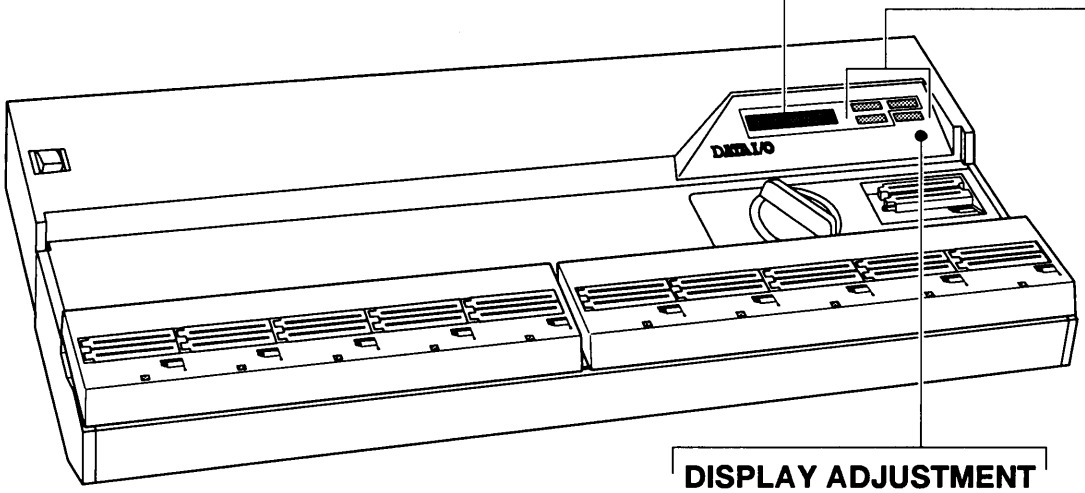
DISPLAY

ACTION SYMBOL — A circle with a rotating line that appears while the programmer is processing devices, represented in this manual by an asterisk (*).



When the PSX is not processing devices or running an application, you can access the scrolling menus.

During programming, bars advance to the right indicating what percentage of the operation is complete.



DISPLAY ADJUSTMENT

To adjust the display, turn the adjustment dial.

SCROLLING MENUS

Enter programming commands, device specifications, and operating parameter values using the scrolling menus.

The scrolling menus operate like a moving window on a list (menu) of options. Press an arrow key once to move the window up or down the list. Hold down an arrow key to quickly scroll through the menu.

PSX has several levels of menus (see page 4-2). The top-level menus are displayed after powerup and you can scroll through them in either direction by using the [∧] or [∨] key. When you select a menu (by pressing [ENTER]), a submenu may become available.

If the top-level menu entered is a device-related operation (such as Load From Master), you must select a manufacturer and device.

If the module installed on the PSX supports more than one package, you also must select a package.

KEYS

[∧]	[∨]	[ENTER]	[EXIT]
Scrolls to the menu item above the displayed item, or increases a parameter value.	Scrolls to the menu item below the displayed item, or decreases a parameter value.	Enters the displayed menu, or runs the menu selection.	Exits the currently selected menu, or discontinues an operation.

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Quick Start Setup

The following procedure summarizes the steps needed to set up and install your PSX to run in **local** mode. Chapter 2, "Setup," contains more detailed information.

1. Install rails and socket modules.

Ordinarily, your PSX is shipped without rails or socket modules installed. To install the rails (and socket modules) you wish to use, refer to "Installing Rails" on page 2-2 and "Installing Socket Modules" on page 2-5 for instructions.

CAUTION: Do not remove or install rails or socket modules when power is applied to the programmer. Removing or installing rails when power is applied to the programmer can damage the programmer, rails, and socket modules, and voids the warranty.

2. Make sure that all device sockets are empty.

Before turning on the power, make sure no devices are installed in your rail or module sockets and that the sockets are in the unlocked position.

Refer to "Installing Devices in Rail Sockets" on page 3-6 for more information.

3. Connect the power cord and turn on the power.

Refer to "Connecting the Power Cord" on page 2-8 for more information.

When you turn on the power, the PSX's system configuration is displayed for several seconds, after which the PSX will run a system test. The system test takes about a minute to complete.

When the system test has completed successfully, the programmer displays:

```
COPY FROM MASTER
^ OR v SCROLLS MENU
```

If the programmer displays a different message, see Chapter 6, "Messages," for an explanation.

If the display screen is blank after the system powers up, turn the display adjustment dial (see page 3-3) until the text is visible.

The programmer is now ready for operation in local mode.

Note: Local mode (stand-alone) operation uses the keys and display on the PSX front panel. Remote mode operation uses an attached PC to control the PSX.

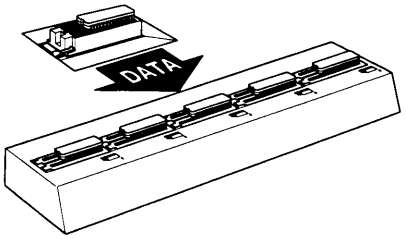
Quick Start Operation: Programming Devices in Local Mode

The following tutorial briefly describes how to program devices in local mode. For more instructions, see Chapter 3, "Operations."

The following commands are used to perform the various programming operations.

COPY FROM MASTER

To copy data from a single master device in the master socket directly to devices in the socket modules.

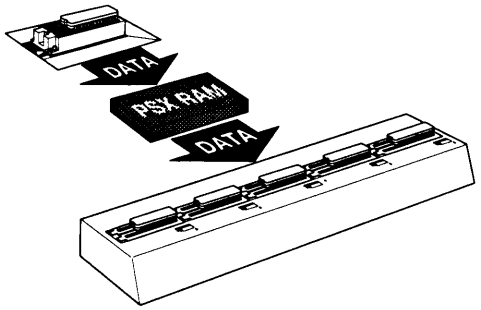


LOAD FROM MASTER

To copy data from a single master device in the master socket into programmer RAM.

COPY FROM RAM

To copy data from RAM to devices in the socket module.

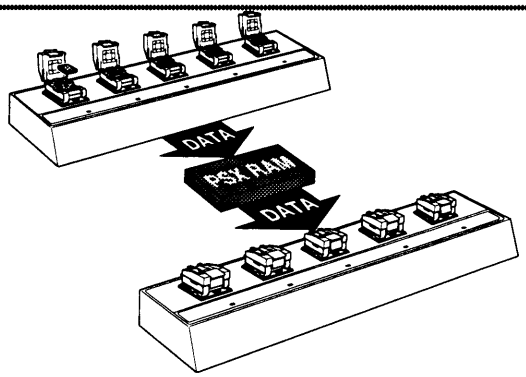


LOAD FROM SET (Setsize = 1)

To load data from a single non-DIP master device in socket 1 of the upper left socket module.

COPY FROM RAM

To copy data from RAM to devices in the socket module.

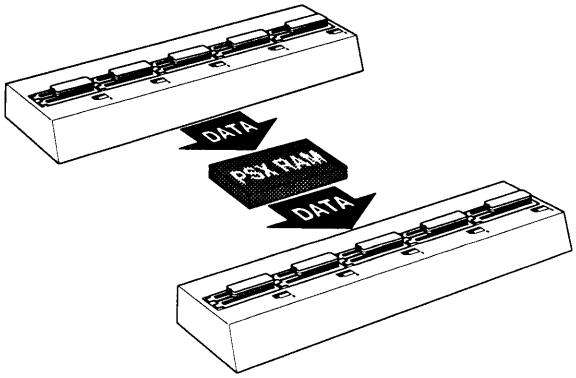


LOAD FROM SET

To load data from a set of master devices into programmer RAM.

COPY FROM SET

To copy data from RAM to a set of devices in the socket module.



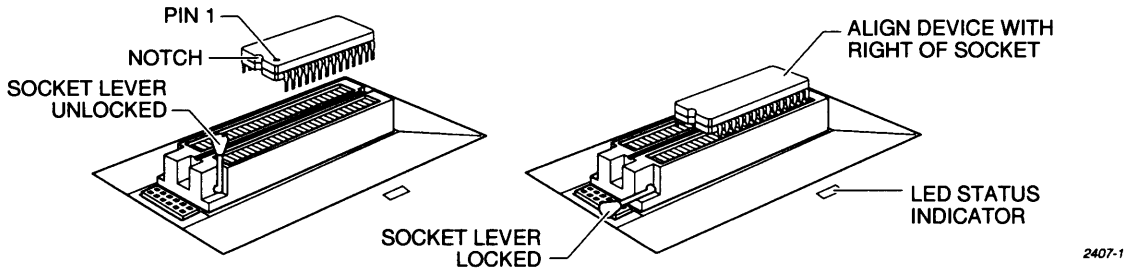
2661-1

I. Install Master Devices

Install the master device or master set of devices from which you wish to load or copy data.

CAUTION: Devices are static sensitive. Operate the PSX at an antistatic workstation. To avoid electric shock and damage to the devices, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

- If you are using **one master device** as the source for your programming operation, do one of the following:
  - Install a DIP device in the **master socket** on your PSX.
  - Install a master socket adapter with a non-DIP device in the master socket.
  - If you are using **one non-DIP master device** as the source for your programming operation and do not have a master socket adapter, install the device into socket 1 of the left-most socket on the upper rail.
- If you are using **multiple master devices** as the source for your programming operation, install devices starting with socket 1. Install additional devices sequentially from left to right until the top row is full, then sequentially from left to right on the bottom row.



See page 3-5 for instructions on how to install a master device in the master socket. See page 3-6 for instructions on how to install devices starting with socket 1 in the rail sockets.

Note: Make sure that the devices are locked in before proceeding. When the devices are locked, they cannot be removed from the sockets.

II. Set Device Parameters

1. Scroll through the PSX menus and select **Copy from Master**.

   The selected manufacturer and device appear on the second line of the display. If no device is selected, `AUTO DEVICE SELECT` is displayed.

2. Manually select the manufacturer name for the device (for example, AMD or Intel), then select the device from the list.

3. Press **ENTER** when the correct manufacturer and device appear in the display.

If you encounter problems, you might need to disable Electronic ID from the **Set Device Options** menu (see page 3-19). For information on Electronic ID see page 3-18.

III. Load Data From Master Devices

If you inserted master device(s) into the rail sockets (you are **not** using the master socket), before you can program a device, data for the target device(s) must be loaded into the programmer's RAM. In local mode operation, do the following to load the data into programmer RAM from a master device or master set of devices:

Note: If you are copying data directly from a device installed in a master socket, you do not need to load data into RAM, skip to Step V, "Program Devices."

1. Use a load operation to load the data from the device into the programmer's RAM:

   - Select the **Load From Master** command (see page 4-13) to load data from the **master device** you inserted in the master socket (Step I, "Install Master Devices"). Note that this operation loads from a device inserted in the master socket.
   - Select the **Load From Set** command (see page 4-14) to load data from the **set of master devices** or a **single master** device you inserted in the rail sockets (Step II, "Install Devices for Load or Copy Operation"). Note that this operation loads from device(s) inserted in the rail sockets.

2. After you select the load operation by turning the dial(s) to the closed/start position (or by pressing **ENTER** if the dials are already in the closed/start position) the programmer begins loading the data.

When the programmer has completed the load operation (the programmer displays the `Load complete - okay` message), remove the master device or set of devices from the rail sockets.

After removing the devices, store them in a safe place.

IV. Program Devices

To program the data into devices, do the following.

1. Install the device or devices you wish to program starting with socket 1. Install additional devices sequentially from left to right until the rail is full (upper rail on PSX1000), then sequentially from left to right on the lower rail (lower rail available on the PSX1000 only). (See page 3-6 for instructions on how to install devices.)

Note: When you program sets, devices must be loaded sequentially, starting at the far left of the upper left socket module or upper rail. When the setsize is greater than the capacity of a single rail (10 or 15 depending on the rail type), all socket modules and rail types must be identical.

2. Scroll through the PSX menus and select one of the following:
   - If you are copying directly from a master device to devices installed in the rails, select the **Copy From Master** command to program devices (see page 4-5).
   - If the **Load From Master** or **Load from Set** command was used to load data from a **single** master device, select **Copy From RAM** to program devices (see page 4-7).
   - If the **Load From Set** command was used to load data from a set of devices, select **Copy From Set** to program devices (see page 4-9).

Note: The PSX supports many more operations, including Diagnostics and Load Through Port. All available operations (commands) are described in Chapter 4, "Commands."

V. Completing the Job

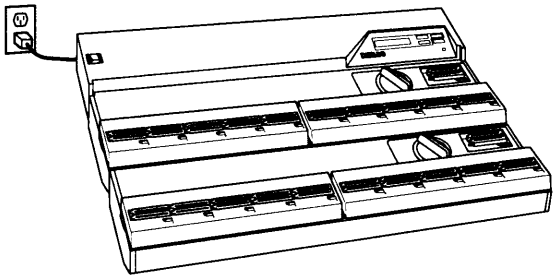
After completing each job, record and clear programming statistics as directed starting on page 4-44.

2 Setup

This chapter describes how to set up the PSX. The procedures referred to in the illustrations below are described on the following pages.

The PSX can be set up in the following three configurations:

A Local Mode



To set up:

- Install rails
- Install socket module (PSX RAIL only)
- Connect power cord
- Turn on the power
- Refer to Chapter 3, "Operation", or Chapter 1, "Getting Started"

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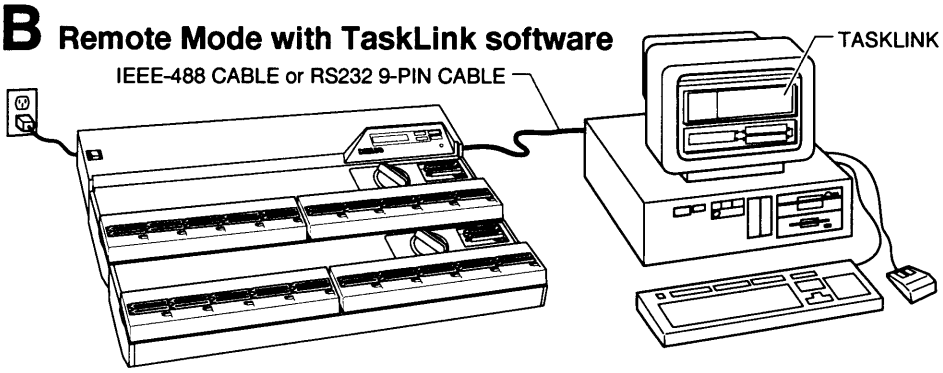
B Remote Mode with TaskLink software

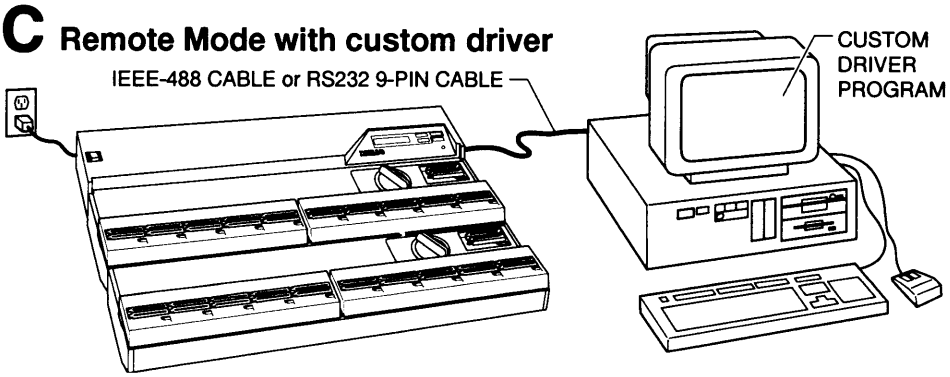


To set up:

- Install rails
- Install socket module (PSX RAIL only)
- Connect power cord
- Connect IEEE-488 or RS232 cable
- Install TaskLink software and set up PSX in remote mode (TaskLink documentation)
- Turn on the power
- Refer to Chapter 3, "Operation"

2361-2

C Remote Mode with custom driver



To set up:

- Install rails
- Install socket module (PSX RAIL only)
- Connect power cord
- Connect IEEE-488 or RS232 cable
- Refer to the "Computer Remote Control Operation" App Note
- Turn on the power
- Refer to Chapter 3, "Operation"

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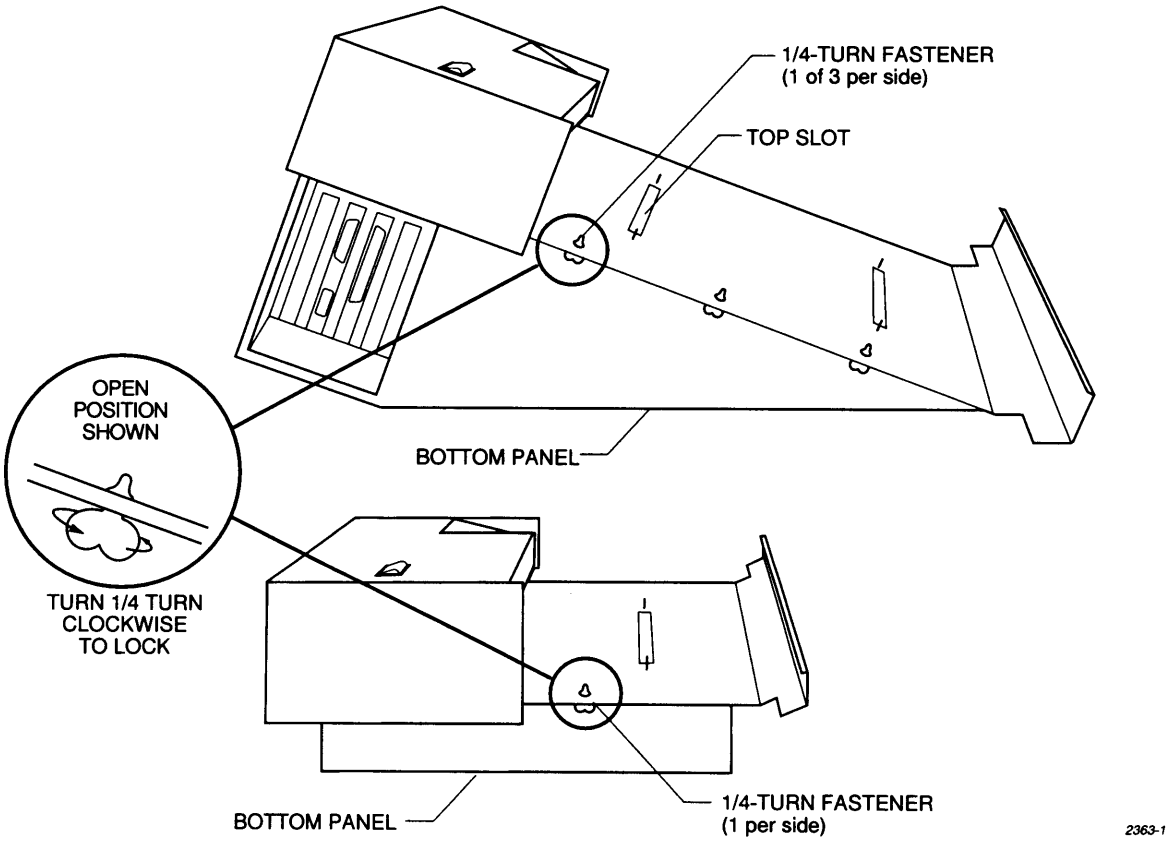
Installing Rail(s)

The following steps describe how to install two rails on the PSX1000 control module. To install a rail on the PSX500 control module, follow the instructions for the lower rail.

CAUTION: Do not install modules when power is applied to the PSX. Doing so can damage the programmer, rails, and socket modules and voids the warranty.

Install rail(s) in the PSX as follows:

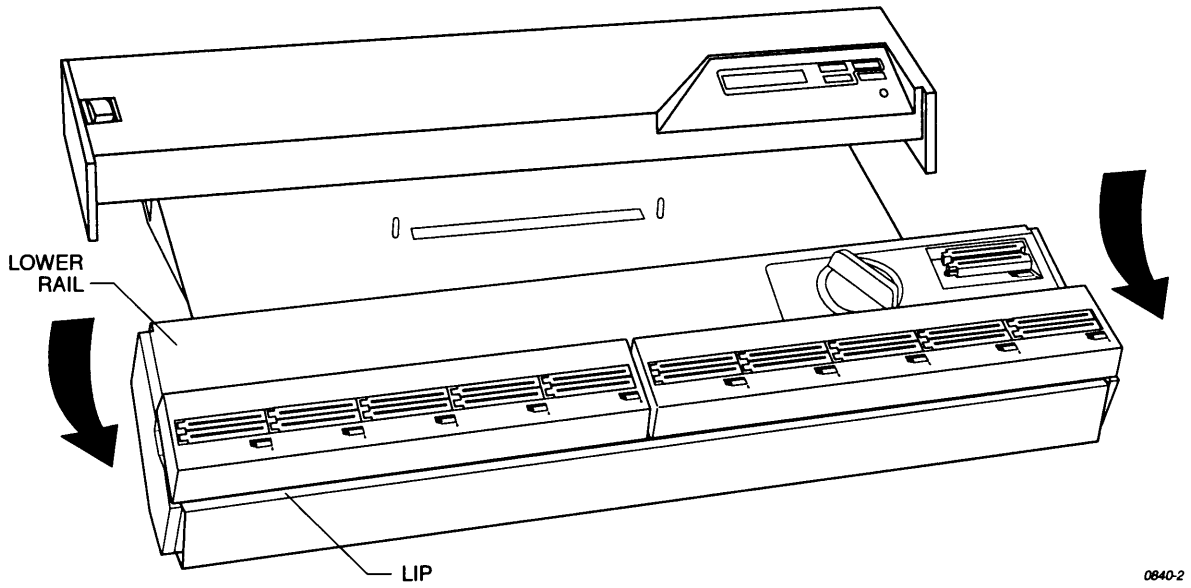
1. Make sure the power to the PSX is off.
2. Turn the fasteners to the open position (so that the wing handles are parallel to the sides of the programmer chassis). Refer to the illustration below.



3. Insert the lower rail into the bottom slot by lowering it into position at a 45-degree angle, and slipping the rail beneath the lip on the programmer frame (see illustration below).

CAUTION: When two different rail types are installed on a PSX1000, the upper rail must be a PSX Rail.

Note: The PSX1000 can be run with only one rail. It will resemble a PSX500 in operation.



4. Lower the top part of the rail until the connector engages; then press the rail firmly in place. When the connector is fully engaged, the bottom of the rail rests flat against the chassis.

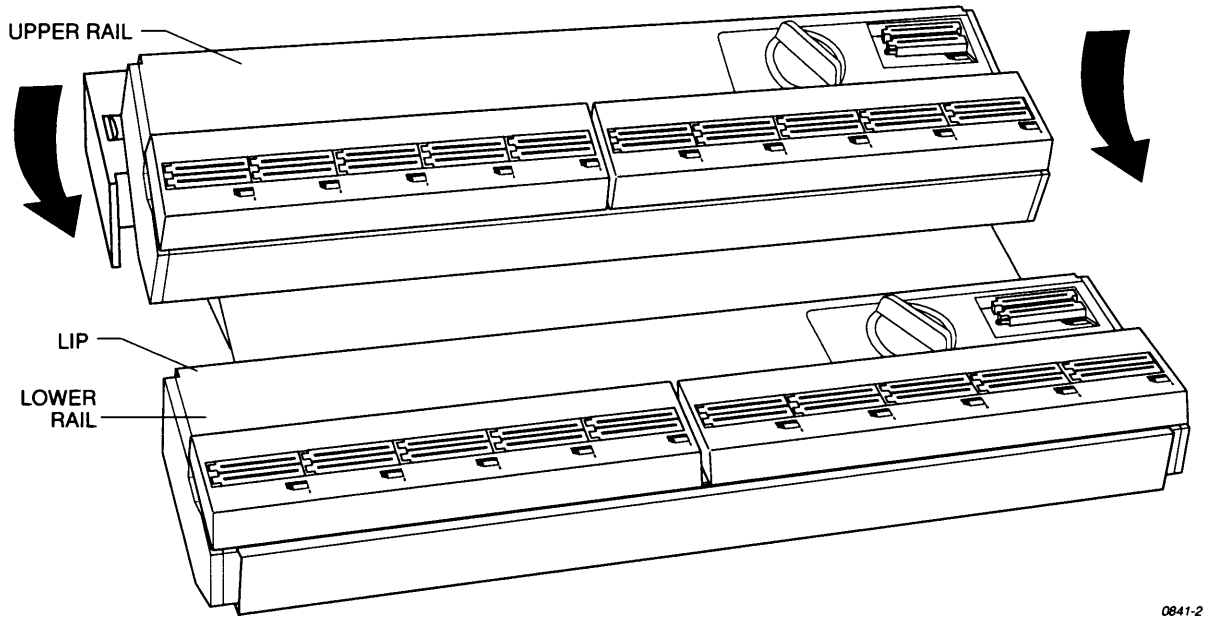
   If the rail connector does not engage fully, make sure that the fasteners are turned so that the wing handles are parallel to the sides of the programmer (unlocked). Move the fasteners left or right along the slot until the rail drops into place.

5. Turn fasteners to lock the rail.

If you are setting up a PSX500, you have completed installing a rail. If you installed a PSX Rail on your PSX500, proceed to "Installing Socket Modules" on page 2-5.

If you are setting up a PSX1000, proceed to steps 6 through 8 on the next page to install the upper rail.

6. If you are using a PSX1000, insert the upper rail or blank rail into the top slot by slipping the front edge of the rail beneath the lip on the lower rail (see the following illustration).



7. Lower the top part of the rail until the connector engages. Press the rail firmly in place.
8. Turn each of the fasteners 1/4 turn clockwise so that the wing handles are perpendicular to the sides of the programmer chassis. (When the fasteners turn and then stop, the rails are locked down.)

You have completed installing rails. If you installed a PSX Rail on your PSX, proceed to "Installing Socket Modules" on page 2-5.

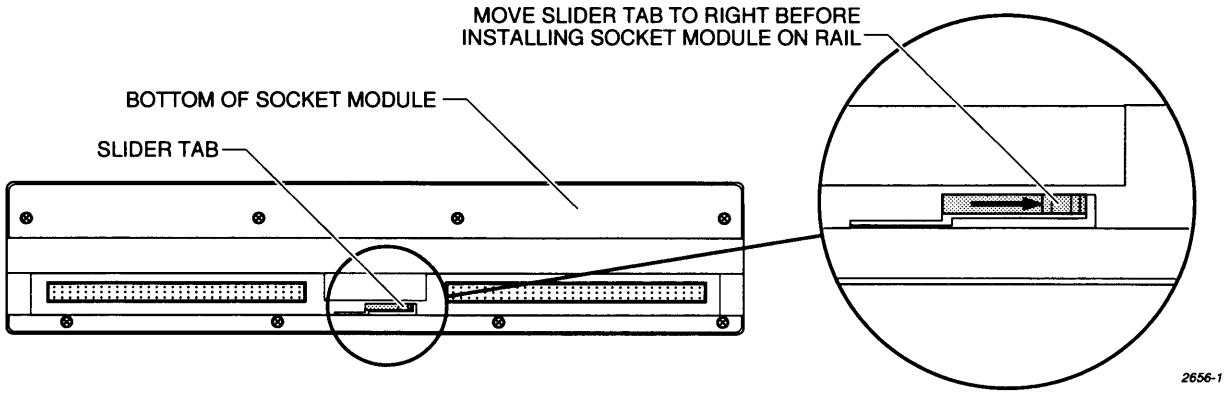
CAUTION: Lifting the programmer by the rails can damage the programmer, rails, and socket modules.

Transporting the programmer with the rail(s) installed can damage the programmer, rails, and socket modules. Remove the rail(s) before moving or shipping the programmer (see "Disassembling the PSX on page 7-3).

Installing Socket Modules

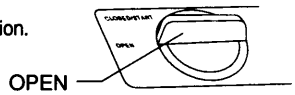
CAUTION: Do not install modules when power is applied to the PSX. Doing so can damage the programmer, rails, and socket modules and voids the warranty.

If you are installing a socket module for DIP devices, turn the module over and move the slider tab to the right as illustrated in the following diagram:

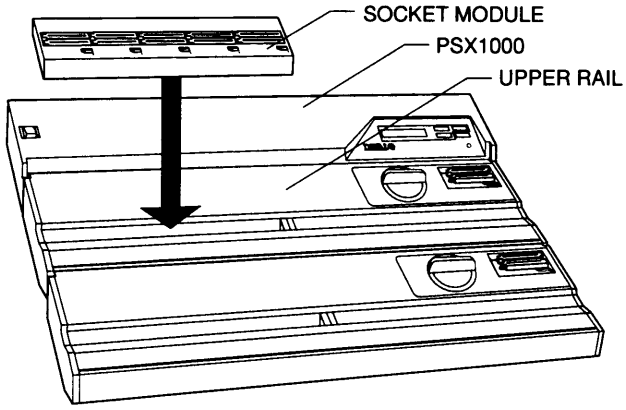


For all other socket modules, proceed to the three steps illustrated below.

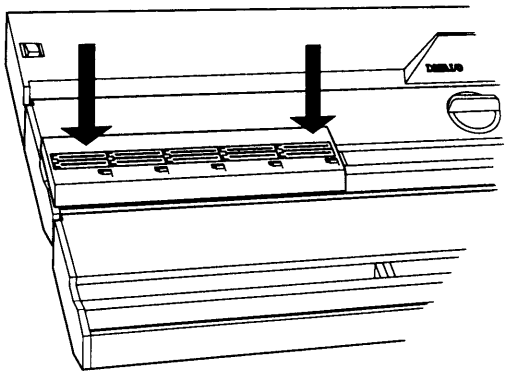
1 Place the dial in the open position.



Note: Socket modules cannot be installed or removed when dial is in the closed position.



2 Starting in the upper left rail, insert the socket module into the upper left slot by lowering it straight down into position until the connector engages.



3 Using equal and constant pressure, press the socket module firmly in place with the palms of both hands. When the connector is engaged, the bottom of the socket module rests flat against the rail chassis. When all socket modules are installed, turn dial(s) to the closed/start position.

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Note: If socket modules are incorrectly installed, the powerup routine will not complete. If this happens, check the following:

- *A rail might not be seated properly in the PSX control module.*
- *A PSX Rail might be in the lower rail position on a PSX1000 and an unsupported rail might be in the upper rail position (for a list of supported rails, see page xiv). When two different rails are installed on a PSX1000, the upper rail must be a PSX Rail.*
- *A socket module might not be properly seated in its rail.*
- *The socket module arrangements might not be supported. See "Supported Socket Module Arrangements" below.*
- *A socket module may not be supported by the version of software you have installed. See the "Supported Software Versions" section on page 2-11 for instructions.*

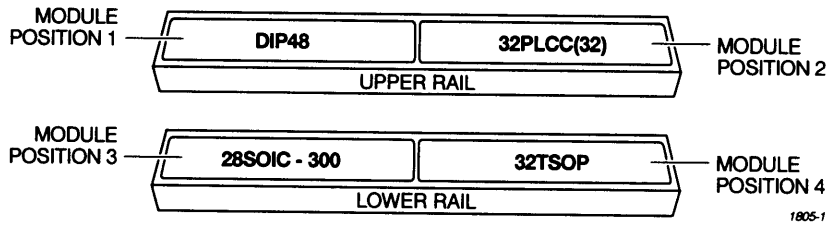
Supported Socket Module Arrangements

CAUTION: Installing socket modules when power is applied to the programmer can damage the programmer, rails, and socket modules and voids the warranty.

A PSX Rail must have two socket modules installed in it **before you power up** the programmer. When installing socket modules, keep the following rules in mind:

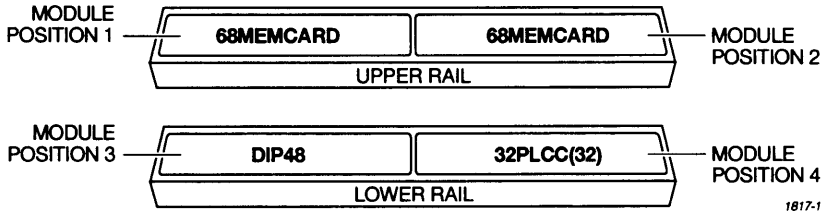
Installing Four Different Socket Modules

When you install four different socket modules (except for the 68MEMCARD socket module and the Micro modules), the socket modules may be in any of the four positions (see illustration below).



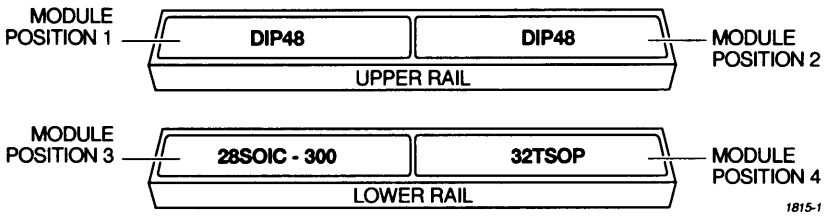
Installing 68MEMCARD Socket Modules and Micro Socket Modules

CAUTION: The 68MEMCARD socket module and Micro modules must always be used in pairs. For instance, when one of the socket modules is a 68MEMCARD socket module, both of the socket modules attached to a PSX Rail must be 68MEMCARD socket modules (see illustration below).



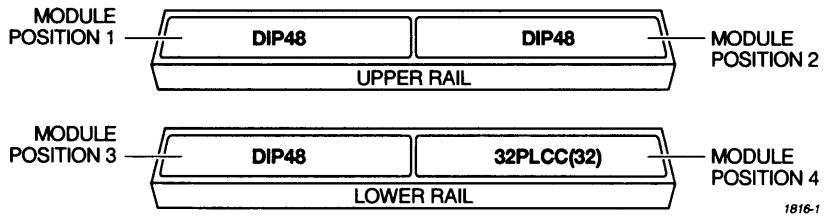
Installing Two Identical Socket Modules

When you install two identical socket modules, they must both be attached to the **same** rail, preferably the **upper** rail (see illustration below).



Installing Three Identical Socket Modules

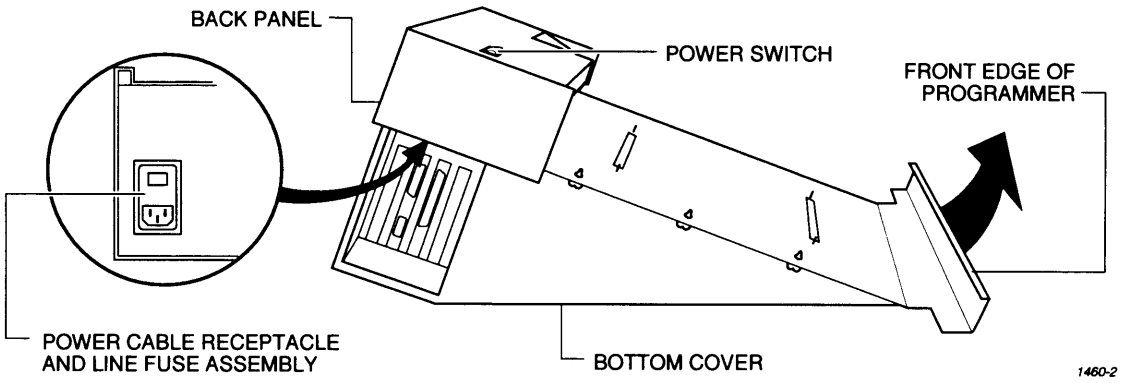
When you install three identical socket modules, install the first two in the upper PSX Rail and the third in the left position of the lower rail (see illustration below).



Connecting the Power Cord

The PSX is shipped with a three-wire power cord. Connect the power cord to the receptacle located on the underside of the control module directly underneath the power switch (see the illustration below). Connect the other end of the cord to an ac power outlet. The three-wire power cord connects the programmer chassis to the earth ground when the cord is connected to a three-wire (grounded) power outlet.

WARNING: Continuity of the grounding circuit is vital for the safe operation of the unit. Never operate this equipment with the grounding conductor disconnected.

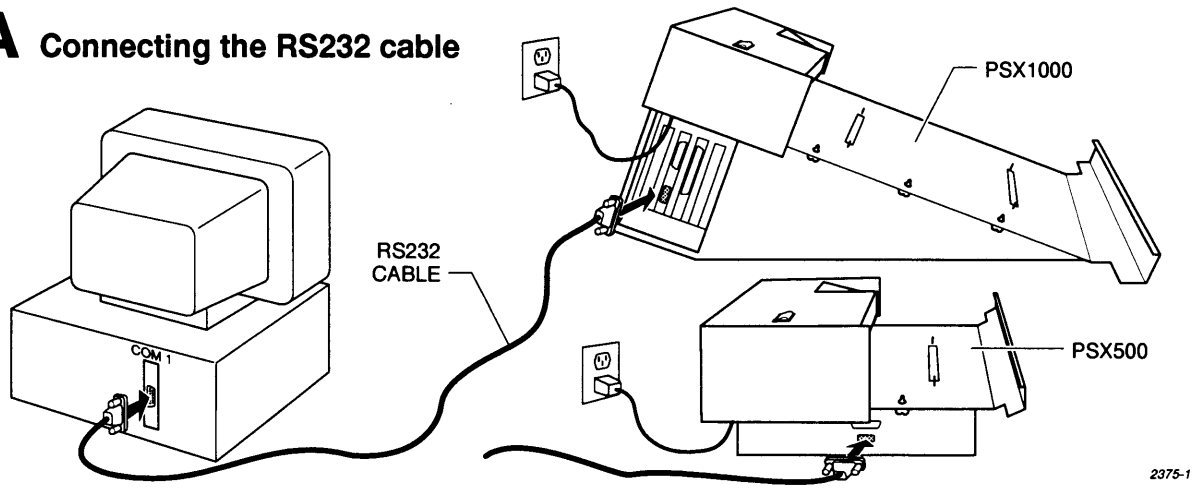


Connecting I/O Port Cable (Optional)

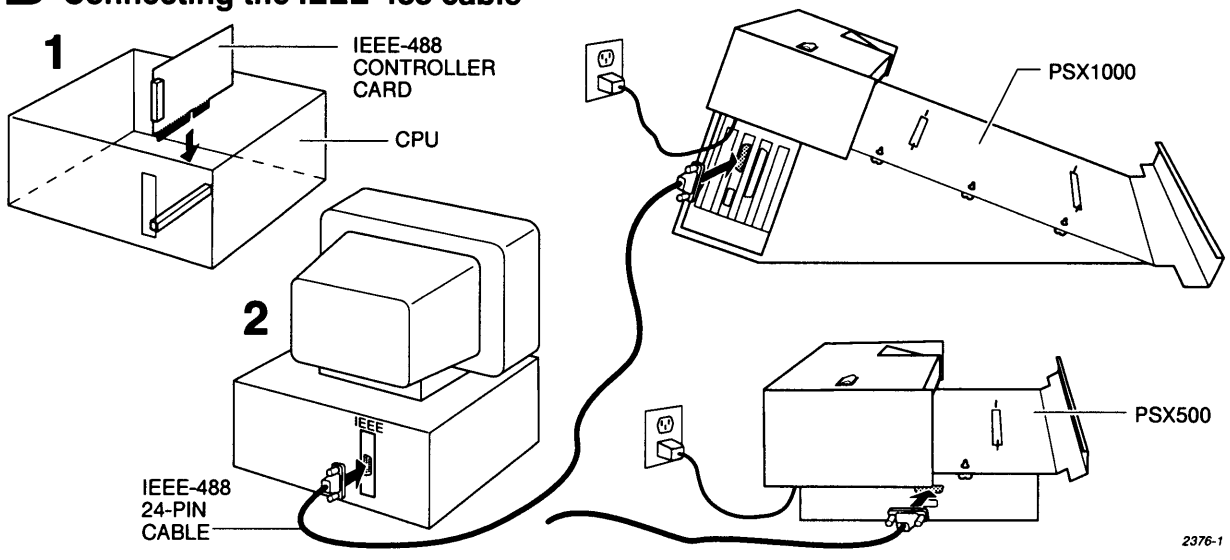
Complete step **A** (for RS232 connection) or step **B** (for IEEE-488 connection) in this section if you intend to do any of the following:

- Upload or download data from a host computer.
- Operate the programmer using TaskLink software.
- Operate the programmer using computer remote control (CRC) commands.

A Connecting the RS232 cable

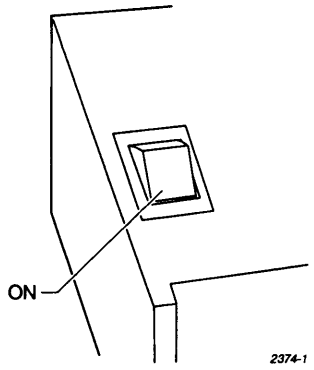


B Connecting the IEEE-488 cable



Note: IEEE-488 support is an available option for the PSX. For more information on using and installing IEEE-488 interfaces, see Appendix B "Using an IEEE-488 Interface."

Turn On the Power



Follow the steps below to turn on the power.

1. Check that the PSX is ready by making sure that:
   - A socket module is installed (with all the sockets empty).
   - The power cord is connected.
   - The appropriate cable is connected (if you plan to use remote mode).
2. Press the power switch to turn on the PSX.
3. The PSX displays:

   `PSXYYYY N.NN`

   for several seconds, where `PSXYYYY` is the model number and *N.NN* is the version of the installed software.
4. The PSX initializes and performs a system test (which should last less than a minute).
5. If the system test completes successfully, the PSX displays:

   ```
   COPY FROM MASTER
   ^ OR v SCROLLS MENU
   ```

If the programmer displays a message, see Chapter 6, "Messages," for an explanation.

If the system powers up but nothing is visible on the display, turn the display adjustment dial (see page 3-3) until the text is visible.

Note: If you have a PSX Rail in the lower rail position and a ***non****-PSX Rail in the upper rail position, an error message will be generated and the powerup cycle will not complete. When two different rails are installed on a PSX1000, the upper rail must be a PSX Rail.*

The PSX is now ready for operation. To learn how to operate the PSX programmers, see Chapter 3, "Operation."

Backwards Compatibility

During powerup, the PSX display shows the current system configuration:

`PSXYYYY N.NN`

where *YYYY* is 500 or 1000 and *N.NN* is the version of the installed software. For example, `PSX1000 3.40` represents a version 3.40 software version.

Supported Software Versions

Each socket module requires a specific version of software. To identify which socket modules are supported on your control module, compare the version of your firmware with those listed in Table 2-1. For more information, see "View Configuration" on page 4-55.

Note: Using socket modules with versions earlier than the one specified in Table 2-1 causes the module to malfunction.

Table 2-1
Software Versions Supported by Socket Modules

Socket Modules	Software Version
PSX-DIP48	All
PSX-32P(28)	2.0 and higher
PSX-32P(28)HT	3.0 and higher
PSX-32P(32)	2.0 and higher
PSX-32P(32)HT	3.0 and higher
PSX-44P(40)	2.0 and higher
PSX-44P(40)HT	3.0 and higher
PSX28SOIC-300	2.1 and higher
PSX28SOIC-330	2.1 and higher
PSX32SOIC-440	3.0 and higher
PSX40SOIC-450	3.0 and higher
PSX44SOIC-530	3.4 and higher
PSX28TSOP	3.2 and higher
PSX32TSOP	3.0 and higher
PSX40TSOP	3.22 and higher
PSX48TSOP	3.4 and higher
PSX56TSOP	3.4 and higher
PSX68MEMCARD	2.1 and higher
PSXMICRODIP	3.22 and higher
PSXMICRO-44	3.22 and higher
PSXMICRO-52P	3.4 and higher
PSXMICRO-64Q	3.5 and higher
PSX40VSOP	3.7 and higher
PSX56SSOP	3.7 and higher

Rails also require a specific minimum version of software. To identify which rails are supported on your control module, compare the version of your firmware with those listed in Table 2-2. For more information, see "View Configuration" on page 4-55.

Table 2-2
Minimum Software Versions Supported by Memory/PSX Rails

Rail Type	Part Number	Minimum Version
Memory Rail 1 (MEM 1)	950-0151-001	1.0
Memory Rail 2 (MEM 2)	950-0151-002	3.22
	950-0151-003	
	950-0151-004	
	950-0151-005	
PSX Rail 5V/3V	950-0151-006	3.61
	950-0151-007	

Note: The term "PSX Rail" used throughout this manual could refer to any of the rails listed above (but not to the SR28, SR40, and Micro Rail from the Series 1000 product), ***except*** *when you are programming 3-volt devices supported on the 950-0151-006 and 950-0151-007 assemblies.*

When 3-volt devices are being programmed, sockets on any rail installed on the programmer other than the 950-0151-006 or 950-0151-007 will remain inactive.

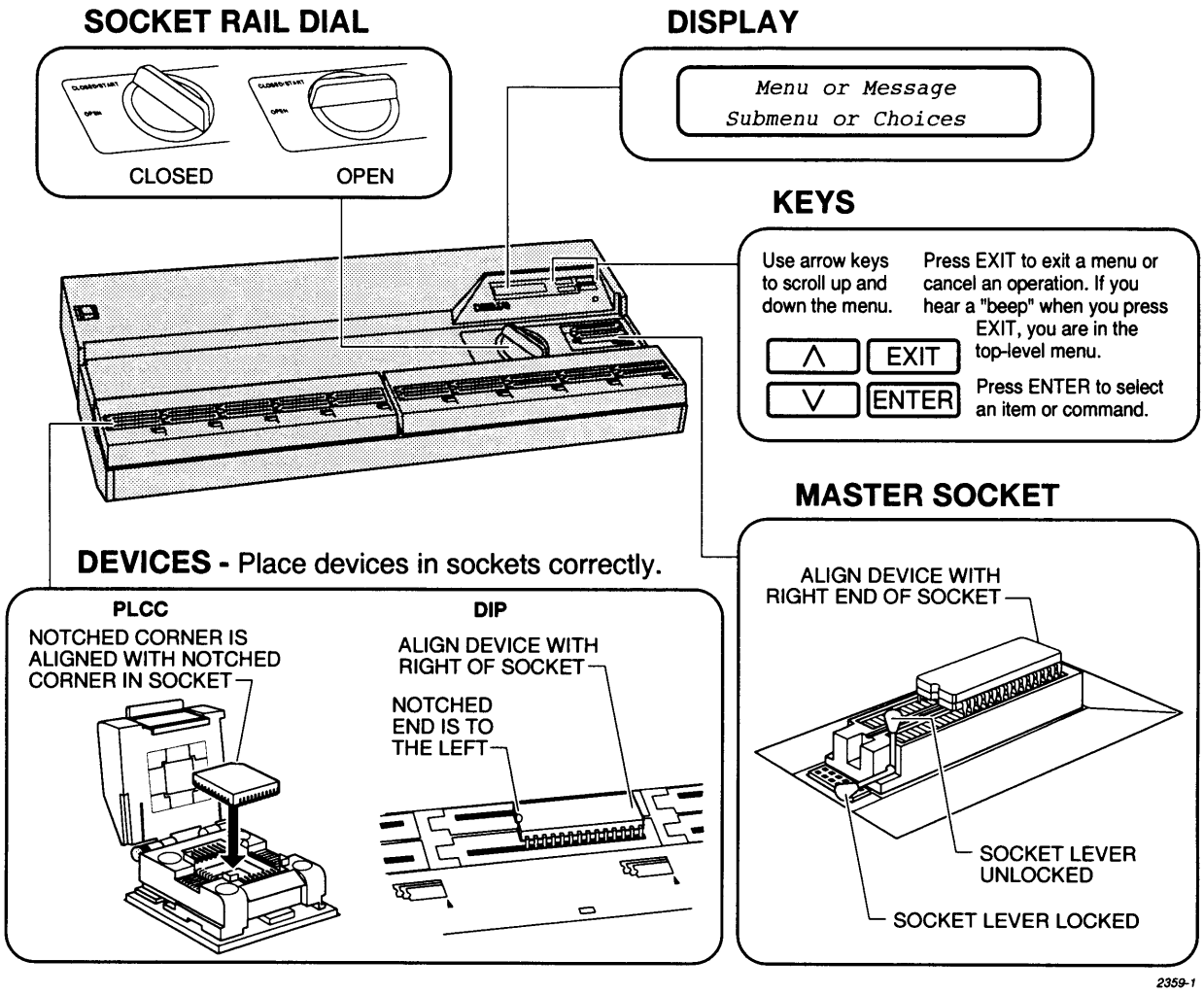
3 Operation

This chapter describes PSX features used during operation (such as the scrolling menus and LED indicators), device selection procedures, and some common parallel programmer operations.

The following topics are included in this chapter:

Basic PSX Features

The following illustration shows basic features of the PSX programmers.



Using the Display, Keyboard, and Menus

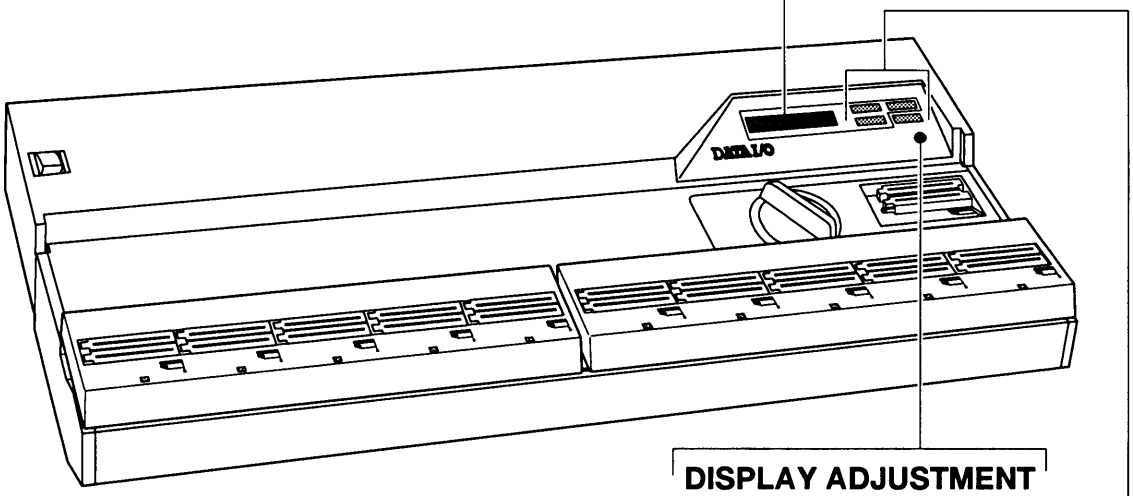
The PSX's display, keyboard and scrolling menus are described in the illustration below.

DISPLAY

ACTION SYMBOL — A circle with a rotating line that appears while the programmer is processing devices, represented in this manual by an asterisk (*).

When the PSX is not processing devices or running an application, you can access the scrolling menus.

During programming, bars advance to the right indicating what percentage of the operation is complete.



DISPLAY ADJUSTMENT

To adjust the display, turn the adjustment dial.

SCROLLING MENUS

Enter programming commands, device specifications, and operating parameter values using the scrolling menus.

The scrolling menus operate like a moving window on a list (menu) of options. Press an arrow key once to move the window up or down the list. Hold down an arrow key to quickly scroll through the menu.

PSX has several levels of menus (see page 4-2). The top-level menus are displayed after powerup and you can scroll through them in either direction by using the [∧] or [∨] key. When you select a menu (by pressing [ENTER]), a submenu may become available.

If the top-level menu entered is a device-related operation (such as Load From Master), you must select a manufacturer and device.

If the module installed on the PSX supports more than one package, you also must select a package.

KEYS

[∧]	[∨]	[ENTER]	[EXIT]
Scrolls to the menu item above the displayed item, or increases a parameter value.	Scrolls to the menu item below the displayed item, or decreases a parameter value.	Enters the displayed menu, or runs the menu selection.	Exits the currently selected menu, or discontinues an operation.

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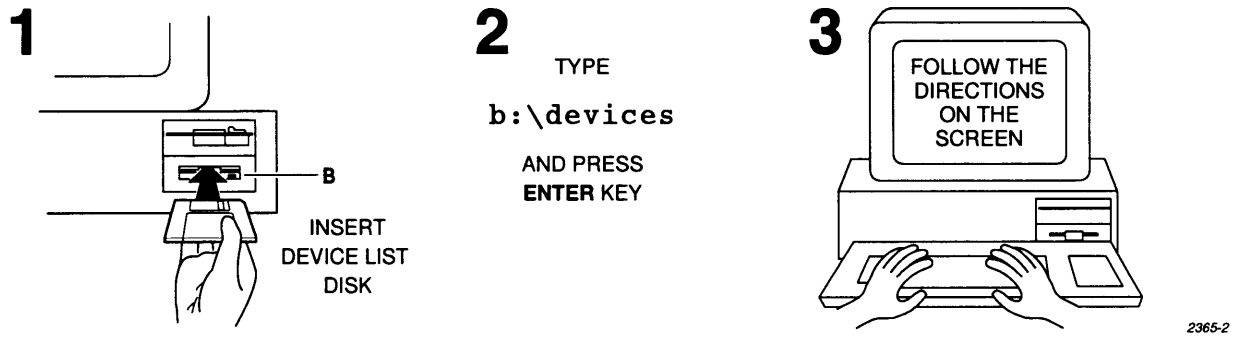
Using the Device List

You can view a list of devices supported by the PSX by running the **Devices** program located on the **Device List** disk. The Device List contains information about the supported devices, including manufacturer, bit size, the presence of electronic ID (see page 3-18), device type, and the socket module required for each device.

To view the Device List, do the following:



The Device List disk includes information on the following topics:

- Devices modified since last version
- Devices added since last version
- Complete supported device list
- Manufacturer cross-reference list
- Footnotes
- README help file

With the Device List, you can generate custom device lists, locate a list of specific devices, and optionally print that list or save it to a file. Also, the data in the Device List is formatted to make importing it into a database or spreadsheet easy.

For more information, see the **readme.txt** file included with the Device List.

Customizing the Device List

The **Select Device List** option under the **Set Device Options** menu (see page 4-19) allows you to select the ten devices that you use most frequently and have them appear at the top of the Device List for quick access. The Select Device List devices are identified by an asterisk (*) on the left.

Installing a Device in the Master Socket

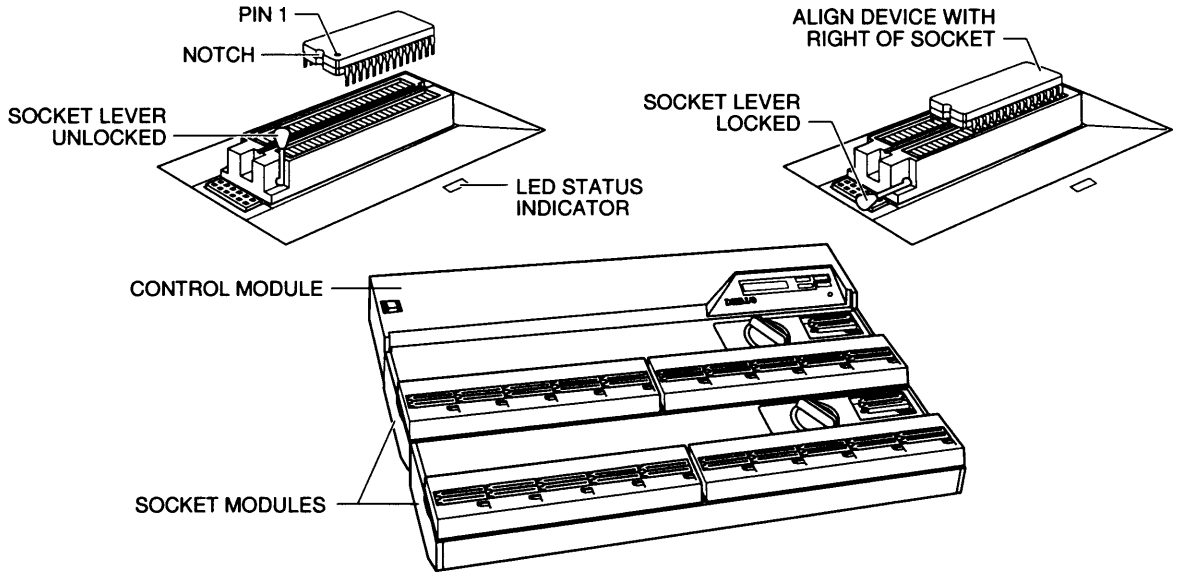
The illustration below shows how to install a DIP device or a master socket adapter (see page xiv) into the master socket.

CAUTION: Devices are static sensitive. Operate the PSX at an antistatic workstation. To avoid electric shock and damage to the devices, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

MASTER DIP SOCKETS

1 Make sure the lever is in the unlocked position. The device should align with the right of the socket. The notch should face the left.

2 Place device in the socket. Move the lever forward into the locked position.

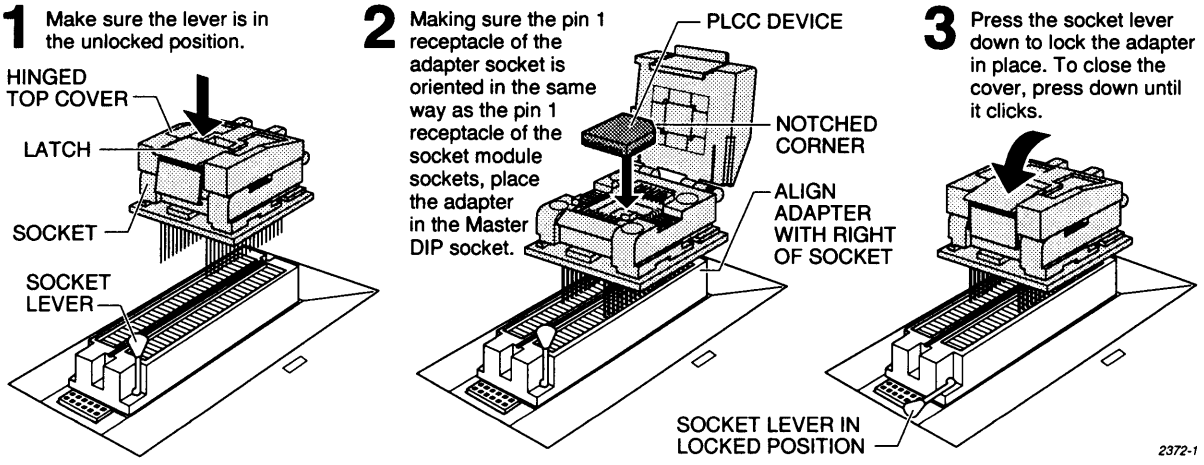


MASTER SOCKET ADAPTERS (PLCC adapter shown)

1 Make sure the lever is in the unlocked position.

2 Making sure the pin 1 receptacle of the adapter socket is oriented in the same way as the pin 1 receptacle of the socket module sockets, place the adapter in the Master DIP socket.

3 Press the socket lever down to lock the adapter in place. To close the cover, press down until it clicks.



Note: If two identical rails are installed on a PSX1000, Data I/O recommends that the master socket adapter be inserted into the ***top rail*** *master DIP socket.*

Installing Devices in Rail Sockets

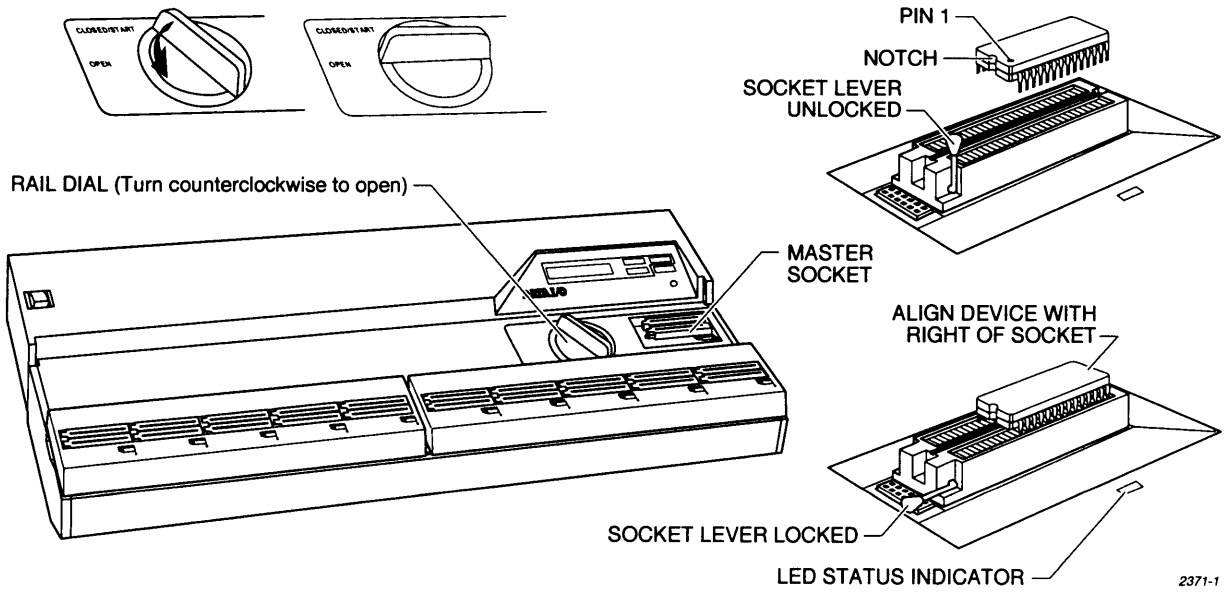
This section includes the following device installation and removal instructions:

- DIP Devices
- PLCC Devices
- SOIC, TSOP, and QFP Devices
- Memory Cards

CAUTION: Devices are static sensitive. Operate the PSX at an antistatic workstation. To avoid electric shock and damage to the devices, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

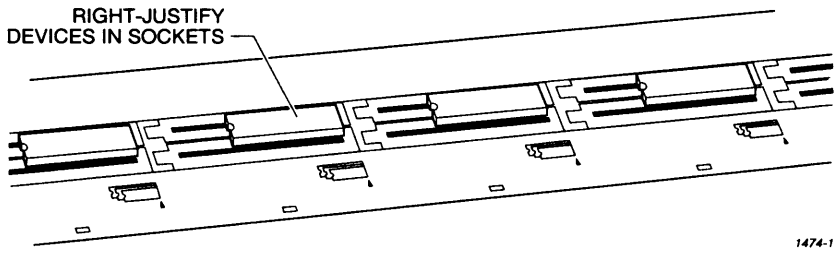
Note: When you program sets, devices must be loaded sequentially, starting at the far left socket of the upper left socket module or upper rail. When the setsize is greater than the capacity of a single rail (10 or 15, depending on the rail type), all socket modules and rail types must be identical.

The illustration below shows how to open and close the rail dial.



DIP Devices

When placing a DIP device in a socket module socket, master socket, or rail socket, make sure pin 1 (represented by the notch at one end of the device) is to the left and the device is right-justified in the socket.



You can manually place devices in sockets or use the rail tool to place devices in sockets.

Installing Devices Manually

Inserting Devices

To insert devices manually, perform the following steps:

1. Turn the dial to the open position.
2. With the notched end to the left, place the device all the way to the right in the socket.
3. Turn the dial to the closed/start position to process devices.

Removing Devices

To remove devices manually, perform the following steps:

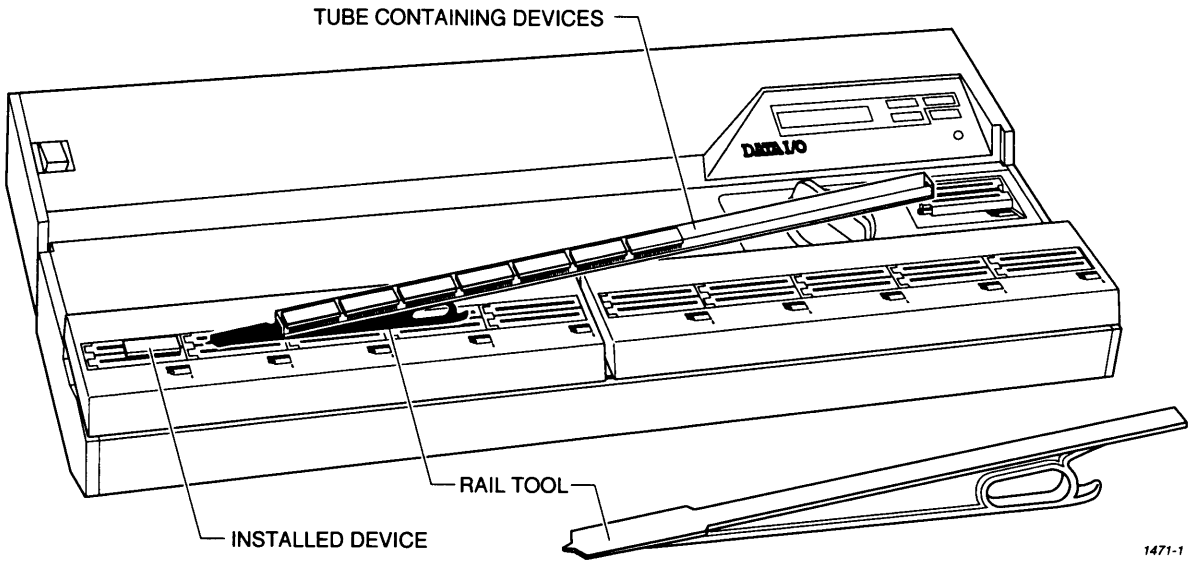
1. Turn the dial to the open position.
2. Remove the devices from the sockets.

Installing Devices Using the Rail Tool

Included with your programmer is a rail tool for use with DIP devices. The rail tool allows you to insert and remove these devices quickly and easily.

Inserting Devices

1. Turn the dial to the open position.
2. Open a device tube.
3. Place the device tube on top of the rail tool so that the pointed end (wide portion) of the rail tool extends beyond the open end of the tube, and so that the handle extends down below the tube (see the illustration on the following page).



4. Place the point of the rail tool in the groove in the center of the rail sockets, and use the point of the rail tool to guide the devices out of the tube and into the sockets. Make sure that pin 1 of the device (usually indicated by a notch) is to the left and that the device is inserted all the way to the right in the socket.
5. Turn the dial to the closed/start position to process devices.

Removing Devices

You can manually remove devices from sockets or use the rail tool to remove devices from sockets as follows:

1. Turn the dial to the open position.
2. Position an empty tube on the rail tool so that the pointed end (wide portion) of the rail tool extends beyond the open end of the tube, and the handle extends down below the tube.
3. Starting with the point of the tool at one end of the rail, scoop the devices up into the tube by running the point of the rail tool down the groove in the middle of the rail sockets.

PLCC Devices

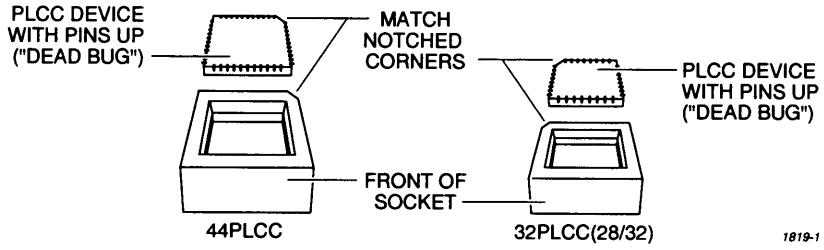
Push/Pop Sockets

When placing a PLCC device in a PLCC push/pop socket module socket or PLCC push/pop master socket adapter refer to the illustrations below, and keep the following in mind:

- Turn the device over so the **pins are up** ("dead bug")
- Make sure pin 1 (represented by the notched corner of the device) is in the same corner as the notched corner of the socket as stated below:

Inserting Devices

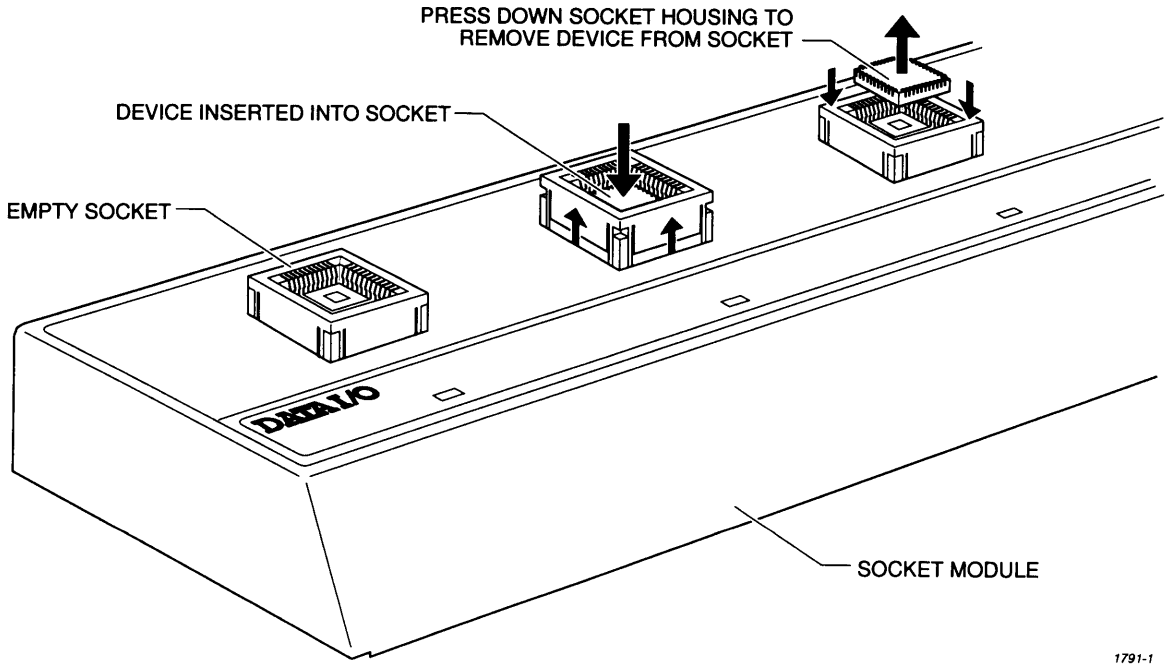
1. Orient the device so that the notched corner on the device is in the same corner as the notched corner on the socket, and drop the PLCC device into the socket (see the illustration below).



2. Press gently on the bottom of the device until it is fully seated in the socket.

Removing Devices

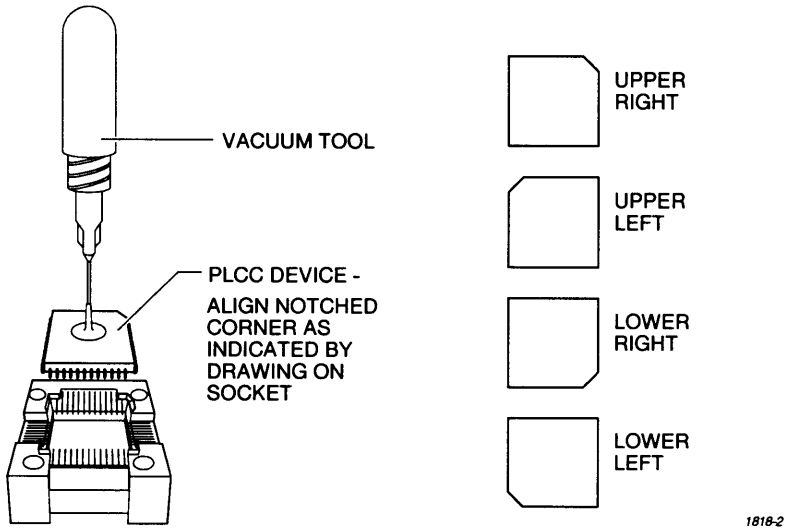
Using even pressure, press down on the socket housing (outside edge) of the socket until the device pops out of the socket.



Hinged-Top Sockets

When placing a PLCC device in a PLCC hinged-top socket module socket or PLCC hinged-top master socket adapter, refer to the following illustrations.

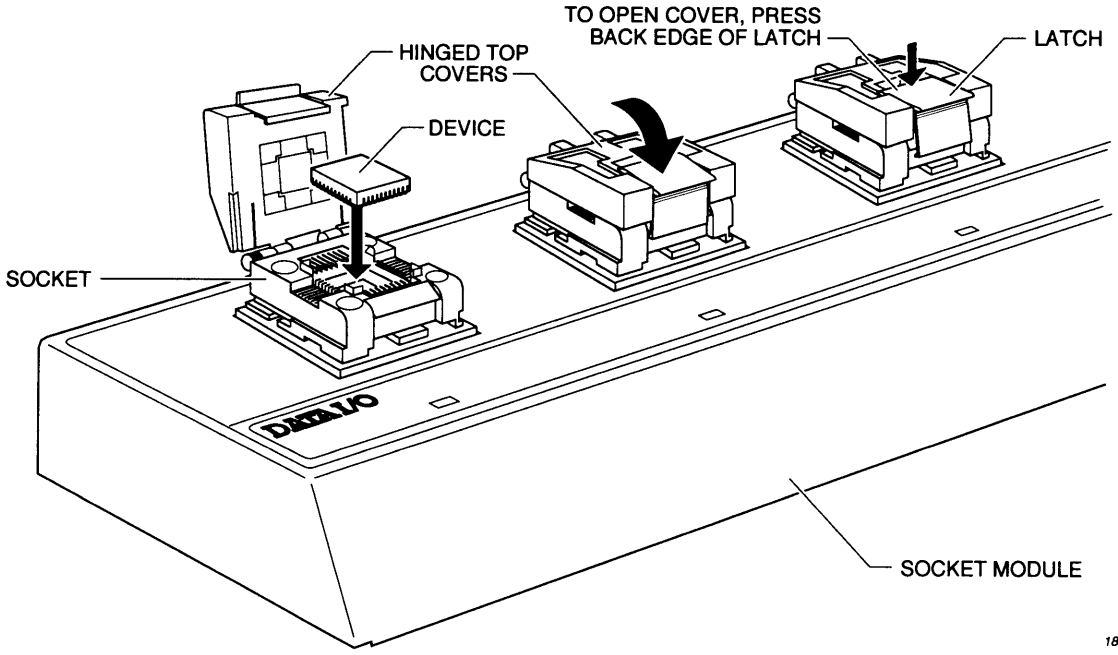
Inserting Devices



1. Use a vacuum tool to pick up a PLCC device with the pins down. Orient the device so that its notched corner is aligned with the corner indicated by the drawing next to the socket, and place the device in the socket (see above figure).
2. Close the cover to secure the device in the socket.

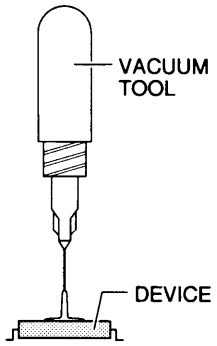
Removing Devices

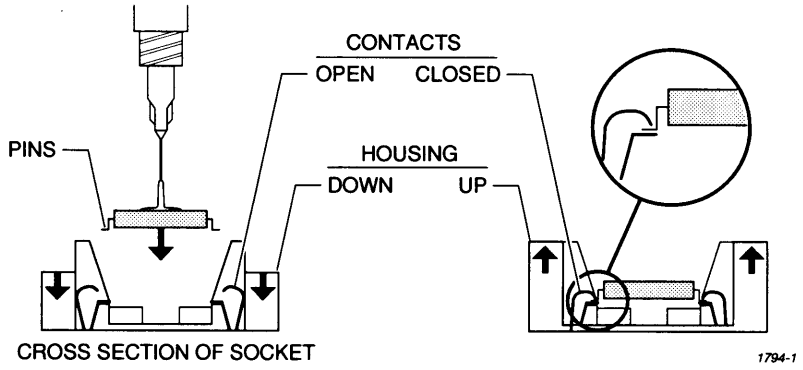
1. Press gently on the back edge of the cover latch to release the cover.
2. Use a vacuum tool to pick up the device.



SOIC, TSOP, and QFP Devices

When placing an SOIC, TSOP, or QFP device in a socket module socket or master socket adapter, use a vacuum tool (as shown in the illustration below) and make sure pin 1 (represented by the notch or the circle indented into the package at one end of the device) is to the left on SOIC sockets (see the illustration on the next page) and to the back (away from the LEDs) on TSOP sockets (see the device manufacturer's data book for the device pinout). For QFP sockets make sure pin 1 (usually represented by a dot on the device) matches the orientation symbol on the module.





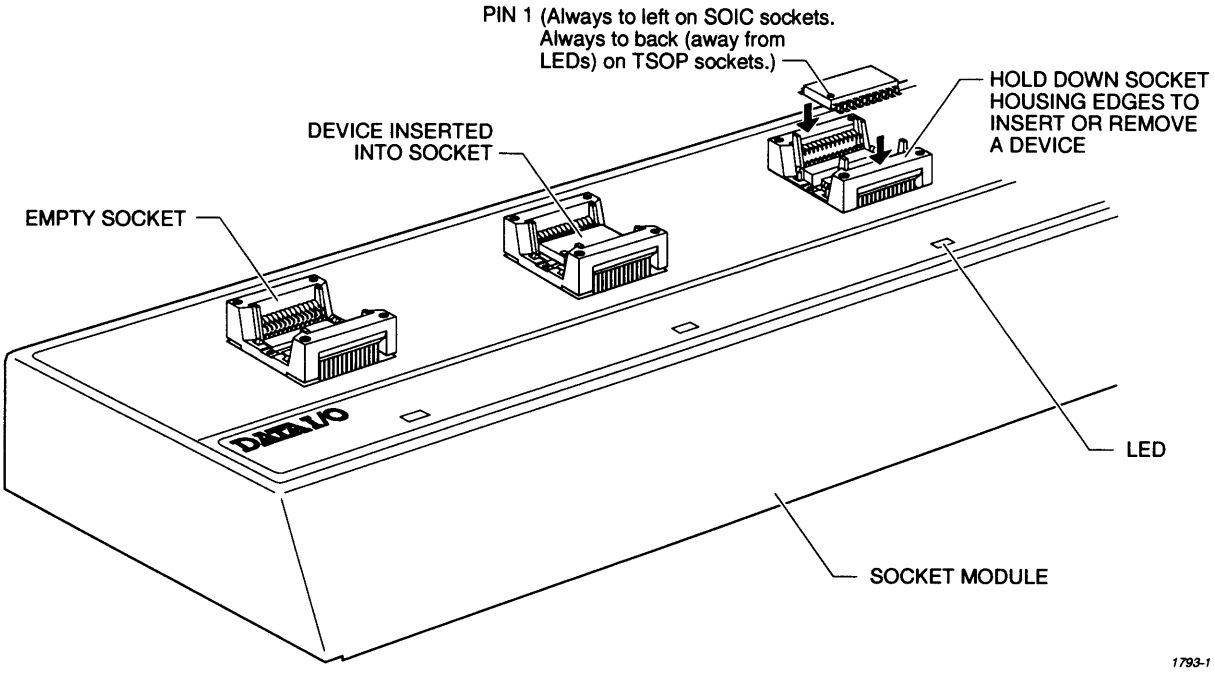
Inserting Devices

1. Press and hold down the socket housing (ends) of the socket.
2. Using the vacuum tool, pick up an SOIC or TSOP device.
3. With the notch or indented circle to the left for an SOIC, to the back (away from the LEDs) for a TSOP, and matching the orientation symbol for a QFP, set the device in the socket.
4. Release the socket housing.

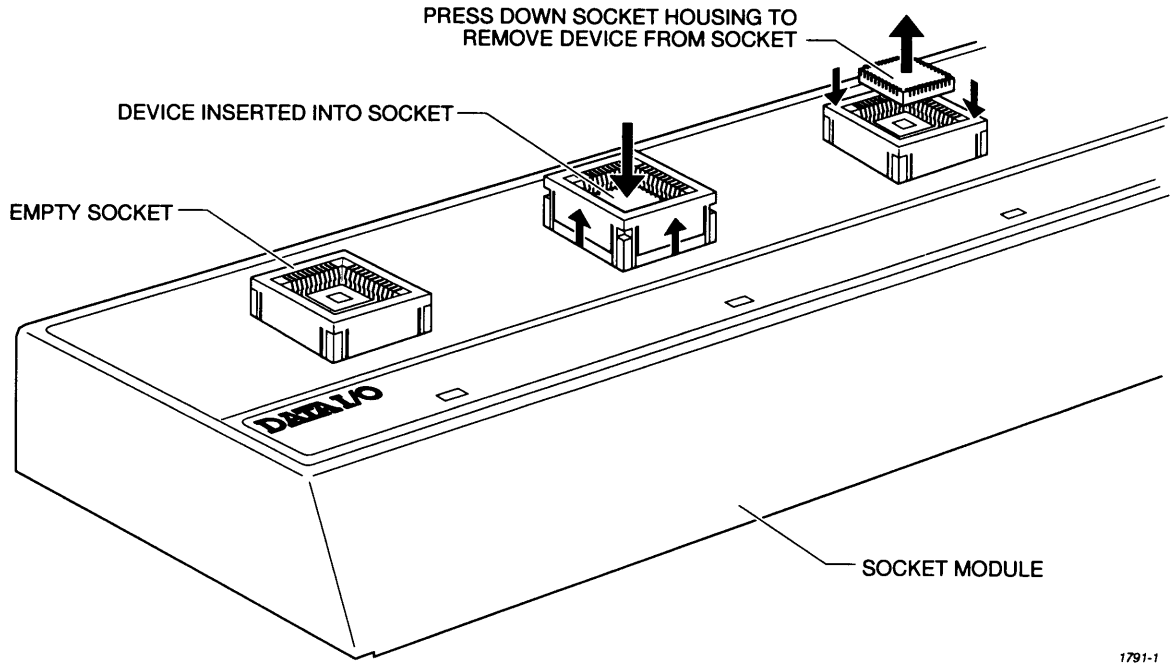
Removing Devices

1. Press and hold down the socket housing (ends) of the socket.
2. Using the vacuum tool, remove the device from the socket.
3. Release the socket housing.

The illustration below shows SOIC sockets.



The illustration below shows PLCC push/pop sockets.



Memory Cards

When placing memory cards in the 68MEMCARD socket module or 68MEMCARD master socket adapter, make sure the keyed end is toward the PCMCIA card sockets. The double-ridged edge should be to the left (the same side as the eject button); the single-ridged edge should be to the right (see illustration below).

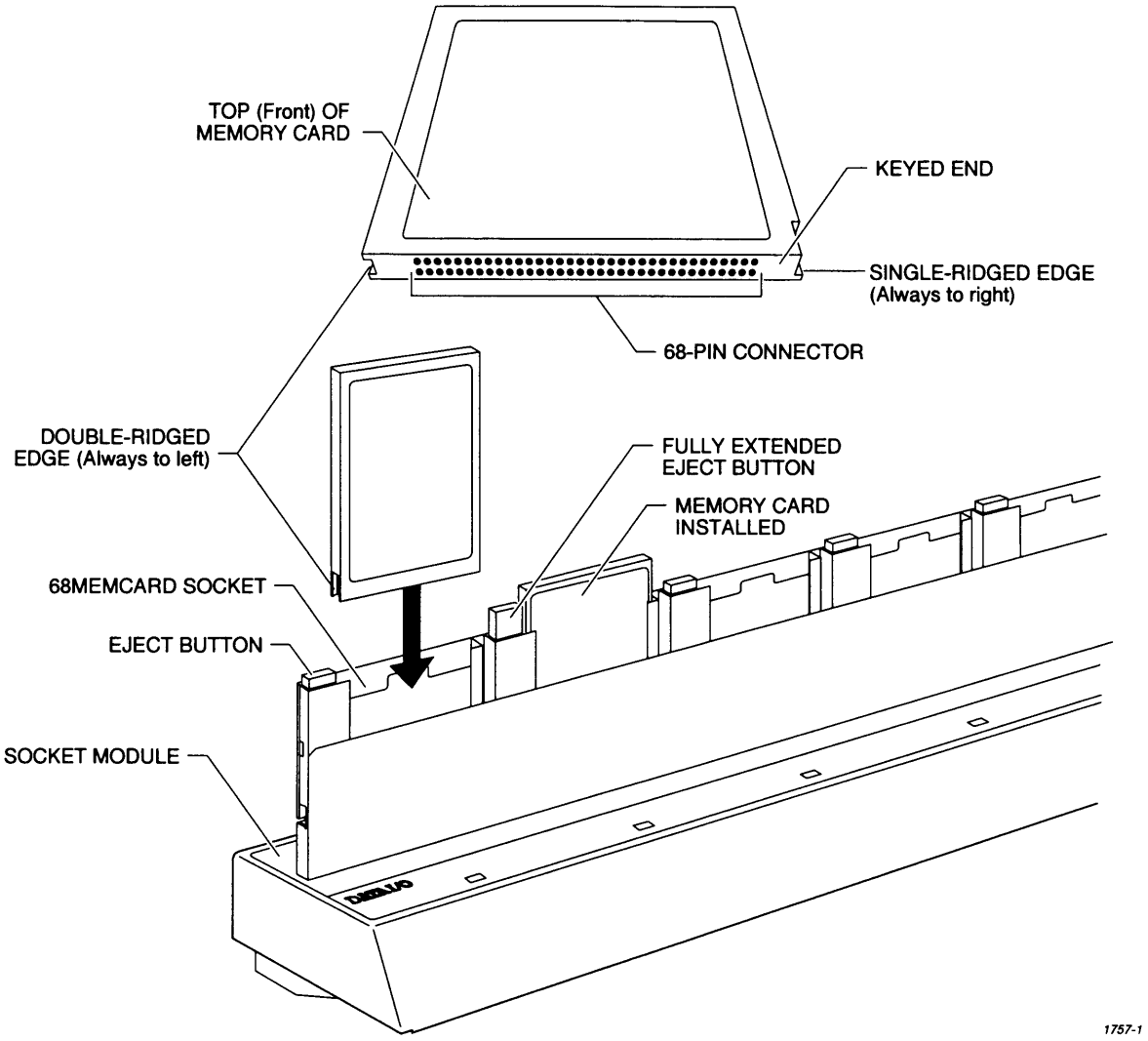
Inserting Devices

1. Place the card in the card socket.
2. Press the card straight down until it is seated in the card socket. When the memory card is properly inserted, the eject button is fully extended.

Removing Devices

1. Press down on the eject button to disconnect the memory card from the card socket.
2. Remove the memory card.

CAUTION: Do not hold down the card while pressing the eject button.


TOP (Front) OF
MEMORY CARD
KEYED END
SINGLE-RIDGED EDGE
(Always to right)
68-PIN CONNECTOR
DOUBLE-RIDGED
EDGE (Always to left)
FULLY EXTENDED
EJECT BUTTON
MEMORY CARD
INSTALLED
68MEMCARD SOCKET
EJECT BUTTON
SOCKET MODULE
1757-1

Programming Devices in Local Mode

The following tutorial describes step by step how to perform common programming operations in local mode.

Note: For CRC (remote) operation using TaskLink, refer to page 2-1 to set up the PSX to operate with TaskLink, and see the TaskLink documentation for instructions on how to use TaskLink.

For CRC (remote) operation using your own drivers, refer to page 2-1 for instructions on how to set up the PSX to operate in CRC mode, and to the "Computer Remote Control" Application Note (see page 4-59).

Before you can program a device in local mode:

- The PSX must have the correct rail(s) installed. If you are using a PSX RAIL, two socket modules must be installed in each rail.
- The PSX must have power turned on and be running in local mode (not running under TaskLink or Computer Remote Control).

See Chapter 2, "Setup," for more information.

Note: Before starting a tutorial, make sure all device sockets on the PSX are empty.

The following tutorials are included in this section:

Tutorial 1: Copy From Master — To copy data from a single master device in the master socket directly to socketed devices

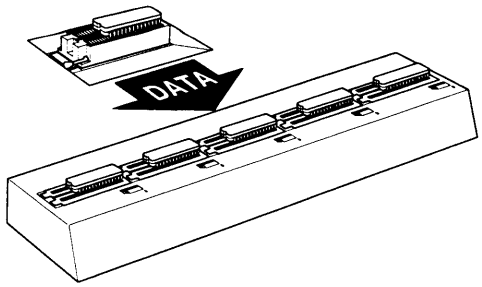
Tutorial 2: Load From Master and Copy From RAM — To load data from a single master device in the master socket to programmer RAM and then load the data in RAM to socketed devices

Tutorial 3: Load From Set and Copy From RAM — To load data from a non-DIP master device in socket 1 of the upper left socket module and then copy the data from RAM to socketed devices (setsize = 1)

Tutorial 4: Load From Set and Copy From Set — To load data from a set of master devices to programmer RAM, and then to copy the data in RAM to sets of socketed devices.

COPY FROM MASTER

To copy data from a single master device in the master socket directly to devices in the socket modules.

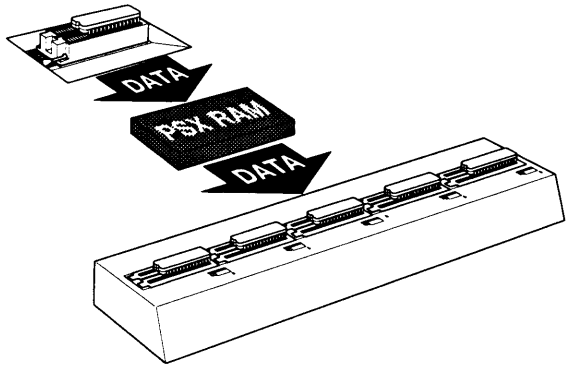


LOAD FROM MASTER

To copy data from a single master device in the master socket into programmer RAM.

COPY FROM RAM

To copy data from RAM to devices in the socket module.

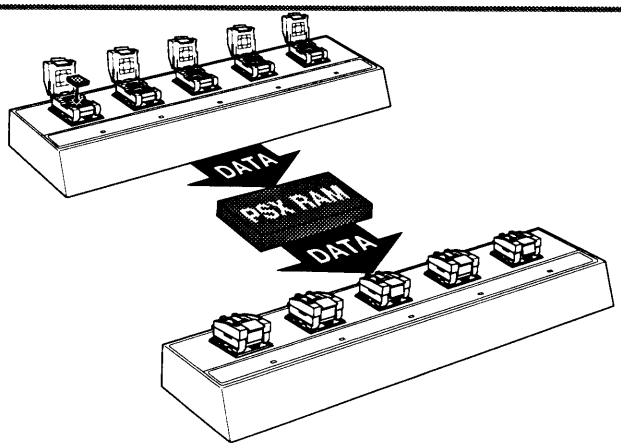


LOAD FROM SET (Setsize = 1)

To load data from a single non-DIP master device in socket 1 of the upper left socket module.

COPY FROM RAM

To copy data from RAM to devices in the socket module.

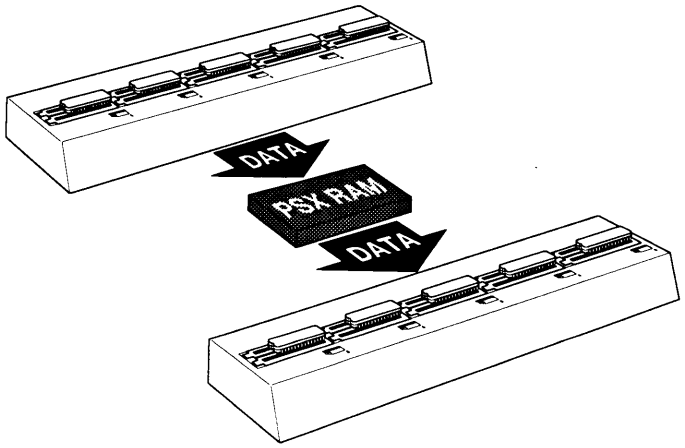


LOAD FROM SET

To load data from a set of master devices into programmer RAM.

COPY FROM SET

To copy data from RAM to a set of devices in the socket module.



2661-1

Setting Device Parameters

Before you can program devices, you must set the correct device information.

When you set the device information (such as the device manufacturer, device type, and package type), your selections become the **default** choices for all device operations until the settings are changed. (*Default* means that if you do not change the value of a device option, the programmer uses the previously set value for that option. For a listing of the default values set at the factory, see page 4-4.)

If the most recent settings are appropriate for the devices you wish to use, you do not need to change them. You can skip ahead to any of the tutorials in this chapter and continue with the programming process.

If you are unsure of the settings or you know you need to change them, change the device options by using either the method described under "Manual Select" (recommended) or "Auto Device Select."

Manual Select

Select the **Copy From Master** command (for a single master device in the master socket), select the **Load From Set** (setsize = 1) command (for a single master device in socket 1), or select the **Load From Set** command (for multiple master devices) from the PSX's menus. Select manufacturer, device, and package as described below:

- To select a different manufacturer, press either arrow key to scroll to the desired manufacturer (displayed alphabetically). To scroll through the list quickly, press and hold the arrow key. When the desired manufacturer appears in the display, press **ENTER**.
- To select a different device, press either arrow key to scroll to the desired device (displayed in alphabetical order). When the desired device appears in the display, press **ENTER**.

Auto Device Select

The Auto Device Select feature is supported only when you program, load, or verify devices that have an **electronic ID** feature. Refer to the **Device List** to find out which devices support the electronic ID feature (see "Using the Device List" on page 3-4 for more information).

CAUTION: Using the Auto Device Select parameter is not recommended because duplicate electronic IDs may exist on devices that do not use the same programming algorithm, and because devices that do not support the standard electronic ID method may become damaged.

To enable the programmer to automatically identify devices using the electronic ID (silicon signature) and select the correct device, go to the **Set Device Options** menu and choose the **Auto Device Select** command from the top of the list in the manufacturer menu.

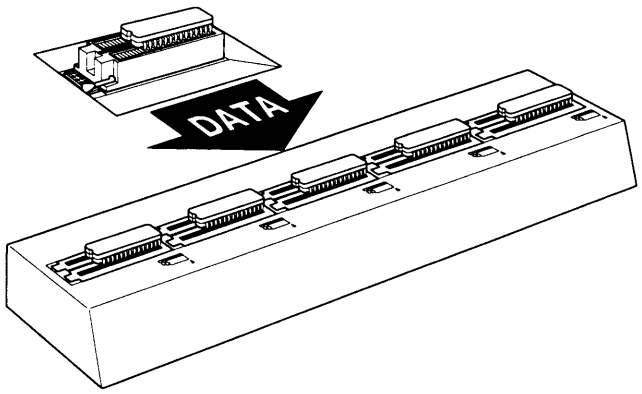
Electronic ID

To enable the programmer to verify that the selected device matches the electronic ID contained in the installed device, from the **Set Device Options** menu choose the **Electronic ID** command.

- If the Electronic ID option is **off**, the programmer uses it only when Auto Device Select is selected.
- If you select a device and Electronic ID is set to **On**, the IDs of the master (source device) and socketed devices must match that of the selected device before you can process devices.
- When electronic ID is set to **Warn**, the LEDs light yellow below any installed device that has an electronic ID different from the selected device. To program the mismatched device(s), press **ENTER**. To discontinue the operation, press **EXIT**.

Tutorial 1: Copy From Master

For programming directly from the master device installed in the master socket, select **Copy From Master**.



2662-1

1. Scroll through the PSX menus and select **Copy From Master**. The selected manufacturer and device appear on the second line of the display. If no device is selected, `AUTO DEVICE SELECT` is displayed.

   Manually select the manufacturer name for the device (for example, AMD or Intel), then select the device from the list. When the correct manufacturer and device appear in the display, press **ENTER**.

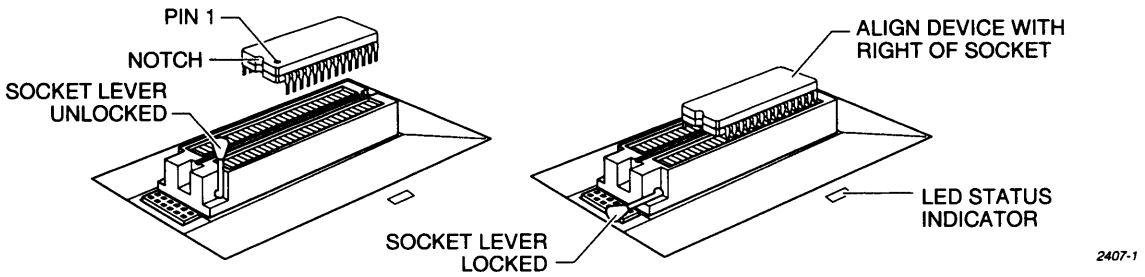
   If you encounter problems, you might need to disable Electronic ID from the **Set Device Options** menu (see page 4-19). For information on Electronic ID see page 3-18.

2. When the PSX displays:

   ```
   INSERT DEVICES
   ENTER TO COPY
   ```

   Install the device from which you wish to copy data. Installation of a DIP device is illustrated below. If you wish to install a different device package, refer to page 3-5 for instructions on how to install a socket adapter.

CAUTION: Devices are static sensitive. Operate the PSX at an antistatic workstation. To avoid electric shock and damage to the devices, use an antistatic wrist strap containing a 1 M W (minimum) to 10 M W (maximum) isolating resistor.



3. Starting with Socket 1, insert the device(s) to be programmed into the module sockets (see "Installing Devices in Rail Sockets" on page 3-6). Make sure the devices are locked in.

4. Press **ENTER** to program devices.

   As the devices are programmed, the display is updated. The action symbol (*) on the first line of the display indicates that the operation is in progress. The bars on the second line of the display advance to the right, indicating the percentage of the operation that is complete.

   The PSX displays:

   ```
   TESTING DEVICES *
   ```

   ```
   PROGRAMMING DEVICES *
   0% ---------- 100%
   ```

   ```
   VERIFYING DEVICES *
   ```

   When programming is complete, the LED below each socket containing a device illuminates. (See page 3-34 for a description of what the colors represent.) If a light does not illuminate below a socket that contains a device, the device might not be seated and locked in the socket properly.

   If the devices programmed successfully, the PSX displays:

   ```
   COPY COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the hexadecimal checksum of the data copied into the devices. (You can select the number of digits used in the checksum from the Set Device Options menu; see page 4-21 for instructions on changing the checksum display width.)

If the devices did not program successfully, the PSX displays:

```
COPY COMPLETE - ERRORS
CHECKSUM = XXXX OR ****
```

Use the arrow keys to scroll through the list of encountered errors. As you scroll through the errors, the LED status indicators light up yellow beneath the socket holding the device in which the displayed error occurred.

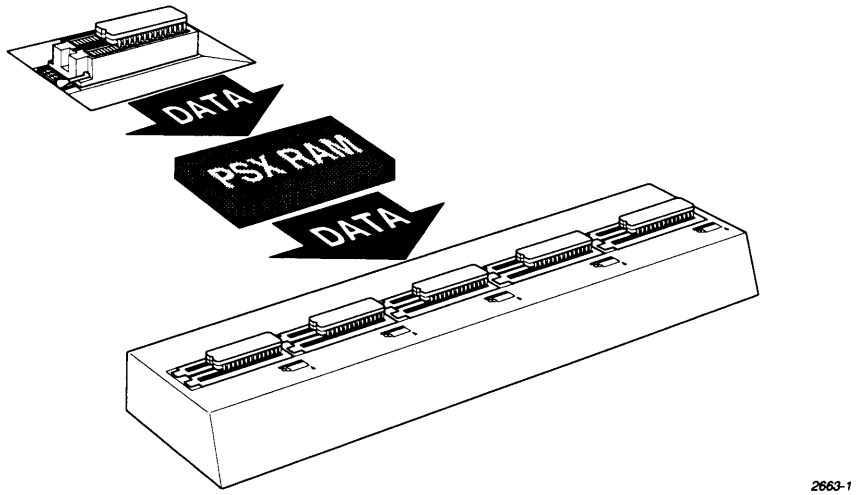
If none of the devices programmed and verified successfully, the PSX displays asterisks in place of the checksum.

5. Remove the programmed devices.
6. To repeat the programming operation for the same device type using the same master device, press **EXIT** and repeat steps 3 through 5.
7. After completing each job, record and clear programming statistics as described starting on page 4-44.

You have now completed the tutorial. To begin a new operation, press **EXIT**. If you encountered problems, see "Troubleshooting" on page 3-34.

Tutorial 2: Load From Master and Copy From RAM

To load data from a master device into RAM, select **Load From Master**. To program device(s) using the data in RAM, select **Copy From RAM**.



1. Scroll through the PSX menus and select **Load From Master.** The selected manufacturer and device appear on the second line of the display. If no device is selected, `AUTO DEVICE SELECT` is displayed.

   Manually select the manufacturer name for the device (for example, AMD or Intel), then select the device from the list. When the correct manufacturer and device appear in the display, press **ENTER**.

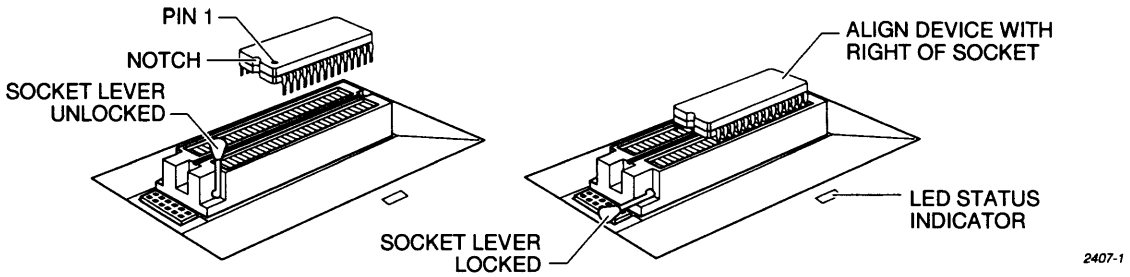
   If you encounter problems, you might need to disable Electronic ID from the **Set Device Options** menu (see page 4-19). For information on electronic ID see page 3-18.

2. When the PSX displays:

   ```
   INSERT MASTER
   ENTER TO LOAD
   ```

   Install the device from which you wish to copy data. See page 3-5 for instructions on how to install master devices and socket adapters.

CAUTION: Devices are static sensitive. Operate the PSX at an antistatic workstation. To avoid electric shock and damage to the devices, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor



3. After you install the master device, press **ENTER** to begin the operation.

   The PSX displays:

   ```
   LOADING FROM MASTER
   ```

   The action symbol indicates that the operation is in progress. When the operation is complete, the PSX displays:

   ```
   LOAD COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the loaded data (see the "Troubleshooting" section on page 3-34 for a description of checksum).

   If an error occurs during the operation, the PSX stops the operation and displays a message. Correct the situation and press **ENTER** to try again, or press **EXIT** to start over (at step 1).

4. Unlock and remove the master device.

5. Press **EXIT** to return to the top-level menu.

6. If you want to program devices with the data in RAM, select **Copy From RAM.**

7. If the devices to be programmed do not have the same ID as the original (master) device, select the manufacturer name for the devices (for example, AMD or Intel), then select the device from the list.

Note: For device-specific information, refer to the **Device List** *(see* "Using the Device List" *on page 3-4 for more information).*

The PSX displays:

```
INSERT DEVICES
ENTER TO COPY
```

Note: For DIP devices, the PSX displays `CLOSE DIAL TO COPY` *instead of* `ENTER TO COPY`.

8. Starting with socket 1, insert the device(s) to be programmed into the module sockets (see "Installing Devices" on page 3-6). Make sure the devices are locked in.

9. Press **ENTER** to program devices.

   As the devices are programmed, the display is updated. The action symbol (*) on the first line of the display indicates that the operation is in progress. The bars on the second line of the display advance to the right, indicating the percentage of the operation that is complete.

   The PSX displays:

   ```
   TESTING DEVICES *
   ```

   ```
   PROGRAMMING DEVICES *
   0%--------- 100%
   ```

   ```
   VERIFYING DEVICES *
   ```

   When programming is complete, the LED below each socket containing a device illuminates. (Refer to page 3-34 for a description of what the colors represent.) If a light does not illuminate below a socket that contains a device, the device might not be seated and locked in the socket properly. (Also see page 4-32 for options on specifying the LED color for empty sockets.)

   If the devices programmed successfully, the PSX displays:

   ```
   COPY COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the hexadecimal checksum of the data copied into the devices. (You can select the number of digits used in the checksum from the Set Device Options menu; see page 4-21 for instructions on changing the checksum display width.)

   If the devices did not program successfully, the PSX displays:

   ```
   COPY COMPLETE - ERRORS
   ```

   Use the arrow keys to scroll through the list of encountered errors. As you scroll through the errors, the LED status indicators light up yellow beneath the socket holding the device in which the error occurred.

   If none of the devices programmed and verified successfully, the PSX displays asterisks in place of the checksum.

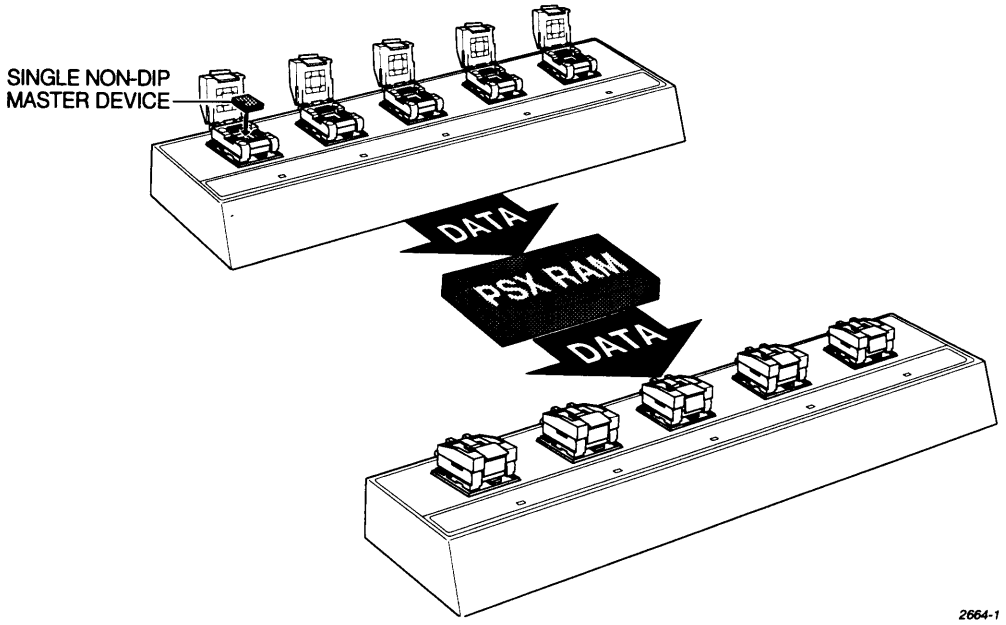
10. Remove the programmed devices.

11. To repeat the programming operation for the same device type using the same RAM data, press **EXIT** and repeat steps 6 through 9.

12. After completing each job, record and clear programming statistics as described starting on page 4-44.

You have now completed the tutorial. To begin a new operation, press **EXIT**. If you encountered problems, see "Troubleshooting" on page 3-34.

Tutorial 3: Load From Set and Copy From RAM



Use the **Load From Set** and **Copy From RAM** commands if you want to program several devices from a single non-DIP master device. The commands allow you to:

- Load data into RAM from a non-DIP master device (the device is placed in socket 1 of the upper left socket module).
- Copy the data from RAM to socketed device(s). Each device will be programmed with data identical to that in the master device.

The steps to accomplish this task are outlined below.

1. Scroll through the PSX menus and select **Load From Set**. The selected manufacturer and device appear on the second line of the display. If no device is selected, `AUTO DEVICE SELECT` is displayed.

   Manually select the manufacturer name for the device (for example, AMD or Intel), then select the device from the list. When the correct manufacturer and device appear in the display, press **ENTER**.

   If you encounter problems, you might need to disable Electronic ID from the **Set Device Options** menu (see page 4-19). For information on electronic ID see page 3-18.

For **Load From Set** (and other set operations), the top line displays the current **setsize** and **bitsize**. Make sure these options are set correctly. **For a single non-DIP master device, the setsize must equal 1 (one).** For more information on setsize and bitsize, refer to page 4-29.

To change the setsize or bitsize, press **EXIT**, and use the arrow keys until the **Set Operation Options** menu is displayed. Press **ENTER** to select the menu. When the setting is correct, press **EXIT** and use the arrow keys to return to the **Load From Set** menu. Press **ENTER** to select the menu.

The PSX displays:

```
INSERT DEVICES
ENTER TO LOAD
```

Note: The PSX might display `CLOSE DIAL TO LOAD` *instead of* `ENTER TO LOAD`.

2. Install the **non-DIP** device you wish to load data from. **Place the device in socket 1 of the upper left rail socket module.** See pages 3-6 for instructions on how to install devices in rail sockets.

CAUTION: Devices are static sensitive. Operate the PSX at an antistatic workstation. To avoid electric shock and damage to the devices, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

3. After you have installed the master device, press **ENTER** to begin the operation.

   The PSX displays:

   ```
   LOADING FROM SET *
   ```

   The action symbol (*) indicates that the operation is in progress. When the operation is complete, the PSX displays:

   ```
   LOAD COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the loaded data (see "Verifying Data Transfer [Checksum]" on page 3-34 for a description of checksum).

   If an error occurs during the operation, the PSX stops the operation and displays a message. Correct the situation and press **ENTER** to try again, or press **EXIT** to start over (at step 1).

4. Unlock and remove the master device.

5. Press **EXIT** to return to the top-level menu.

6. If you want to program devices with the data in RAM, select **Copy From RAM.**

7. If the devices to be programmed do not have the same ID as the original (master) device, select the manufacturer name for the devices (for example, AMD or Intel), then select the device from the list.

Note: For device-specific information, refer to the **Device List** *(see "Using the Device List" on page 3-4 for more information).*

The PSX displays:

```
INSERT DEVICES
ENTER TO COPY
```

Note: For DIP devices, the PSX displays `CLOSE DIAL TO COPY` *instead of* `ENTER TO COPY`.

8. Starting with socket 1, insert the device(s) to be programmed into the module sockets (see "Installing Devices" on page 3-6). Make sure the devices are locked in.

9. Press **ENTER** to program devices.

   As the devices are programmed, the display is updated. The action symbol (*) on the first line of the display indicates that the operation is in progress. The bars on the second line of the display advance to the right, indicating the percentage of the operation that is complete.

   The PSX displays:

```
TESTING DEVICES *

PROGRAMMING DEVICES *
0%--------- 100%

VERIFYING DEVICES *
```

   When programming is complete, the LED below each socket containing a device illuminates. (Refer to page 3-34 for a description of what the colors represent.) If a light does not illuminate below a socket that contains a device, the device might not be seated and locked in the socket properly.

   If the devices programmed successfully, the PSX displays:

```
COPY COMPLETE - OKAY
CHECKSUM = XXXX
```

   where *XXXX* represents the hexadecimal checksum of the data copied into the devices. (You can select the number of digits used in the checksum from the Set Device Options menu; see page 4-21 for instructions on changing the checksum display width.)

If the devices did not program successfully, the PSX displays:

```
COPY COMPLETE - ERRORS
```

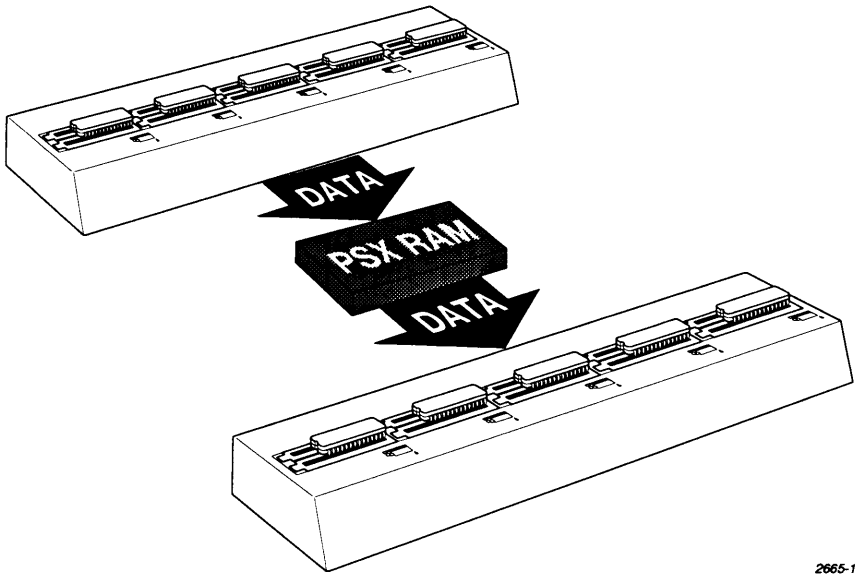
Use the arrow keys to scroll through the list of encountered errors. As you scroll through the errors, the LED status indicators light up yellow beneath the socket holding the device in which the error occurred.

If none of the devices programmed and verified successfully, the PSX displays asterisks in place of the checksum.

10. Remove the programmed devices.
11. To repeat the programming operation for the same device type using the same RAM data, press **EXIT** and repeat steps 6 through 9.
12. After completing each job, record and clear programming statistics as described starting on page 4-44.

You have now completed the tutorial. To begin a new operation, press **EXIT**. If you encountered problems, see "Troubleshooting" on page 3-34.

Tutorial 4: Load From Set and Copy From Set



To load data from a set of master devices into RAM, select **Load From Set**. To program device(s) using the data in RAM, select **Copy From Set**.

1. Scroll through the PSX menus and select **Load From Set**. The selected manufacturer and device appear on the second line of the display. If no device is selected, `AUTO DEVICE SELECT` is displayed.

   Manually select the manufacturer name for the device (for example, AMD or Intel), then select the device from the list. When the correct manufacturer and device appear in the display, press **ENTER**.

   If you encounter problems, you might need to disable Electronic ID from the **Set Device Options** menu (see page 4-19). For information on electronic ID see page 3-18.

2. For **Load From Set** (and other set operations), the top line displays the current **setsize** and **bitsize**. Make sure these options are set correctly (the setsize should equal the number of devices in the set, and the bitsize should equal the bitsize of each device). For more information on setsize and bitsize, refer to page 4-29.

   To change the setsize or bitsize, press **EXIT**, and use the arrow keys until the **Set Operation Options** menu is displayed. Press **ENTER** to select the menu. When the setting is correct, press **EXIT** and use the arrow keys to return to the **Load From Set** menu. Press **ENTER** to select the menu.

3. The PSX displays:

```
INSERT DEVICES
ENTER TO LOAD
```

Note: The PSX might display `CLOSE DIAL TO LOAD` *instead of* `ENTER TO LOAD`.

Install the device or set of devices you wish to load data from. See pages 3-5 and 3-6 for instructions on how to install devices.

CAUTION: Devices are static sensitive. Operate the PSX at an antistatic workstation. To avoid electric shock and damage to the devices, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

For a **set of devices** or a single **non-DIP** device, install the first device in socket 1 of the left module. Install additional devices sequentially from left to right until the top rail is full, then sequentially from left to right on the bottom rail. Make sure that the devices are locked in (turn the dial to the start position) before you proceed.

4. After you have installed the master device(s), press **ENTER** to begin the operation.

   The PSX displays:

   ```
   LOADING FROM SET *
   ```

   The action symbol (*) indicates that the operation is in progress. When the operation is complete, the PSX displays:

   ```
   LOAD COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the loaded data (see "Verifying Data Transfer (Checksum)" on page 3-34 for a description of checksum).

   If an error occurs during the operation, the PSX stops the operation and displays a message. Correct the situation and press **ENTER** to try again, or press **EXIT** to start over (at step 1).

5. Unlock and remove the master device(s). (For a set of DIP devices, turn the dial to the OPEN position.)

6. Press **EXIT** to return to the top-level menu.

7. For programming from a set of master devices, select **Copy From Set**, or for programming from a single master device, select **Copy From RAM**.

   If the devices to be programmed do not have the same ID as the original (master) device(s), select the manufacturer for the devices (for example, AMD or Intel), then select the device from the list.

8. Insert the device(s) to be programmed into the module sockets (see "Installing Devices" on page 3-6). Insert the device(s) starting with socket 1. Make sure the devices are locked in.

   For a set of devices, install additional devices sequentially from left to right until the top rail is full, then sequentially from left to right on the bottom rail. Make sure that the devices are locked in before proceeding.

9. Press **ENTER** to program devices.

   As the devices are programmed, the display is updated. The action symbol (*) on the first line of the display indicates that the operation is in progress. The bars on the second line of the display advance to the right, indicating the percentage of the operation that is complete. The PSX displays:

   ```
   TESTING DEVICES *
   ```

   ```
   PROGRAMMING DEVICES *
   0%---------100%
   ```

   ```
   VERIFYING DEVICES *
   ```

   When programming is complete, the LED illuminates below each socket containing a device. (See page 3-34 for a description of what the colors represent.) If a light does not illuminate below a socket that contains a device, the device might not be seated and locked in the socket properly.

   If the devices programmed successfully, the PSX displays:

   ```
   COPY COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the hexadecimal checksum of the data copied into the devices. (You can select the number of digits used in the checksum from the Set Device Options menu; see page 4-21 for instructions on changing the checksum display width.)

If the devices did not program successfully, the PSX displays:

```
COPY COMPLETE - ERRORS
```

Use the arrow keys to scroll through the list of encountered errors. As you scroll through the errors, the LED status indicators light up yellow beneath the socket holding the device in which the error occurred.

If none of the devices programmed and verified successfully, the PSX displays asterisks in place of the checksum.

10. Remove the programmed devices.

11. To repeat the programming operation for the same device type using the same RAM data, press **EXIT** and repeat steps 8 through 10.

12. After completing each job, record and clear programming statistics as described starting on page 4-44.

You have now completed the tutorial.

To begin a new operation, press **EXIT**. If you encountered problems, see "Troubleshooting" on page 3-34.

Troubleshooting

Discontinuing an Operation

To discontinue an operation in progress, press **EXIT**. The PSX displays a message. You can either restart the operation or proceed to a new one. You do not have to re-enter any values you entered for the operation.

Verifying Data Transfer (Checksum)

After performing a copy, load, or verify operation, the PSX displays a 4- or 8-digit hexadecimal checksum on the second line of the display. (You can select the number of digits used in the checksum from the Set Device Options menu.) For example, if you copy the device data from RAM to blank devices, at the end of the operation the PSX displays:

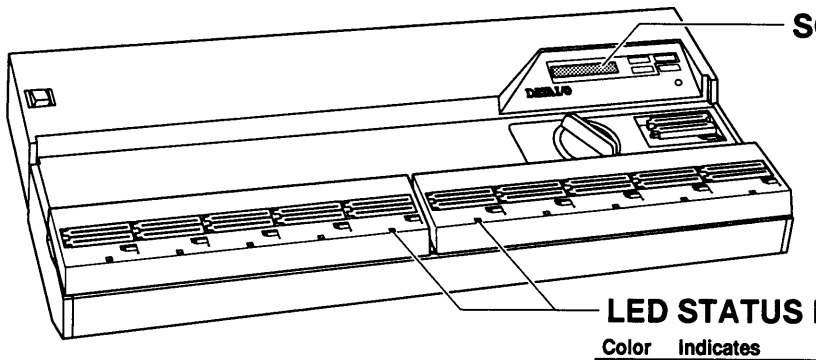
```
COPY COMPLETE - OKAY
CHECKSUM = XXXX
```

where *XXXX* is the 4- or 8-digit hexadecimal checksum.

If the checksum calculated after the operation matches the original checksum for the device(s), the data transfer was successful; otherwise, an error occurred (see "Errors and Messages" on the next page for more information).

Reading LED Status Indicators

The following illustration describes what the LED colors represent.



Color	Indicates
Green	Devices successfully processed or device operation in progress
Red *	Empty socket, or device or socket module partially shorted, or devices not successfully processed
Yellow	Devices in which the error currently displayed on the front panel occurred

2370-2

* *You can set the indicator light to OFF for empty sockets.* *(See page 4-32.)*

Scrolling Menus

You can review messages received during device-related operations after the operation is completed. When the programmer displays ERRORS (which blinks), the socket LEDs are green at sockets containing successfully processed devices and red at sockets containing devices that encountered errors. As you scroll through the errors, the red LEDs turn yellow when the errors currently displayed on the front panel occurred in the device in that socket. See Chapter 6, "Messages," for an explanation of each message.

Errors and Messages

Messages are displayed to notify you of status and problems. For example, if the devices did not program successfully, the PSX displays:

```
COPY COMPLETE - ERRORS
CHECKSUM = ****
```

Use the arrow keys to scroll through the list of encountered errors. As you scroll through the errors, the LED status indicators light up yellow when the error currently displayed on the front panel occurred in the device in that socket. If none of the devices programmed and verified successfully, the PSX displays **** (asterisks) in place of the checksum.

Refer to Chapter 6, "Messages," for a description of each message and suggested corrective action.

Turning Off the Power

Before turning off the power, make sure all device sockets are empty and in the unlocked position.

Powering Down Saves Defaults

All the operating parameter values you select (such as manufacturer, device, parity, or baud rate) are saved when you turn off the power and become the defaults until you change them. If the PSX is in computer remote control (CRC) mode when you turn it off, it automatically re-enters CRC when you turn it back on.

Note: For factory default settings see page 4-4.

4 Commands

This chapter lists and describes the PSX commands (menu items) in alphabetical order and lists the translation formats supported by the PSX.

Command Summary

The PSX commands are accessed through a menu structure (shown in the diagrams on the next few pages). In the diagrams, top-level menus appear on the left, and the submenus, or options, available under each of the top-level menus are shown next to the menu name. Items appearing in boxes with dashed lines are available only when the PSX is set up for IEEE-488 operation. To use the menus, do the following:

- To display a menu item, scroll to it by pressing the arrow keys.
- To enter a specific menu (select the command), press **ENTER**.
- To leave a menu, press **EXIT**.

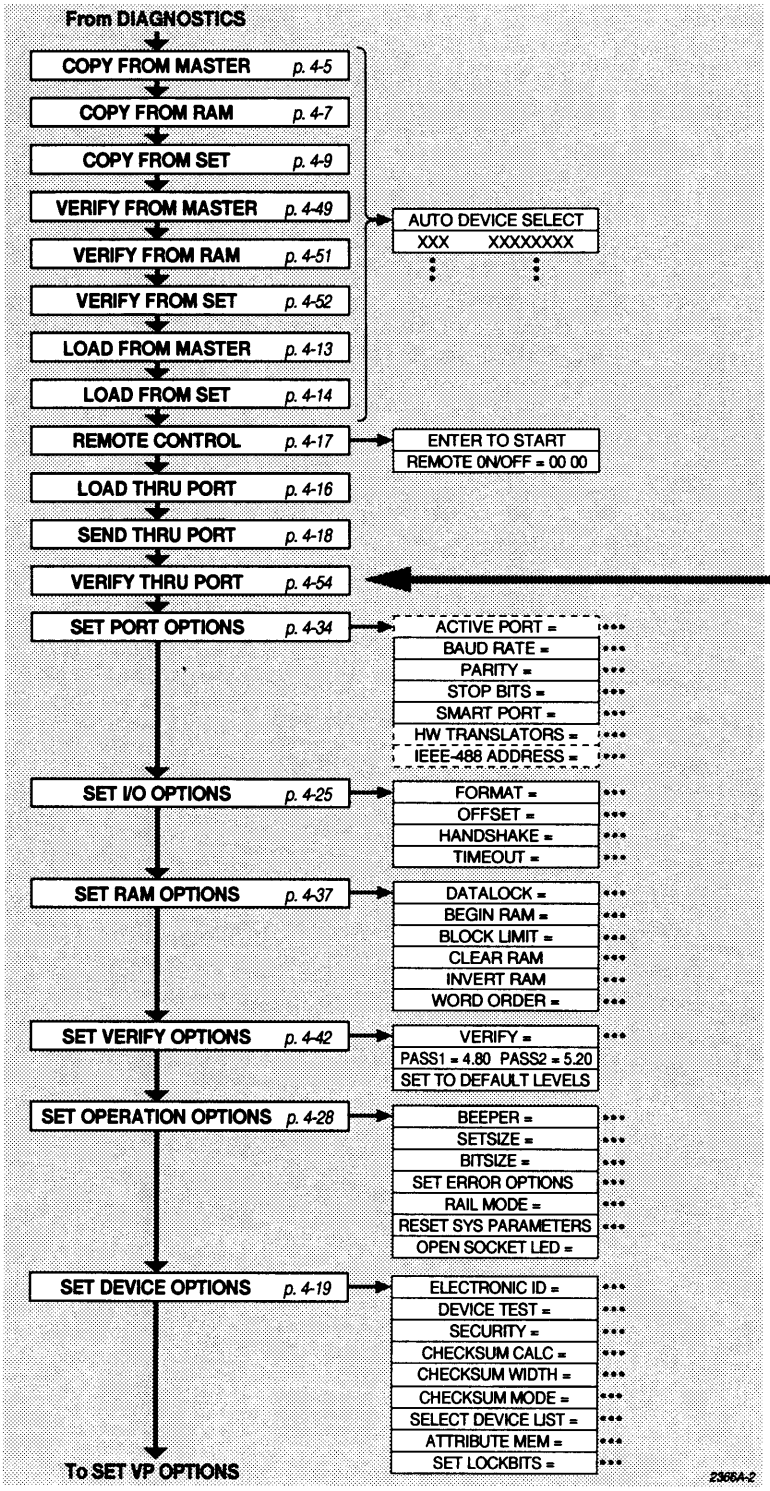
Note: To learn how to scroll through the PSX menus, see page 3-3. If you are confused about where you are in the menus, refer to the command structure outlined on page 4-2.

Each command is described in detail on the following pages.

Note: Some commands require that devices be installed in sockets on the programmer. When placing a device in a rail or socket, refer to the "Installing Devices" section on page 3-6.

PSX Command Structure (Menus)

The following diagrams summarize the PSX menu and command structure. Use the PSX keys [EXIT] [^] [v] [ENTER] to move through the menu structure. The text enclosed in boxes shows what is displayed on the PSX's LCD.



For example, if you start at

`VERIFY THRU PORT`

press [v] to move to

`SET PORT OPTIONS`

press [v] to move to

`SET I/O OPTIONS`

press [ENTER] to move to

`FORMAT =`

press [^] to move to

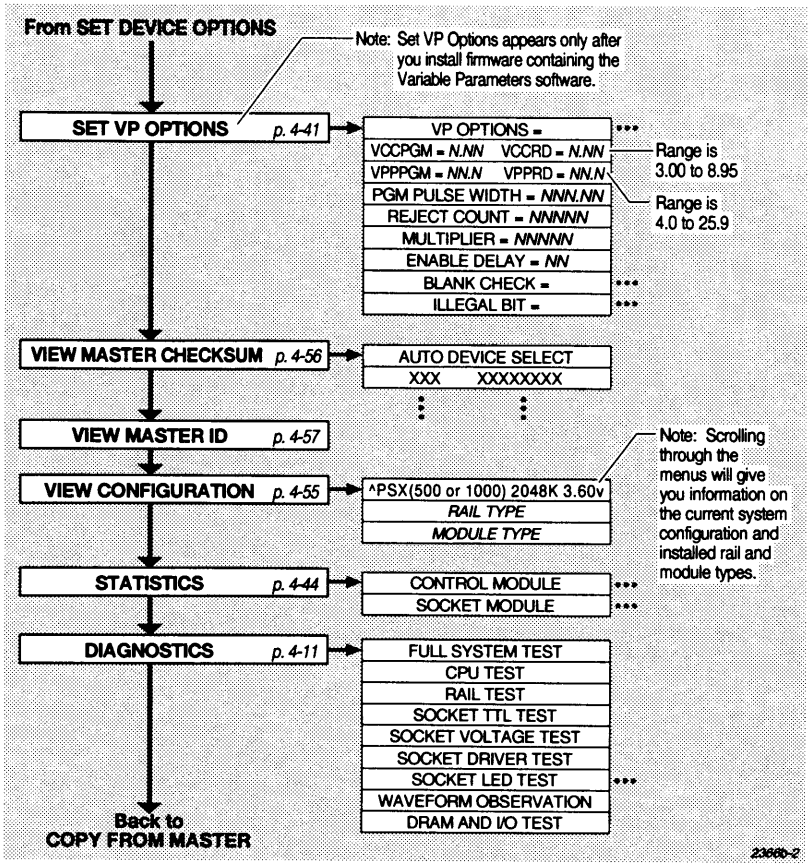
`TIMEOUT`

press [EXIT] to move to

`SET I/O OPTIONS`

(continued on next page)

(PSX Command Structure continued)



Notes

Default Settings Appear as *Blinking* Text

If a menu item appears as **blinking** text, it is the default setting for the command. If you do not want to use this setting, scroll through the menus until the desired setting is displayed and press **ENTER**.

Lost in Menus? Press EXIT

If you are confused about where you are in the menus, press **EXIT**.

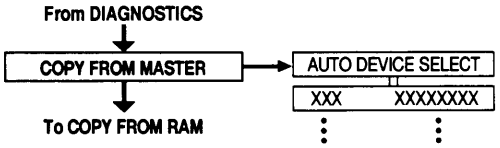
Continue to press **EXIT** until you find where you are in the menus. A **beep** indicates that you have reached a top-level (main) menu. The top-level menus are shown in bold on the left side of the diagram.

Factory Default Settings

Category	Option Name	Default Setting*
Device	Electronic ID	On
	Device Test	On
	Security Setting	Array
	Checksum Calculation	On
	Checksum Display Width	8 digits
	Checksum Calculation Mode	Bytewise
	Attribute Memory (for memory cards)	On
Verify	Number of Verify Passes	2
	Voltage Levels	Manufacturer-recommended
Operation	Beeper Pitch	7
	Setsize	1
	Bitsize	8
	Device Insertion Test	Continue
	Blank Check	Continue
	Illegal Bit Test	Continue
	Rail Mode	Parallel
	Open Socket LED	Red
Port	Active Port	Serial
	Baud Rate	9600
	Parity	Off
	Stop Bit	1
	SmartPort	On
	Hardware Translators	On
	IEEE-488 Address	1
I/O	I/O Format	Intel MCS
	Address Offset	First Address Downloaded
	Handshake Option	0
	Timeout	30
	CRC Code	00 00 (Off)
RAM	DataLock	Off
	Beginning RAM Address	000000
	Block Limit	Device Size
	Word Order	Low/High

* *Default settings can be changed and are saved on powerdown (see page 3-35).*

Copy From Master



Use this operation to copy the data from a master device inserted in a master socket to devices installed in the rail sockets. The Copy From Master operation is the default command for the PSX and is displayed when the programmer is powered up. Use the following procedure to copy the master device data to blank devices.

Note: You can install only DIP devices in the master socket unless your device is supported by a master socket adapter. In addition, if Micro modules are installed, you cannot use a ***Copy From Master*** *operation to copy data from the master socket.*

Attempting to perform an unsupported operation using the master socket usually generates the following message:

```
MASTER NOT SUPPORTED
```

In this case, perform a ***Load From Master*** *(using the rail sockets) or a* ***Load From Set*** *(with setsize of 1) operation to load the data into RAM. Perform a* ***Copy from RAM*** *operation to program devices with the data stored in RAM.*

1. Select **Copy From Master.**
2. Select the manufacturer and device. If the rails or modules installed on the PSX support more than one package, the PSX displays a submenu of available socket modules. Select the module that supports the package you want to program. The PSX displays:

   ```
   INSERT DEVICES
   CLOSE DIAL TO COPY
   ```

3. Insert and lock the master device into the master socket on the rail.

   For parallel rail programming, install the master device in the upper rail master socket. For alternate rail programming, install a master device in each master socket.

4. Insert the devices to be programmed into the rail sockets.

5. Turn the dial(s) to the closed/start position to process devices. The PSX displays:

   ```
   TESTING DEVICES *

   PROGRAMMING DEVICES *
   0% ———————— 100%

   VERIFYING DEVICES *
   ```

   When processing is complete, the LED below each socket illuminates. If there are no failures, the programmer displays:

   ```
   COPY COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the data.

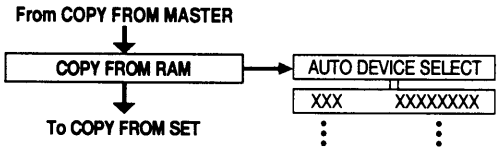
   If there are failures, the programmer displays:

   ```
   COPY COMPLETE - ERRORS
   ```

   See "Errors and Messages" on page 3-35 for an explanation of how to scroll through the messages. Refer to Chapter 6, "Messages," for a description of each message and suggested corrective action.

6. Turn the dial(s) to the open position.
7. Remove the programmed devices.

Copy From RAM



Use the **Copy From RAM** command to copy the data from programmer RAM to blank devices installed in the sockets. Before performing this procedure, you must load the programming data into RAM using either a **Load From Master, Load From Set,** or **Load Thru Port operation.**

1. Select **Copy From RAM.**
2. Select the manufacturer and device. If the rails or modules installed on the PSX support more than one package, the PSX displays a submenu of available socket modules. Select the module that supports the package you want to program. The PSX displays:

   ```
   INSERT DEVICES
   CLOSE DIAL TO COPY
   ```

3. Insert and lock the devices to be programmed into the sockets.
4. For parallel rail programming, install devices in both rails. For alternate rail programming, install devices in the rail indicated by the arrows on the second line of the display.
5. Turn the dial(s) to the closed/start position to start processing. The programmer displays:

   ```
   TESTING DEVICES *

   PROGRAMMING DEVICES *
   0% ———— 100%

   VERIFYING DEVICES *
   ```

   When processing is complete, the LED below each socket illuminates. (See page 3-34 for an explanation of the color meanings.)

   If there are no failures, the PSX displays:

   ```
   COPY COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the data.

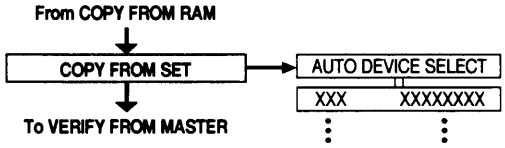
If there are failures, the PSX displays:

```
COPY COMPLETE - ERRORS
CHECKSUM = ****
```

See "Errors and Messages" on page 3-35 for an explanation of how to scroll through the messages. Refer to Chapter 6, "Messages," for a description of each message and suggested corrective action.

6. Turn the dial(s) to the open position and remove the programmed devices.

Copy From Set



Use the **Copy From Set** command to copy the data from RAM to a set of devices installed in the sockets. This operation copies different RAM data into each device of the set. Before performing this procedure, you must load the programming data into RAM using either a **Load From Set** or a **Load Thru Port** operation.

1. Select **Copy From Set.** The top line of the display shows the current setsize and bitsize. Make sure these options are set correctly. If you want to change the setsize or bitsize, press **EXIT** and select the **Set Operation Options** menu.

---

*Note: Performing a **Load from Set** with a set size of 1 is the same as performing a **Load From Master** except that a **Load From Set** loads from the rail sockets. **Copy from RAM** should be used to program devices if the set size is 1.*

2. Select the manufacturer and device. If the rails or modules installed on the PSX support more than one package, the PSX displays a submenu of available socket modules. Select the module that supports the package you want to program. The PSX displays:

```
INSERT DEVICE SET
CLOSE DIAL TO COPY
```

3. Insert the devices to be programmed into the sockets.

   The device installed in socket 1 of the upper rail is programmed with the first block of RAM data; the device in socket 2 is programmed with the next block of RAM data, and so on until the setsize is reached. You can program multiple sets with one **Copy From Set** operation by installing more than one set of devices in the sockets.

4. Turn the dial(s) to the closed/start position to begin processing. The PSX displays:

```
TESTING DEVICES *

PROGRAMMING SETS *
0% ———— 100%

VERIFYING SETS *
```

When processing is complete, the LED below each socket illuminates. If there are no failures, the PSX displays:

```
COPY COMPLETE - OKAY
CHECKSUM = XXXX
```

where *XXXX* represents the checksum of the set data.

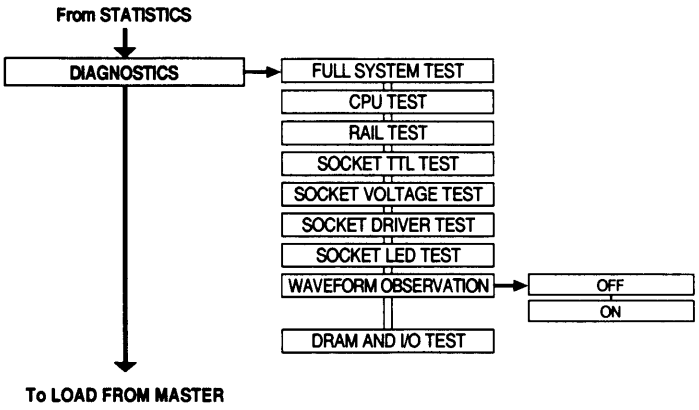
If there are failures, the PSX displays:

```
COPY COMPLETE - ERRORS
CHECKSUM = ****
```

See "Errors and Messages" on page 3-35 for an explanation of how to scroll through the messages. Refer to Chapter 6, "Messages," for a description of each message and suggested corrective action.

5. Turn the dial(s) to the open position and remove the programmed devices.

Diagnostics



The Diagnostics menu enables you to perform various diagnostic tests on the programmer to ensure the integrity of its operation.

Note: Diagnostics cannot be performed if Data Lock is On (see the "Set Data Lock" section on page 4-37 for information).

The table lists and describes the tests.

Test	Description
Full System Test	CPU analog voltages, DRAM, I/O, and modules
CPU Test	CPU analog voltages
Rail Test	All installed rails
Socket TTL Test	TTL level stimulus at rail sockets
Socket Voltage Test	Static voltage levels at rail sockets
Socket Driver Test	Analog waveforms at rail sockets
Socket LED Test	LED test on installed rails
Waveform Observation	Enable/disable continuous device read/write mode
DRAM and I/O Test	RAM, serial, and parallel ports

To run a diagnostic test, select the desired test from the Diagnostics menu.

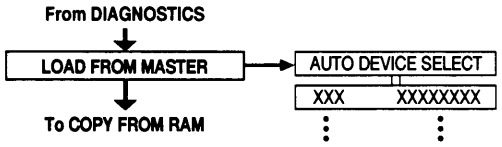
When running a diagnostic test, you may need to do the following:

- For socket tests, if more than one type of rail is installed, select the rail type to be tested.
- When different rail types are installed, the programmer prompts for the rail you want to run the test on. If only one rail type is installed, the test is performed automatically for the installed rail(s).
- For accurate PSX Rail diagnostics, make sure each installed rail has two DIP48 socket modules installed.

If the programmer displays a message after performing any of these tests, refer to Chapter 6, "Messages," for a description of each message and suggested corrective action.

For additional help on running diagnostic tests, refer to the "Diagnostics" section on page 5-3. For further details, call your nearest Customer Support office as listed in Appendix A.

Load From Master



Use the **Load From Master** command to load programmer RAM with the data from a device. (You cannot perform this operation if Data Lock is On — see the "Set Data Lock" section on page 4-37 for information.)

Note: Load From Master is disabled for microcontrollers when Micro modules are installed. Use Load From Set for microcontrollers.

1. Select **Load From Master.**
2. Select the manufacturer and device. The PSX displays:

```
INSERT MASTER
ENTER TO LOAD
```

3. Insert the source device into the master socket (DIP devices) or in socket 1 of the upper rail (for non-DIP devices). (Socket 1 is the left-most socket in the upper rail, or the upper left module if PSX Rails are installed.)

---

*Note: The **Load From Master** operation loads data from the device (almost always a DIP device) inserted in the master socket. Do not use a Load From Master to load data from a device inserted in socket 1 (upper left rail socket).*

*To load from a device inserted in socket 1, perform a **Load From Set** with a setsize of 1.*

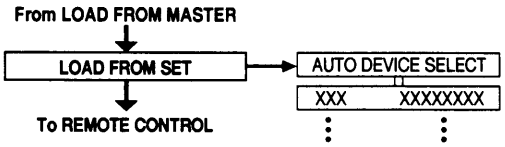
4. Lock the device into the socket and press **ENTER**. The PSX displays the following:

```
LOADING FROM MASTER *
LOAD COMPLETE - OKAY
CHECKSUM = XXXX
```

where *XXXX* represents the checksum of the data. If a problem occurs during any part of the operation, the programmer stops and displays a message. (See Chapter 6, "Messages," for an explanation.)

5. Unlock the device from the socket.
6. Remove the device.

Load From Set



Use the **Load From Set** command to load programmer RAM with the data from a set of master devices (more than one device). (You cannot perform this operation if Data Lock is On— see the "Set Data Lock" section on page 4-37 for information.)

The first device of the set must be installed in socket 1 (the socket at the left end of the rail). If two rails of the same type are installed, the first device of the set must be installed in socket 1 of the upper rail. You must load all the devices of the set in one Load From Set operation.

1. Select **Load From Set**. The top line of the display shows the current setsize and bitsize. Make sure these options are set correctly. If you want to change the setsize or bitsize, press **EXIT** and select the **Set Operation Options** menu.

   For instance, to load from a single master device inserted in socket 1, set the setsize to 1 (one).

2. Select the manufacturer and device. If the rails or modules installed on the PSX support more than one package, the PSX displays a submenu of available socket modules. Select the module that supports the package you want to load from. The PSX displays the following:

   ```
   INSERT MASTER SET
   CLOSE DIAL TO LOAD
   ```

3. Insert the master (source) devices into the rail/module.

   Insert the devices of the set into adjacent sockets with the first device of the set in socket 1.

   For parallel rail programming, you can install the rest of the master device set in the lower rail if it does not fit in the upper rail. For alternate rail programming, install the master device set only in the upper rail.

4. Turn the dial(s) to the closed/start position to process devices. The PSX displays:

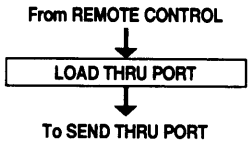
   ```
   LOADING FROM SET *

   LOAD COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the data. If a problem occurs during any part of the operation, the programmer stops and displays a message. (See Chapter 6, "Messages," for an explanation.)

5. Turn the dial(s) to the open position.
6. Remove the master set of devices.

Load Thru Port



Use the **Load Thru Port** command to load data from a host system to programmer RAM via one of the I/O ports. (This operation cannot be performed if Data Lock is On—see the "Set Data Lock" section on page 4-37 for information.)

1. Select **Load Thru Port**. The PSX displays:

   ```
   LOAD ACTIVE_PORT FORMAT
   ENTER TO START
   ```

   The first line of the display shows the current port and translation format.

   To change the current port and translation format, go to the **Set Port Options** or **Set I/O Options** menus to change the parameters.

2. Press **ENTER**. The PSX displays:

   ```
   LOADING THRU PORT *
   ```

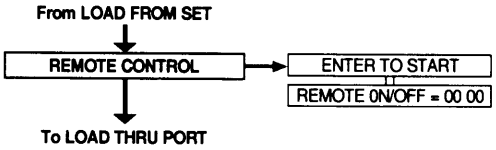
3. Initiate the download from the host computer. When the Load Thru Port procedure is complete, the PSX displays:

   ```
   LOAD PORT COMPLETE
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the data.

   If a problem occurs during any part of the operation, the programmer stops and displays a message. (See Chapter 6, "Messages," for an explanation.)

Remote Control



Enable/Disable CRC

Use the Remote Control command to enable or disable computer remote control (CRC).

1. Select **Remote Control**. The PSX displays:

   ```
   REMOTE CONTROL
   ENTER TO START
   ```

2. To change the programmer's operating mode to CRC, press **ENTER**. Small $^{r}_{c}$ characters appear in the upper left corner of the display indicating that the programmer is in CRC.

   To disable CRC, press ∧ + **EXIT** (press the up arrow key and, while holding the key down, press the **EXIT** key).

Remote On/Off = 00 00

Use this option to specify a code to remotely enable or disable CRC.

---

*Note: To operate the PSX with TaskLink, the CRC enable/disable code must be disabled (set to zeros: **Remote On/Off = 00 00**).*

1. Select **Remote Control**.
2. Select **CRC On/Off**. The PSX displays:

   ```
   REMOTE MODE
   REMOTE ON/OFF = XX XX
   ```

   where the left *XX* is the code for enabling CRC and the right *XX* is the code for disabling CRC.

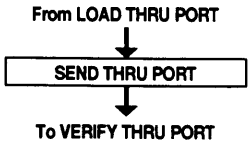
   For example, **Remote On/Off = 11 13** means that the host computer or terminal sends ASCII code 11 (**CTRL** + **Q**) to enable CRC, and code 13 (**CTRL** + **S**) to disable CRC.

   To change the codes, press **ENTER**. The left digit of the left group blinks. Use the arrow keys to scroll through the range of hex numbers, 0 through F. When the desired number is displayed, press **ENTER**. The next digit to the right blinks. Repeat this process until the desired codes have been entered.

3. To exit the CRC On/Off feature, press **EXIT**.

For more information refer to the "Computer Remote Control" Application Note (983-0486), available from Customer Support.

Send Thru Port



Use the **Send Thru Port** command to send the data in RAM to the devices in the sockets via one of the I/O ports.

1. Select **Send Thru Port**. The PSX displays:

   ```
   SEND ACTIVE_PORT FORMAT
   ENTER TO START
   ```

   The first line of the display shows the current port and translation format.

   To change the current port and translation format, go to the Set Port Options or Set I/O Options menus to change the parameters.

2. Press **ENTER**. The PSX displays:

   ```
   SENDING THRU PORT *
   ```

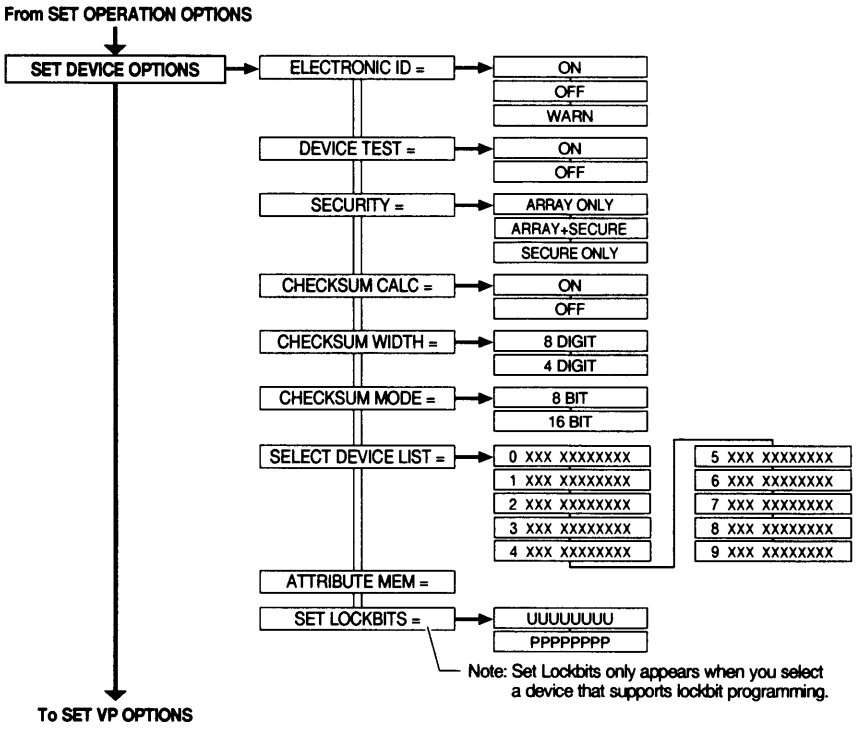
   When the Send Thru Port procedure is complete, the PSX displays:

   ```
   SEND PORT COMPLETE
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the data.

   If a problem occurs during any part of the operation, the programmer stops and displays a message. (See Chapter 6, "Messages," for an explanation.)

Set Device Options



Set Device Options allows you to enable (On or Warn) or disable (Off) the Electronic ID feature, set security bit programming options, select devices for a customized device list, and select options for performing a checksum on data. Use the following procedures to set the device options. The default setting for each option is shown in the table on page 4-4.

Electronic ID

The Electronic ID feature shortens the device selection procedure by automatically identifying the installed device(s) and checking to make sure that the IDs of the installed devices are compatible with the selected device type. If the types do not match, the devices are disabled for the operation.

When Electronic ID is set to **ON**, Electronic ID is always checked.

When Electronic ID is set to **Warn**, any incompatible device is identified with a yellow LED. You can then continue the operation on the device(s) by pressing **ENTER**, or discontinue the operation by pressing **EXIT**.

When Electronic ID is disabled (**Off**), a device ID check is performed only when Auto Device Select is enabled. (See the "Auto Device Select" section on page 3-17, for a discussion of the Auto Device Select feature.)

1. Select **Set Device Options**.
2. Select **Electronic ID =** . The second line of the display shows the current Electronic ID setting.

   To change the setting, press **ENTER**. The Electronic ID setting blinks.
3. Scroll to the desired setting.
4. Press **ENTER**. The second line of the display shows the selected setting.

Device Test

The Device Test option allows you to disable Device Insertion tests that are normally performed when a device is programmed.

CAUTION: When Device Test is disabled, the programmer attempts to program devices even if they are inserted incorrectly. The device can be damaged if inserted incorrectly in the socket.

1. Select **Set Device Options**.
2. Select **Device Test =** . The PSX displays the current setting.

   To change the setting, press **ENTER**.
3. Scroll to the desired setting.
4. Press **ENTER**. The display shows the selected setting.

Select Security Option

This option programs the security bit of devices that support security data protection. The PSX may not be able to read data contained in a device with a programmed security bit. The security bit is programmed during a Copy From RAM or a Copy From Master operation. The available settings are described in the following table.

Setting	Description
ARRAY ONLY	Data is copied into the device but the security bit is not programmed, allowing the data to be read (and copied) by a programmer
SECURE ONLY	Only the security bit is programmed, "locking" the data already contained in the device
ARRAY + SECURE	Data is copied into the device. The data is then verified and the security bit is programmed to lock the data

Note: Once the security bit is programmed, the programmer may not be able to verify the device.

1. Select **Set Device Options**.
2. Select **Security =** . The second line of the display shows the current security setting.

   To change the setting, press **ENTER**. The security setting blinks.
3. Scroll to the desired setting.
4. Press **ENTER**. The second line of the display shows the selected setting.

Enable/Disable Checksum Calculation

This option enables or disables checksum calculation. Checksum calculation is performed on the transferred data after a Copy, Load, or Verify operation and enables you to verify that the data was transferred correctly. A checksum calculation is always performed after I/O port transfers even if the checksum calculation is disabled. Use the following procedure to enable or disable the checksum option.

1. Select **Set Device Options**.
2. Select **Checksum Calc =** . The second line of the display shows the current checksum calculation setting.

   To change the setting, press **ENTER**. The setting blinks.
3. Scroll to the desired setting.
4. Press **ENTER**. The display shows the selected setting.

Select Checksum Display Width

This option allows you to select either a 4- or 8-digit checksum (displayed after a Copy, Load, or Verify operation is performed). The 8-digit checksum is a more accurate checksum, but not all development systems support an 8-digit checksum. Use the following procedure to select either a 4- or 8-digit checksum.

1. Select **Set Device Options**.
2. Select **Checksum Width =** . The second line of the display shows the current checksum width setting.

   To change the setting, press **ENTER**. The `4DIGIT` or `8DIGIT` at the end of the line blinks.
3. Scroll to the desired setting.
4. Press **ENTER**. The display shows the selected setting.

Select Checksum Calculation Mode

This option allows you to set the checksum calculation: bytewise or wordwise. If set to 8-bit, the checksum is calculated bytewise for 8- and 16-bit devices. If set to 16-bit, the checksum is calculated wordwise for 16-bit devices only. When an 8-bit device is selected, a bytewise checksum calculation is automatically used, even if a 16-bit checksum calculation is selected. Use the following procedure to select an 8- or 16-bit checksum calculation.

1. Select **Set Device Options**.
2. Select **Checksum Mode =** . The second line of the display shows the current checksum mode setting.

   To change the setting, press **ENTER**. The `8BIT` or `16BIT` at the end of the line blinks.
3. Scroll to the desired setting.
4. Press **ENTER**. The display shows the selected setting.

Select Device List

This option allows you to customize the online device list so that the ten devices you use most frequently appear at the top of the list for quick access. You can select any of the devices from the regular device list to be included in the customized device list.

Use the following procedure to create a customized device list.

1. Select **Set Device Options**.
2. Select **Select Device List**.

   The line number appears on the left. If you have never entered any devices in the customized device list, the PSX displays:

   ```
   SELECT DEVICE LIST
   * NO DEVICE SELECTED
   ```
3. Select the line you want to change, and press **ENTER**. The first manufacturer and device on the regular device list appears and blinks.
4. Scroll through the list until the manufacturer and device you want to select is displayed. Press **ENTER**. The device selection stops blinking, indicating that it has been entered into the customized device list.

To delete a selected device without adding a new device, select **No Device Selected** at the beginning of the online device list.

The Select Device List devices are identified by an asterisk on the left.

You can enter up to 10 devices in the customized device list in this manner. When you exit, the devices in the customized device list are renumbered consecutively and any gaps are closed.

Attribute Memory

When programming memory cards with the 68MEMCARD socket modules, use Attribute Mem to enable or disable programming of the attribute memory that may be available on the memory cards you are programming.

Note: Not all memory cards support attribute memory.

When loading data from memory cards, use this option to enable or disable loading of the data from the attribute memory that may be available on the memory cards you are loading from.

When this option is enabled and attribute memory is available, the PSX **programs to** all memory on the card (including attribute memory) when **Copy From RAM** or **Copy From Set** is selected and **loads from** all memory on the card (including attribute memory) when **Load From Set** is selected.

Attribute memory data is copied from or loaded to the RAM address immediately following the memory card device size. For example, if the memory card contains 1024 bytes, the attribute memory data will be located beginning at RAM address 1024. When the Attribute Mem option is enabled, attribute memory data is included when calculating the checksum.

Set Lockbits

The Set Lockbits option allows you to select individual lockbits for programming during a **Copy from RAM** or a **Copy from Master** operation on devices that support this feature.

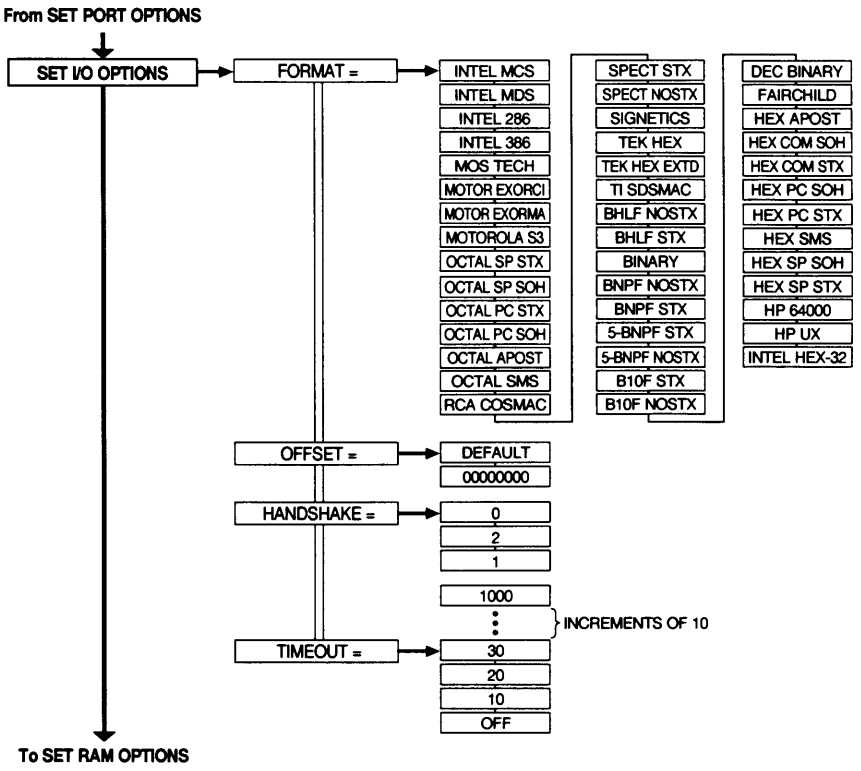
Use Set Lockbits in conjunction with the Set Security option, which displays the number of lockbits supported by the device. Programmed lockbits are represented by P; unprogrammed lockbits are represented by U. The order is from left to right with the left lockbit being lockbit number 1. The default, which is `ALL LOCKBITS PROGRAMMED`, is reset during powerup and when a new device is selected.

Note: The Set Lockbits option is displayed only when the currently selected device supports lockbit programming.

1. Select **Set Device Options**.
2. Select **Lockbits =** . The second line of the display shows the current lockbit setting.

   To change the setting, press **ENTER**. The first lockbit blinks.
3. The lockbits are set one position at a time. Scroll to the desired setting.
4. Press **ENTER**. The cursor moves one position to the right. Set each lockbit until the entire setting is correct.

Set I/O Options



These options allow you to select the desired data translation format, address offset, handshake, and timeout for input/output (upload/download) operations. The I/O defaults are shown in the table on page 4-4.

I/O Format

1. Select **Set I/O Options**. Scroll until the second line of the display shows the I/O format.

   The I/O format is the format into which data is translated for an output operation (Send Thru Port) and in which data is accepted for an input operation (Load Thru Port).

   To change the I/O format, press ENTER. The I/O format blinks.

2. Scroll to the desired I/O format setting. For a list of available data translation formats and their descriptions see "Translation Formats" on page 4-58.

3. Press ENTER. The second line of the display shows the selected I/O format setting.

Address Offset

1. Scroll until the second line of the display shows the address offset.

Note: If the format selected uses a 16-digit offset (for example, extended Tek Hex), the low-order 8 digits and the high-order 8 digits are displayed in two displays.

When `DEFAULT = FFFFFFFF` is selected, the programmer assigns a record address of 0000 to the first outgoing data record and stores the first incoming record in the beginning RAM address selected (see "Set RAM Options" for instructions on selecting the beginning RAM address). For an explanation of the I/O address offset refer to the "Address Offset" Application Note (see page 4-59).

To change the address offset, press **ENTER**. The address offset blinks.

2. The offset address is set one position at a time, beginning with the most significant digit. Use the arrow keys to increase or decrease the digit (in hexadecimal) to the value desired for each position.
3. When the value displayed for the particular position is correct, press **ENTER**. The cursor moves to the next most significant position. Do the same thing for each digit position until the displayed offset address is correct. To set the offset address to Default, set all of the digits to F. If you do not need to change all of the digits, press **EXIT** when finished.

Note: To specify a 16-digit offset address, advance to the high order offset display and repeat steps 2 and 3.

4. Press **ENTER**. The second line of the display shows the selected address offset setting.

Handshake Option

1. Scroll until the second line of the display shows the handshake option. The handshake options are defined in the following table.

   To change the handshake option, press **ENTER**. The handshake option blinks.

Option	Input Function	Output Function
0	Data is received without handshaking.	Data transmission is halted upon receipt of an X-Off character; transmission resumes upon receipt of an X-On character.
1	Transmits an X-On character when ready to receive data; transmits an X-Off character if the receiver buffer is full; transmits an X-On character if the receiver buffer is empty; transmits an X-Off after all the data is received.	Transmits a Punch On character prior to data transmission. Data transmission is halted upon receipt of an X-Off character; transmission resumes upon receipt of an X-On character. A Punch Off character is sent when the transmission is complete.
2	Data is received without handshaking.	Transmits data only after receiving an X-On character. Data transmission is halted upon receipt of an X-Off character; transmission resumes upon receipt of an X-On character.

2. Scroll to the desired handshake option.
3. Press **ENTER**. The second line of the display shows the selected handshake option.

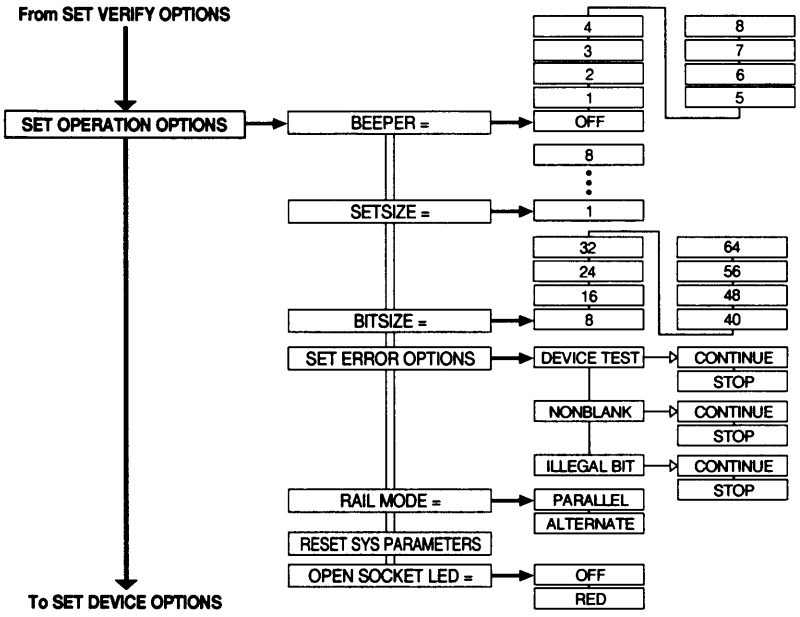
Timeout

1. Scroll until the second line of the display shows the timeout setting.

   To change the timeout setting, press **ENTER**. The timeout setting blinks.

2. Scroll to the desired timeout setting.
3. Press **ENTER**. The second line of the display shows the selected timeout setting.

Set Operation Options



These options allow you to change the following settings:

- Enable or disable the programmer's beeper and set the beeper pitch.
- Set the setsize (number of devices in a set to be loaded or programmed) and the bitsize of the data to be programmed into a set of devices.
- Select whether the programmer should stop or continue when an error is generated.
- Select parallel or alternate rail programming.
- Reset system parameters.
- Change the open socket LED color.

Use the following procedures to set the options. The default setting for each option is shown in the table on page 4-4.

Select Beeper Pitch

You can enable or disable the programmer beeper. The available settings are Off, and 1 through 8. Select 1 through 8 to enable the beeper and set the beeper pitch. A selection of 1 is the highest pitch; 8 is the lowest pitch. Setting each programmer beeper to a unique pitch allows you to more easily identify which programmer produced the sound.

1. Select **Set Operation Options**.
2. Select **Beeper =** . The second line of the display shows the current beeper selection.

   To change the beeper setting, press **ENTER**.
3. Scroll to the desired setting.
4. Press **ENTER**. The second line of the display shows the selected setting.

Select Setsize

The Setsize option allows you to specify the number of devices in the set to be loaded, programmed, or verified. For a **Copy From Set** operation, the programmer copies RAM data into consecutive devices up to the setsize. If more devices are installed, the programmer copies the same RAM data into the additional devices, producing duplicates of the first set of devices programmed. (This operation cannot be performed if Data Lock is On—see the "Set Data Lock" section on page 4-37 for information.)

1. Select **Set Operation Options**.
2. Select **Setsize**. The second line of the display shows the current setsize. To change the setting, press **ENTER**.
3. Scroll to the desired setting.
4. Press **ENTER**. The second line of the display shows the selected setting.

Select Bitsize

The Bitsize option allows you to select the bitsize (word width) of the data to be programmed into a set of devices. The Bitsize selection should match the bitsize of the processor that will be accessing the data programmed into the set of devices. (This operation cannot be performed if Data Lock is On—see the "Set Data Lock" section on page 4-37 for information.)

1. Select **Set Operation Options**.
2. Select **Bitsize**. The second line of the display shows the current bitsize.
3. Scroll to the desired setting.
4. Press **ENTER**. The second line of the display shows the selected setting.

Set Rail Mode

Change the rail mode setting as follows:

1. Select Set Operation Options.
2. Select Rail Mode. The second line of the display shows the rail setting.
3. To change the setting, press ENTER and use the arrow keys to toggle the setting.
4. Press ENTER.

Rail Mode

This option does not appear on the Set Operation Options menu of the PSX500 programmer. It also does not appear on the PSX1000 menu if a single rail or two dissimilar rails are installed on the control module.

Parallel

Parallel rail programming is the factory default. Parallel programming uses a master device to program the devices in both rails simultaneously when two identical rails are installed.

Alternate

Use alternate rail programming to speed up production flow by alternating the programming process from one rail to the other. While the programmer is processing devices on one rail, the operator can label and remove programmed devices from the other rail and load it with blank devices. Alternate rail programming requires that two identical rails be installed, each with its own master device. Both master devices must be the same device type, but they do not need identical data. Data in RAM can be used as the programming data source when you want to program the devices in both rails with the same data.

Note: Auto Device Select is not supported when using alternate rail programming. Select the device manually.

Using Alternate Rail Mode

Alternate rail programming affects the following device-related operations:

Copy From Master	Copy From Set
Copy From RAM	Load From Set
Verify From Master	Verify From Set
Verify From RAM	

To use alternate rail programming, perform the following steps:

1. Power down the programmer.
2. Install two identical rails on the programmer.
3. Power up the programmer.
4. Select one of the device-related operations listed above. Proceed with that operation as described in its operation procedure. When the procedure tells you to insert the devices and turn the dial to the closed/start position, look for two arrows at either end of the second line of the display. These arrows indicate which rail to insert the devices into (the active rail).
5. Insert the devices into the active rail (lower rail if the arrows point down; upper rail if the arrows point up).
6. Turn the active rail dial to the closed/start position. The operation begins on the active rail.
7. While the operation is in process, insert devices into the other rail. Turn the dial to the closed/start position. The operation is performed on the second rail after the operation on the first rail is complete and the first rail dial is turned to the open position.
8. Label and remove the programmed devices in the first rail and load it with blank devices. Turn the dial to the closed/start position. The operation is repeated on this rail after the operation on the other rail is complete and the dial is turned to the open position.

Errors When Using Alternate Rail Mode

When an error occurs, alternate rail programming is interrupted. Some errors cause the programmer to switch to the alternate rail, pause, or stop the operation as defined in the following list.

`NO DEVICES PRESENT`	Switches to alternate rail
`DEVICE INSERTION`	Pauses operation
`NO ELECTRONIC ID`	Pauses operation
`INVALID ELECTRONIC ID`	Pauses operation
`BLOCK LIMIT ERROR`	Stops operation
`INVALID SET ERROR`	Stops operation

Resetting System Parameters

All of the system parameters you select (such as device type, parity, and baud rate) are saved on powerdown and become the defaults until you change them. To reset these parameters to the factory defaults (see page 4-4), use the following procedure:

1. Select **Set Operation Options**.
2. Scroll to **Reset System Parameters**.

3. Press ENTER + ∨ (press the ENTER key and while still pressing the key down, press the down arrow key, then release both keys at the same time).

   The PSX might beep while you press the keys. You can ignore these beeps.

4. Press ENTER to reset system parameters to factory default values.

Empty Socket LED

This option sets the LED color (Red or Off) for empty sockets. Setting this feature to **Red** (the default) prompts the sockets to light up either green (pass) or red (fail). If the socket lights up red, it signifies one of the following conditions:

- The socket is empty
- A device failed to program
- A device was inserted incorrectly
- The leads on the device are not making contact

Note: Data I/O recommends setting this option to **Red** *so that it is clear to the operator which sockets failed to program a device.*

When the **Off** option is selected, the LED will light up red *only when the socketed device failed to program*. The LED will **not** light up if a device was inserted incorrectly, the leads on a device did not make contact with the programmer, or if the socket is empty.

CAUTION: Be sure that operators understand the meaning of the indicators to prevent the acceptance of unprogrammed parts.

To reset the Empty Socket LED option, follow these steps:

1. Select **Set Operation Options**.
2. Select **Open Socket LED =** . The second line of the display shows the current setting.

   To change the setting, press ∧ or ∨.

3. Press ENTER.

Set Error Options

This option allows you to specify whether the programmer continues or stops operations when a device test, nonblank, or illegal bit test error is encountered. If you select **Stop**, the programmer *stops* operations and displays an error message when an error is encountered. If you select **Continue**, the programmer *completes* operations before displaying the error message.

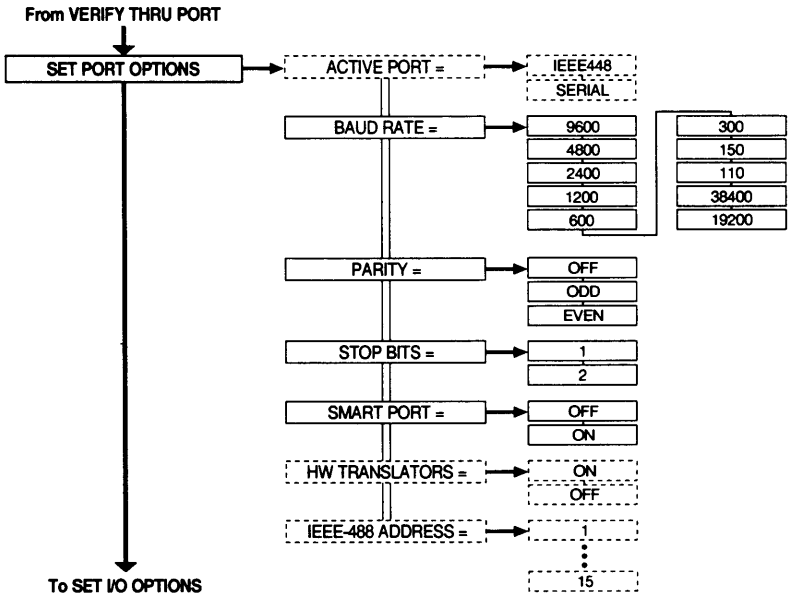
To specify the setting you want, perform the following:

1. Select **Set Operation Options**.
2. Select **Set Error Options**.
3. Select the setting you want to change.

   To change the option for the displayed test, press **ENTER**, then scroll to the desired setting.
4. Press **ENTER** to accept the new setting.
5. To change the setting for another test, repeat steps 3 and 4.

Note: If a device fails the device test, the socket LED remains red while the nonblank and illegal bit tests are being performed.

Set Port Options



These options allow you to select the active port and to set the serial port options. The port defaults are shown in the table on page 4-4.

Note: To use the options in the boxes with dashed lines, you must have the PSX set up for IEEE-488 communication.

Active Port

1. Select **Set Port Options**. Scroll until the second line of the display shows the active port. To change the active port, press **ENTER**. The active port blinks.
2. Scroll to the desired port.
3. Press **ENTER**. The second line of the display shows the selected active port.

Baud Rate

1. Scroll until the second line of the display shows the baud rate. To change the baud rate, press **ENTER**. The baud rate blinks.
2. Scroll to the desired baud rate.
3. Press **ENTER**. The second line of the display shows the selected baud rate.

Parity

1. Scroll until the second line of the display shows the parity setting. To change the parity setting, press ENTER. The parity setting blinks.
2. Scroll to the desired parity setting.
3. Press ENTER. The second line of the display shows the selected parity setting.

Stop Bits

1. Scroll until the second line of the display shows the stop bits setting. To change this setting, press ENTER. The stop bits setting blinks.
2. Scroll to the desired stop bits setting.
3. Press ENTER. The second line of the display shows the selected stop bits setting.

SmartPort

When enabled, the SmartPort feature senses the host's transmit and receive signals (commonly called Tx and Rx) and automatically connects the RS232 port Tx and Rx signals to the host signals so you don't have to swap lines in your cable.

Note: If the host has a SmartPort capability, disable the SmartPort feature in the PSX.

1. Scroll until the second line of the display shows the SmartPort setting. To change this setting, press ENTER. The SmartPort setting blinks.
2. Scroll to the desired SmartPort setting.
3. Press ENTER. The second line of the display shows the selected SmartPort setting.

Hardware Translators

When enabled, the hardware translators are supported with the following formats. Use these formats with TaskLink and an IEEE port for fastest throughput.

Format	Displayed Name	Code
Intel Hex-32	INTEL HEX-32	99
Intel Intellec 8/MDS	INTEL MDS	83
Intel MCS-86 Hex Object	INTEL MCS	88
Motorola 32-bit (S3 record)	MOTOROLA S3	95
Motorola EXORciser	MOTOR EXORCI	82
Motorola EXORmacs	MOTOR EXORMA	87

IEEE-488 Address

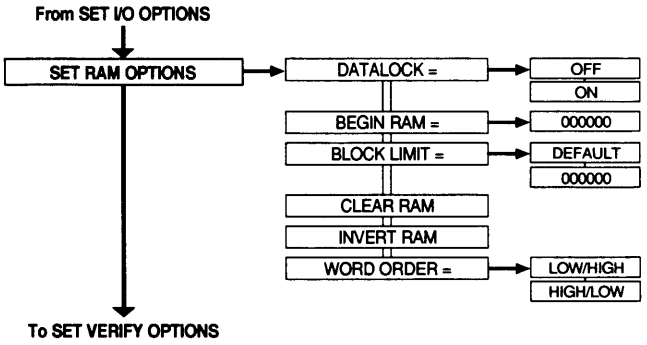
The PSX IEEE-488 Address usually does not need to be changed from its default (1). However, you may want to change the setting if any of the following are true:

- You have other equipment on your IEEE-488 bus that must be set to address 1
- You use your own IEEE-488 driver software instead of TaskLink
- You want to control more than one PSX using software that supports this capability (TaskLink for DOS currently does not).

Follow these steps to change the IEEE-488 address.

1. Select **Set Port Options**. Scroll until the second line of the display shows the IEEE-488 Address. To change the address, press **ENTER**. The `1` blinks.
2. Scroll to the desired selection. (The display returns to `1` when you scroll past `15`.)
3. Press **ENTER**. The selected IEEE-488 Address is displayed on the second line.

Set RAM Options



Use the **Set RAM Options** menu to enable and set the following features.

- Lock RAM to ensure security of your data.
- Set the beginning RAM address to/from which data will be transferred.
- Set the size of the block of data to be transferred.
- Clear data at all RAM addresses to 00.
- Invert (complement) data at all RAM addresses.
- Select data order for word wide device. (This feature is available only if the installed module supports 16-bit wide devices.)

Use the following procedures to change the options available under the **Set RAM Options** menu.

Set Data Lock

The Data Lock feature allows you to lock the data contained in programmer RAM so that it cannot be altered. When Data Lock is enabled, the following commands cannot be performed:

Load From Master	Invert RAM	Block Limit
Load From Set	Clear RAM	Diagnostics
Load Thru Port	Clear Statistics	Setsize
Begin RAM	Word Order	Bitsize

1. Select **Set RAM Options.**
2. Select **Data Lock.** The second line of the display shows the data lock setting.

   To change the data lock setting, press **ENTER.** The data lock setting blinks.
3. Hold down the ∨ key and press **ENTER** to toggle the setting.

When the data lock mode is selected, DL appears in the upper right corner of the PSX's display as a reminder that Data Lock is enabled.

Set Beginning RAM Address

The beginning RAM address sets the first address of RAM into which data is loaded from a device or host computer. It also sets the address of the first data byte in RAM to be transferred out of RAM to a device or host computer. To set the beginning RAM address, perform the following procedure. (This operation cannot be performed if Data Lock is On—see the "Set Data Lock" section on page 4-37 for information.)

1. Select **Set RAM Options**.
2. Select **Begin RAM Address**. The second line of the display shows the current beginning RAM address.
   To change the beginning RAM address, press ENTER. The most significant digit of the beginning RAM address blinks.
3. The beginning RAM address is set one position at a time, beginning with the most significant digit. Use the arrow keys to increase or decrease (in hexadecimal) the value for each position.
4. When the displayed value for the particular position is correct, press ENTER. The cursor moves to the next most significant position. Repeat this process to select each remaining digit of the beginning RAM address.
5. Press EXIT. The second line of the display shows the selected address.

Set Block Limit

The block limit sets the size of the data block to be transferred. The block limit is set in hexadecimal. A block limit of 000000 causes the programmer to set the block limit to the size of the currently selected device multiplied by the selected setsize and bitsize. (This operation cannot be performed if Data Lock is On—see the "Set Data Lock" section on page 4-37 for information.)

1. Select **Set RAM Options**.
2. Select **Block Limit**. The second line of the display shows the current block limit selected.

   To change the block limit, press ENTER. The most significant digit of the current block limit blinks.
3. The block limit is set one position at a time, beginning with the most significant digit. Use the arrow keys to increase or decrease (in hexadecimal) the value for each position.

4. When the displayed value for the particular position is correct, press **ENTER**. The cursor moves to the next most significant position. Repeat this process to select each remaining digit of the block limit.
5. Press **EXIT**. The second line of the display shows the selected block limit.

   If you entered 000000 as the block limit, the PSX displays default as the block limit.

Clear RAM

The Clear RAM option allows you to set all RAM data to 00. (This operation cannot be performed if Data Lock is On—see the "Set Data Lock" section on page 4-37 for information.)

1. Select **Set RAM Options**.
2. Select **Clear RAM**.
3. Press **ENTER** to start the operation. The PSX displays:

   ```
   CLEAR RAM *
   ```

   When the operation is complete, the PSX displays:

   ```
   CLEAR RAM
   COMPLETE
   ```

Invert RAM

The Invert RAM option allows you to invert all RAM data. To return the data to its original state, perform a second Invert RAM operation. (This operation cannot be performed if Data Lock is On—see the "Set Data Lock" section on page 4-37 for information.)

1. Select **Set RAM Options**.
2. Select **Invert RAM**.
3. Press **ENTER** to start the operation. The PSX displays:

   ```
   INVERT RAM *
   ```

   When the operation is complete, the PSX displays:

   ```
   INVERT RAM
   COMPLETE
   ```

Set Word Order for 16-bit Devices

The Word Order option allows you to select the order that RAM data is transferred to, or from, 16-bit-wide devices. The two available settings, Low/High and High/Low, are described below. (This operation cannot be performed if Data Lock is On—see the "Set Data Lock" section on page 4-37 for information.)

Note: This option is displayed when a module that supports 16-bit wide devices is installed.

Low/High—For a Copy From RAM operation, the first byte of data is transferred to the low byte of the device (D0 through D7). The second byte of data is transferred to the high byte of the device (D8 through D15). This alternating pattern continues until the selected range of programmer RAM is copied.

For a Load From Master operation, the process is reversed: the first low byte is transferred to the first RAM address and the first high byte is transferred to the second RAM address. This alternating pattern continues until the device data is loaded into programmer RAM.

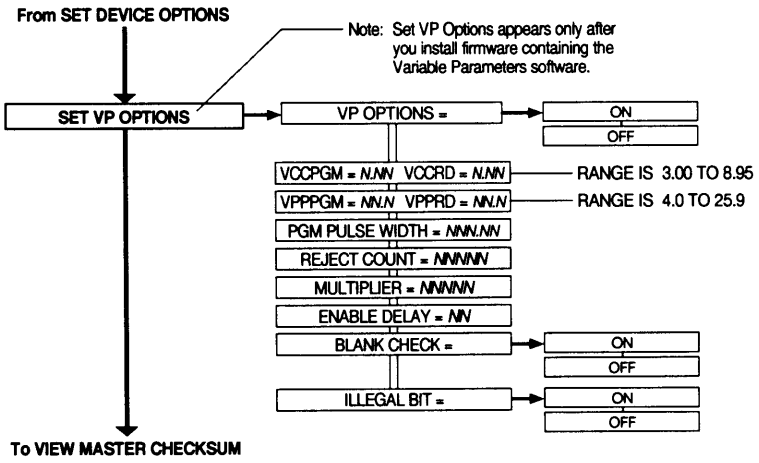
High/Low—For a Copy From RAM operation, the first byte of data is transferred to the high byte of the device (D8 through D15) and the second byte of data is transferred to the low byte of the device (D0 through D7). This alternating pattern continues until the selected range of programmer RAM is copied.

For a Load From Master operation, the process is reversed; the first high byte is transferred to the first RAM address and the first low byte is transferred to the second RAM address. This alternating pattern continues until the device data is loaded into programmer RAM.

1. Select **Set RAM Options**.
2. Select **Word Order**. The second line of the display shows the current word order selected.

   To change the current word order, press **ENTER**. The word order selection blinks.
3. Scroll to the desired word order setting. Press **ENTER**. The second line of the display shows the selected word order setting.

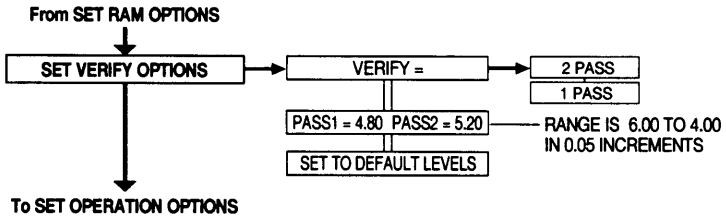
Set Variable Parameters Options



Variable Parameters enables you to modify algorithm-related parameters for programming devices that need more rigorous programming and/or verification.

The optional Set VP Options menu item is only present in the menu when firmware containing the Variable Parameters option is installed in the control module. Refer to the *Variable Parameters User Manual* (part number 096-0133) for information on how to use this menu option.

Set Verify Options



These options allow you to select either a 1 Pass or 2 Pass verify and the 2 Pass voltage levels. If a 1 Pass verify is selected, you can select a verify voltage or use the default value (usually the nominal operating voltage). If a 2 Pass verify is selected, the programmer checks the device(s) at the levels you have selected. The factory default levels are the high and low operating levels recommended by the manufacturer of the selected device. Use the following procedures to change the verify options.

Select Number of Verify Passes

1. Select **Set Verify Options.**
2. Select **Verify =** . The second line of the display shows the current verify option selected.

   To change the setting, press **ENTER.** The currently selected option blinks.
3. Scroll to the desired setting.
4. Press **ENTER.** The second line of the display shows the selected setting.

Note: If a 1 Pass or 2 Pass verify option is selected, the verify voltage levels can be altered using the next procedure, "Select 1 Pass or 2 Pass Verify Voltage Levels."

Select 1 Pass or 2 Pass Verify Voltage Levels

The verify voltage levels you set are used whenever a 1 Pass or 2 Pass verification is performed, regardless of the device type selected.

1. Select **Set Verify Options.**
2. Select **1 Pass = , 2 Pass =** . The second line of the display shows the current voltage levels for 1 Pass and 2 Pass.

   To change the voltage levels, press **ENTER.** The 1 Pass voltage level blinks.

3. Use the arrow keys to increase or decrease the voltage setting. The ∧ key increases the voltage in .05V increments; the ∨ key decreases the voltage in .05V decrements.

   To change the 2 Pass voltage, repeat steps 2 and 3. If you do not want to change a voltage, press **ENTER** to accept the currently displayed voltage.

Note: An asterisk at the left end of the second line of the display indicates that the verify voltages are not at their default values; double arrows (>>) indicate that the verify voltages are at their default values.

Set to Default Levels

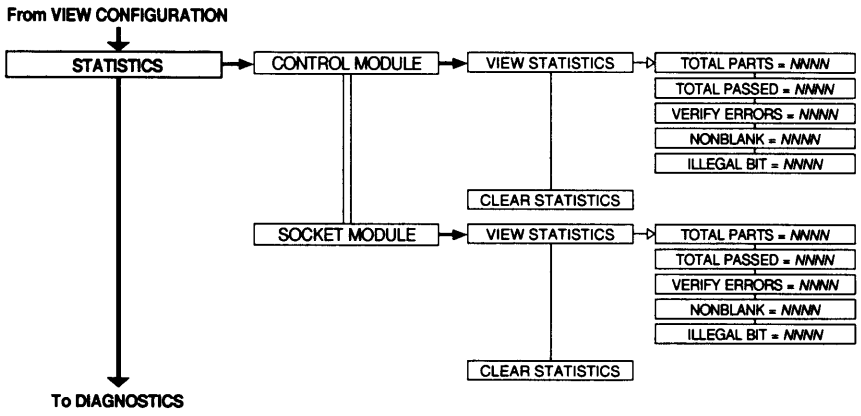
This command sets the verify voltages to the factory defaults (see page 4-4).

1. Select **Set Verify Options.**
2. Select **Set to Default Levels.** The PSX displays:

   ```
   ENTER TO CONTINUE
   ```

3. Press **ENTER** to set verify voltages to default levels.

Statistics



This option allows you to view and clear the PSX control module and socket module statistics.

Control Module

View Statistics

Use the View Statistics command to view the following device statistics for the control module:

- Number of devices
- Number of devices successfully programmed
- Number of devices that did not verify
- Number of nonblank devices
- Number of devices that contained illegal bits

Select **View Statistics.** Use the arrow keys to scroll through the following displays:

```
TOTAL PARTS = NNNN
TOTAL PASSED = NNNN
VERIFY ERRORS = NNNN
NONBLANK = NNNN
ILLEGAL BIT = NNNN
```

Clear Statistics

Use the Clear Statistics command to clear the device statistics for the control module after processing each job. Statistics are not cleared on powerdown; they must be cleared by the operator. Statistics cannot be cleared when Data Lock is On (see the "Set Data Lock" section on page 4-37 for information). Use the following procedure to clear the cumulative device statistics for the control module:

1. Select **Clear Statistics.**
2. Press **ENTER** to clear the statistics.

View Socket Cycles

Use the View Socket Cycles command to view the following socket cycles statistics for the control module.

- The number of upper rail dial closures since the last reset.
- The number of lower rail dial closures since the last reset.
- The total number of upper rail dial closures (not resettable).
- The total number of lower rail dial closures (not resettable).

Note: The socket cycles statistics are a total of rail dial closures occurring on the control module. It is not specific to the rail(s) installed on the PSX.

Select View Socket Cycles. Use the arrow keys to scroll through the following displays:

```
Upper skt cycle = XX
Lower skt cycle = XX
Total upper = XX
Total lower = XX
```

Clear Socket Cycles

When the number of upper or lower rail dial closures equals the warrantied number for that socket (see the "Socket Warranty and Replacement" section on page D-2) the programmer displays the following message upon powerup:

```
Excessive socket cycles
ENTER to continue
```

We suggest that you replace the sockets at this time. To order a socket replacement kit, contact your nearest Customer Support office. (See the "Socket Warranty and Replacement" section on page D-2 for a list of part numbers for available socket replacement kits.)

After installing the socket replacement kit, use the Clear Socket Cycles command to clear the number of upper and lower rail dial closures since the last reset. Statistics cannot be cleared when Data Lock is On (see the "Set Data Lock" section on page 4-37 for information). Use the following procedure to clear the resettable socket cycles for the control module:

1. Select **Clear Socket Cycles** (ENTER + ^).
2. Press ENTER to clear the number of socket cycles.

Socket Modules

View Statistics

Device statistics for each socket module are displayed separately.

Use the View Statistics command to view the following device statistics for the socket module:

- Number of devices
- Number of devices successfully programmed
- Number of devices that did not verify
- Number of nonblank devices
- Number of devices that contained illegal bits

Select **View Statistics**. Use the arrow keys to scroll through the following device statistics displays for each socket module:

```
TOTAL PARTS = NNNN
TOTAL PASSED = NNNN
VERIFY ERRORS = NNNN
NONBLANK = NNNN
ILLEGAL BIT = NNNN
```

Each module is identified by its position on the control module as follows:

Position Code	Definition
UL	Upper left
UR	Upper right
LL	Lower left
LR	Lower right

Use the View Statistics command to view the following device statistics for the socket modules:

- Number of devices
- Number of devices successfully programmed
- Number of devices that did not verify
- Number of nonblank devices
- Number of devices that contained illegal bits

Select **View Statistics**. Use the arrow keys to scroll through the following device statistics displays for each socket module:

```
Total parts = XX
Total passed = XX
Verify errors = XX
Nonblank = XX
Illegal bit = XX
```

Clear Statistics

Use the Clear Statistics command to clear the socket module device statistics on the installed socket module after processing each job. Statistics are not cleared on powerdown; they must be cleared by the operator. Statistics cannot be cleared when Data Lock is On (see the "Set Data Lock" section on page 4-37 for information). Use the following procedure to clear the cumulative device statistics for the socket modules:

1. Select **Clear Statistics**.
2. Press **ENTER** to clear the statistics.

View Socket Cycles

Statistics for each socket module are displayed separately. Each module is identified by its position on the control module as follows:

Position Code	Definition
UL	Upper left
UR	Upper right
LL	Lower left
LR	Lower right

Use the View Socket Cycles command to view the following socket cycle statistics for the socket modules.

- The number of rail dial closures for each socket module since the last reset.
- The total number of rail dial closures for each socket module (not resettable).

Select **View Socket Cycles**. Use the arrow keys to scroll through the following socket module statistics displays:

```
UL socket cycle = XXXX
UR socket cycle = XXXX
LR socket cycle = XXXX
LL socket cycle = XXXX
```

Clear Socket Cycles

When any of the socket module cycles equals the warrantied number for that socket (see the "Socket Warranty and Replacement" section on page D-2), the programmer displays the following message upon powerup:

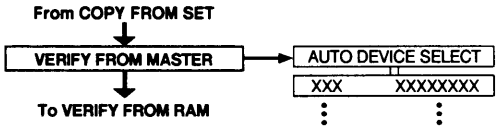
```
Excessive socket cycles
ENTER to continue
```

We suggest that you replace the sockets at this time. To order a socket replacement kit, contact your nearest Customer Support office as listed in the Preface. (See the "Socket Warranty and Replacement" section on page D-2 for a list of part numbers for available socket replacement kits.)

After installing the socket replacement kit, use the Clear Socket Cycles command to clear the number of rail dial closures for each installed socket module since the last reset. Statistics cannot be cleared when Data Lock is On (see the "Set Data Lock" section on page 4-37 for information). Use the following procedure to clear the resettable socket cycles statistics for the socket modules:

1. Select **Clear Socket Cycles** (ENTER + ∧).
2. Press ENTER to clear the statistics.

Verify From Master



After the PSX has performed a Copy From Master operation, use **Verify From Master** to check that the data was transferred correctly. A Verify From Master operation compares the device data with that of the master device to make sure they match.

The programmer can perform a 1 Pass or 2 Pass verify. Both verify operations test the device(s) at the level selected with the Set Verify Options menu. The factory default levels are the high and low operating levels recommended by the manufacturer of the selected device. To set the number of passes and/or verify voltage levels, select the Set Verify Options menu.

Note: If you are verifying devices that were just programmed, leave the devices in the sockets and perform the following procedure.

If the devices you want to verify are not installed, make sure the dial is in the open position and the device sockets are empty before performing the following procedure.

1. Select **Verify From Master**.
2. Select the manufacturer and device. If the rails or modules installed on the PSX support more than one package, the PSX displays a submenu of available socket modules. Select the module that supports the package you want to verify. The programmer displays:

   ```
   INSERT DEVICES
   CLOSE DIAL TO VERIFY
   ```

3. Insert the master device in the master socket.

   For parallel rail programming, install the master device in either of the two master sockets. For alternate rail programming, install a master device in each master socket.

4. If the devices to be verified are not in the sockets, insert them.

5. Turn the dial(s) to the closed/start position to process devices. The PSX displays:

   ```
   VERIFYING DEVICES *
   ```

   When processing is complete, the LED below each socket illuminates. If there are no failures, the programmer displays:

   ```
   VERIFY COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the data.

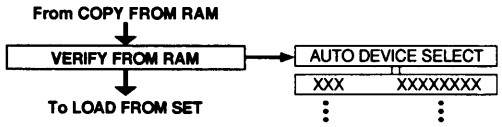
   If there are failures, the programmer displays:

   ```
   VERIFY COMPLETE - ERRORS
   ```

   See "Reading LED Status Indicators" on page 3-34 for information on how to scroll through the messages and read the LEDs.

6. Turn the dial(s) to the open position.
7. Remove the verified devices.

Verify From RAM



Use the **Verify From RAM** command to verify that the data in the programmed device(s) matches the data in programmer RAM.

1. Select **Verify From RAM**.
2. Select the manufacturer and device. If the rails or modules installed on the PSX support more than one package, the PSX displays a submenu of available socket modules. Select the module that supports the package you want to verify. The PSX displays:

   ```
   INSERT DEVICES
   CLOSE DIAL TO VERIFY
   ```

3. Insert the devices to be verified into the sockets.

   For parallel rail programming, install devices in both rails. For alternate rail programming, install devices in the rail indicated by the arrows on the second line of the display.

4. Lock the devices into sockets and turn the dial(s) to the closed/start position to process devices. The PSX displays:

   ```
   VERIFYING DEVICES *
   ```

   When verifying is complete, the LED below each socket illuminates. If there are no failures, the PSX displays:

   ```
   VERIFY COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

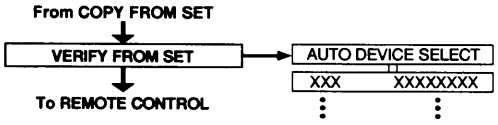
   where *XXXX* represents the checksum of the data. If there are failures, the PSX displays:

   ```
   VERIFY COMPLETE - ERRORS
   ```

   and the LED below each socket illuminates (see page 3-34 for an explanation of the LED color).

5. Turn the dial(s) to the open position.
6. Remove the verified devices.

Verify From Set



Use the **Verify From Set** command to verify that the data in the programmed set(s) of devices matches the data in programmer RAM. Because each device of the set was programmed with different data, make sure each device to be verified is inserted into a socket that corresponds to the same block of RAM data with which the device was programmed. For example, if the setsize is 4, the first device of the set (originally programmed in socket 1) could be verified in socket 1 or socket 5.

1. Select **Verify From Set**. Make sure that setsize and bitsize, which are displayed on the top line of the display, are set correctly. To change the setsize or bitsize, press **EXIT** and select the Set Operation Options menu.

2. Select the manufacturer and device. If the rails or modules installed on the PSX support more than one package, the PSX displays a submenu of available socket modules. Select the module that supports the package you want to verify. The PSX displays:

   ```
   INSERT DEVICE SET
   CLOSE DIAL TO VERIFY
   ```

3. Insert the devices to be verified into the sockets. Multiple sets can be verified with one Verify From Set operation by installing more than one set of devices in the rail/module.

   For parallel rail programming, install devices in both rails. For alternate rail programming, install devices in the rail indicated by the arrows on the second line of the display.

4. Turn the dial(s) to the closed/start position to process devices.

   The PSX displays:

   ```
   VERIFYING SETS *
   ```

   When processing is complete, the LED below each socket illuminates. If there are no failures, the PSX displays:

   ```
   VERIFY COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the data.

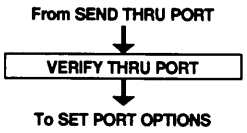
If there are failures, the PSX displays:

```
VERIFY COMPLETE - ERRORS
CHECKSUM = ****
```

and the LED below each socket illuminates (see page 3-34 for an explanation of the LED color).

5. Turn the dial(s) to the open position.
6. Remove the verified devices.

Verify Thru Port



The **Verify Thru Port** command uses an I/O port to verify that programmer RAM data matches the host data.

1. Select **Verify Thru Port**. The PSX displays:

   ```
   VRFY ACTIVE_PORT FORMAT
   ENTER TO START
   ```

   The first line of the display shows the current port and translation format.

   To change the current port and translation format, go to the Set Port Options or Set I/O Options menus to change the parameters.

2. Press **ENTER**. The PSX displays:

   ```
   VERIFYING THRU PORT *
   ```

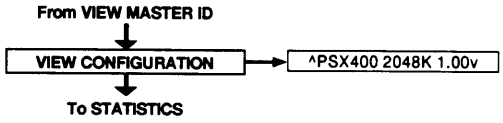
   When the Verify Thru Port procedure is complete, the PSX displays:

   ```
   VERIFY PORT COMPLETE
   CHECKSUM = XXXX
   ```

   where *XXXX* represents the checksum of the data.

   If a problem occurs during any part of the operation, the programmer stops and displays a message. (See Chapter 6, "Messages," for an explanation.)

View Configuration



The **View Configuration** command displays the programmer's model number, RAM size, software version number, rail type, and the type of module installed (if applicable). These are things you need to know when contacting Customer Support concerning your equipment.

1. Select **View Configuration**. The second line of the display shows the current system configuration:

   ```
   VIEW CONFIGURATION
   PSXXXXX YYYYYK N.NN zz
   ```

   where PSX*XXXX* is the model number, *YYYYYK* is the amount of installed RAM, *N.NN* is the version of the installed software, and *zz* is blank or VP for Variable Parameters. For example:

   ```
   VIEW CONFIGURATION
   PSX1000 16384K 4.00
   ```

   indicates the system is a PSX1000 with 16 MB of RAM and running version 4.00 firmware.

2. Press ∨ once to display the installed rail types.

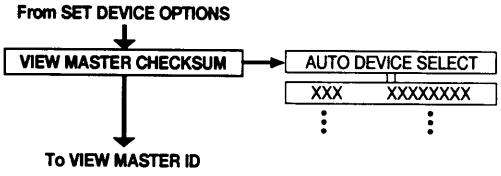
Rail	Part Number
MEM 1	950-0151-001
MEM 2	950-0151-002
	950-0151-003
	950-0151-004
	950-0151-005
MEM 5V/3V	950-0151-006
	950-0151-007

3. If one or two PSX Rails are installed and socket modules are installed on the rails, press ∨ again to display the installed socket module type(s).

   Each module is identified by its position on the control module as follows:

Position Code	Definition
UL	Upper left
UR	Upper right
LL	Lower left
LR	Lower right

View Master Checksum



The **View Master Checksum** command calculates and displays the master device's checksum. Use the following procedure to view the checksum of the master device.

Note: View Master Checksum is disabled for microcontrollers when Micro modules are installed, or if device/package combinations do not support master operations.

1. Select **View Master Checksum**. The PSX displays the last device selected.

   To change the device, press **ENTER**.

2. Scroll to the desired manufacturer. Press **ENTER**.

3. Scroll to the desired device. Press **ENTER**.

4. The PSX displays:

   ```
   INSERT MASTER
   ENTER TO VIEW
   ```

5. Insert the master device into the master socket (make sure the device is properly locked in the socket).

6. Press **ENTER** to begin the operation. While the calculation is being done, the PSX displays:

   ```
   READING FROM MASTER *
   ```

   ```
   VIEW COMPLETE - OKAY
   CHECKSUM = XXXX
   ```

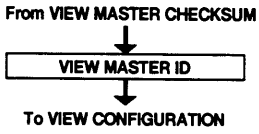
   where *XXXX* represents the checksum of the data.

   If a problem occurs during any part of the operation, the programmer stops and displays a message. (See Chapter 6, "Messages," for an explanation.)

7. Lift the socket lever and remove the master device from the master socket.

8. If you want to read the checksum of another device with the same manufacturer and part number, press **ENTER** twice and return to step 4.

View Master ID



The **View Master ID** command reads and displays the electronic ID (if a valid ID is present), the manufacturer, and the part number for the device installed in the master socket. Use the following procedure to view the ID of the master device.

1. Select **View Master ID**. The PSX displays:

   ```
   INSERT MASTER
   ENTER TO VIEW
   ```

2. Insert the device into the master socket (make sure the device is properly locked in the socket).

3. Press **ENTER** to begin the operation. When the ID has been read, the PSX displays:

   ```
   MASTER ID = XX XX
   MANUFACTURER, PART_NUMBER
   ```

   or

   ```
   MASTER ID = XXXX XXXX
   MANUFACTURER, PART_NUMBER
   ```

   where *XX XX* or *XXXX XXXX* is the ID read. A 4-digit ID is read for an 8-bit-wide device and an 8-digit ID is read for a 16-bit-wide device. The second line of the display shows the device's manufacturer and part number.

4. Unlock and remove the device from the socket.

5. If you want to read the electronic ID of another device, press **ENTER** and repeat steps 2 through 4.

Translation Formats

The following translation formats are available for downloading data from a PC to the PSX. For additional information about translation formats, refer to the Hardware Translators section of "Set Port Options" on page 4-34 and to the "Translation Formats" Application Note (see page 4-59 for information on accessing application notes).

Format	Displayed Name	Code
ASCII-B10F	B10F STX/NOSTX	03
ASCII-BHLF	BHLF STX/NOSTX	02
ASCII-BNPF	BNPF STX/NOSTX	01
ASCII-Octal Apostrophe	OCTAL APOST	32
ASCII-Octal Percent	OCTAL PC STX/SOH	31
ASCII-Octal SMS	OCTAL SMS	37
ASCII-Octal Space	OCTAL SP STX/SOH	30
ASCII-Hex Apostrophe	HEX APOST	52
ASCII-Hex Comma	HEX COM STX/SOH	53
ASCII-Hex Percent	HEX PC STX/SOH	51
ASCII-Hex SMS	HEX SMS	57
ASCII-Hex Space	HEX SP STX/SOH	50
Binary	BINARY	10
DEC Binary	DEC BINARY	11
Fairchild Fairbug	FAIRCHILD	80
5-level BNPF	5-BNPF STX/NOSTX	08
Hewlett-Packard 64000 Absolute	HP64000	89
Hewlett-Packard UNIX Format	HP UX	96
Intel Hex-32	INTEL HEX-32	99
Intel Intellec 8/MDS	INTEL MDS	83
Intel MCS-86 Hex Object	INTEL MCS	88
Intel OMF286	INTEL 286	98
Intel OMF386	INTEL 386	97
MOS Technology	MOS TECH	81
Motorola 32-bit (S3 record)	MOTOROLA S3	95
Motorola EXORciser	MOTOR EXORCI	82
Motorola EXORmacs	MOTOR EXORMA	87
RCA Cosmac	RCA COSMAC	70
Signetics Absolute Object	SIGNETICS	85
Spectrum	SPECT STX/NOSTX	12
Tektronix Hexadecimal	TEX HEX	86
Tektronix Hexadecimal Extended	TEX HEX EXTD	94
Texas Instruments SDSMAC	TI SDSMAC	90

Application Notes

The following Application Notes are available from your nearest Customer Support office as listed in Appendix A.

Computer Remote Control (CRC)—983-0486	Describes how to set up the RS232 and IEEE-488 ports for use with a host computer and software driver; describes the CRC commands that are available for the PSX parallel programmers.
Translation Formats—983-0487	Describes translation formats and how to use them.

5 Troubleshooting

This chapter describes how to solve problems you may encounter during both operation and diagnostic tests. It also includes a "Diagnostics" section that gives detailed explanations of the diagnostic tests available on the PSX in the **Diagnostics** menu and a "Theory of Operation" section with block diagrams of the various circuits in the PSX components.

CAUTION: Assembling or disassembling the PSX (including removing or installing a rails and socket modules) when power is applied to the PSX can damage it and the socket module and voids the warranty.

Common Problems

Several problems are listed below with some suggestions for correcting them. Customer Support numbers are listed in Appendix A.

- **Programmer does not power up.**

  The most likely cause of the problem is the CPU board. The next most likely cause is the power supply (see page D-25 for PSX performance-verification instructions).

  If the problem persists, contact your nearest Customer Support office.

- **Module LEDs turn on and stay lit during powerup.**

  The problem may be a mis-seated module or a mis-seated rail. Turn off the PSX, remove the module or rail, and reinstall the module or rail. (See "Installing Socket Modules" on page 2-5.)

  If the LEDs stay illuminated during powerup, contact your nearest Customer Support office.

- **The PSX is unable to copy from RAM and displays:**

  `PROGRAM FAIL`

  If this problem occurs continuously for various devices, the most likely cause of the problem is the CPU board. The next most likely cause of the problem is the logic board.

  If this problem occurs intermittently or with only certain devices, contact your nearest Customer Support office.

- **Rail LEDs turn on and stay lit during powerup.**

  The problem may be a mis-seated rail. Turn off the programmer and remove the rail (see the "Disassembling the PSX" section on page 7-3). Then reinstall the rail (see the "Installing Rail(s)" section on page 2-2).

  If the rail LEDs still illuminate and stay illuminated during power up, contact your nearest Customer Support office.

- **Only one socket fails to program.**

  The problem may be a mis-seated socket module. Turn off the programmer and remove the module (see the "Disassembling the PSX" section on page 7-3) and check the connector for bent pins. If none of the pins are bent, reinstall the module on the rail (see the "Installing Socket Modules" section on page 2-5).

  If one module still fails to program, turn off the programmer and switch the placement of the socket modules (move the module on the left to the right end of the rail, and the module on the right to the left end). If the problem follows the module, suspect the daughterboards or mother board in the module. If the problem stays on the same side of the rail, suspect the PSX RAIL driver board.

- **The PSX displays black bars.**

  Turn the display adjustment (see page 3-3) until the display is clear.

- **The PSX does not communicate with the PC.**

  Make sure the I/O cables are connected correctly. Refer to "Connecting I/O Port Cable" on page 4-9 and to Appendix B for more information.

  The PC and the programmer may be using different I/O settings. For example, the programmer may be set to use IEEE while the PC is using the serial port.

  Baud rate and communications settings could be mismatched. See the Set Port Options command on page 4-34 for more information on setting communications options.

Diagnostics

The Diagnostics menu offers several diagnostic tests for the PSX to ensure the integrity of its operation. If you have problems running a test or desire additional information about diagnostic tests, refer to the following:

- For information on how to use the scrolling menus, refer to "Using the Display, Keyboard, and Menus" on page 3-3.
- For information on what tests are available and how to run a test, see "Diagnostics" on page 4-11.
- If the programmer displays a message after performing any of these tests, see Chapter 6, "Messages," for an explanation of the messages encountered.
- For further details, call your nearest Customer Support office as listed in Appendix A.

Note: Diagnostics cannot be performed if Data Lock is On (see the "Set Data Lock" section on page 4-37 for information).

Note: When different rail types are installed, the programmer prompts for the rail you want to run the test on. If only one rail type is installed, the test is performed automatically for the installed rail(s).

Note: For accurate diagnostics, install PSX RAILs that each have two DIP48 socket modules installed.

Each diagnostic test is explained in the following sections.

Full System Test

CPU analog system, DRAM, I/O, and rails

The Full System Test sequentially loops through the CPU Test, Rail Test, and Interface Board Test described below. The number of passes and failures is displayed.

CPU Test

CPU analog system

When power is initially applied to the system, the CPU Test performs a check of the static RAM, CPU functions, keyboard/display, firmware, checksum, and EEPROM test. The CPU Test continuously loops through checks of all system references, all REF and RAW voltages, and automatic performance verification. The number of passes and failures is displayed.

Rail Test

All installed rails

The Rail Test continuously tests all socket latches and readback and verify circuits, address counters and routers, device detection circuits, and the state machine circuit. The number of passes and failures is displayed.

Socket TTL Test

TTL level stimulus at rail sockets

Note: When different rail types are installed, the programmer prompts for the rail on which you want to run the Socket TTL Test. If only one rail type is installed, the test is performed automatically for the installed rail(s).

Note: For accurate diagnostics, use two PSX RAILs that each have two DIP48 socket modules installed.

PSX RAIL

The PSX RAIL Socket TTL Test causes the digital pin drivers to cycle high and low from pin 1 through pin 48 (see Figure 5-1). Pin 24 is ground.

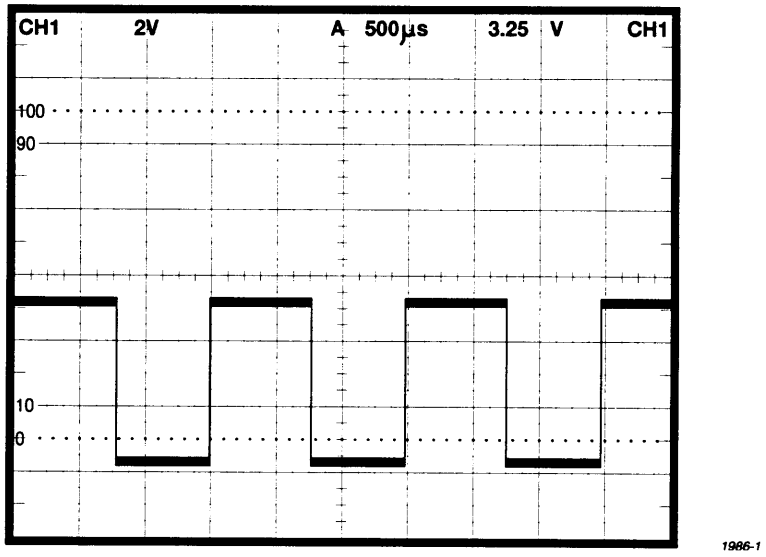


Figure 5-1
PSX Rail Socket TTL Test Waveform for Programming Socket Pins 1 through 48

Micro rail and 40-pin rail

The Micro rail and 40-pin rail Socket TTL Test causes the digital pin drivers to cycle high and low from pin 1 through pin 40 (see Figure 5-2). Pin 20 is ground.

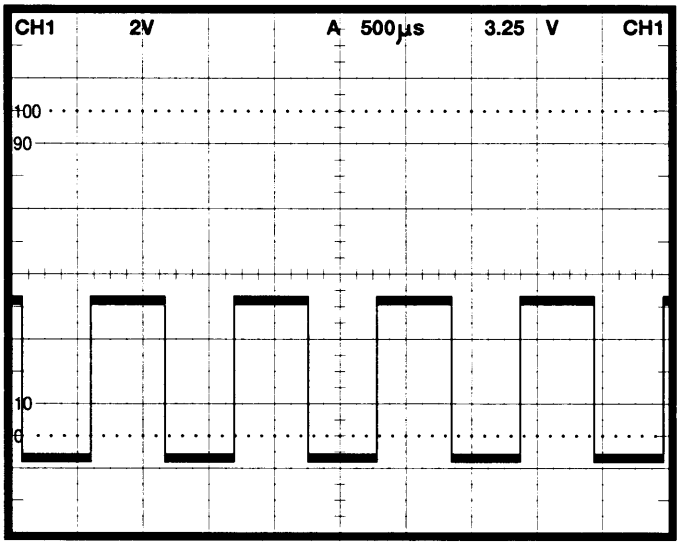


Figure 5-2
Micro rail and 40-pin Rail Socket TTL Test Waveform for Programming Socket Pins 1 through 40

28-pin rail

The 28-pin rail Socket TTL Test continuously sends a binary sequence to all of the non-power socket pins. The pattern is applied to the pins in eight-bit groups. Voltage levels on the pins should toggle between high and low at a rate determined by the position of the pin within the eight-pin group. The least significant bit (LSB) will toggle at the 1X rate, the LSB +1 at the 2X rate, the LSB +2 at the 3X rate, and so forth up to the most significant bit (MSB). The pins in each of the three non-power 8-pin groups and their relationship within the group (LSB to MSB) are shown below:

- Pins 11 (LSB), 12, 13, 15, 16, 17, 18, 19 (MSB)
- Pins 10 (LSB), 9, 8, 7, 6, 5, 4, 3 (MSB)
- Pins 25 (LSB), 24, 21, 2, 27, 20 (MSB)

Socket Voltage Test

Static voltage levels at rail sockets

Use a voltmeter to test the voltages on the specified socket pins.

Note: When different rail types are installed, the programmer prompts for the rail on which you want to run the Socket Voltage Test. If only one rail type is installed, the test is performed automatically for the installed rail(s).

Note: For accurate diagnostics, use two PSX RAILs that each have two DIP48 socket modules installed.

PSX RAIL

The PSX RAIL Socket Voltage Test applies a constant voltage to the power circuits associated with each socket setting all of the socket pins low except for the following (pin 24 is ground):

Socket Pin No.	Voltage Range (V dc)		
3, 5, 7, 9, 11, 32, 34, 35, 43	14.25	to	15.75
25, 38, 40, 42, 44	4.75	to	5.25

Micro rail and 40-pin rail

The Micro rail and 40-pin rail Socket Voltage Test sets all of the socket pins low except for the following (pin 20 is ground):

Socket Pin No.	Voltage Range (V dc)		
1,7, 30	14.25	to	15.75
40	4.75	to	5.25

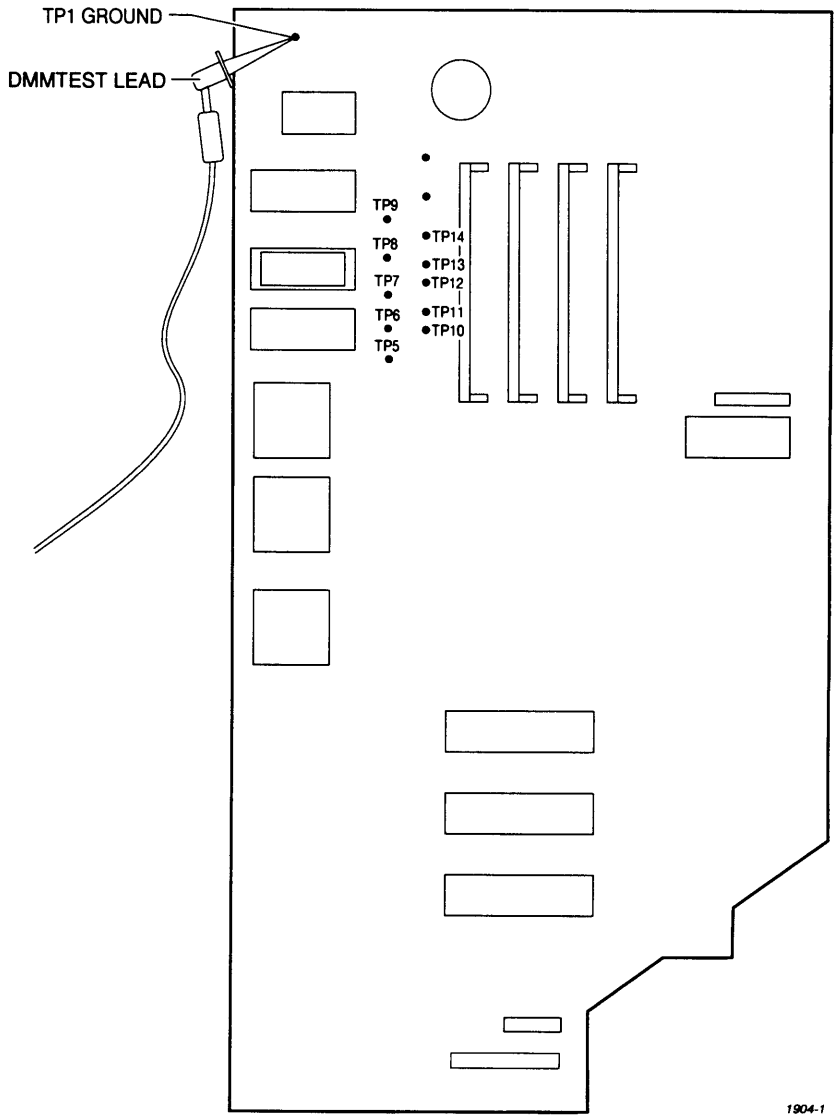
28-pin rail

The 28-pin rail Socket Voltage Test applies a constant voltage to the power circuits associated with each socket as follows (pin 14 is ground):

Socket Pin No.	Voltage Range (V dc)		
1, 22, 23	14.25	to	15.75
26, 28	4.75	to	5.25

CPU board— If any of the above socket voltages are not within the specified range, you can test the voltages at the CPU board test points (TP) listed below. See Figure 5-3 for the location of test points on the CPU board. Test point 1 (TP1) is ground.

Figure 5-3
CPU Test Points for Socket Voltage Test



Note: The following readings apply only when no rails are installed.

CPU Board Test Point	Voltage Range (V dc)		
5, 6, 7	14.94	to	18.26
8, 9	5.94	to	7.26
10, 11, 13	14.25	to	15.75
12, 14	4.75	to	5.25

Socket Driver Test

Analog waveforms at rail sockets

Use a scope to view the waveforms on the specified socket pins. Have a 512Ω resistor handy for viewing the waveforms on the Micro rail and 40-pin rail master socket pins 1, 5, 26, and 28. Use a voltmeter to test the voltages on the Micro rail and 40-pin rail master socket pins 36 and 40.

Note: When different rail types are installed, the programmer prompts for the rail on which you want to run the Socket Driver Test. If only one rail type is installed, the test is performed automatically for the installed rail(s).

Note: For accurate diagnostics, use two PSX RAILs that each have two DIP48 socket modules installed.

PSX RAIL

The PSX RAIL Socket Driver Test sets all of the socket pins low except for the following (pin 15, 24, or 34 is ground):

Socket Pins 3, 5, 7, 9, 11, 32, 34, 35, and 43

The test ramps the digital to analog converter (DAC) up to approximately 25V, turns off and on the reference switch, turns off and on the high voltage pin router, and turns off DACs (see Figure 5-4 or Figure 5-5, depending on the version of the rail you are using).

Master Socket Pins 34, 35, and 43

The test ramps the digital to analog converter (DAC) up to approximately 25V, turns off and on the reference switch, turns off and on the high voltage pin router, and turns off DACs (see Figure 5-4 or Figure 5-5, depending on the version of the rail you are using).

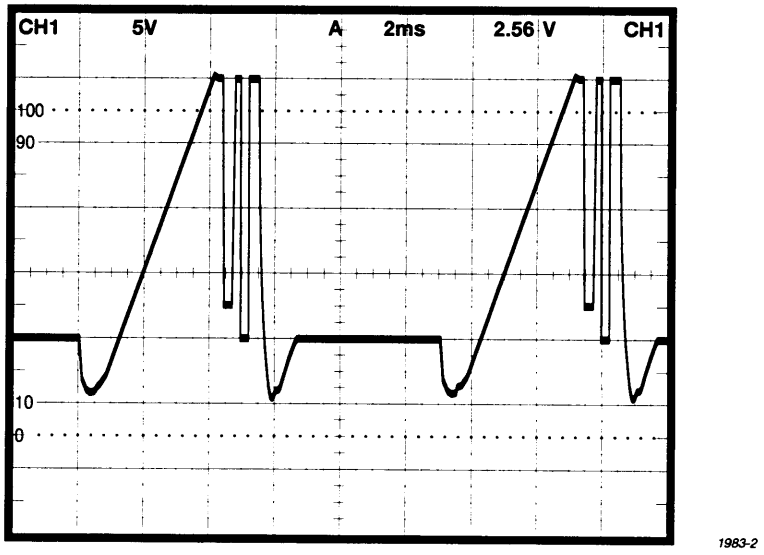
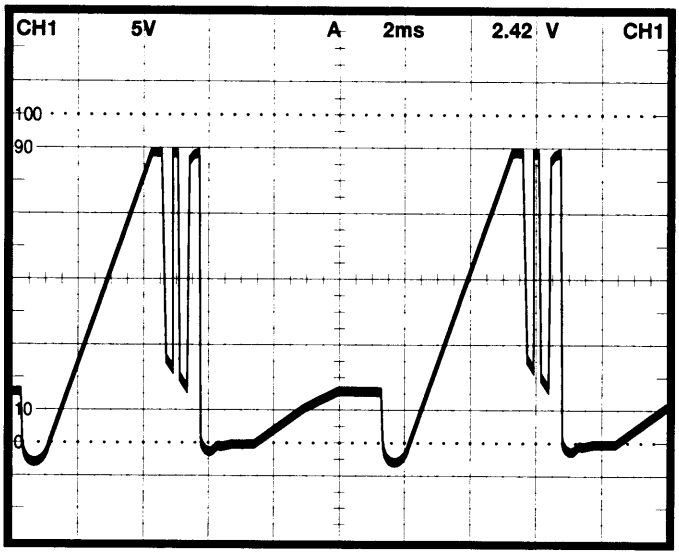


Figure 5-4
*PSX Rail (Part #**950-0151-001**) Socket Driver Test Waveform for Programming Socket Pins 3, 5, 7, 9, 11, 32, 34, 35, and 43; and for Master Socket Pins 34, 35, and 43*

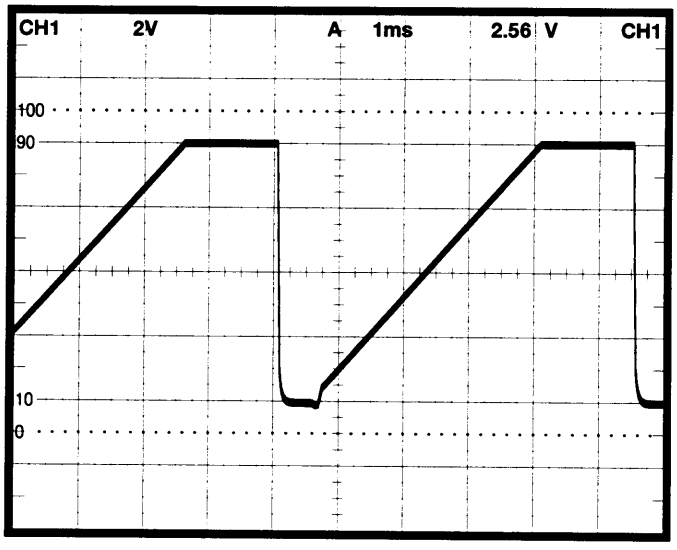
Figure 5-5
PSX Rail (Part #950-0151-002) Socket Driver Test Waveform for Programming Socket Pins 3, 5, 7, 9, 11, 32, 34, 35, and 45; and for Master Socket Pins 34, 35, and 43



Socket Pins 25, 38, 40, 42, and 44

The test ramps the digital to analog converter (DAC) up to approximately 8V, turns off and on the reference switch, turns off and on the high voltage pin router, and turns off DACs (see Figure 5-6).

Figure 5-6
PSX Rail Socket Driver Test Waveform for Programming Socket Pins 25, 38, 40, 42, and 44



Micro rail and 40-pin rail

The Micro rail and 40-pin rail Socket Driver Test sets all of the socket pins low except for the following (pin 11 or 30 is ground):

Socket Pins 1, 5, 26, 28, 31, and 38

The test ramps the digital to analog converter (DAC) up to approximately 25V, turns off and on the reference switch, turns off and on the high voltage pin router, and turns off DACs (see Figure 5-7).

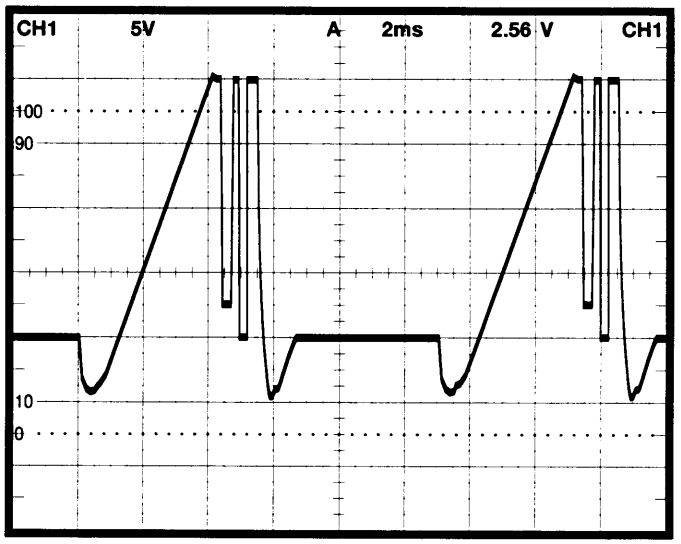


Figure 5-7
Micro rail and 40-pin Rail Socket Driver Test Waveform for Programming Socket Pins 1, 5, 26, 28, 31, and 38

Socket Pin 7

The test ramps the DAC up to approximately 21V, turns off and on the high voltage pin router, and turns off DACs (see Figure 5-8).

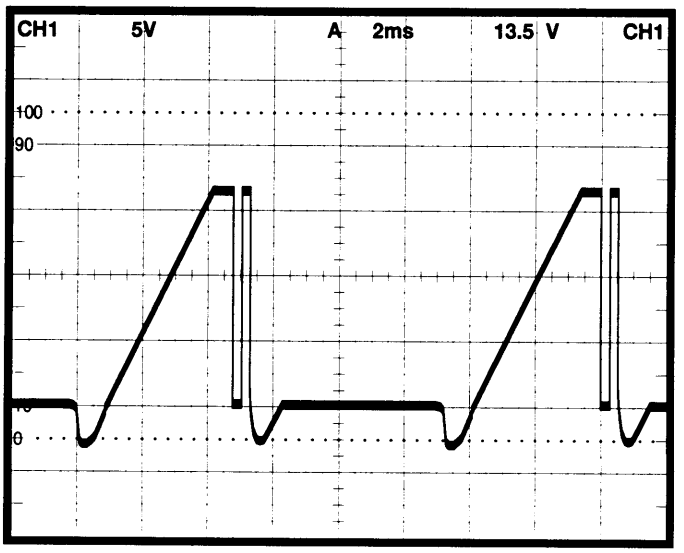
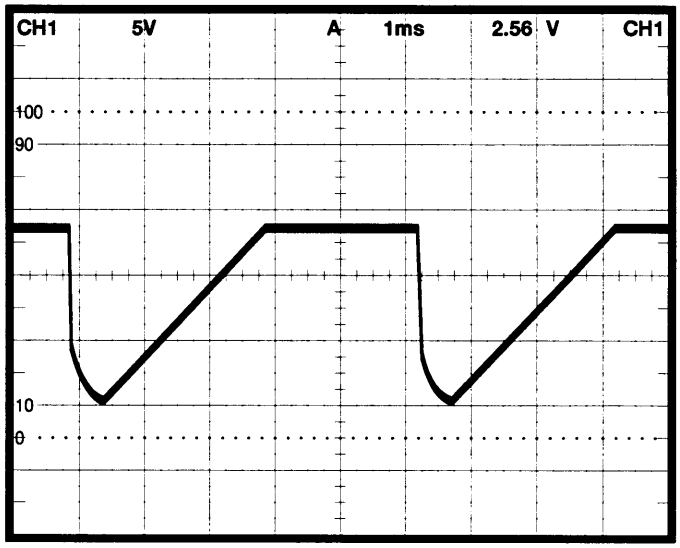


Figure 5-8
Micro Rail and 40-pin Rail Socket Driver Test Waveform for Programming and Master Socket Pin 7

Socket Pin 20

The test ramps the DAC up to approximately 21V (the high voltage pin router clamps the output to 14.5V), turns off and on the high voltage pin router, and turns off DACs (see Figure 5-9).

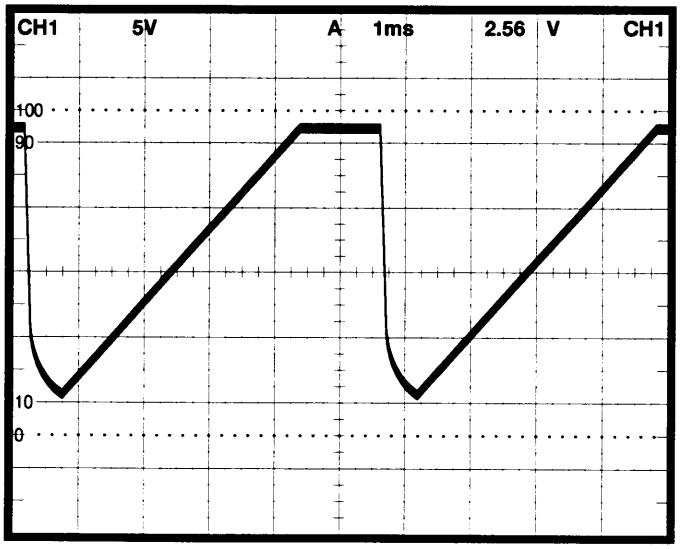
Figure 5-9
Micro rail and 40-pin Rail Socket Driver Test Waveform for Programming Socket Pin 20



Socket Pin 25

The test ramps the DAC up to approximately 21V, turns off and on the high voltage pin router, and turns off DACs (see Figure 5-10).

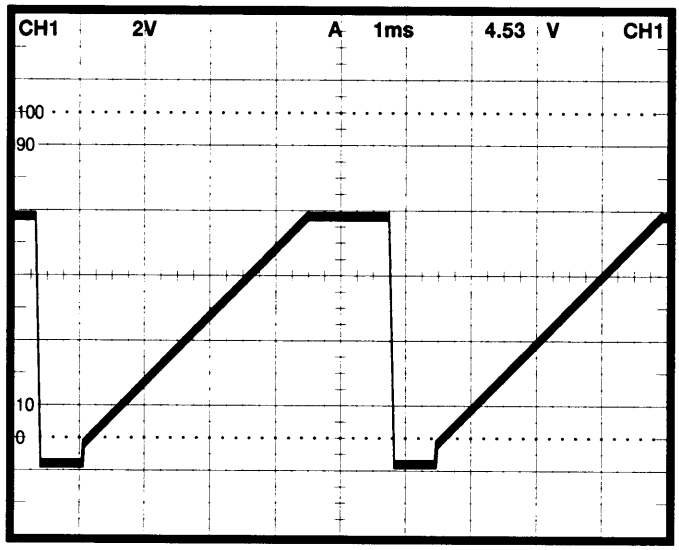
Figure 5-10
Micro rail and 40-pin Rail Socket Driver Test Waveform for Programming Socket Pin 25



Socket Pins 36 and 40

The test ramps the DAC up to approximately 8V and turns off DACs (see Figure 5-11).

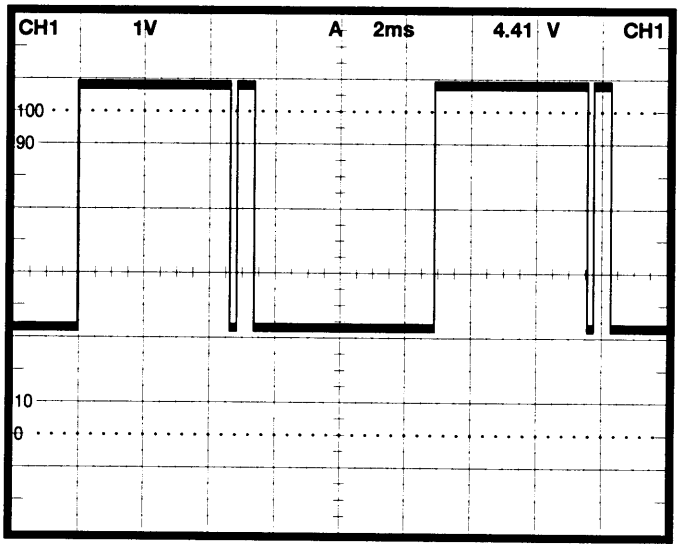
Figure 5-11
Micro rail and 40-pin Rail Socket Driver Test Waveform for Programming Socket Pins 36 and 40



Master Socket Pins 1, 5, 26, and 28

Connect a 512Ω resistor between the pin being tested and ground (pin 11 or 30) before checking the waveform. The test turns the high voltage pin router on and off, and on and off (see Figure 5-12).

Figure 5-12
Micro rail and 40-pin Rail Socket Driver Test Waveform for Master Socket Pins 1, 5, 26, and 28



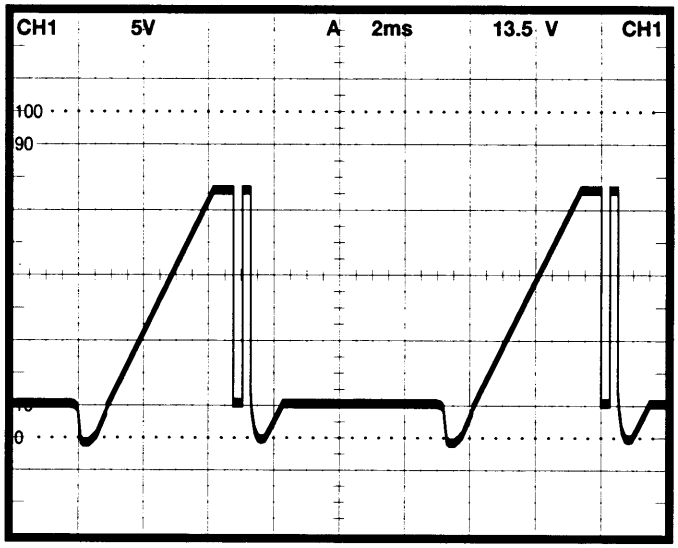
Master Socket Pin 7

The test ramps the DAC up to approximately 21V, turns off and on the high voltage pin router and turns off DACs (see Figure 5-8).

Master Socket Pin 31

The test ramps the DAC up to approximately 21V, turns off and on the high voltage pin router, and turns off DACs (see Figure 5-13).

Figure 5-13
Micro rail and 40-pin Rail Socket Driver Test Waveform for Master Socket Pin 31



Master Socket Pins 36 and 40

These pins should read between 4.75 and 5.25V dc.

28-pin rail

The 28-pin rail Socket Driver Test continuously loops the waveform test patterns shown in Figures 5-14 through 5-16 on the V_{CC} power socket pins (pins 26 and 28) and the V_{PP} power socket pins (pins 1, 22, and 23).

Figure 5-14 shows the V_{CC} waveforms on the master socket and Figure 5-15 shows the V_{CC} waveforms on the programming socket. Figure 5-16 shows the V_{PP} waveforms on the programming socket.

Figure 5-14
28-pin Rail Socket Driver Test Waveform for Master Socket Pins 26 and 28 (V_{CC})

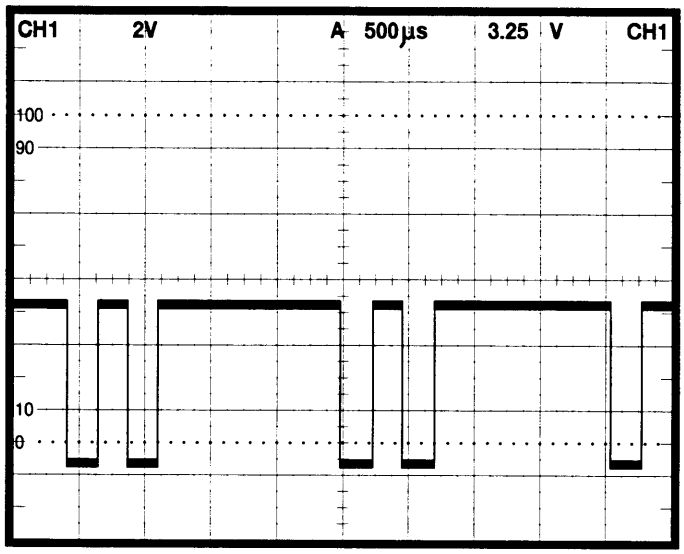


Figure 5-15
28-pin Rail Socket Driver Test Waveform for Programming Socket Pins 26 and 28 (V_{CC})

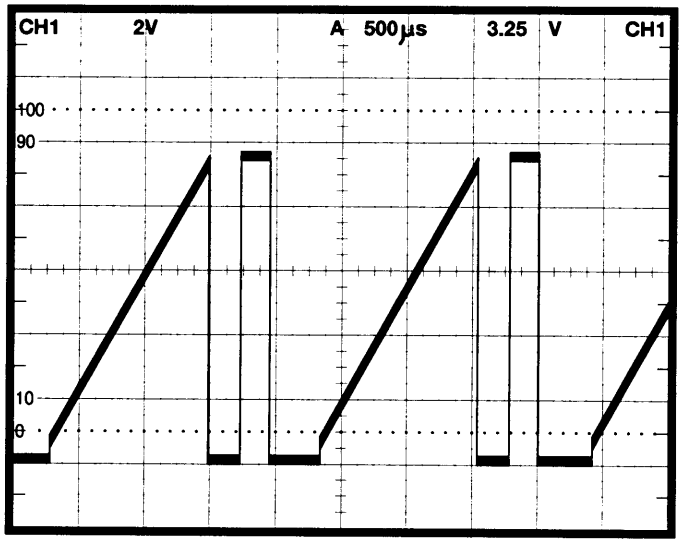
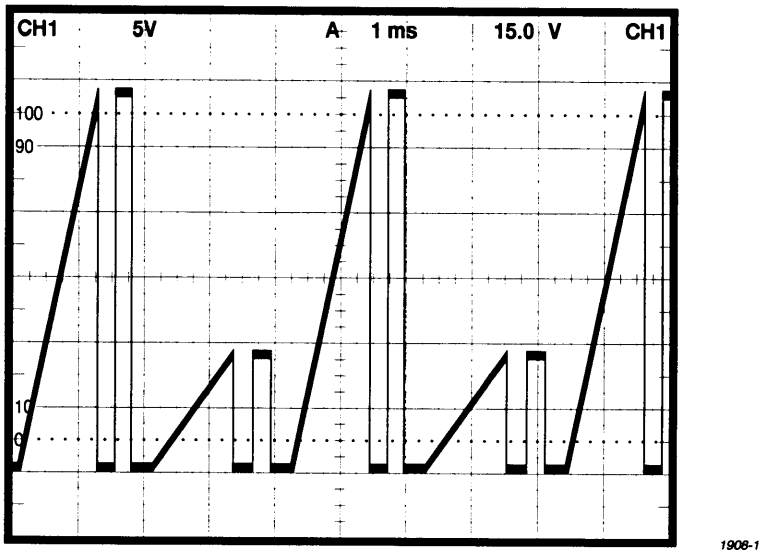


Figure 5-16
28-pin Rail Socket Driver Test Waveform for Programming Socket Pins 1, 22, and 23 (V_{PP})



Socket LED Test

LED test on installed rails

The Socket LED Test applies a continuous pattern to the socket LEDs. The pattern illuminates all sockets in sequence, first as red, then as yellow, then green.

Waveform Observation

Enable/disable continuous device read/write mode

Enables or disables loops through a program or verify operation at the socket. Once enabled, the test performs a copy (write) or verify (read) command for the full address range. The Memory, Micro rail and 40-pin rail Waveform Observation test writes RAM data to the programming socket and FF to the master socket. The 28-pin rail Waveform Observation test alternately writes 55 and AA to the socket.

DRAM and I/O Test

RAM, serial, and parallel ports

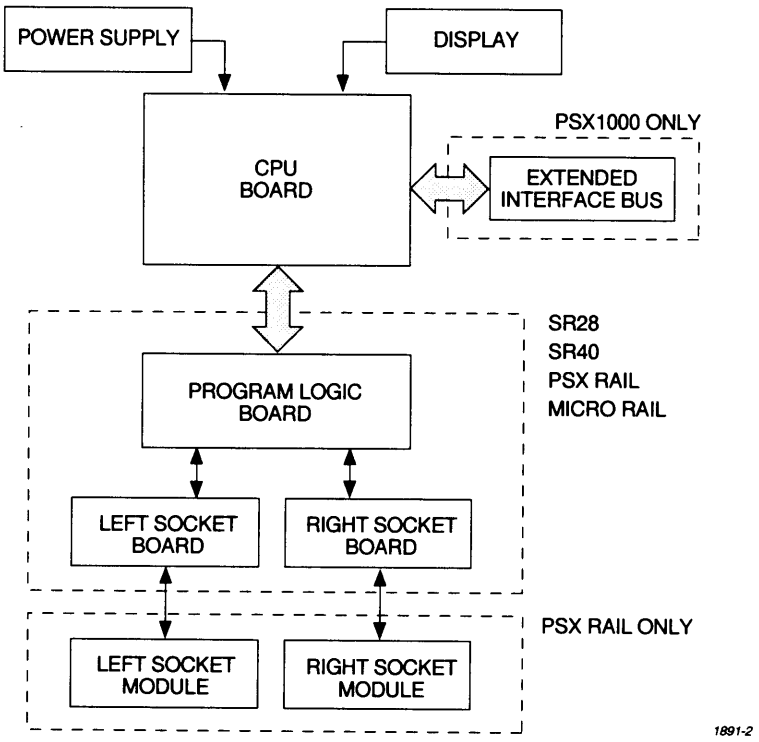
The test continuously performs dynamic RAM, serial and IEEE-488 port tests. The number of passes and failures is displayed. For dynamic RAM errors, the PSX briefly displays the logical RAM address and the bits in error.

Theory of Operation

This section lists the boards contained in the components of the PSX programmers and a general overview of how several of the commands work. Also included are block diagrams of the basic circuitry found on these boards.

Figure 5-17 shows a block diagram of the PSX system.

Figure 5-17
PSX System Block Diagram



List of Boards

- The PSX Control Module contains a CPU board, power supply, and display/keyboard assembly.
- The PSX RAIL contains a logic control board and left and right driver boards.
- Socket modules (used on the PSX RAIL only) each contain a socket board (and 5 daughter boards for non-DIP modules).
- The Micro rail and 40-pin rails contain a logic control board and left and right socket boards.
- The 28-pin rail contains a program logic board and left and right socket boards.

Operation

Copy From Master and Copy From RAM

After selecting **Copy From Master** or **Copy From RAM** from the front panel, you select a device. The CPU software reads the device and sets up the address router and the device testing circuitry. The address router controls the socket pin assignments. The device test circuitry tests for and disables sockets containing bad devices. The first address is written to and read from the master device or RAM. The address and data are then routed to the sockets where the data is written to the devices. If called for by the selected algorithm, a hardware byte verification is performed. Then, the address is increased by an increment of one and written to the master device or RAM so that the next byte of data can be read.

When the data in the last address of the master device or RAM has been written into the receiving device, the CPU begins an automatic verification procedure. The verification procedure checks the data in every master device or RAM address against the data in every corresponding device address either at the high and low voltages selected from the front panel or at the default settings.

Load Thru Port

After you select **Load Thru Port** from the front panel, the programmer enables the port selected in **Set Port Options: Active Port** and the translation format selected in **Set I/O Options: Format**. The first message is translated to read the address and data and to strip the control characters. The data is then written to RAM (data is not written directly from the port to a device). The second message is then translated and the procedure is repeated until the transmission is complete. **Load From Master** and **Load From Set** work similarly. Use **Copy From RAM** once data is loaded into RAM.

Block Diagrams

This section includes block diagrams of the major circuit boards contained in the components of the PSX programmers.

CPU Boards

Figure 5-18 shows a block diagram of the PSX1000 CPU board. Figure 5-19 shows a block diagram of the PSX500 CPU board.

Figure 5-18
PSX 1000 CPU Board Block Diagram

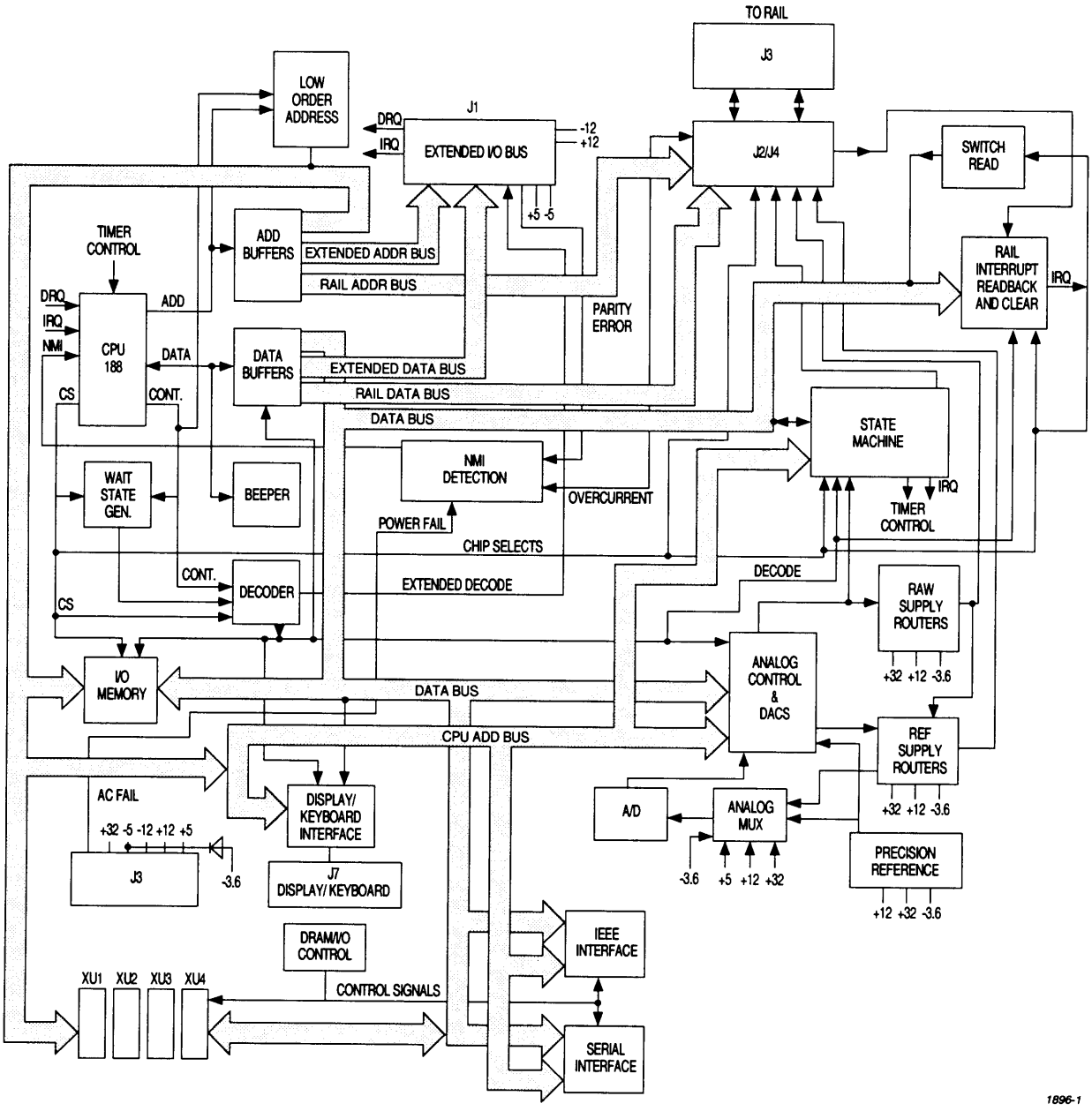
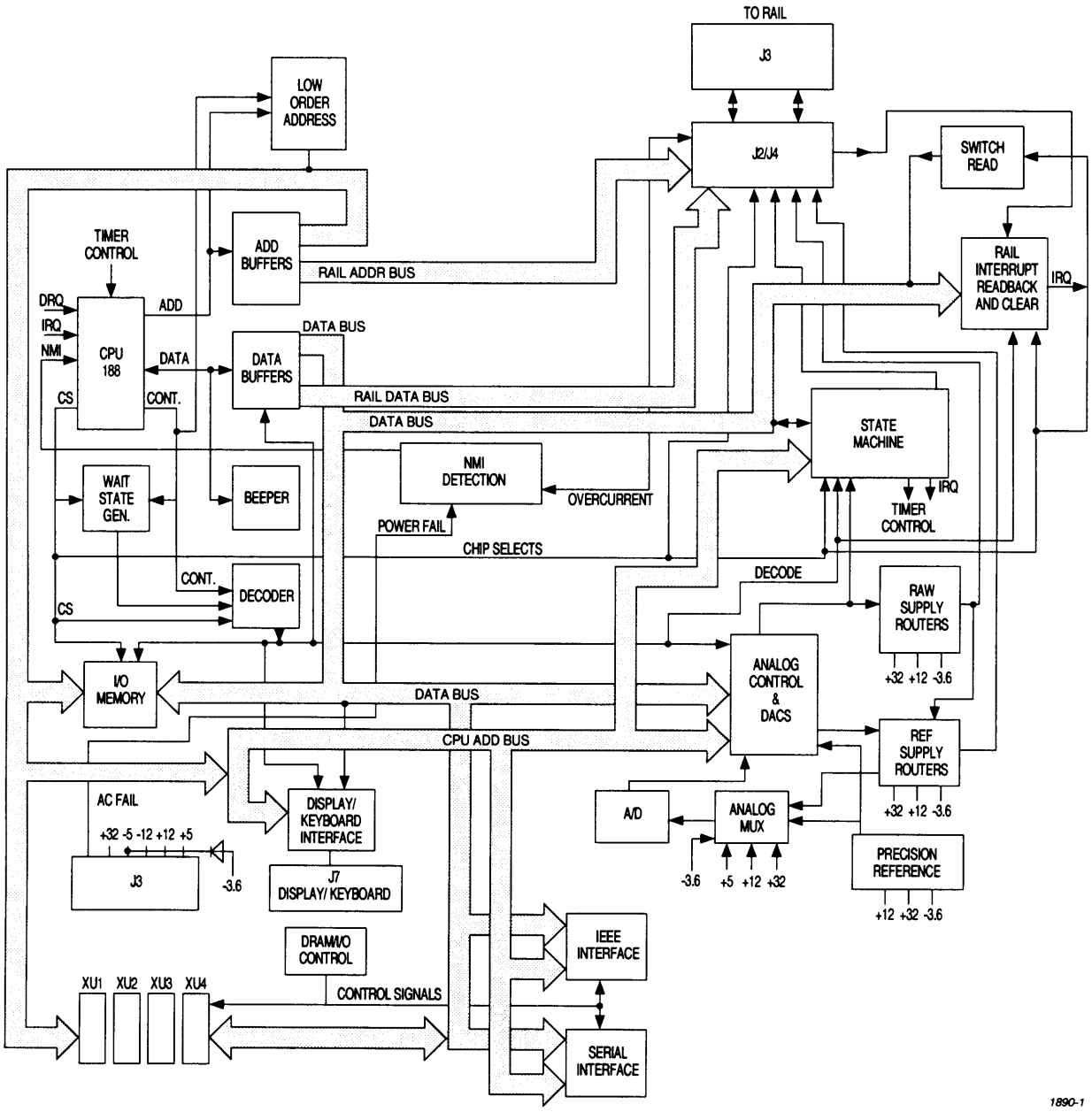


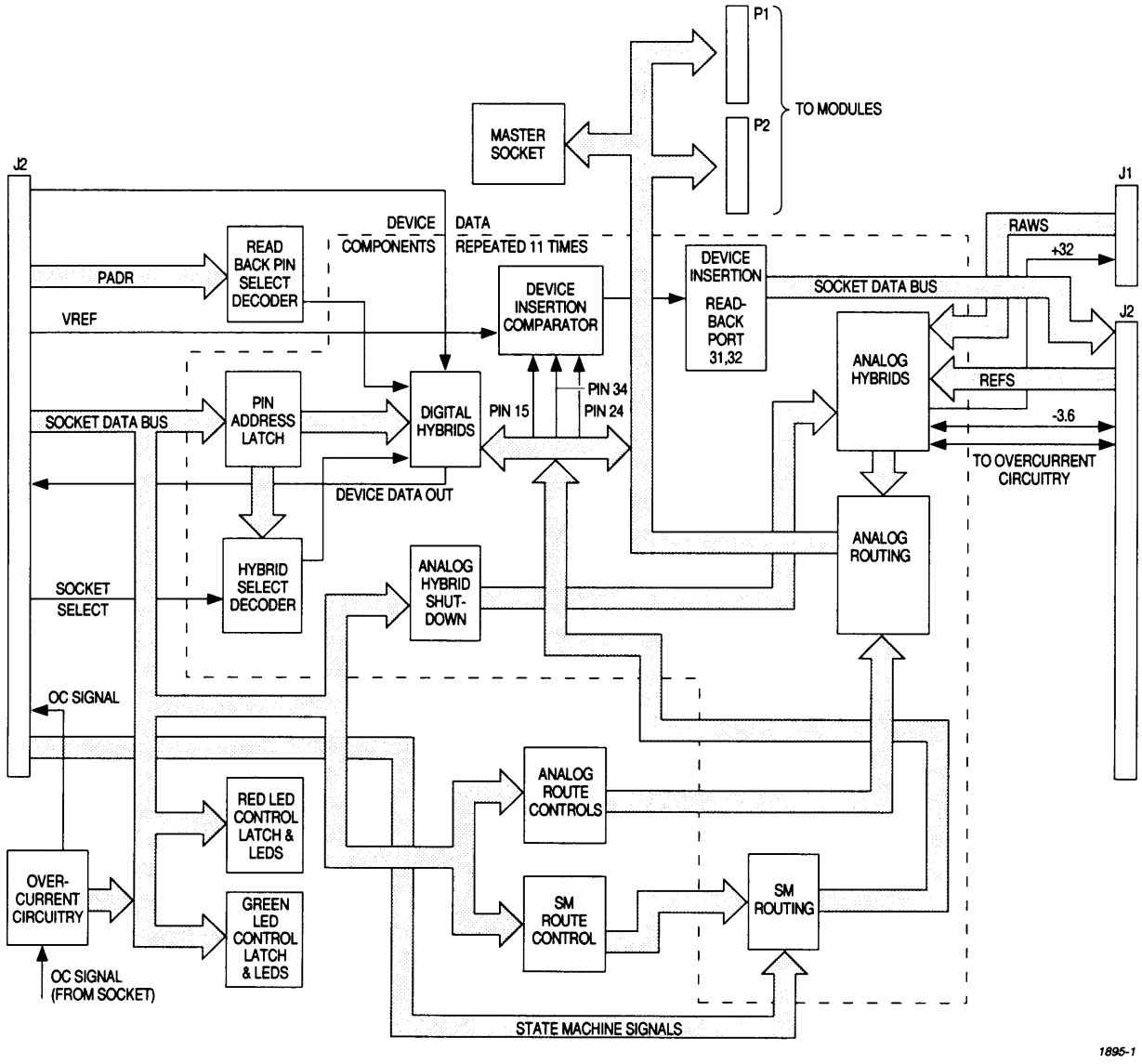
Figure 5-19
PSX500 CPU Board Block Diagram



PSX RAIL Driver Board

Figure 5-20 shows a block diagram of the PSX RAIL driver board.

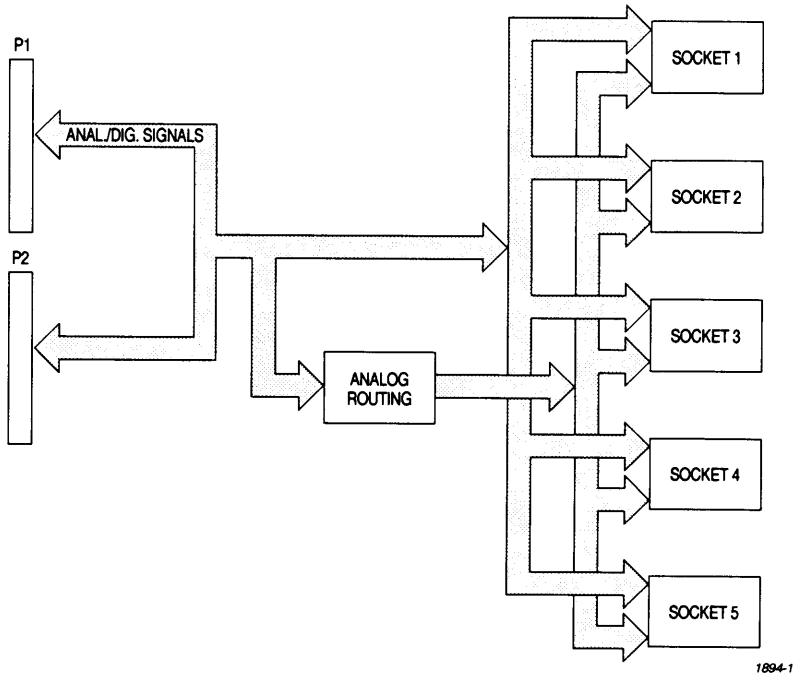
Figure 5-20
PSX Rail Driver Board Block Diagram



Socket Module Socket Board

Figure 5-21 shows a block diagram of a socket module socket board. Socket modules are used in conjunction with the PSX RAIL only.

Figure 5-21
Socket Modules Socket Board Block Diagram



Socket Boards

Figure 5-22 shows a block diagram of the Micro rail and 40-pin rail socket board. The left and right socket boards work as a single unit. The right socket board has a master socket, five programming sockets and their associated circuitry. The left socket board has five programming sockets.

Figure 5-22
Micro rail and 40-pin Rail Driver Board Block Diagram

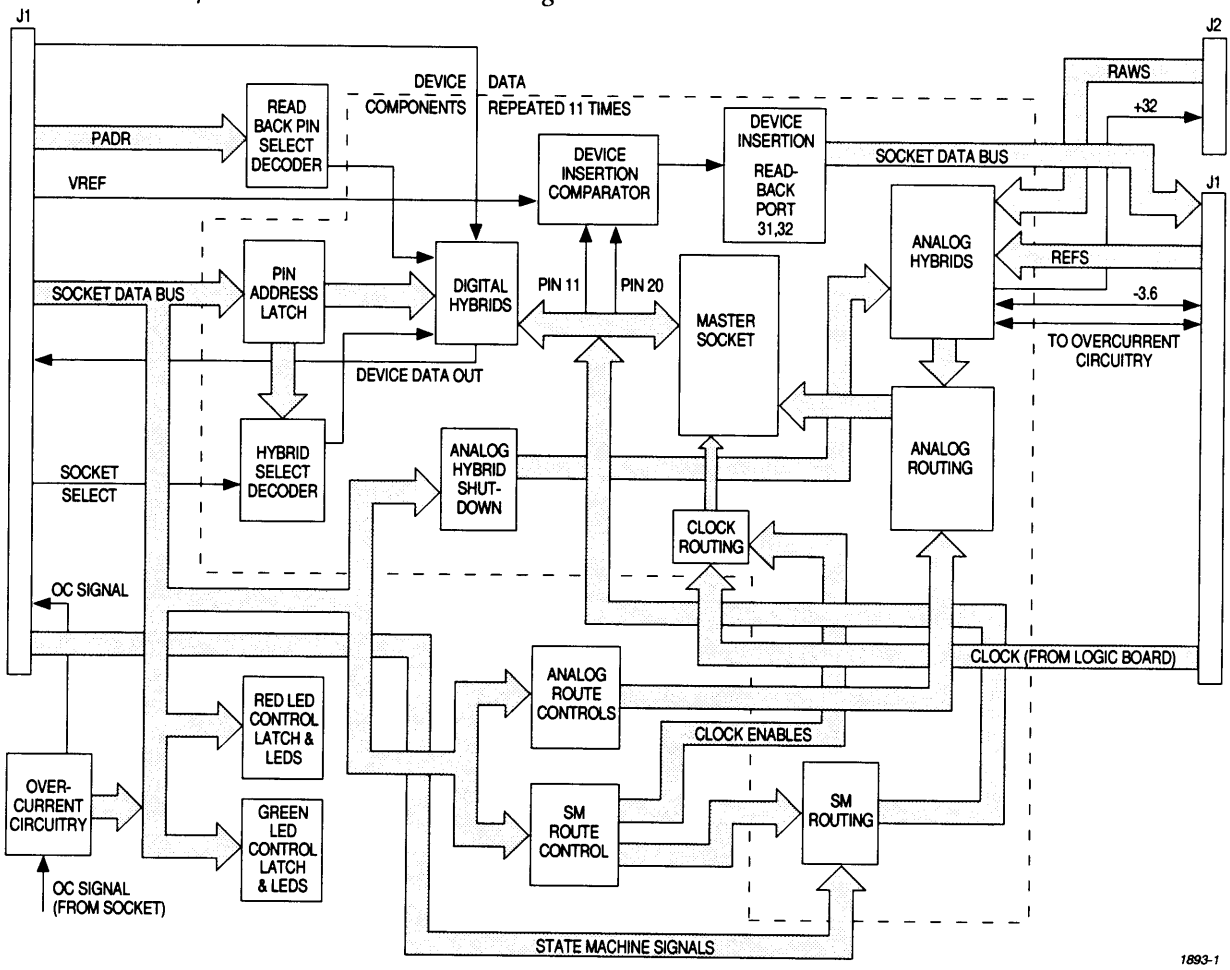
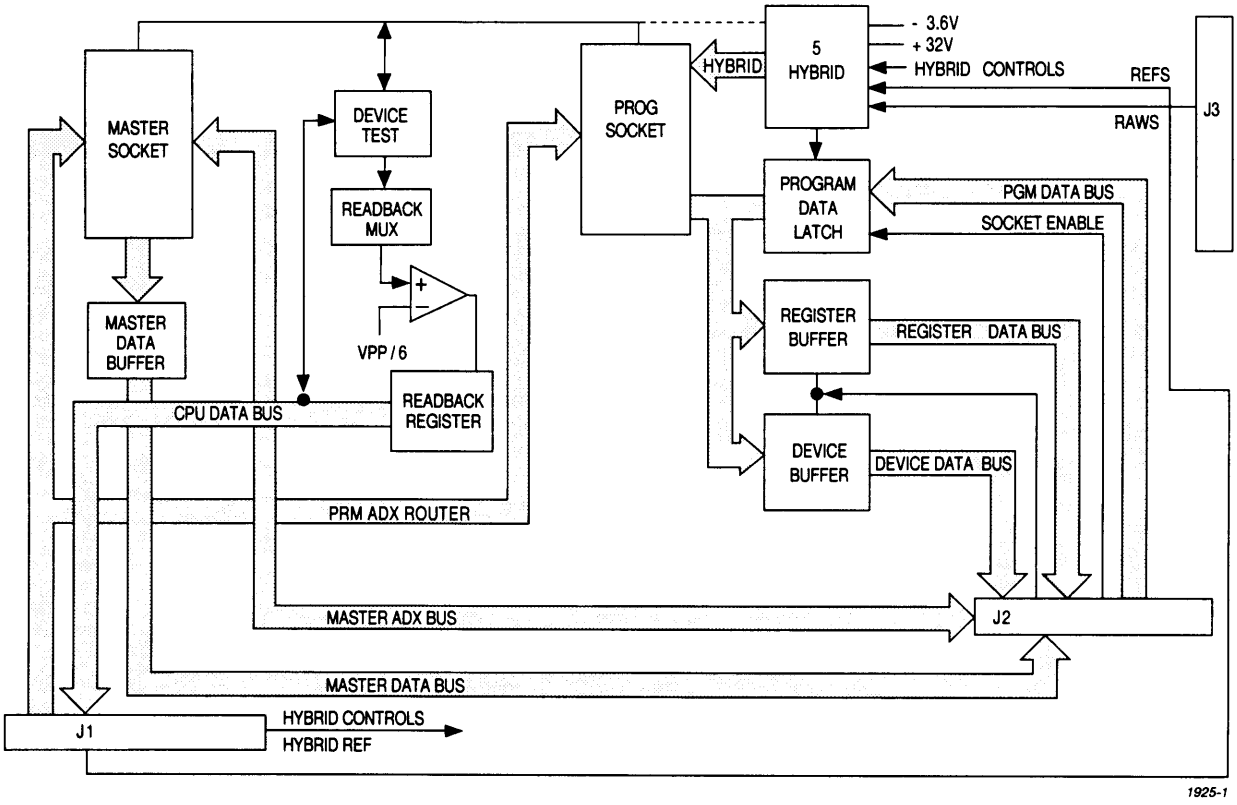


Figure 5-23 shows a block diagram of the 28-pin rail socket board. The left and right socket boards work as a single unit. The right socket board has a master socket, seven programming sockets and their associated circuitry. The left socket board has eight programming sockets.

Figure 5-23
28-pin Rail Socket Board Block Diagram



Logic Control Boards

Figure 5-24 on the following page shows a block diagram of the PSX RAIL and Micro rail logic control board. Figure 5-25 shows a block diagram of the 40-pin rail logic control board. Figure 5-26 shows the 28-pin rail program logic board.

Figure 5-24
PSX RAIL and Micro Rail Logic Control Board Block Diagram

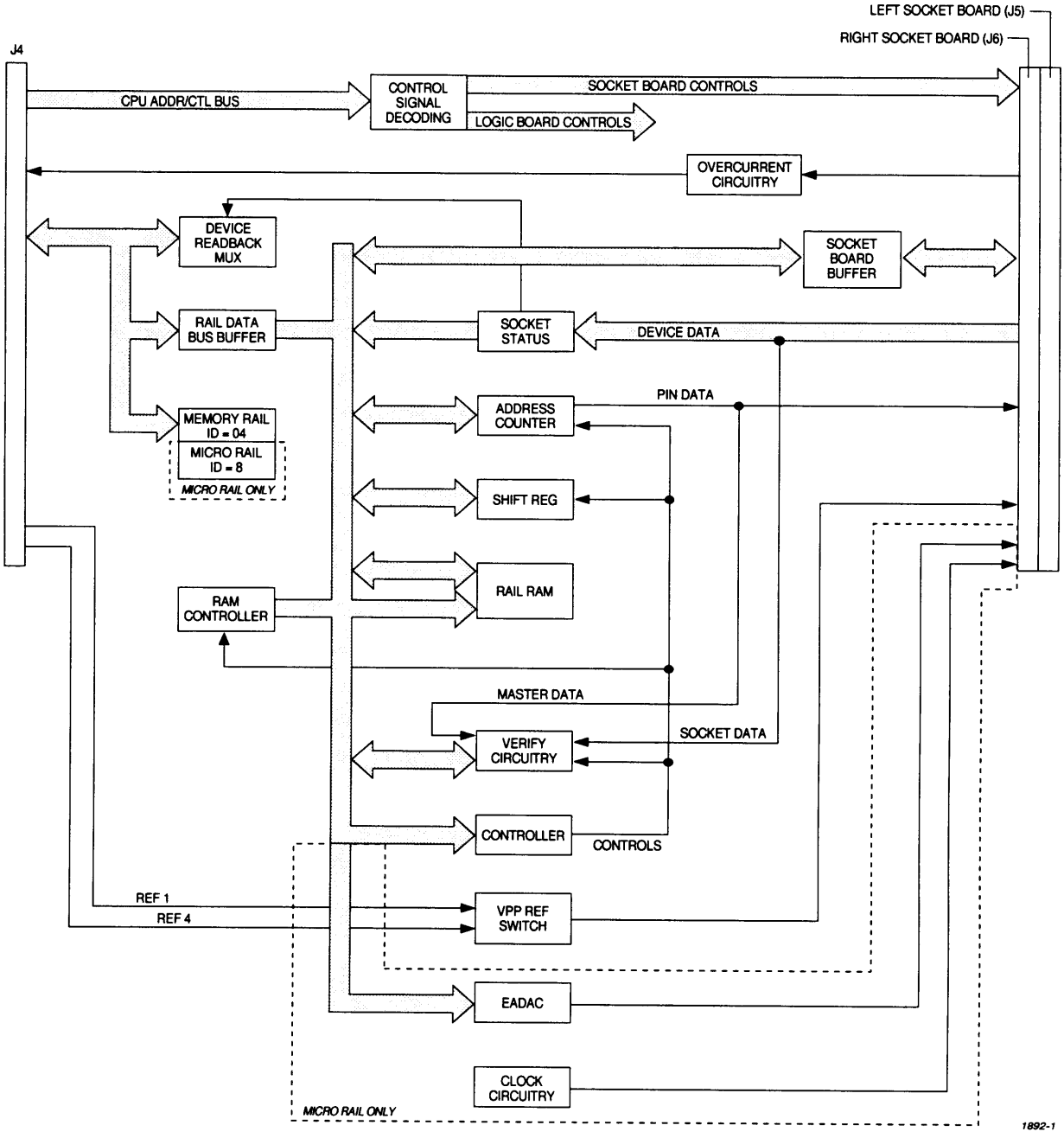


Figure 5-25
40-pin Rail Logic Control Board Block Diagram

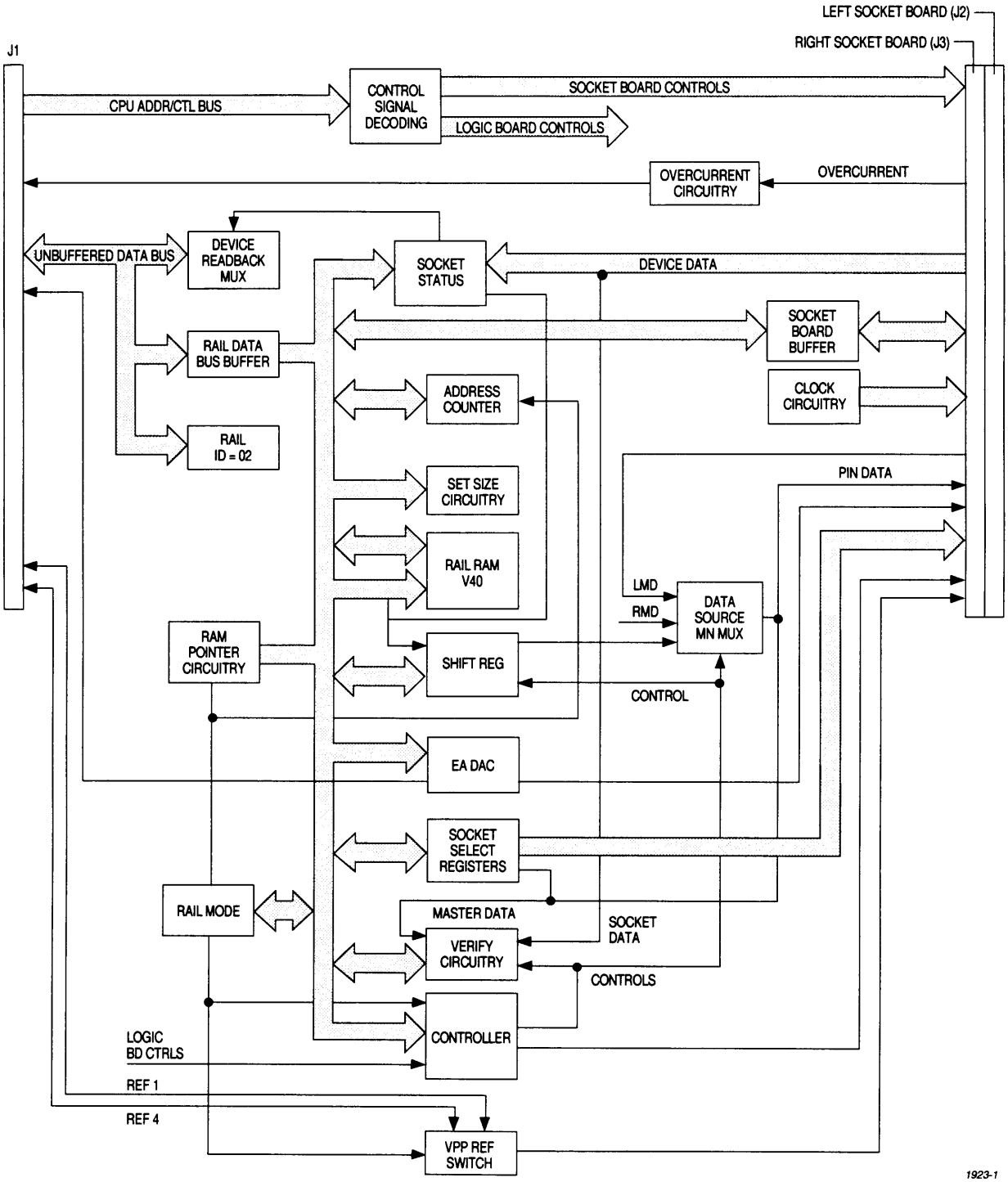
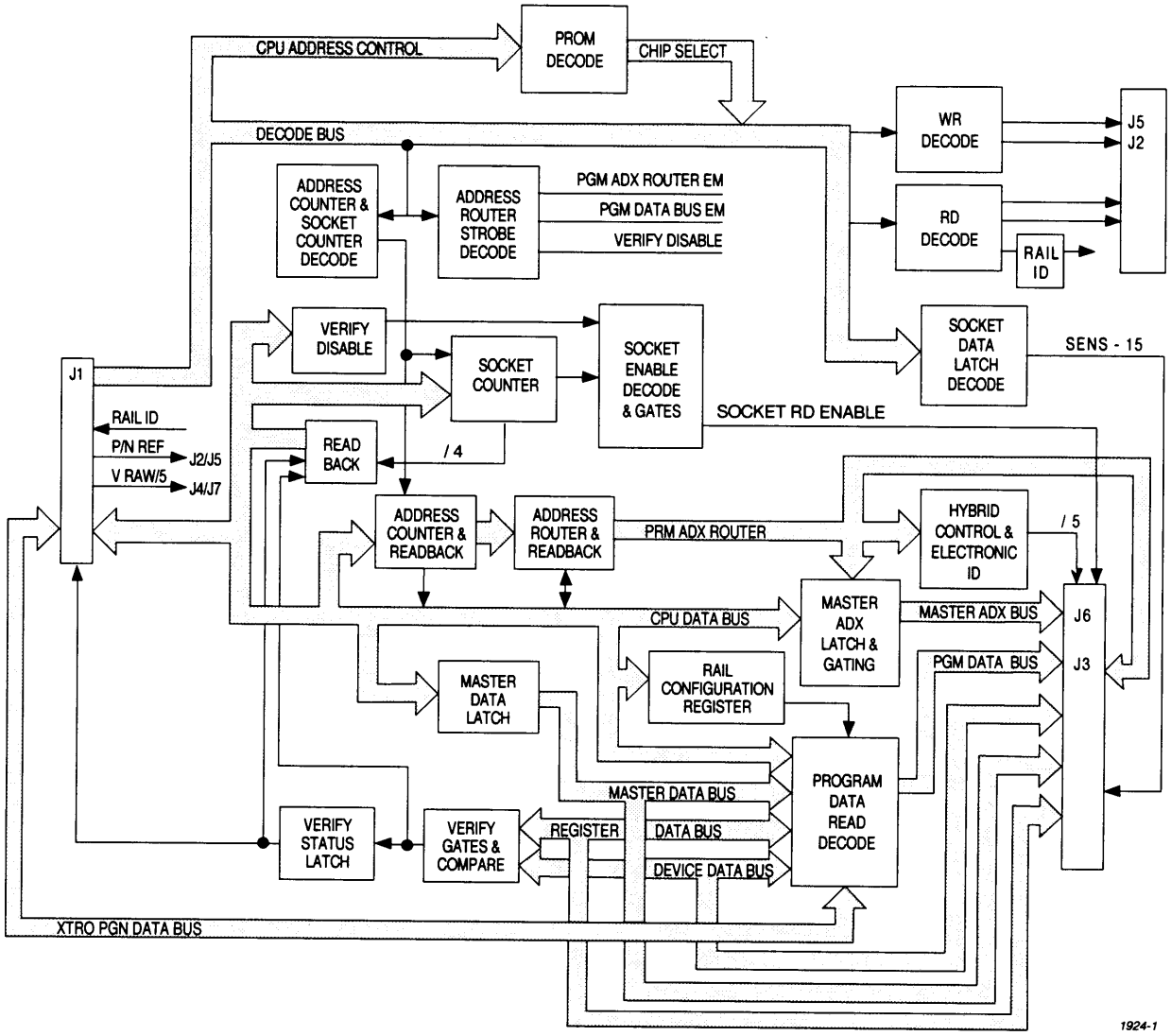


Figure 5-26
28-pin Rail Logic Control Board Block Diagram



6 Messages

This chapter includes an alphabetical list of the PSX messages with a description of the probable causes and corrective actions.

Some messages have been assigned a computer remote control (CRC) code that can be incorporated into a CRC driver. These CRC codes appear in parentheses in the message.

For more information, contact your nearest Customer Support office as listed in Appendix A for assistance.

Note: We recommend that you contact you nearest Customer Support office for board-level service or repair.

X V REFERENCE ERROR

The system XV supply (where X is the voltage value) is not within the appropriate range. The most likely cause of the failure is the CPU board (5V, 12V, and 32V) or power supply (10V). Suspect an out-of-performance verification power supply (see Appendix D for performance verification instructions), analog MUX, A/D converter or reference chip and associated circuitry. Contact your nearest Customer Support office for assistance.

***** AC POWER FAILURE *****

The AC input power went below the recommended operating voltage. Check the input line voltage and power supply on the control module.

ADDR CHECK INCORRECT (84)

The address checksum field is not the same as the calculated value. Repeat the operation that caused the error. If the error persists, check the transmitter source.

ADDRESS COUNTER ERROR

A write/read test to the address counter failed. The most likely cause of the failure is in the 28-pin rail logic board. Contact your nearest Customer Support office.

ADDRESS INCREMENT ERROR

The address counters failed to increment properly. The most likely cause of the failure is the Micro rail or PSX RAIL assembly. Contact your nearest Customer Support office.

ADDRESS INVALID (84)

Characters in the address field are neither hex or octal. Try the operation again. If the error persists, check the transmitter source.

ADDRESS ROUTER ERROR

The programmer attempted to route the upper 5 address lines, A11 through A15, to all routable socket pins, (pins 1, 2, 20, 22, 23, 26, 27, 28) and read back the appropriate routing through the read back buffer. The most likely cause of the failure is in the 28-pin rail logic board. Contact your nearest Customer Support office.

ADDRESS SETUP ERROR

The controller failed to run the address setup as defined. The most likely cause of the failure is the Micro rail or PSX RAIL assembly. Contact your nearest Customer Support office.

ADDRESS SPEEDUP ERROR

The address speedup circuit failed to limit the address setup to only one bit. The most likely cause of the failure is the Micro rail or PSX RAIL assembly. Contact your nearest Customer Support office.

AUTOCAL ERROR

The programmer attempted to perform an autocalibration on the REF*xx* lines and encountered a divide by zero condition. A REF line may be stuck at some voltage. The most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

AUTOCALIBRATION ERROR (CE)

An error was detected during an attempt to autocalibrate. The unit may need servicing or calibration (see Appendix D). Contact your nearest Customer Support office.

BAD INTERRUPT-AUTO PROGM

The state machine was set to the Auto Program Mode and started. An interrupt was received, but the state machine did not go through the required number of cycles. Suspect the CPU board. Contact your nearest Customer Support office.

Note: For any state machine test to function properly, no other diagnostic errors can occur.

BAD INTERRUPT-AUTO VERFY

The state machine was set to the Auto Verify Mode and started. An interrupt was received, but the state machine did not go through the required number of cycles. Suspect the CPU board or rail logic board. Contact your nearest Customer Support office.

Note: For any state machine test to function properly, no other diagnostic errors can occur.

BAD INTERRUPT-PROG VERFY

The state machine was set to the Program Verify Mode and started. An interrupt was received, but the state machine did not go through the required number of cycles. Suspect the CPU board or rail logic board. Contact your nearest Customer Support office.

Note: For any state machine test to function properly, no other diagnostic errors can occur.

BAD INTERRUPT-QUICK PROG

The state machine was set to the Quick Program Mode and started. An interrupt was received, but the state machine did not go through the required number of cycles. Suspect the CPU board or rail logic board. Contact your nearest Customer Support office.

Note: For any state machine test to function properly, no other diagnostic errors can occur.

BITSIZE ERROR (30)

The bitsize selected is incompatible with the data width of the device type selected. For example, setting a bitsize (*nn*22) of 24 and attempting to perform an operation on a 16-bitwide device causes a Bitsize Error. Valid bitsizes would be 16, 32, 48, and 64 (any integer multiple of the device word width).

BLOCK LIMIT ERROR (27)

The size of the data to be programmed exceeds the available user RAM. The begin RAM address, plus the product of the blocksize and wordsize [R + (B x W)] exceed the end of user RAM. Increase the amount of user RAM or reduce the block size (limit).

BUFFER OVERFLOW (48)

Serial port buffer overflow. Indicates that a handshake is needed (X-On/X-Off or RTS/CTS), or that the baud rates are incompatible.

BYTE COUNT INVALID (84)

The byte count field is not in hexadecimal.

CALIBRATION ERROR

After performing an autocalibration, an attempt to drive the REF*xx* lines to a known voltage using the calibration coefficients failed. The most likely cause of the failure is the CPU board. (See Appendix D.) Contact your nearest Customer Support office.

CHECKSUM INCORRECT (82)

The checksum field is not the same as the calculated value.

CHECKSUM INVALID (84)

The checksum field is not a valid hex or octal number.

CLOCK FREQUENCY ERROR

This error can occur when using a Micro rail or 40-pin rail. Suspect the socket boards or rail logic board. Contact your nearest Customer Support office.

CONTROLLER READ ERROR

The CPU wrote a data pattern to the master socket on pins 1 through 16. The controller then read back the master socket and the pattern read did not match the pattern previously written. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

CONTROLLER VERIFY ERROR

The controller failed to perform a verify function. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

CONTROLLER WRITE ERROR

The controller wrote a data pattern to the master socket. The controller then read the master socket and found that the pattern read did not match the pattern written. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

CPU DMA ERROR

A check of the CPU DMA registers or an actual movement of data using DMA in RAM did not function as expected. The most likely cause of the failure is the CPU board. Contact your nearest Customer Support office as listed in Appendix A for assistance.

CPU IRQ ERROR

A check of the CPU IRQ registers or the generation of internal CPU interrupts did not function as expected. The most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

CPU TIMER ERROR

A check of the CPU timer registers or a time-out test did not function as expected. The most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

DATA INVALID (84)

Characters in the data field are not hexadecimal or octal, or there are not enough characters to form a data field.

DATA READ BACK ERROR

The controller failed to do a data read back function. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

DATA SETUP ERROR

The controller failed to run the data setup as defined. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

DEVICE DATA SHORTS (33)

The device contains shorts between the data lines. The device cannot be correctly programmed or read. Replace the device.

DEVICE DETECTION ERROR

A device is present in a socket when performing diagnostics on the 28-pin rail. Remove the installed device to correct the error.

The position-sensing pins (pins 2, 3, and 15) on each socket were checked for valid voltage levels under three conditions.

1. The CMOS switches were left on and these pins were pulled up to 5V through their corresponding registers.
2. The CMOS switches were left on and these pins were pulled up to ground through their corresponding registers.
3. The CMOS switches were turned off and the voltage levels checked. The most likely cause of the failure is in the 28-pin rail assembly. Suspect all device-sensing circuitry and all registers associated with sockets pins 2, 3, and 15.

DEVICE DISABLE ERROR (31)

The device failed to disable when unselected. The device is faulty. Replace the device.

DEVICE ENABLE ERROR (32)

The device failed to enable when selected. The device is faulty. Replace the device.

DEVICE INSERTION ERROR (36)

The device has been inserted into the socket incorrectly. It may be backwards or misjustified, or some pins may not be making complete contact with the socket. Reinsert the device and try the operation again.

If the programmer displays this error when you know the device is inserted correctly, the most likely cause of the failure is the socket module. Contact your nearest Customer Support office.

DEVICE NONBLANK (20)

The device to be programmed already has data programmed into it. You can still program the device if no illegal-bit error is detected.

DIGITAL PIN ERROR

An error was found in the digital pin test on the socket(s) with a red LED. Use the Socket TTL Test in the **Diagnostics** menu to check for pins that do not toggle properly.

The most likely cause of the failure is in the Micro rail or 40-pin rail assembly or PSX RAIL driver board. The next most likely cause of the failure is the logic control board in the PSX RAIL, Micro, or 40-pin rail assembly. If any of the LEDs are lit up, suspect the corresponding socket board(s). Contact your nearest Customer Support office.

DRAM SIMM JX ERROR

Attempting a write/read test on already detected RAM failed. The most likely cause of the failure is the CPU board or bad DRAM. Suspect the RAM SIMMs or refresh circuitry. Try replacing the SIMMs (see the "Updating Firmware or Installing a RAM Upgrade" section on page 7-11 for instructions). Contact your nearest Customer Support office.

EEPROM ERROR

If this error is encountered during normal operation, the system may prompt ENTER TO INITIALIZE.

Pressing **ENTER** causes the programmer to attempt to initialize non-volatile memory back to the factory default values. If the programmer cannot initialize memory, it displays UNABLE TO INITIALIZE. No other operations can be performed until the EEPROM is replaced.

ENX ROUTER ERROR

The ENX line from the state machine (where X is the number of the line) was unsuccessfully routed to all routable pins. Suspect the CPU board and check the hardware associated with an address router error on the rail. Contact your nearest Customer Support office.

EXCESSIVE SOCKET CYCLES

The sockets have reached the warranted number of insertion cycles per socket. You should replace the sockets and clear socket cycles at this interval. Contact your nearest Customer Support office as listed in the Preface to order a socket replacement kit. See the "Socket Warranty and Replacement" section on page D-2 for replacement kit part numbers and replacement instructions.

This message can also occur when the lithium battery is removed or needs replacement. Due to environmental concerns, the battery must be disposed of in a specific manner. See the "Replacing the Line Fuse" section on page 7-9 for instructions on replacing and disposing of the battery.

FALL TIME ERROR

Suspect the rail socket boards. Contact your nearest Customer Support office.

FATAL ERROR: *XXX*

An unexpected interruption occurred. *XXX* is the type of error. Contact your nearest customer Support office.

FIRMWARE CHECKSUM ERROR

The calculated checksum over all firmware PROMs does not match the value stored in programmer PROM. Check for an incorrectly installed or faulty PROM (in socket U3 on the CPU board). Also check for an incorrect security PAL for the installed EPROM.

FORCE IDLE ERROR

The controller's busy line was detected as active after it was forced to stop. The most likely cause of the failure is the logic control board in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

FORCED MISVERIFY FAILURE

The verifier failed to mark a socket as misverified. The most likely cause of the failure is in the emory, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

FRAMING ERROR (41)

Indicates a serial input start/stop bit mismatch. Repeat the operation. Check that the baud rate of the PSX and the transmitter source match.

GROUND PIN ERROR

Suspect the PSX RAIL, Micro, or 40-pin rail socket boards. Contact your nearest Customer Support office.

HI ADDR REG CLEAR ERROR

The high address register failed to clear. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

HI ADDRESS REG R/W ERROR

The high address register failed the read/write test. The most likely cause of the failure is the board in the PSX RAIL, Micro, or 40-pin rail assembly. The next most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

HI SHIFT REG R/W ERROR

The high-shift register failed the read/write test. logic control board in the PSX RAIL, Micro, or 40-pin rail assembly. The next most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

IEEE-488 CHIP ERROR

Attempting a write/read test on the IEEE-488 control registers failed. The most likely cause of the failure is the CPU board or IEEE cable. Contact your nearest Customer Support office.

IEEE-488 DMA ERROR

An attempt to write/read the DMA control register did not perform as expected. The most likely cause of the failure is the CPU board or IEEE cable. Contact your nearest Customer Support office.

IEEE-488 IRQ ERROR

Attempting to force an interrupt from the IEEE-488 controller failed. The most likely cause of the failure is the CPU board or IEEE cable. Contact your nearest Customer Support office.

IEEE-488 LINK ERROR

Attempting to perform a write/read test over the IEEE-488 link failed. The most likely cause of the failure is the CPU board or IEEE cable.

ILLEGAL BIT ERROR

The device to be programmed has data in it that cannot be written over. Erase the device or replace the device with a blank device before attempting to program again. Contact your nearest Customer Support office.

ILLEGAL BIT FAILED

The verify circuitry did not detect an illegal bit when one was expected. The most likely cause of the failure is in the 28-pin rail assembly. Contact your nearest Customer Support office.

INPUT COMPARE ERROR (52)

The data input from the port is not the same as the data in RAM.

INVALID DEVICE SELECTED (25)

The device type selected is not valid for the operation selected. This condition can occur when attempting to do EEPROM tests on a non-EEPROM device. Specify a valid device type.

INVALID ELECTRONIC ID (83) (3C)

The electronic ID read from the device is not correct for the device type selected, or is not present at all.

INVALID LOWER RAIL ID

The ID read from the lower rail is not correct. The most likely cause of the failure is the CPU board. The next most likely cause of the failure is the logic control board in the rail assembly. Contact your nearest Customer Support office.

INVALID SET (3E)

This error can occur during either a load or a program/verify operation.

During a load operation, the number of devices present or that passed device testing is less than the specified set size. Insert a valid set of devices.

During a programming or verifying operation, the product of the setsize and wordsize [S x W] exceeds the number of device sockets. Specify a valid setsize and wordsize so that their product is valid. Also, the devices selected cannot support set operations, such as microprocessors.

INVALID UPPER RAIL ID

The ID read from the upper rail is not correct. This message can occur when the installed rail is newer than the firmware of the base. (See Table 2-2 on page 2-12 for a list of rails and supporting software.) Other likely culprits for the error are the CPU board or the logic control board in the rail assembly. Contact your nearest Customer Support office.

I/O TIMEOUT ERROR (46)

Data was not received over the active port in the required amount of time. Repeat the operation. If the error persists, verify the cable connections.

KEYBOARD ERROR

An attempt to clear the keyboard controller did not function correctly. Suspect the CPU board, a stuck key on the keyboard, or cable. Contact your nearest Customer Support office.

LCD DISPLAY ERROR

A write/read of display RAM failed. The most likely cause of the failure is the CPU board. Suspect the display. Contact your nearest Customer Support office.

LEFT SOCKET BRD MISSING

The left socket board cannot be detected as installed in the PSX RAIL, Micro, or 40-pin rail. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

LO ADDR REG CLEAR ERROR

The low address register failed to clear. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

LO ADDRESS REG R/W ERROR

The low address register failed the read/write test. The most likely cause of the failure is the logic control board in the PSX RAIL, Micro, or 40-pin rail assembly. The next most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

LO SHIFT REG R/W ERROR

The low shift register failed the read/write test. The most likely cause of the failure is the logic control board in the PSX RAIL, Micro, or 40-pin rail assembly. The next most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

MASTER INSERTION ERROR (37)

Either the master device has been inserted incorrectly or is not present (if the operation requires a master). Correctly insert the master device.

If the programmer displays this error when you know the device is inserted correctly the most likely cause of the failure is the rail socket board. Contact your nearest Customer Support office.

MASTER NOT SUPPORTED (2B)

A master operation was attempted with a device that does not support master operations with the current PSX hardware configuration.

MASTER ROUTER ERROR

Suspect the 28-pin rail logic board. Contact your nearest Customer Support office.

MID ADDR REG CLEAR ERROR

The middle address register failed to clear. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

MID ADDRESS REG R/W ERROR

The middle address register failed the read/write test. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

MISVERIFY DETECT FAILED

The verify circuitry did not detect a misverify when one was expected. The most likely cause of the failure is in the 28-pin rail assembly. Contact your nearest Customer Support office.

***XX* MOD CHECKSUM ERROR**

The installed module (where *XX* is upper left (UL), upper right (UR), lower left (LL), or lower right (LR)), has a checksum error in the internal initialization data. Contact your nearest Customer Support office

***XX* MOD NOT INITIALIZED**

The installed module (where *XX* is upper left (UL), upper right (UR), lower left (LL), or lower right (LR)), is not initialized. Contact your nearest Customer Support office.

MODE REGISTER R/W ERROR

The mode control register failed the read/write test. The most likely cause of the failure is the PSX RAIL, Micro, or 40-pin rail assembly. The next most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

NO DEVICES PRESENT (3B)

During a programming or verifying operation, the programmer does not detect devices in the module. Insert the devices.

NO ELECTRONIC ID (81) (3D)

No electronic ID was read from the device. Either the device does not support electronic ID, or the device is faulty.

NO INTERRUPT-AUTO PROGM

The state machine was set to Auto Program Mode and started. An interrupt was not received at the CPU from the state machine. Suspect the CPU board. Contact your nearest Customer Support office.

Note: For any state machine test to function properly, no other diagnostic errors can occur.

NO INTERRUPT-AUTO VERFY

The state machine was set to Auto Verify Mode and started. An interrupt was not received at the CPU from the state machine. Suspect the CPU board. Contact your nearest Customer Support office.

Note: For any state machine test to function properly, no other diagnostic errors can occur.

NO INTERRUPT-PROG VERFY

The state machine was set to the Program Verify Mode and started. An interrupt was not received at the CPU from the state machine. Suspect the CPU board and socket counter on the rail. Contact your nearest Customer Support office.

Note: For any state machine test to function properly, no other diagnostic errors can occur.

NO INTERRUPT-QUICK PROG

The state machine was set to the Quick Program Mode and started. An interrupt was not received at the CPU from the state machine. Suspect the CPU board and the socket counter on the rail. Contact your nearest Customer Support office.

Note: For any state machine test to function properly, no other diagnostic errors can occur.

NO RAILS

Rails are either not installed, or installed, but not making a connection with the PSX control module. Reinstall the rail. See "Disassembling the PSX" on page 7-3 for instructions on how to remove a rail; see "Installing Rail(s)" on page 2-2 for instructions on how to attach a rail to the control module. If the programmer continues to display this message, suspect the rail. Contact your nearest Customer Support office.

NO RAILS DETECTED (26)

The incorrect socket rail or no socket rail is installed for the device selected. Power down the programmer and install the correct socket rail. See "Disassembling the PSX" on page 7-3 for instructions on how to remove a rail; see "Installing Rail(s)" on page 2-2 for instructions on how to attach a rail to the control module.

OPERATION STOPPED (FF)

The operation was stopped by the operator.

******** OVERCURRENT *******

Check if a device is inserted into a socket. If so, remove the device. If not, the socket indicated is causing an overcurrent. The most likely cause of the failure is the module socket board. Contact your nearest Customer Support office.

OVERCURRENT ERROR (38) (39)

More current than allowed was drawn by the device during a read or write operation. This discontinues all operations. The device is faulty. Replace the device.

OVERCURRENT TEST FAILURE

Suspect rail socket boards. Contact your nearest Customer Support office.

OVERRUN ERROR (42)

Input character lost in serial port receive buffer. Repeat the operation. If the error persists, check the baud rate setting and/or install a hardware handshake system (RTS/CTS).

PGM ROUTER ERROR

The PGM line from the state machine was unsuccessfully routed to all routable pins. Check the same hardware associated with an address router error. Contact your nearest Customer Support office.

PIN *XX* COMPARATOR ERROR

The analog comparator on pin *XX* (where *XX* is the number of the pin) of the device socket failed to give the correct reading. The most likely cause of the failure is the socket module assembly. Contact your nearest Customer Support office.

PIN *XX* GROUND FAILURE

Pin *XX* (where *XX* is the number of the pin) of the device socket failed to pull low when the ground switch was turned on. The most likely cause of the failure is the PSX RAIL, Micro, or 40-pin rail assembly. Suspect the socket boards on the Micro rail or 40-pin rail. Suspect the socket modules on the PSX RAIL. Contact your nearest Customer Support office.

PIN *XX* STATE MACHINE ERR

Pin *XX* (where *XX* is the number of the pin) of the device socket failed when the state machine routed signal was applied. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail socket board. The next most likely cause of the failure is the logic control board in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

PIN DISABLE ERROR

Suspect the 28-pin rail assembly. Contact your nearest Customer Support office.

PIN DRIVER ERROR

Suspect the module assembly. Contact your nearest Customer Support office.

PIN DRIVER LOAD ERROR

Suspect the rail assembly. Contact your nearest Customer Support office.

PIN DR LINEARITY ERROR

Suspect the 28-pin rail assembly. Contact your nearest Customer Support office.

PROGRAMMING ERROR (22)

The device failed to program. This may have occurred because the device cannot be programmed. Attempt the operation again, using a new device of the same type.

RAIL DAC ERROR

The Micro rail or 40-pin rail DAC did not fall within the specified tolerance of the voltage to which it was programmed. The most likely cause of the failure is the logic control board in the Micro rail or 40-pin rail assembly. The next most likely cause of the failure is the driver board in the Micro rail or 40-pin rail assembly. Contact your nearest Customer Support office.

RAIL MODE SWITCH ERROR

Suspect the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

RAIL RAM ERROR

The PSX RAIL, Micro, or 40-pin rail RAM did not pass the read/write error. The most likely cause of the failure is in the Micro rail or PSX RAIL rail assembly. Contact your nearest Customer Support office.

********* RAM ERROR ********

Attempting to read the dynamic RAM resulted in a parity error. Suspect the Control module DRAM SIMMs or the CPU board. Contact your nearest Customer Support office.

RAM PARITY ERROR

Attempting to read the dynamic RAM resulted in a fatal parity error. Suspect the RAM SIMMs, or CPU board. Try replacing the SIMMs (see the "Updating Firmware or Installing a RAM Upgrade" section on page 7-11 for instructions). Contact your nearest Customer Support office.

RECORD INCORRECT (90)

The record type is invalid or the record count is incorrect. Try the operation again. If the error persists, check the format type or transmitter source.

REF ROUTER ERROR

With all DACs off and all routers off, a voltage was read on one of the REF*xx* lines. The most likely cause of the failure is the CPU board. The next most likely cause of the failure is the logic control board in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

REF TTL ERROR

Attempting to set the V_{CC} DAC to 5V and turning off all routers did not yield a voltage between 4V and 5V on REF1, 22, 23 and 26 and a near zero voltage on REF28. The most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

REF TURNOFF ERROR

Turning off the voltage reference router failed (attempting to set V_{CC} DAC to 0V and V_{PP} DAC to 25V with all routers off did not yield a near zero voltage on all REF lines). The most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

REF VCC ERROR

Attempting to set all REF*xx* (V_{CC} REF) voltages failed. The most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

REF VPP ERROR

Attempting to set REF1, 22, and 23 (V_{PP} REFs) to 25V failed. The most likely cause of the failure is the CPU board. Contact your nearest Customer Support office.

REQUIRES UPDATED MODULE
CALL CUSTOMER SERVICE

Refer to the device footnotes on the device list disk to determine the current revision of the PSX module required to program this device. Contact your nearest Customer Support office.

RIGHT SOCKET BRD MISSING

The right socket board cannot be detected as installed in the PSX RAIL, Micro, or 40-pin rail. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

RISE TIME ERROR

Suspect the rail socket boards. Contact your nearest Customer Support office.

ROUTER OVERRIDE FAILURE

Attempting to manually move each routable pin (pins 1, 2, 20, 22, 23, 26, 27, and 28) and read each pin's state back through the router read back buffer failed. The most likely cause of the failure is in the 28-pin rail assembly. Contact your nearest Customer Support office.

SERIAL CHIP ERROR

Attempting a write/read test of characters through the serial chip in local loopback mode failed. The most likely cause of the failure is the CPU board or serial cable. Contact your nearest Customer Support office.

SERIAL IRQ ERROR

Attempting a write/read test of characters through the serial chip in local loopback mode using the interrupt failed. Suspect the CPU board. Contact your nearest Customer Support office.

SERIAL PARITY ERROR (43)

Parity error detected on serial input data. Repeat the operation. If error persists, verify that transmitter is sending the correct parity.

SHORTED ANALOG ERROR

Check for shorted analog driver pins on a PSX RAIL, Micro, or 40-pin rail socket.

SHORTED PIN ERROR

Check for shorted pins on a 28-pin rail socket.

SHORTED TTL ERROR

Check for shorted digital driver pins on a socket. The most likely cause of the failure is the PSX RAIL, Micro, or 40-pin rail socket board. Contact your nearest Customer Support office.

SIL SIG VOLTAGE ERROR

Check the prm adx. router bus pin 24 (U59 and Q6 on the logic board) for the 28-pin rail.

SLEW ERROR

Suspect the 28-pin rail socket boards or the CPU board. Contact your nearest Customer Support office.

SM SOCKET VERIFY FAILURE

The PSX RAIL, Micro, or 40-pin rail failed to flag sockets as misverified when the state machine started a verify cycle. The most likely cause of the failure is in the Micro rail or PSX RAIL assembly. Contact your nearest Customer Support office.

SM VERIFY HALT FAILURE

The state machine failed to halt after it started a verify operation on the PSX RAIL, Micro, or 40-pin rail. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

SM VERIFY STATUS BIT ERR

The verify status bit in the state machine status register failed to go high, indicating a verify error on the PSX RAIL, Micro, or 40-pin rail. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

SOC DIGITAL DISABLE ERR

A socket on the PSX RAIL, Micro, or 40-pin rail was disabled for digital input, yet it accepted data written to it. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

SOCKET DISABLE ERROR

A test was performed to see if all 15 socket read back buffers could be verify disabled. Those with red LEDs failed this test. The most likely cause of the failure is in the 28-pin rail assembly. Contact your nearest Customer Support office.

SOCKET NUMBER REG ERROR

A write/read test to the socket counter failed. The most likely cause of the failure is in the 28-pin rail assembly. Contact your nearest Customer Support office.

SOCKET POINTER REG ERROR

The socket pointer registers allowed a socket to misverify when verify errors should have been disabled. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

SOCKET REG DISABLE ERROR

A test was performed to see if all 15 register read back buffers could be verify disabled. Those with red LEDs failed this test. The most likely cause of the failure is in the 28-pin rail assembly. Contact your nearest Customer Support office.

SOCKET SEL REG R/W ERROR

The socket select register failed the read/write test. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

SOCKET WRITE/READ ERROR

Several data patterns were written to each write/read error socket register and read back through the Device Data Bus and the Register Data Bus. Those sockets with red LEDs failed this test. The most likely cause of the failure is in the 28-pin rail assembly. Contact your nearest Customer Support office.

STATE MACHINE TTL ERROR

Suspect the PSX RAIL, Micro, or 40-pin rail socket boards. Contact your nearest Customer Support office.

STATIC RAM ERROR

A write/read test to static RAM failed. Contact your nearest Customer Support office.

SYSTEM PARAMETERS ERROR

If this error is encountered during normal operation, the system may prompt `ENTER TO INITIALIZE`.

Pressing **ENTER** causes the programmer to attempt to initialize nonvolatile memory back to the factory default values. If the programmer cannot initialize memory, it displays `UNABLE TO INITIALIZE`. No other operations can be performed until the system parameters are reinitialized.

TTL RISE/FALL ERROR

Suspect the 28-pin rail assembly. Contact your nearest Customer Support office.

TTL TEST ERROR

Suspect the rail assembly. Contact your nearest Customer Support office.

TWO MASTERS ERROR

Parallel rail programming is specified and a master device is detected in each rail. Remove one of the masters or select alternate rail programming.

UNEXPECTED ILLEGAL BIT

The verify circuitry detected an illegal bit when one was not expected. The most likely cause of the failure is the program logic board in the 28-pin rail assembly. Contact your nearest Customer Support office.

UNKNOWN ID

The electronic ID read from the device does not match any known manufacturer ID.

VERIFY CIRCUIT ERROR

Suspect the 28-pin rail logic board. Contact your nearest Customer Support office.

VERIFY DETECT FAILED

The verify circuitry detected a misverify when one was not expected. The most likely cause of the failure is in the 28-pin rail assembly. Contact your nearest Customer Support office.

VERIFY DISABLE REG ERROR

The verify disable registers allowed a socket to misverify when verify errors should have been disabled. The most likely cause of the failure is in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

VERIFY ERROR (29)

The device failed to program or verify properly when compared with RAM or master. The device contains incorrect data, or the device data is not being compared against the block of data that it was programmed with. Make sure that the correct block of data was specified for the verify operation, or erase the device, if possible, and attempt to program it again, or discard the faulty device.

If the programmer displays this error when you know the device is a good device the most likely cause of the failure is the logic board (when all LEDs are lit) or the PSX RAIL driver board or 40-pin assembly. Contact your nearest Customer Support office.

VERIFY PAL ERROR

The verify PAL status bit would not clear. The most likely cause of the failure is the logic board in the PSX RAIL, Micro, or 40-pin rail assembly. Contact your nearest Customer Support office.

VPP SWITCH FAILURE

An error was found during the check for V_{PP} switch functionality. Suspect the rail.

WARNING: MEMORY RAIL BAD

A PSX RAIL did not pass the diagnostic routine. All LEDs are red on the failed rail(s). Enter the Diagnostics menu and rerun the tests (see the "Diagnostics" section on page 5-3). If the PSX generates this error again, contact your nearest Customer Support office.

WARNING: MICRO RAIL BAD

A Micro rail did not pass the diagnostic routine. All LEDs are red on the failed rail(s). Enter the Diagnostics menu and rerun the tests (see the "Diagnostics" section on page 5-3). If the PSX generates this error again, contact your nearest Customer Support office.

WARNING: 28-PIN RAIL BAD

A 28-pin rail did not pass the diagnostic routine. Enter the Diagnostics menu and rerun the tests (see the "Diagnostics" section on page 5-3). If the PSX generates this error again, contact your nearest Customer Support office.

WARNING: 40-PIN RAIL BAD

A 40-pin rail did not pass the diagnostic routine. Enter the Diagnostics menu and rerun the tests (see the "Diagnostics" section on page 5-3). If the PSX generates this error again, contact your nearest Customer Support office.

7 Maintenance

This chapter includes the following sections:

CAUTION: The procedures in this chapter must be performed by a qualified electronic service technician. Do not attempt to perform these procedures if you are not qualified to do so.

WARNING: Disassembling the programmer when power is applied can cause severe electric shock.

Spare Parts

Spare parts are available from Data I/O. Call the Service Dispatch Group at 800-735-6070 to request spare parts.

Replacing Sockets

For procedures on how to replace sockets, refer to Appendix D.

Verifying the Performance of the PSX

For information on how to verify the performance of the PSX, refer to Appendix D.

Reducing Electrostatic Discharge

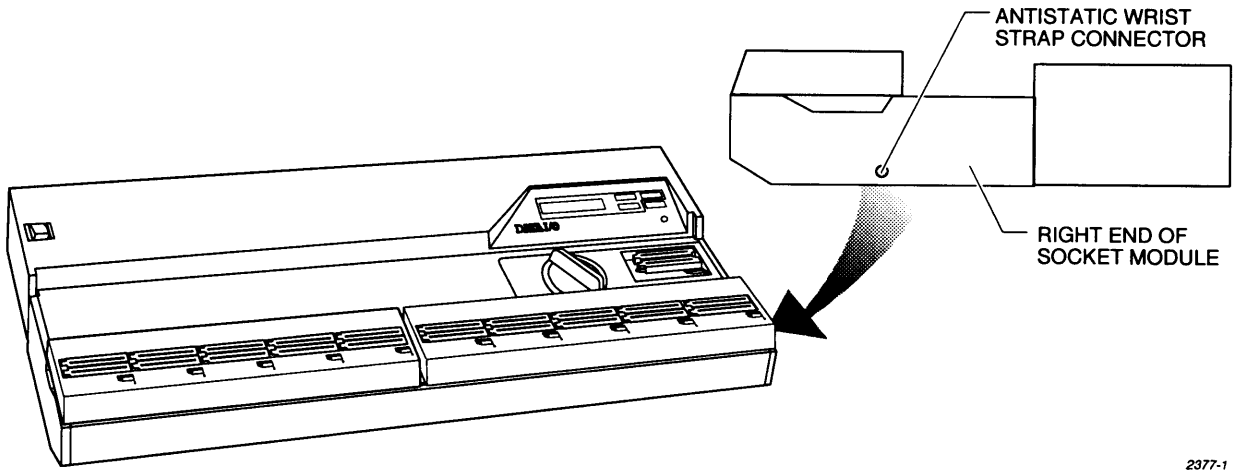
The circuit boards inside the PSX are susceptible to electrostatic discharge (ESD), which can damage the circuitry inside the programmer.

The easiest way to prevent damage from ESD is to make sure a common static potential (ground) exists between the static-sensitive device, its environment, and you. To accomplish this, ground yourself to an antistatic workstation with an antistatic wrist strap, and cover the surface of the workstation with an antistatic material.

WARNING: To avoid electric shock, use an antistatic wrist strap that contains a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

Ideally, you should ground the programmer to a grounded antistatic workstation and wear a wrist strap that is connected to the same antistatic workstation. An ambient temperature of 18° to 28°C (64.4° to 82.4°F) and relative humidity less than 85% should be maintained.

If you do not have an antistatic workstation available, wear an antistatic wrist strap and connect it to the PSX's wrist strap connector on the right side of a rail.



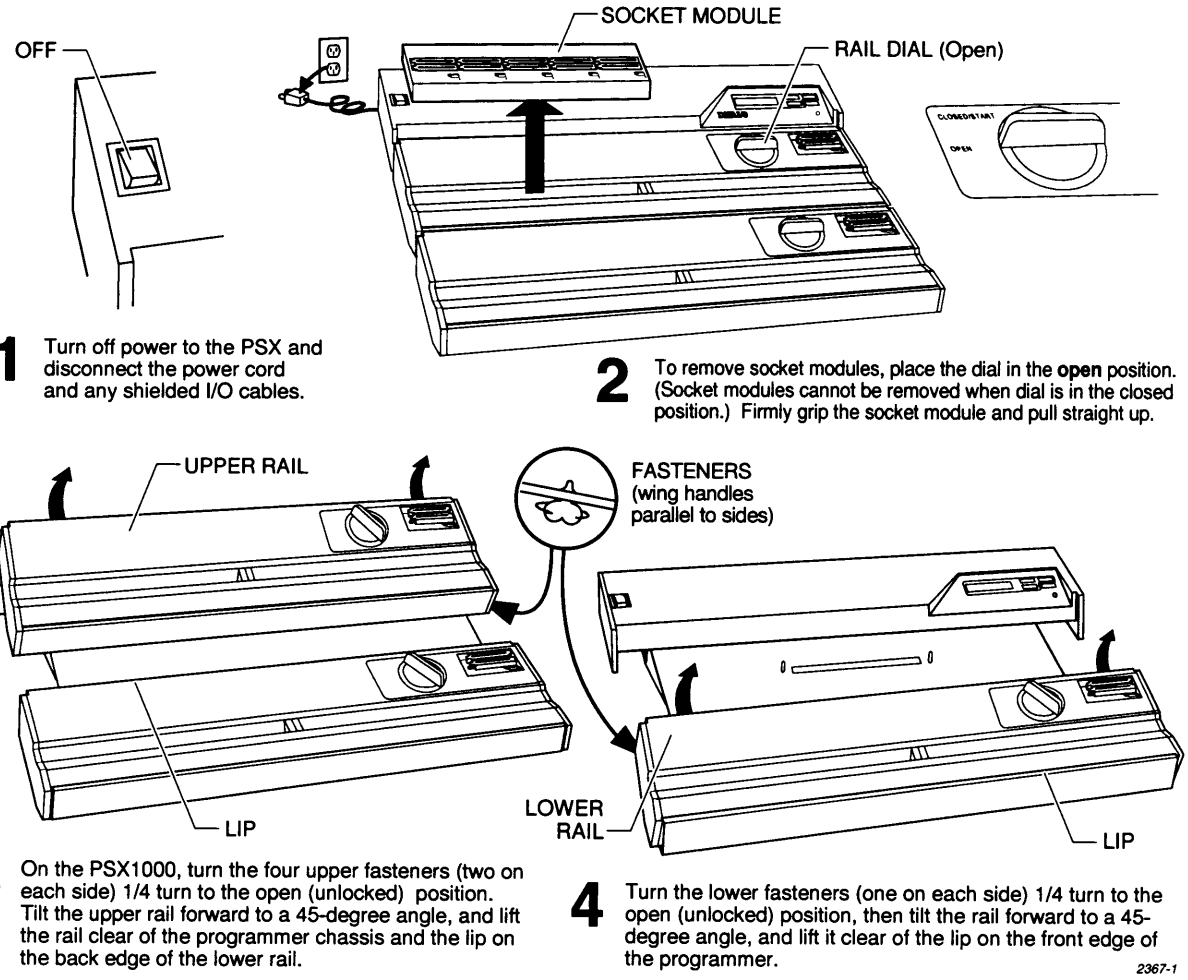
Disassembling the PSX

WARNING: Disassembling or reassembling the PSX when power is applied can cause severe electric shock.

CAUTION: Disassembling or reassembling the PSX when power is applied can damage the programmer and socket modules, and voids the warranty.

Control Module Disassembly and Reassembly

Please refer to the following illustration when disassembling and reassembling your PSX control module for cleaning:



1 Turn off power to the PSX and disconnect the power cord and any shielded I/O cables.

2 To remove socket modules, place the dial in the **open** position. (Socket modules cannot be removed when dial is in the closed position.) Firmly grip the socket module and pull straight up.

3 On the PSX1000, turn the four upper fasteners (two on each side) 1/4 turn to the open (unlocked) position. Tilt the upper rail forward to a 45-degree angle, and lift the rail clear of the programmer chassis and the lip on the back edge of the lower rail.

4 Turn the lower fasteners (one on each side) 1/4 turn to the open (unlocked) position, then tilt the rail forward to a 45-degree angle, and lift it clear of the lip on the front edge of the programmer.

Disassembling Socket Modules

The "Socket Warranty and Replacement" section in Appendix D includes instructions on how to disassemble and reassemble socket modules. Please refer to these sections when disassembling and reassembling your PSX socket modules for cleaning.

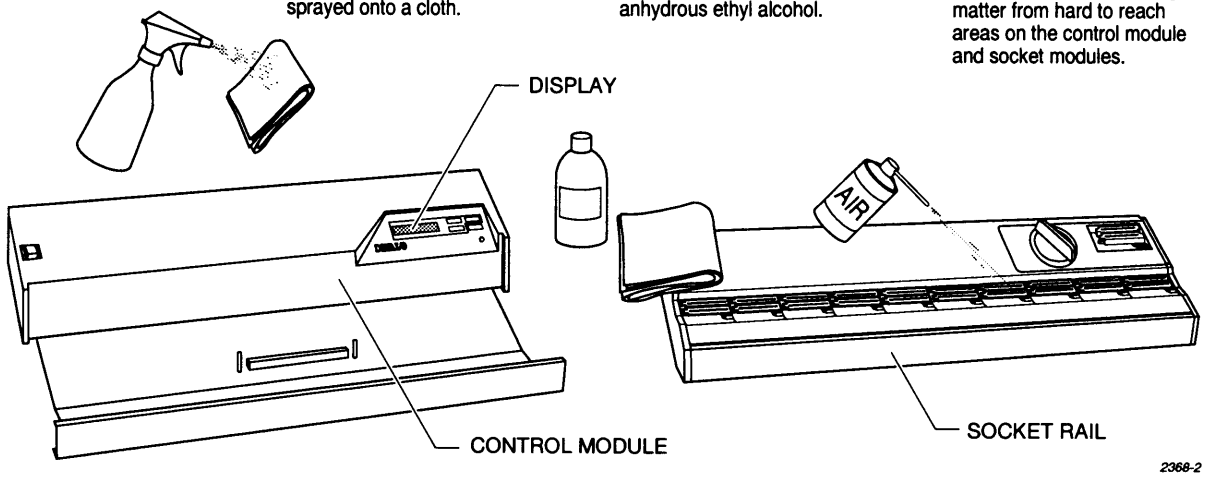
Cleaning the PSX

1 Disassemble the PSX.

2 Clean the display with a nonabrasive glass cleaner sprayed onto a cloth.

3 Clean the PSX exterior using a soft cloth dampened with anhydrous ethyl alcohol.

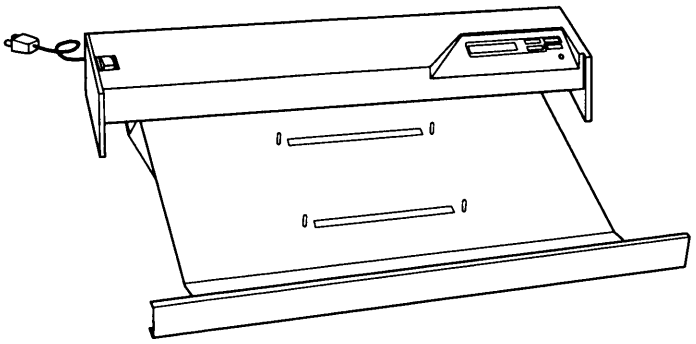
4 Use low-pressure, clean, dry air to remove dust or foreign matter from hard to reach areas on the control module and socket modules.



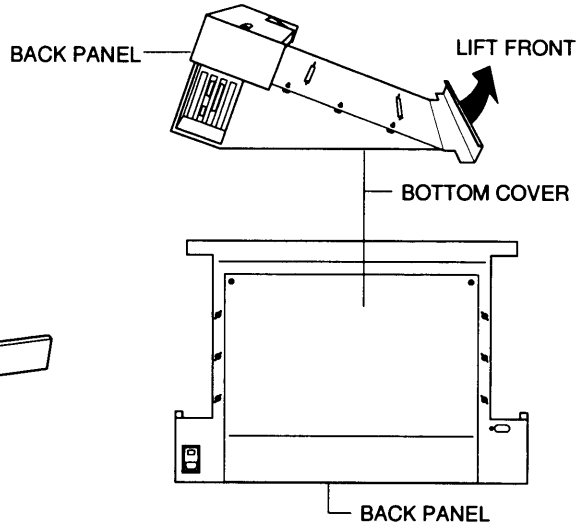
Removing the Bottom Cover

1 Disassemble PSX (See page 7-3).

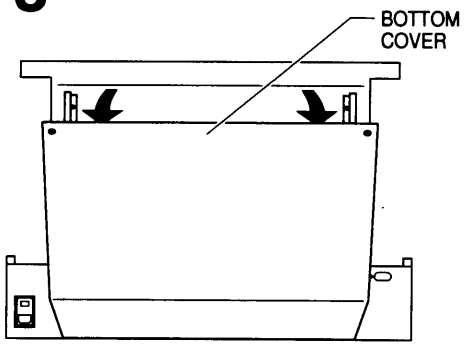
Note: Make sure power is turned off.



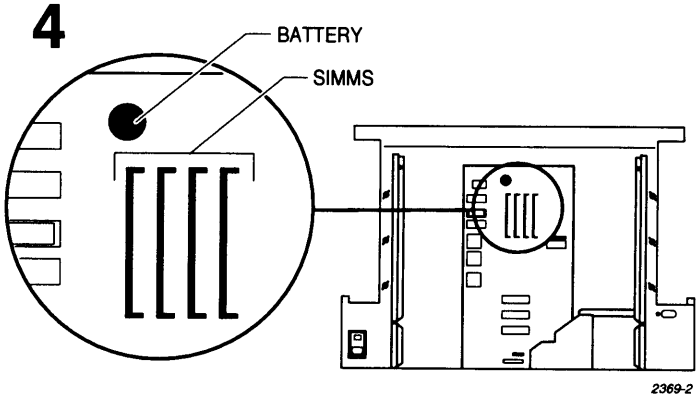
2 Turn the control module upright on its back panel and remove the Phillips-head screws securing the bottom cover.



3 Remove bottom cover.



4



2369-2

Replacing the Lithium Battery

The PSX contains a lithium battery that provides power for storing the programmer setup when the PSX is not running. If your PSX is powered up most of the time, you may never need to replace the battery.

If the battery needs to be replaced, the PSX may display one of the following message upon powerup:

```
EXCESSIVE SOCKET CYCLES
```
or
```
INITIALIZING SYSTEM PARAMETERS
```

To disassemble the PSX, replace the battery, and reassemble the PSX, you need the following tools:

- Antistatic workstation
- Antistatic wrist strap

WARNING: To avoid electric shock, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

- Cotton or surgical gloves
- Small flat-head screwdriver
- Phillips screwdriver
- *(Optional)* A 3.5-digit Digital Multimeter (DMM) with an accuracy of ± 0.25% V dc (for example, a Fluke 8050A DMM)

WARNING: Disassembling or reassembling the PSX when power is applied can cause severe electric shock.

CAUTION: Disassembling or reassembling the PSX when power is applied can damage the programmer and socket modules, and voids the warranty.

Disassemble the PSX

Before you can replace the lithium battery, you must disassemble the PSX as described on page 7-3 and remove the bottom cover as described on page 7-5.

CAUTION: Be sure to turn off power to the PSX and disconnect the power cord and any shielded I/O port cables from the PSX before beginning the disassembly process.

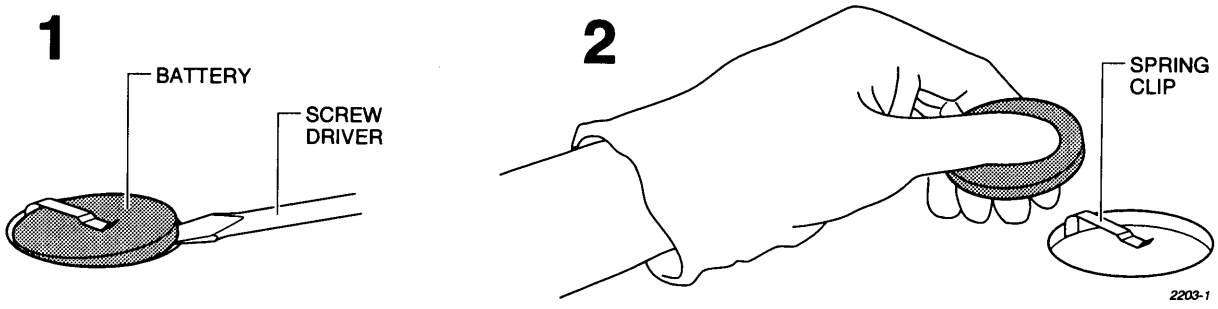
Remove the Old Battery

Locate the lithium battery on the PSX's CPU board (see page 7-5). Remove the old battery as follows:

1. Put on the cotton or surgical gloves.

CAUTION: For best performance, do not touch the battery without gloves on. If the battery comes into contact with the oils on your skin, it could short and not last as long as it should.

2. Insert the flat-blade screwdriver in one of the open slots around the plastic battery holder and under the battery.
3. Lift the battery out of the holder enough to grasp the battery edges between the fingers of your other hand. Slip the battery out from under the spring clip.



4. At this point, you may want to use a voltmeter to verify that the battery needs to be replaced. A good battery should measure 2.5V to 3.0V.

Dispose of the expended lithium battery according to the battery manufacturer's instructions.

WARNING: Disposal of lithium batteries in the United States is regulated by the U. S. Environmental Protection Agency (EPA). Lithium batteries (whether live or expended) are considered a hazardous waste and must be disposed of in accordance with local and federal hazardous material disposal laws and regulations. Land disposal of lithium batteries is prohibited unless they are treated or otherwise rendered non-reactive.

Lithium batteries should not be opened, crushed, punctured, or otherwise mutilated, because this will release sulfur dioxide and the electrolyte and expose hazardous materials.

Collect and transport cells and batteries for disposal in a manner that prevents short circuit, compacting, mutilation, or any other abusive physical or electrical handling that would destroy their physical integrity. Contact the battery manufacturer (Ray-O-Vac, Panasonic, or Seiko) for more information.

Install a New Battery

1. Make sure you are wearing a pair of cotton or surgical gloves.
2. Make sure the replacement battery is a 3-volt battery of the same or equivalent type as a BR2325 battery.

CAUTION: Replace the battery only with the same or equivalent type recommended by the battery manufacturer. Dispose of used batteries according to the battery manufacturer's instructions.

3. Hold the battery so that the positive side (the side with the plus sign [+] on it) is toward you.

WARNING: There is a danger of explosion if the battery is incorrectly replaced. (A fire can start if the battery is installed upside-down.)

4. Insert the new battery between the battery holder and spring clip.
5. Press on the top of the battery until it is fully seated in the battery holder.

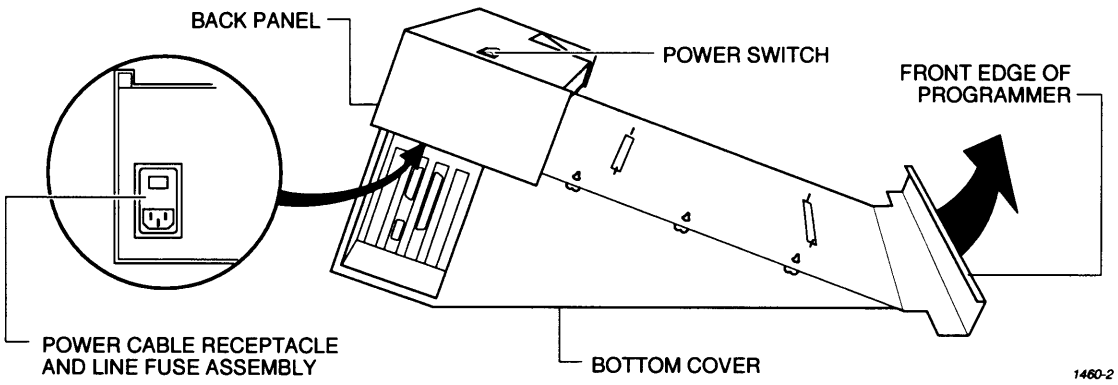
Reassemble the PSX

Reassemble the PSX as follows:

1. Replace the bottom cover in its original position.
2. Reinstall the Phillips-head screws securing the bottom cover to the chassis.
3. Return the programmer to its upright position and reconnect the power cord (see the "Connecting the Power Cord" section on page 2-8) and any shielded I/O port cables (see the "Connecting I/O Port Cable" section on page 2-9).
4. Reinstall rail(s) as directed in the "Installing Rails" section on page 2-2 and reinstall socket modules (if necessary) as directed in the "Installing Socket Modules" section on page 2-5).
5. Power up the programmer (see the "Turn on the Power" section on page 2-10).

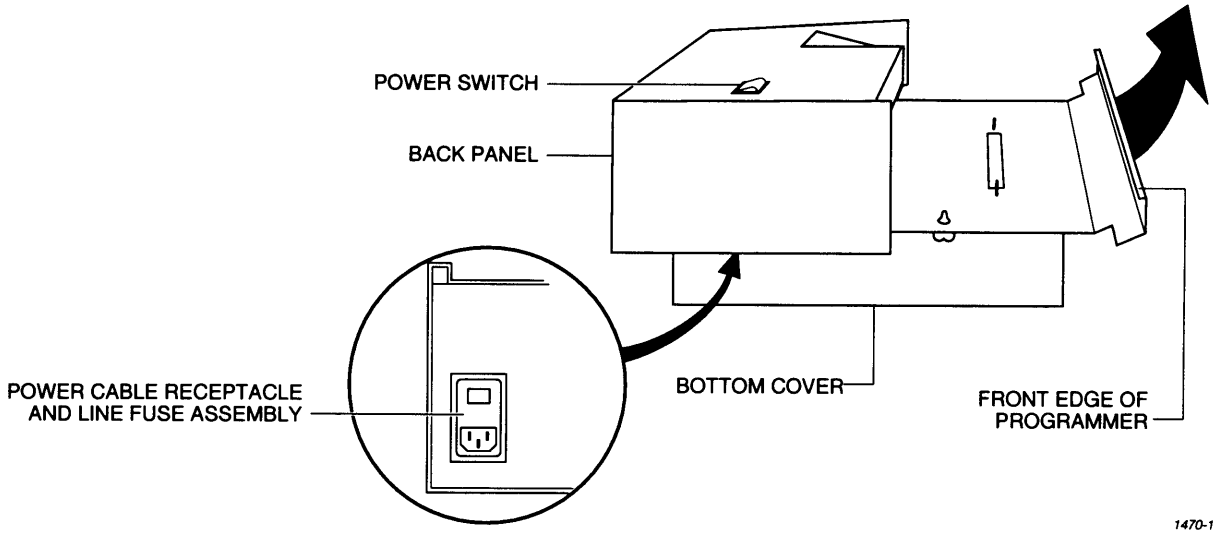
Replacing the Line Fuse

The line fuse is located in the fuse assembly on the underside of the control module directly underneath the power switch. The following two illustrations show the PSX1000 and PSX500 power cable receptacle and line fuse assembly locations.



CAUTION: The procedures in this section must be performed by a qualified electronic service technician. Do not attempt to perform these procedures if you are not qualified to do so.

WARNING: Disassembling the programmer when power is applied can cause severe electric shock.

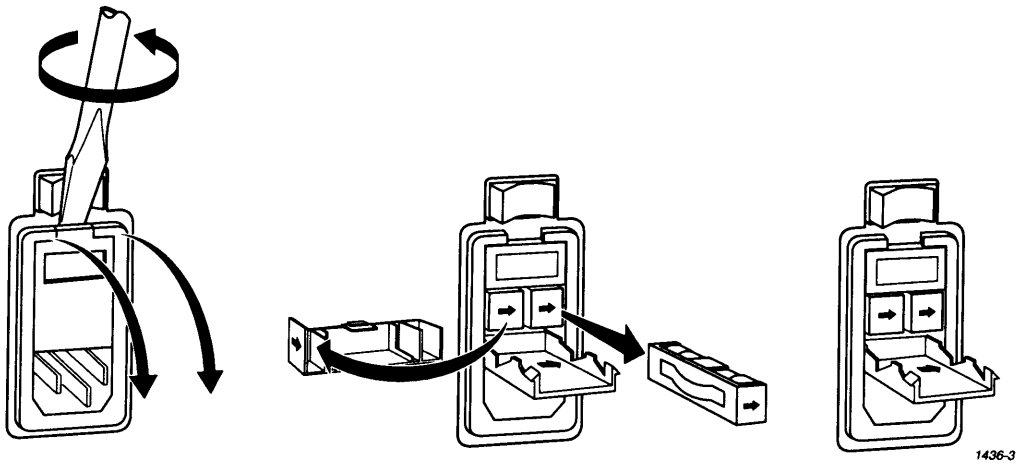


Perform the following procedure to verify that the line fuse is correct and intact.

1. Turn the programmer off and disconnect the power cord and any shielded I/O port cables from the programmer.
2. Remove any installed rail(s) (see the "Disassembling the PSX" on page 7-3). You do not need to remove socket modules from a Memory rail before removing it from the control module.
3. Lift the front of the programmer upward until the entire bottom cover is visible and the programmer is resting on its back panel.
4. Using a small, flat-blade screwdriver, gently pry open the door covering the fuse assembly (see illustration on the next page).

   The PSX has two fuse receptacles: the white receptacle accepts 0.25 x 1.25 in. fuses; the black receptacle accepts 5 x 20 mm fuses.

   Because only the right side of the fuse assembly is connected to the programmer's circuitry, place the fuse receptacle you want to use (white or black) on the right side. Place the other fuse receptacle on the left.



5. Pull out the fuse holder on the right.
6. Examine the right-hand fuse and make sure it is intact. If it is, proceed to step 7. If it is blown, install a new fuse. See the table below for line fuse ratings.

CAUTION: *For continued protection against the possibility of fire, replace fuses with fuses of the voltage, current, and type rating specified in the following table.*

Fuse Size	Operating Voltage	Current	Line Fuse Rating Voltage/Type	Data I/O Part Number
0.25 x 1.25 in	115/230	6A	250 V /normal blow (F)	416-0003*
5 x 20 mm	115/230	6A	250 V /normal blow (F)	

* *The Data I/O fuse fits only in the white fuse receptacle.*

7. Replace the fuse assembly in the programmer's back panel and snap the door closed.
8. Return the programmer to its upright position and reconnect the power cord (see the "Connecting the Power Cord" section on page 2-8) and any shielded I/O port cables (see the "Connecting I/O Port Cables" section on page 2-9).
9. Reinstall the rail(s) as directed in the "Installing Rail(s)" section on page 2-2.
10. Power up the programmer (see the "Turn on the Power" section on page 2-10).

Updating Firmware or Installing a RAM Upgrade

Updating your PSX consists of installing new firmware (devices) in the firmware update sockets and the security device socket. Upgrading your PSX's memory (RAM) consists of installing new 1-, 4-, or 16-MB SIMMs into memory expansion sockets. This section describes how to install and test your new firmware or SIMMs.

Note: All nonvolatile parameters (port parameters, I/O parameters and verify parameters) saved before powerdown are set to default values upon installation of the new firmware. Make a note of your preferred parameter values prior to installing the update kit, so you can easily reselect them after installing the firmware.

PSX parameters do not change when you install a RAM upgrade.

You need a small slot-head screwdriver to install your RAM upgrade, and a PLCC extractor tool (provided) to install your new firmware.

CAUTION: *Firmware is static sensitive. Install your new firmware at an antistatic workstation. To avoid electric shock and damage to the devices, use an antistatic wrist strap that contains a 1 M Ω (minimum) to 10 M Ω (maximum) isolating resistor.*

CAUTION: The procedures in this section must be performed by a qualified electronic service technician. Do not attempt to perform these procedures unless you are qualified to do so.

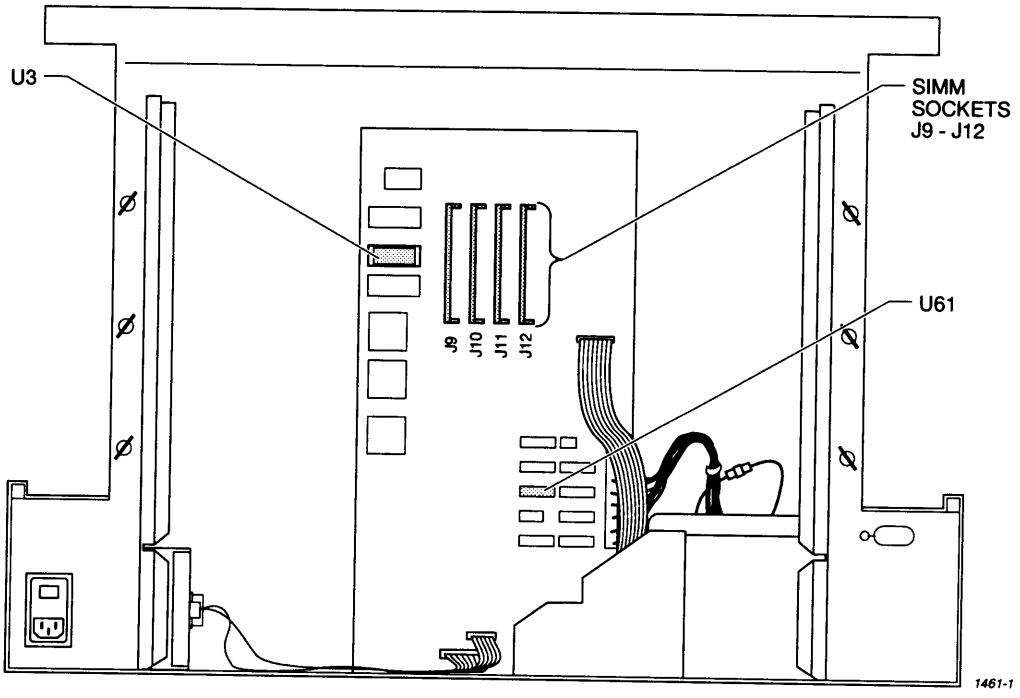
Disassemble the PSX

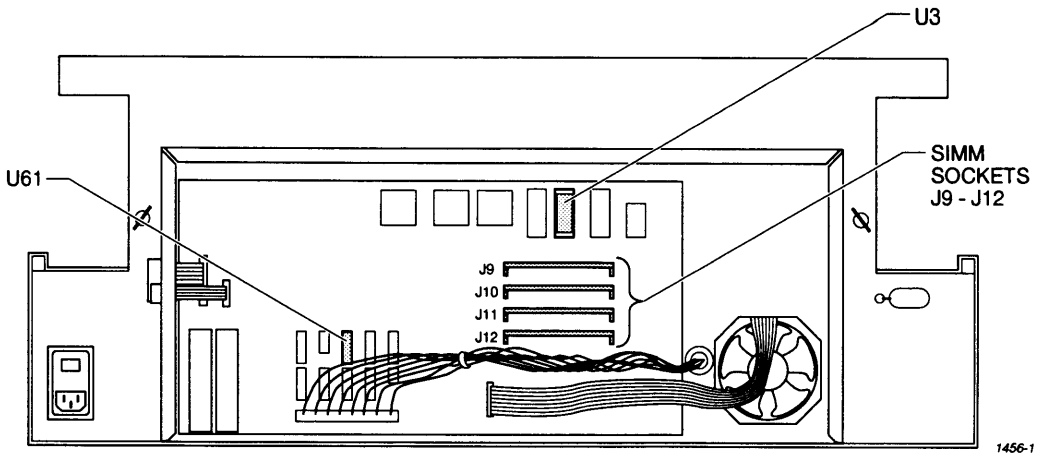
Before you can install a firmware update or a RAM upgrade, you must disassemble the PSX as described on page 7-3 and remove the bottom cover as described on page 7-5.

CAUTION: Be sure to turn off the PSX and disconnect the power cord and any shielded I/O port cables from the PSX before beginning the disassembly process.

Locate Sockets on CPU Board

Remove and install the firmware or SIMMs as follows, referring to the following illustrations for the location of the sockets on the PSX1000 (top illustration) and PSX500 (bottom illustration) CPU boards.

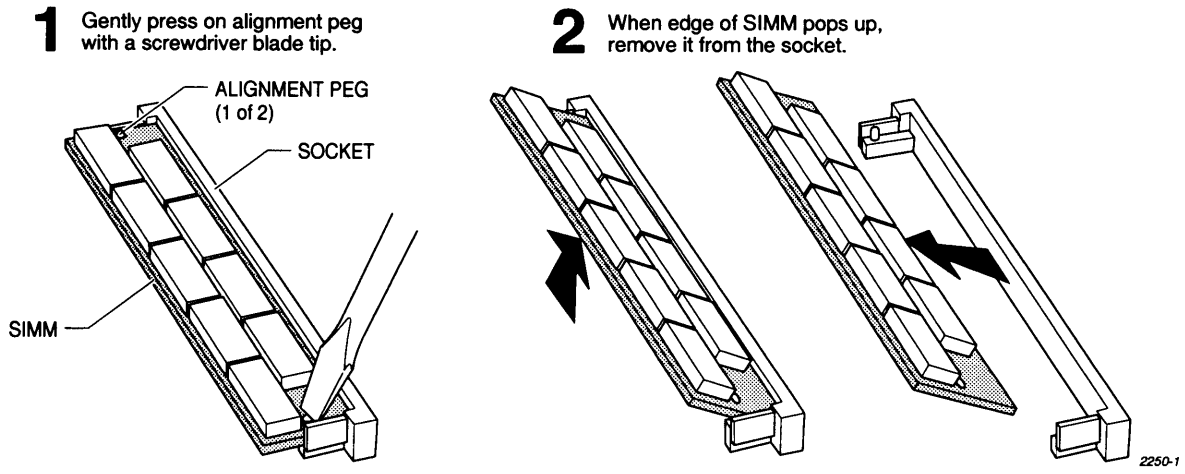




Remove Old Firmware or SIMMs

Firmware Update—With the IC extractor tool or small slot-head screwdriver, remove the firmware from the sockets U3 and U61.

RAM Upgrade —Remove the SIMMs in sockets J9 through J12.



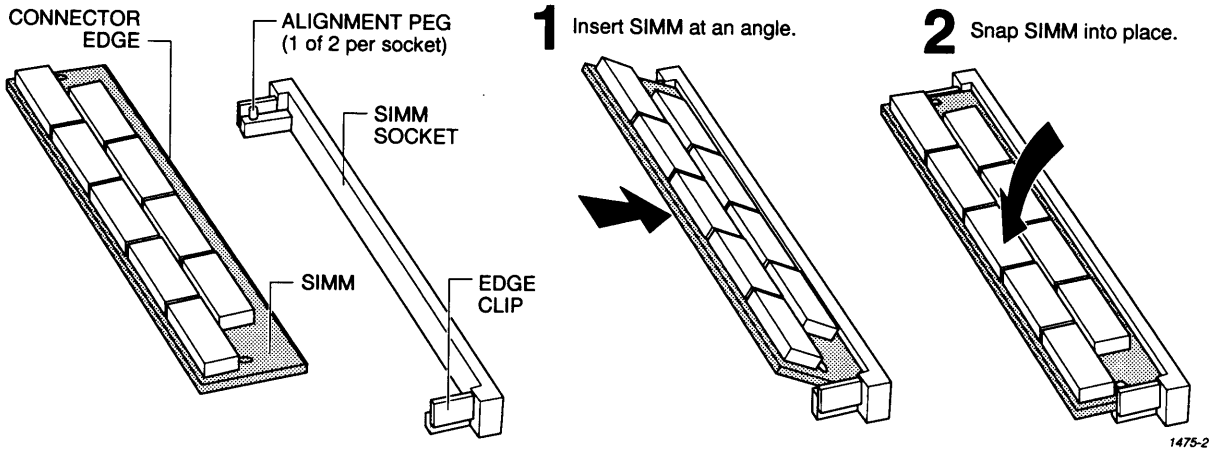
Install New Firmware or SIMMs

Firmware Update—Install the update kit firmware in the locations specified on each device. Make sure that pin 1 (identified by a dot or notch in the end of the device nearest pin 1) is placed where indicated on the socket and that none of the firmware pins are bent during installation.

RAM Upgrade —Install the SIMMs in any of the sockets J1 through J4 as follows:

1. Insert the connector edge of the SIMM.
2. Set the trailing edge of the SIMM onto the alignment pegs on the side of the SIMM socket.

When the SIMM is installed properly, the SIMM rests on the alignment pegs and the edge clips on the socket snap around the SIMM as shown in the following illustration.



Note: You can place SIMMs in any of the four sockets. It does not matter which sockets are used or in what order the SIMMs are placed into the sockets.

Reassemble the PSX

Reassemble the PSX as described on page 7-8.

Perform Powerup Test

The CPU board, module, DMA, timer, DRAM and I/O port are tested during powerup. To perform the powerup test, follow the steps below.

1. Make sure that the rail(s) (and socket modules) are installed and all the sockets are empty, then turn on the PSX.

   As the systems are initialized, the PSX displays several screens that describe the test currently being performed or the error currently encountered.

2. After the PSX has initialized, it beeps twice and displays:

   ```
   COPY FROM MASTER
   ```

3. If the PSX completes the powerup routine successfully, attach the label (enclosed in the update kit) to the back panel.

   If the PSX does not complete the powerup routine successfully, follow the steps in the "Disassemble the PSX" section on page 7-3 and make sure that:

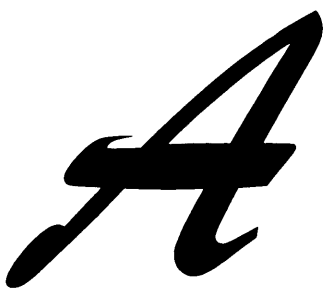
   - None of the firmware pins were bent during installation.
   - Each part was installed in the correct socket (see location designator on each part).
   - Pin 1 on each part is in the location designated for pin 1 by the socket.

Follow the steps in the "Reassemble the PSX," section above and power up the programmer again. If the self-test fails, call your nearest Customer Support office as listed in Appendix A.

If the programmer displays a message, refer to Chapter 6, "Messages," for an explanation.

If the programmer does not power up, make sure the line fuse is intact. See the "Replacing the Line Fuse" section on page 7-9 for instructions on checking the line fuse.

The PSX may generate an `Excessive Socket Cycles` message upon powerup. To ensure accurate statistics after replacing the battery, clear the control module statistics as directed in the "Clear Statistics" section on page 4-44 and the "Clear Socket Cycles" section on page 4-45.



Technical Assistance, Warranty, and Repair

This appendix includes details about contacting Data I/O for technical assistance, repair and warranty services, and Keep Current™ subscription service. The appendix also explains the Bulletin Board Service.

Data I/O Customer Support

United States

For technical assistance, contact:

Data I/O Customer Resource Center
Telephone: 800-247-5700
Fax: 206-869-2821

For repair or warranty service, contact:

Data I/O Central Dispatch
Telephone: 800-735-6070
Fax: 206-881-0561

For Keep Current subscription service, contact:

Data I/O Sales
Telephone: 800-332-8246
Fax: 206-869-7423

Canada

For technical assistance, contact:

Data I/O Customer Resource Center
Telephone: 800-247-5700
Fax: 206-869-2821

For repair, warranty service, or Keep Current subscription service, contact:

Data I/O Canada
6725 Airport Road, Suite 302
Mississauga, Ontario, L4V 1V2
Telephone: 905-678-076
Fax: 905-678-7306

Japan

For technical assistance, repair, warranty service, or Keep Current subscription service, contact:

Data I/O Japan
Osaki CN Building 2F
5-10-10, Osaki Shinagawa-Ku
Tokyo 141
Telephone: 3-3779-2152
Fax: 3-3779-2207 (Operations)
3779-2203 (Other)

Germany

For technical assistance, repair, warranty service, or Keep Current subscription service, contact:

Data I/O GmbH
Lochhamer Schlag 5a
82166 Gräfelfing
Telephone: 089-858580
Fax: 089-8585810

Other European Countries

For technical assistance, repair, warranty service, or Keep Current subscription service, contact your local Data I/O representative.

Other Countries Worldwide

For technical assistance, repair, warranty service, or Keep Current subscription service, contact the office below and ask for the number of your local Data I/O representative.

Data I/O Intercontinental
10525 Willows Road N.E.
P.O. Box 97046
Redmond, WA USA 98073-9746
Telephone: 206-881-6444
Fax: 206-882-1043
Telex: 4740166

Technical Assistance

You may contact Data I/O for technical assistance by calling, sending a fax or electronic mail (e-mail), or using the Bulletin Board Service (BBS). To help us give you quick and accurate assistance, please provide the following information:

- Product version number
- Product serial number (if available)
- Detailed description of the problem you are experiencing
- Error messages (if any)
- Device manufacturer and part number (if device-related)

Calling

Call the appropriate Data I/O Customer Support number listed at the front of this Appendix. When you call, please be at your programmer or computer, have the product manual nearby, and be ready to provide the information listed above.

Sending a Fax

Fax the information listed above with your name, phone number, and address to the appropriate Data I/O Customer Support fax number listed at the front of this appendix.

Sending E-mail

To reach Data I/O via e-mail, send a message including your name, phone number, e-mail address, and the information listed above to the following address:

techhelp@data-io.com

Using the BBS

To reach Data I/O via the BBS, include your name, phone number, e-mail address, and the information listed above in a message, and send it to the BBS as described in the following section.

Bulletin Board Service

The Data I/O Bulletin Board System (BBS) enables you to:

- Obtain a wide range of information on Data I/O products, including current product descriptions, new revision information, technical support information, application notes, and other miscellaneous information.
- Access device support information
- Request support for a particular device
- Leave messages for the BBS system operator, Customer Support personnel, or other customers
- Download many DOS and Windows utilities

Online help files provide more information about the BBS and its capabilities.

BBS numbers for all countries are as follows:

Country	BBS Number
Belgium	+32-(0)1-6380731
Canada	+1-905-678-0547
France	+33-(0)13-9562699
Germany	+49-(0)89-8585833
Japan	+81-33779-2233
Netherlands	+31-(0)40-582424
Norway	+47-(0)66-780445
Sweden	+46-(0)8-7391037
Switzerland	+41-(0)1-308-6656
United States	+1-206-882-3211

World Wide Web

The Data I/O Home Page on the World Wide Web (WWW) includes links to online information about technical products, general information about Data I/O, a list of sales offices, and technical user information such as application notes and device lists.

To access the WWW, you will need an Internet account with Web access, and a Web browser such as Netscape or Mosaic.

The address of the Data I/O Home Page is:

http://www.data-io.com.

Warranty Information

Data I/O Corporation warrants this product against defects in materials and workmanship at the time of delivery and thereafter for a period of one (1) year.

The foregoing warranty and the manufacturers' warranties, if any, are in lieu of all other warranties, expressed, implied or arising under law, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Data I/O maintains customer service offices throughout the world, each staffed with factory-trained technicians to provide prompt, quality service. For warranty service, contact Data I/O Customer Support at the numbers listed at the front of this appendix.

Keep Current Subscription Service

Data I/O offers a one-year renewable subscription to keep your product and documentation up-to-date with the latest features and device support. Called the Keep Current subscription service, this subscription also incorporates manufacturer-recommended changes to existing device support to maintain optimum yields, throughput, and long-term reliability.

For more information, or to order Keep Current subscription service, contact Data I/O Customer Support at the numbers listed at the front of this appendix.

Repair Service

After the warranty period expires, repair services are available at Data I/O Service Centers on a time-and-materials basis, and through a fixed price annual agreement that covers all parts and labor needed to correct normal malfunctions. The annual agreement includes semiannual performance certification.

For more information, or to order a Repair Service Agreement, contact Data I/O Customer Support at the numbers listed at the front of this appendix.

User Registration and Address Change

If the end user for this product or your address has changed since the Registration Card was mailed, please notify Data I/O Customer Support at the numbers listed at the front of this appendix. This ensures that you receive information about product enhancements. Be sure to include the product serial number, if available.

Using an IEEE-488 Interface

The PSX can interface with a PC using either a standard RS232 9-pin cable or an IEEE-488 cable. This appendix describes how to install and use the IEEE-488 interface.

When the PSX is connected to a PC using a standard RS232 port, data is transferred at 9600 baud. The PSX can also be configured with a PC-mounted IEEE-488 port. This port dramatically increases the file download speed and functionality of the programmer, while potentially increasing the complexity of the host PC to programmer link.

Note: In this section, a machine that supports IEEE functions in a dedicated or bus application is referred to as a device.

Installation

An IEEE-488 interface board must be installed in your PC in order to communicate with an IEEE-488 compatible machine (such as the IEEE-488 version of the PSX). The following instructions briefly describe how to install and set up your IEEE interface. For more complete setup and installation instructions, refer to the document *TaskLink IEEE-488 Interface* (980-0050-*xxx*) included with your TaskLink package.

To install the interface board, do the following:

Note: To install the IEEE board, your PC needs at least one available ISA-compatible 16-bit or larger socket.

1. Turn off the power to your PC, PSX, and all PC peripherals.
2. Unpack and install your IEEE board as directed in the documentation that was included with the board. For information on how to install a board into your PC, refer to the instructions that came with your PC.

   The PSX supports the default switch settings of the IEEE board. (This is the 7210 configuration.)
3. If it has not already been done, install TaskLink software or a custom CRC driver program onto your PC. TaskLink installation is described in the *TaskLink User Manual*.

4. Install the IEEE option software by doing the following:
   a. If you have already connected the IEEE cable to your PC, disconnect the cable.
   b. Insert the **IEEE Option** disk into a disk drive on your PC.
   c. Enter

      `a:install`

      where *a* is the drive in which you placed the disk. Follow the instructions on the screen, answering any prompts.
   d. After software installation, reboot your PC.
5. At the DOS prompt, enter **ibtest** to test the IEEE board and your system. (The **ibdiag** program can be used to further diagnose any compatibility problems. **ibdiag** is described in the *Getting Started with Your GPIB-PCII/IIA and the NI-488.2 Software for MS-DOS* manual included with the board.)
6. Set up your PSX for IEEE operation by doing the following:
   a. Attach the appropriate rail(s) and socket modules.
   b. Turn on the power to the PSX.
   c. After the powerup test, use the arrow keys to scroll to Set Port Options and press **ENTER**.
   d. From the Set Port Options menu, set the Active Port = to **IEEE488**.
   e. From the Set Port Options menu, set the HW Translators = to **ON**.
   f. From the `Remote Control` menu, set the Remote On/Off = to **00 00**.
   g. Select Remote Control again. Small $^{r}_{c}$ characters should appear in the upper left-hand corner of the display indicating that the programmer is in CRC.
7. Attach the IEEE-488 cable.
8. Set up the programmer type and programmer port settings for your interface software (such as TaskLink).

Installing Multiple Devices

Each IEEE-488 interface board supports up to 16 devices. The interface board permits devices on the bus to be individually addressed, with independent "talk" and "listen" modes.

Each interface board is provided with one IEEE-488 connector that attaches to a matching cable containing a male/female stacking connector. To use more than one device (up to 16 devices), connect cables to the stacking connector (in effect, *daisy-chaining* multiple devices to one interface board).

Installing Multiple Boards

Using National Instruments IEEE boards, you can install up to four boards in your PC; each board supports up to 16 devices.

Using the IEEE-488 Connection

The IEEE-488 interface board takes commands and data from the PC, and transmits them in parallel format via an IEEE-488 cable to the device(s), and conversely, can receive responses and data from the device(s) and transfer them to the host system.

The IEEE-488 compatible software used in conjunction with the interface board typically provides for system configuration, applications monitoring, and user-application program language interfaces such as C, BASIC, and Universal Language Interface. IEEE-488 bus devices can be operated with this software using strings of individual system and device-specific commands to the interface board. However, it is easier to use a user-application program for communication between the host PC, interface board, and the programmer.

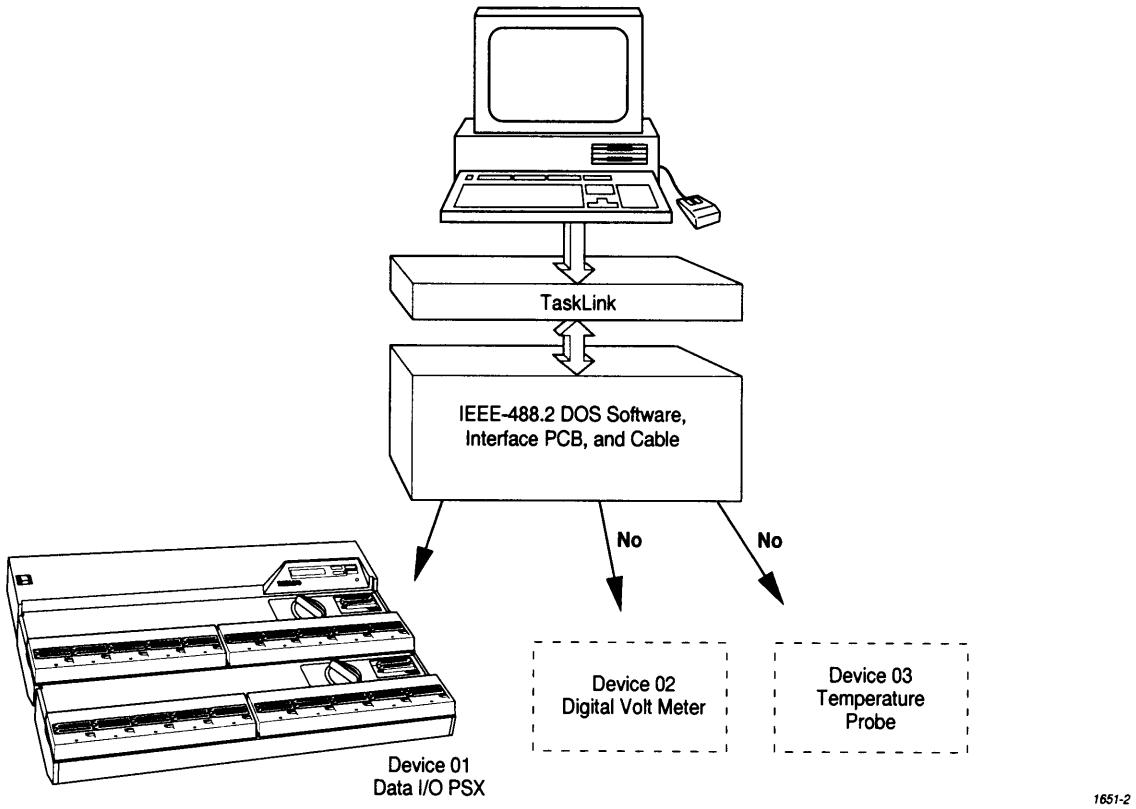
Using IEEE-488 protocol, the programmer can be set up as a dedicated application controlled by TaskLink software, or as a bus application using an IEEE-488 standard interface board and software.

The PSX as a Dedicated Application (TaskLink)

Each IEEE-488 device (for example, instrument, probe, or programmer) has a unique command set and therefore requires that you write a user-application program that can communicate with the NI-IEEE MS-DOS software through a language interface.

TaskLink includes a user-application program for the PSX programmer and is able to pass the appropriate Data I/O computer remote control (CRC) command set to the programmer. TaskLink is configured for IEEE-488 operation by first selecting the PSX as the target programmer in the **Options: Programmer Type** menu, then selecting IEEE-488 in the **Options: Programmer Port** menu. This setup allows TaskLink to pass most CRC commands and data formats over the IEEE link to the programmer, but does not allow TaskLink to control any device other than the PSX programmer. This relationship is illustrated in Figure B-1.

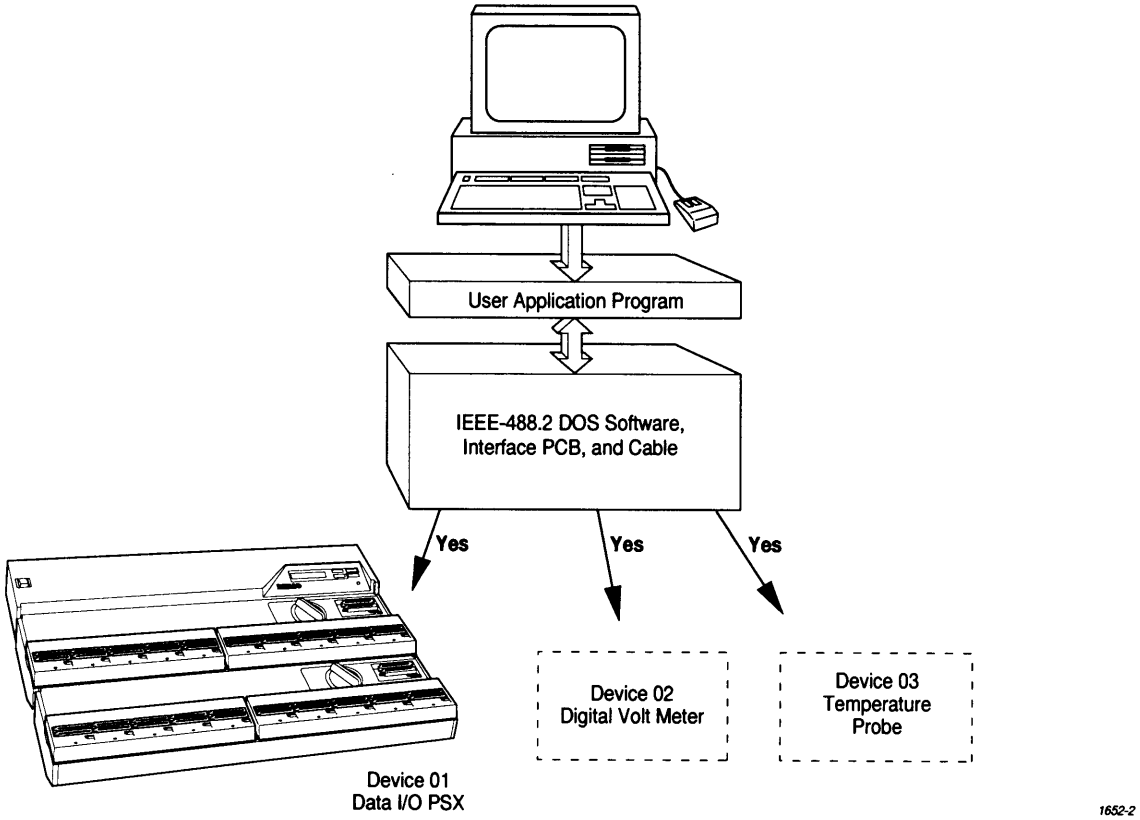
Figure D-27
Dedicated Application - TaskLink/IEEE/PSX



The PSX as an IEEE-488.2 Bus Device (National Instruments)

The PSX can be operated as one of many devices on an IEEE-488 standard bus. You must write additional software in the form of a user application program (see Figure B-2).

Figure D-28
Bus Application - User Application Program/IEEE/the PSX and other devices

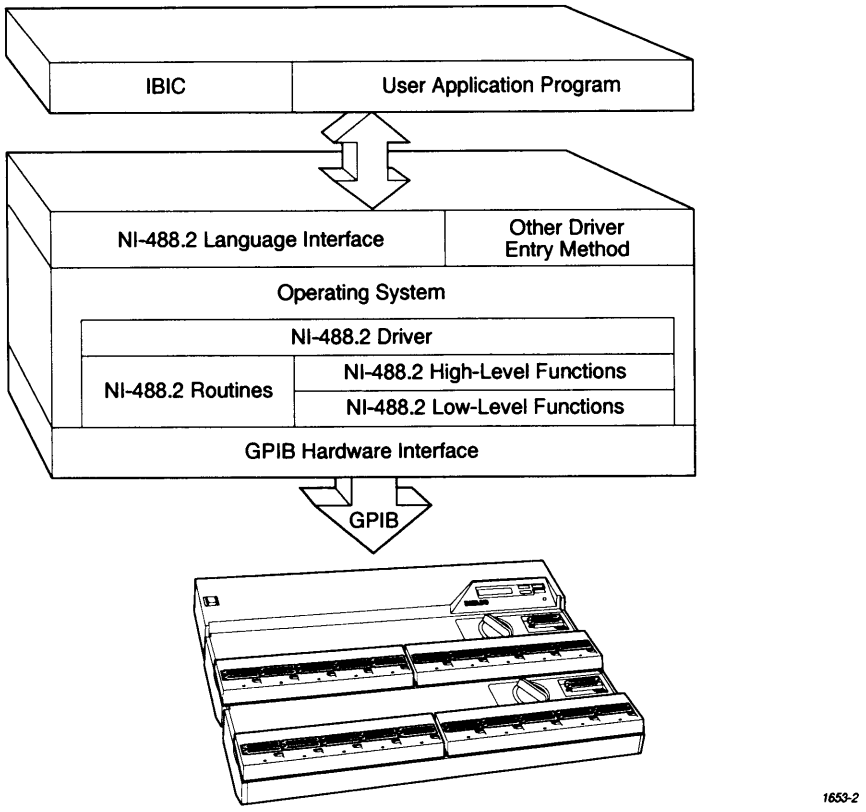


Successful IEEE-488 communication between your computer and the PSX may involve several sets of interactive handshakes and translations as shown in Figure B-3. The general IEEE-488 protocol for the transfer of one command from the host PC to the programmer via the IEEE-488 interface is listed below. The last two commands are programmer-specific. The balance of the command set is the necessary protocol for the IEEE-488 interface.

- Universal untalk
- The PSX primary listen address
- Universal unlisten
- Transfer data (if required)
- Send command
- Host PC primary talk address

Depending on the user requirements, additional programmer commands may be sent, or the sequence terminated and an alternative mode initiated.

Figure D-29
National Instruments IEEE-488.2 (courtesy of National Instruments)

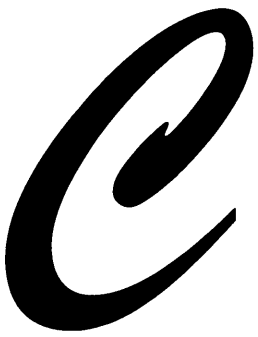


Note: For more useful information on writing your own IEEE-488 interface, contact National Instruments@146 anonymous FTP site at ***ftp.natinst.com.***

Summary

Using an IEEE-488 port with the PSX programmers offers a substantially higher rate of data transfer than using a standard RS232 port. Using Data I/O TaskLink software in an IEEE-488 dedicated application simplifies programmer use while limiting the IEEE-488 system to a single device configuration.

Configuring the PSX as one of many devices in an IEEE-488 bus application requires additional cost and effort in system setup, and substantially increases the complexity of the user environment.



Specifications

This appendix contains the PSX product line specifications, factory default settings, and safety information.

Specifications

The PSX product line specifications are listed below.

Power Requirements

Voltage Range	100 to 240V ac ± 10%
Frequency Range	47 to 63 Hz
Power Consumption	500 VA maximum 350 Watts maximum
Input Current	5A maximum

Physical

Control Modules

PSX1000

Dimensions:	81w x 27h x 61d cm (32w x 10.75h x 24d in.)
Weight:	12.34 kg (27 lb, 3 oz)

PSX500

Dimensions:	81w x 16h x 36d cm (32w x 6.3h x 14.2d in.)
Weight:	13.05 kg (28 lb, 12 oz)

Rails

PSX RAIL

Dimensions:	81w x 9h x22d cm (32w x 3.5h x 8.5d in.)
Weight:	6 kg (13 lb, 4 oz)

Micro/40-pin

Dimensions:	81w x 9h x22d cm (32w x 3.5h x 8.5d in)
Weight:	6.5 kg (14 lb, 4.5 oz)

28-pin

Dimensions:	81w x 9h x22d cm (32w x3.5h x 8.5d in.)
Weight:	6.5 kg (14 lb, 4.5 oz)

Socket Modules

Dimensions

All socket modules are the same dimensions across the front (width) and from the front to the back (depth). The only dimension that varies (because of the sockets) is the height.

The dimensions of a socket module without sockets are: 40.23w x 5.04h x 8.94d cm (15.84w x 1.986h x 3.518d in.)

	Height	
Socket Module	**Centimeters**	**Inches**
PSX-DIP48	5.219	2.055
PSX-32P(28)	5.750	2.264
PSX-32P(28)HT	7.236	2.849
PSX-32P(32)	5.750	2.264
PSX-32P(32)HT	7.236	2.849
PSX-44P(40)	5.770	2.272
PSX-44P(40)HT	7.335	2.888
PSX28SOIC-300	12.760	5.024
PSX28SOIC-330	5.971	2.351
PSX32SOIC-440	5.984	2.356
PSX40SOIC-450	5.974	2.352
PSX44SOIC-530	6.024	2.372
PSX28TSOP	5.694	2.242
PSX32TSOP	5.699	2.244
PSX40TSOP	5.626	2.215
PSX48TSOP	5.626	2.215
PSX56TSOP	5.626	2.215
PSX68MEMCARD	5.626	2.215
PSXMICRODIP	5.219	2.055
PSXMICRO-44	7.335	2.888
PSXMICRO-52P	7.430	2.925
PSXMICRO-64Q	5.908	2.326
PSX40VSOP	5.626	2.215
PSX56SSOP	5.694	2.242

Weight

In general, all socket modules weigh 0.85 kg (1 lb, 14 oz). The 68MEMCARD socket module weighs 1.08 kg (2 lb, 6 oz).

Functional

Keyboard

4-key keypad

Display

2-line, 48-character alphanumeric

Serial I/O

RS-232C with the following supported baud rates: 50, 75, 110, 134.5, 150, 200, 300, 600, 1050, 1200, 1800, 2000, 2400, 4800, 9600, 19.2K, and 38.4K.

Parallel I/O

IEEE-488, complying with IEEE-488 Standard 488-1978 and 1980 supplement. High-speed data transfer rate using 8 data and 8 bus management lines, up to 120 kilobytes per second. EMI-shielded IEEE-488 connector.

Translation Formats

There are 43 translation formats available for the PSX programmers (see the **Set I/O Options: Format** menu shown on page 4-25.

Environmental

Temperature	**Operating:**	+5° to +45°C (+41° to +113°F)
	Storage:	-40° to +70°C (-40° to +158°F)
Humidity	To 90% noncondensing	
Altitude	**Operating:**	To 5000 meters (16,000 ft)
	Storage:	To 8500 meters (28,000 ft)

Safety

The PSX was designed to comply with the following safety standards:

Underwriters Laboratories — UL 1950

Canadian Standards Association — CSA C22.2 No. 231

Technischer Überwachungsverein — TÜV GS-Mark Certification EN60950

Electrostatic Discharge (ESD)

IEC 801-2 (± 8 kV)

Certificate of RFI/EMI Conformance

Data I/O certifies that the PSX complies with the Radio Frequency Interference (RFI) and Electromagnetic Interference (EMI) requirements of EN55022 Class A and EN50082-1 as called out in 89/336/EEC, the EMC Directive for the European Community.

CE - *EC conformity mark*

Safety Summary

This summary contains general safety information for operating personnel. In addition, specific **WARNINGS** and **CAUTIONS** appear throughout this manual where they apply and are not included in this summary.

Antistatic Wrist Strap

To avoid electric shock, the antistatic wrist strap must contain a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

Definitions

WARNING statements identify conditions or practices that could result in personal injury or loss of life. **CAUTION** statements identify conditions or practices that could result in damage to equipment or other property.

Grounding the Product

The product is grounded through the grounding conductor of the power cord. To avoid electric shock, plug the power cord into a properly wired and grounded receptacle only. Grounding this equipment is essential for its safe operation.

Power Cord

Use only the power cord specified for your equipment.

Power Source

To avoid damage, operate the equipment only within specified line (ac) voltage.

Servicing

To reduce the risk of electric shock, perform only the servicing described in this manual.

Symbols

This symbol on equipment indicates that the user should consult the manual for further detail.

V~ This symbol stands for V ac, for example, 120 V~ = 120V ac.

This symbol denotes a fuse rating for a user-replaceable fuse.

This symbol denotes the protective ground connection.

This symbol denotes a ground connection for a signal or for an antistatic wrist strap with impedance of 1 MΩ (minimum) to 10 MΩ (maximum).

Zusammenfassende Sicherheitsinformationen

Diese Zusammenfassung enthält allgemeine Sicherheitsinformationen für das Bedienerpersonal. Zusätzlich erscheinen, wenn zutreffend, ausdrückliche Hinweise (ACHTUNG!, VORSICHT!) im Verlauf des Textes. Diese Hinweise werden in dieser Zusammenfassung nicht wiederholt.

Antistatik-Armband

Zum Schutz gegen Stromschläge muß das Antistatik-Armband einen Isolierwiderstand von minimal 1MΩ und maximal 10MΩ enthalten.

Definitionen

Mit **ACHTUNG!** ("WARNING") überschriebene Hinweise dienen zur Identifizierung und Warnung vor Zuständen oder Vorgängen, die Verletzungen oder Tod herbeiführen können. **VORSICHT!** ("CAUTION") dient zum Hinweis auf Zustände und Schritte, die zu Geräte-oder andersartigen Sachschäden führen können.

Erdung des Gerätes

Das Gerät wird durch den dritten Leiter des Netzkabel geerded. Stecken Sie die Netzschnur zur Vermeidung von Stromschlägen nur in eine geerdete Steckdose. Richtige Erdung ist für den problemfreien Betrieb dieses Gerätes unerläßlich.

Netzkabel

Verwenden Sie nur die für dieses Gerät vorgesehene Netzkabel.

Stromquelle

Vermeiden Sie Beschädigungen des Gerätes durch den Betrieb an der vorgeschriebenen Wechselspannung.

Wartung/Reparatur

Führen Sie zum Vermeiden von Stromschlägen nur die in diesem Handbuch erwähnten Wartungsarbeiten durch.

Symbole

Dieses Symbol bedeutet, daß das Handbuch weitere dem Bediener hilfreiche Hinweise enthält.

V~ Dieses Symbol bedeutet V ac (Volt Wechselstrom); z.B. 120V~ = 120V ac.

Dieses Symbol bezeichnet Sicherungsdaten für vom Bediener auszuwechseinde Sicherungen.

Dieses Symbol bezeichnet eine Schutzerde-Verbindung.

Dieses Symbol bezeichnet eine Masseverbindung für ein Signal oder ein Antistatik-Armband mit einer Impedanz von 1 MΩ (min) bis 10 MΩ (max).

Résumé des consignes de sécurité

Ce résumé comprend les informations relatives à la sécurité pour les opérateurs. De plus, tout au long de ce manuel, on retrouve aux endroits appropriés, des **MISES EN GARDE** et des **AVERTISSEMENTS** spécifiques qui ne sont pas inclus dans ce résumé.

Bracelet antistatique

Afin d'éviter tout choc électrique, le bracelet antistatique doit renfermer un résistor de 1MΩ (minimum) à 10MΩ (maximum).

Définitions

Les indications de **MISE EN GARDE** ("WARNING") signalent les conditions ou pratiques qui pourraient causer des blessures corporelles ou la mort. Les indications d'**AVERTISSEMENTS** ("CAUTION") signalent les conditions ou pratiques qui pourraient endommager l'équipement ou entraîner d'autres dommages matériels.

Mise à la terre du produit

Le produit est mis à la terre par l'entremise de la borne de mise à la terre du cordon d'alimentation. Pour éviter tout choc électrique, il faut brancher le cordon d'alimentation uniquement dans un réceptacle mis à la terre correctement et dont les fils ont été rattachés correctement. Il est essentiel de mettre cet appareil à la terre pour qu'il puisse fonctionner sans danger.

Cordon d'alimentation

N'utiliser que le cordon d'alimentation spécifié pour votre appareil.

Source d'alimentation

Pour éviter d'endommager l'appareil, il faut respecter la tension (ca) spécifiée.

Service

Afin de réduire les risques de choc électrique, il faut s'en tenir aux opérations d'entretien et de réparation spécifiées dans ce manuel.

Symboles


Ce symbole indique que l'utilisateur doit consulter le manuel pour obtenir de plus amples détails.

V~ Ce symbole représente le voltage en courant alternatif V ca, par exemple, 120 V~ = 120 V ca.


Ce symbole indique la valeur nominale d'un fusible remplaçable par l'utilisateur.


Ce symbole indique la connexion d'isolation à la masse.


Ce symbole indique une connexion de masse pour un signal ou un bracelet antistatique avec une impédance de 1 MΩ (minimum) à 10 MΩ (maximum).

Riepilogo di sicurezza

Questo riepilogo contiene informazioni di sicurezza per il personale addetto alle operazioni. Inoltre, specifiche note di **ATTENZIONE** e di **AVVISO** relative al contesto fanno parte di questo manuale e non sono state ripetute in questo riepilogo.

Cinghia antistatica da polso

Per evitare le scosse elettriche, la cinghia antistatica da polso deve contenere un resistore di isolamento da 1MΩ (minimo) a 10MΩ (massimo).

Definizioni

Le note di **ATTENZIONE ("WARNING")** identificano condizioni o procedure che potrebbero causare infortuni personali o decessi. Le note di **AVVISO** ("CAUTION") identificano condizioni o procedure che potrebbero causare danni all'equipaggiamento o ad altra proprietà.

Messa a terra del prodotto

Il prodotto viene messo a terra tramite il conduttore della messa a terra del cavo elettrico. Per evitare scosse elettriche, innestare il cavo elettrico in una presa correttamente cablata e messa a terra. La messa a terra di questo equipaggiamento è essenziale per un funzionamento sicuro.

Cavo elettrico

Usare solo il cavo elettrico specificato per l'equipaggiamento.

Fonte di alimentazione

Per evitare danni, operare l'equipaggiamento solo entro la tensione (ca) di linea specificata.

Manutenzione

Per ridurre il rischio di scossa elettrica, svolgere solo la manutenzione descritta in questo manuale.

Simboli


Questo simbolo indica che l'utente deve consultare il manuale per ulteriori dettagli.

V~ Questo simbolo indica V ca, ad esempio, 120V~ = 120 V ca.


Questo simbolo indica la capacità nominale di un fusibile che può venire sostituito dall'utente.


Questo simbolo contrassegna la messa a terra di protezione.


Questo simbolo contrassegna una messa a terra per un segnale o per un cinturino da polso antistatico con impedenza compresa tra 1 MΩ (minimo) e 10 MΩ (massimo).

Resumen de seguridad

En este resumen se proporciona información general sobre seguridad para el personal operario. Además, aparecen notas de **ADVERTENCIA** y **CUIDADO** por todo el manual, donde son apropiadas y no se incluyen en este resumen.

Muñequera antiestática

Para evitar descargas eléctricas, la muñequera antiestática debe contener un resistor aislante de 1 MΩ (como mínimo) a 10 MΩ (como máximo).

Definiciones

Las notas de **ADVERTENCIA** ("WARNING") identifican condiciones o prácticas que pudieran dar como resultado lesiones personales o pérdida de la vida. Las notas de **PRECAUCION** ("CAUTION") identifican condiciones o prácticas que pudieran dar como resultado daños en equipos u otras propiedades.

Conexión a tierra del producto

El producto se conecta a tierra por medio del conductor de masa del cable de alimentación. Para evitar descargas eléctricas, enchufe el cable de alimentación en un receptáculo alambrado y conectado a tierra de modo correcto.

Cable de alimentación

Use sólo el cable de alimentación especificado para el equipo de que se trate.

Fuente de alimentación

Para evitar daños, haga funcionar el equipo sólo dentro de los voltajes de línea especificados (de ca).

Servicios

Para reducir los riesgos de que se produzcan descargas eléctricas, lleve a cabo sólo los servicios descritos en este manual.

Símbolos


Este símbolo indica que el usuario debería consultar el manual para obtener más detalles.

V~ Este símbolo representa V ca. Por ejemplo,120 V ~ = 120V ca.


Este símbolo denota un valor nominal para un fusible reemplazable por el usuario.


Este símbolo indica la conexión a tierra de protección.


Este símbolo equivale a una conexión a tierra para una señal o una banda pulsera de antiestática con una impedancia de 1 MΩ (mínima) a 10 MΩ (máxima).

Service

This chapter is a supplement to Chapter 7, "Maintenance," and includes the following sections:

CAUTION: The procedures in this chapter must be performed by a qualified electronic service technician. Do not attempt to perform these procedures if you are not qualified to do so.

Reducing Electrostatic Discharge

To reduce electrostatic discharge, you should ground the programmer to a grounded antistatic workstation and wear a wrist strap that is connected to the same antistatic workstation. An ambient temperature of 18° to 28°C (64.4° to 82.4°F) and relative humidity less than 85% should be maintained.

WARNING: To avoid electric shock, use an antistatic wrist strap that contains a 1 MW (minimum) to 10 MW (maximum) isolating resistor.

If you do not have an antistatic workstation available, wear an antistatic wrist strap and connect it to the PSX's wrist strap connector on the right side of a rail. For more information, refer to "Reducing Electrostatic Discharge" on page 7-2.

Disassembling the PSX

For instructions on how to disassemble the PSX, refer to "Disassembling the PSX" on page 7-3.

WARNING: Disassembling the programmer when power is applied can cause severe electric shock.

Spare Parts

Spare parts are available from Data I/O. Call the Service Dispatch Group at 800-735-6070 to request spare parts.

Socket Warranty and Replacement

When the sockets have reached the warranted number of insertion cycles per socket, the PSX generates the following message:

```
Excessive socket cycles
ENTER to continue
```

You should replace the sockets and clear socket cycles (see the "Statistics" section starting on page 4-44) at this interval. You may want to order socket replacement kits ahead of time so you have them on hand when you need them. If you have not done so already, contact your nearest Customer Support office as listed in the Preface to order a socket replacement kit.

Table D-1 lists the warranties and socket replacement kit part numbers for socket module sockets. Table D-2 lists the warranties and socket replacement kit part numbers for rail sockets.

Table D-1
Socket Module Socket Warranties and Replacement Kit Part Numbers

Socket Module	Warranty (insertion cycles per socket)	Socket Replacement Kit Part Number
PSX-DIP48	25,000	952-0110
PSX-32P(28)	5,000	952-0064
PSX-32P(28)HT	10,000	952-0111
PSX-32P(32)	5,000	952-0065
PSX-32P(32)HT	10,000	952-0111
PSX-44P(40)	5,000	952-0066
PSX-44P(40)HT	10,000	952-0113
PSX28SOIC-300	10,000	952-0104
PSX28SOIC-330	10,000	952-0103
PSX32SOIC-440	10,000	952-0105
PSX40SOIC-450	10,000	952-0106
PSX44SOIC-530	10,000	952-0107
PSX28TSOP	10,000	952-0128
PSX32TSOP	10,000	952-0109
PSX40TSOP	10,000	952-0129
PSX48TSOP	10,000	952-0146
PSX56TSOP	10,000	952-0130
PSX68MEMCARD	10,000	952-0108
PSXMICRODIP	25,000	952-0110
PSXMICRO-44	10,000	952-0148
PSXMICRO-52P	10,000	952-0149
PSXMICRO-64Q	10,000	952-0147

Table D-1
Socket Module Socket Warranties and Replacement Kit Part Numbers

Socket Module	Warranty (insertion cycles per socket)	Socket Replacement Kit Part Number
PSX40VSOP	10,000	952-0194
PSX56SSOP	10,000	952-0163

Table D-2
Rail Socket Warranties and Replacement Part Numbers

Rail Sockets	Warranty (insertion cycles per socket)	Socket Replacement Kit Part Number
Micro or 40-pin	25,000	952-0012
28-pin	25,000	952-0011

Socket Replacement for DIP48 Socket Modules

This section describes how to replace sockets in your DIP48 socket module.

CAUTION: The procedures in this section must be performed by a qualified electronic service technician. Do not attempt to perform these procedures if you are not qualified to do so.

WARNING: Disassembling the programmer when power is applied can cause severe electric shock.

CAUTION: Removing or installing rails or socket modules when power is applied to the programmer can damage the programmer, rails, and socket modules and voids the warranty.

Package Contents

The socket replacement kit contains the hardware to replace the sockets in your DIP48 socket module. The kit includes five sockets.

Tools You Will Need

To replace the DIP48 socket module board assembly, you need the following tools:

- Antistatic workstation
- Antistatic wrist strap

WARNING: To avoid electric shock, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

- Phillips screwdrivers
- Flat-blade screwdriver
- Needle-nose pliers

Disassembly

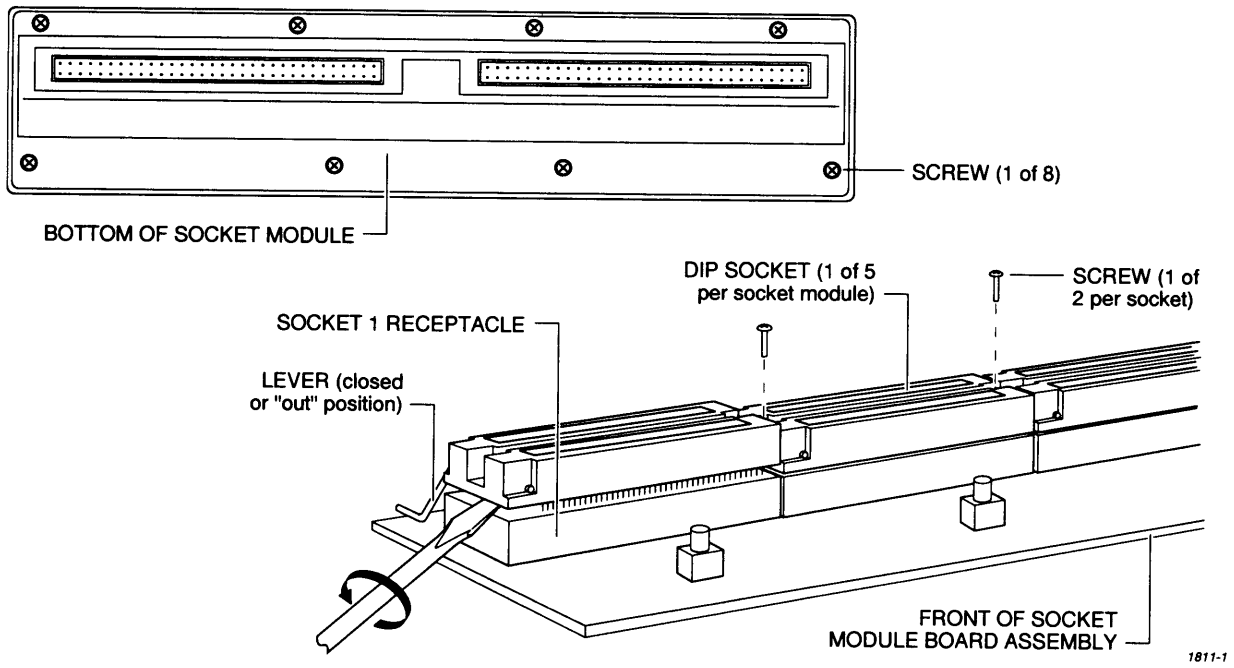
1. Power down the programmer.
2. Place the dial in the **open** position.

Note: Socket modules cannot be removed when the dial is in the closed position.

3. Firmly grasp the socket module and pulling straight up, remove the socket module from the rail.

4. Turn the socket module over on the antistatic workstation so the sockets and LEDs are down and the LEDs are toward you.
5. Using a Phillips screwdriver, remove the eight screws securing the bottom cover to the top cover (see Figure D-30).

Figure D-30
DIP48 Socket Module Disassembly



6. Remove the bottom cover.
7. Remove the socket module board assembly from the top cover. Set the top cover aside.
8. Remove the socket actuator slide from the upper edge of the socket module board assembly.

Removing Old Sockets

1. Set the socket module board assembly on the antistatic workstation with the LEDs toward you and the socket levers away from you.

CAUTION: For the next step, make sure you use a Phillips screwdriver that fits the screw head. Using a screwdriver that is too large could strip the screw head.

2. Using a Phillips screwdriver, completely loosen the screws at each end of each socket with firm downward pressure on the screwdriver. It is not necessary to remove the screws; they will lift out when you lift the socket out. Loosen the screws on all the sockets.

3. Using the flat-blade screwdriver and working alternately at several points around the socket 1 (the far left socket — see Figure D-30), gently separate the socket from the socket receptacle. Dislodge the socket and screws.
4. Repeat step 3 for each of the five sockets.

Installing New Sockets

1. With the lever away from you and to the left, hold a socket directly over the socket receptacle, matching pin 1 (the lower left pin) with the pin 1 position of the receptacle.
2. Lower the socket straight down into position until the connector engages.
3. Press the socket firmly in place.
4. Install the rest of the new sockets in the same way.

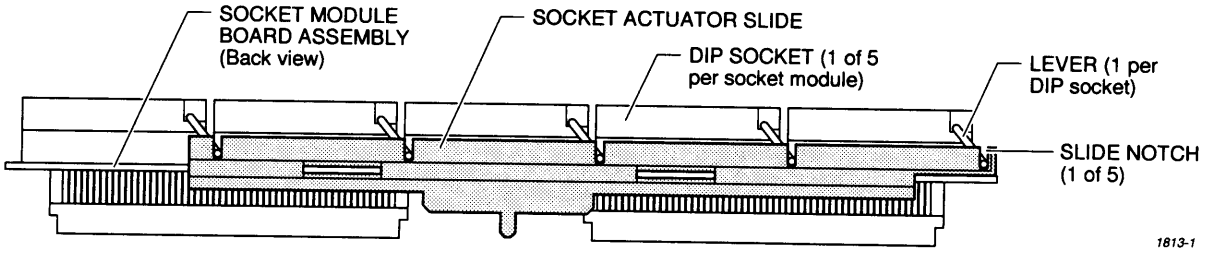
Reassembly

1. Use the needle-nose pliers to pick up and replace a small, Phillips-head screw into one of the holes at one end of socket 1. Replace all screws at both ends of each socket (2 per socket).

CAUTION: For the following step, tighten the screws to a maximum of 0.3 in./lb torque (finger-tight). Exceeding this value may cause the socket to bow slightly, creating intermittent contact between the socket and the devices.

2. Tighten each screw with the screwdriver.
3. Replace the socket actuator slide on the upper edge of the socket module board assembly (see Figure D-31)

Figure D-31
DIP48 Socket Module Reassembly



4. Move the actuator all the way to the right (when the actuator is on the edge farthest from you).

5. Set the top cover upside-down on the antistatic workstation with the LED overlays toward you. Turn the socket module board assembly over, and place it in the top cover with the actuator away from you.
6. Replace the bottom cover.
7. Using a Phillips screwdriver, replace the eight screws securing the bottom cover to the top cover.
8. Starting in the upper left of the upper rail, insert the socket module into the upper left slot by lowering it straight down into position until the connector engages.
9. With the palms of both hands and using equal and constant pressure, press the socket module firmly in place. When the connector is fully engaged, the bottom of the socket module rests flat against the rail chassis.
10. Power up the programmer.
11. Clear the socket cycles statistics as directed in the "Clear Socket Cycles" section on page 4-45.

Socket Board Replacement for PLCC, SOIC, TSOP, SSOP, VSOP, and QFP Socket Modules

The following kinds of socket modules are available for PLCCs, SOICs, TSOPs, and QFPs:

- Push/pop PLCC
- Open-top SOIC
- Open-top TSOP
- Open-top SSOP
- Open-top VSOP
- Open-top QFP
- Hinged-top PLCC

This section describes how to replace the push/pop PLCC and open-top SOIC, TSOP, SSOP, VSOP, and QFP sockets. Instructions for replacing hinged-top PLCC sockets are on page D-12.

The push/pop PLCC sockets require the socket board assemblies (daughter boards) to be replaced when the sockets are replaced.

CAUTION: The procedures in this section must be performed by a qualified electronic service technician. Do not attempt to perform these procedures if you are not qualified to do so.

WARNING: Disassembling the programmer when power is applied can cause severe electric shock.

CAUTION: Removing or installing rails or socket modules when power is applied to the programmer can damage the programmer, rails, and socket modules and voids the warranty.

Package Contents

The socket replacement kit contains the hardware to replace the sockets in your PLCC, SOIC, TSOP, SSOP, VSOP, or QFP socket modules. Each kit includes five socket board assemblies.

Tools You Will Need

To replace the socket board assemblies in the PLCC, SOIC, TSOP, SSOP, VSOP, and QFP socket modules, you need the following:

- Antistatic workstation
- Antistatic wrist strap
- Phillips screwdriver
- Flat-blade screwdriver

WARNING **To avoid electric shock, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.**

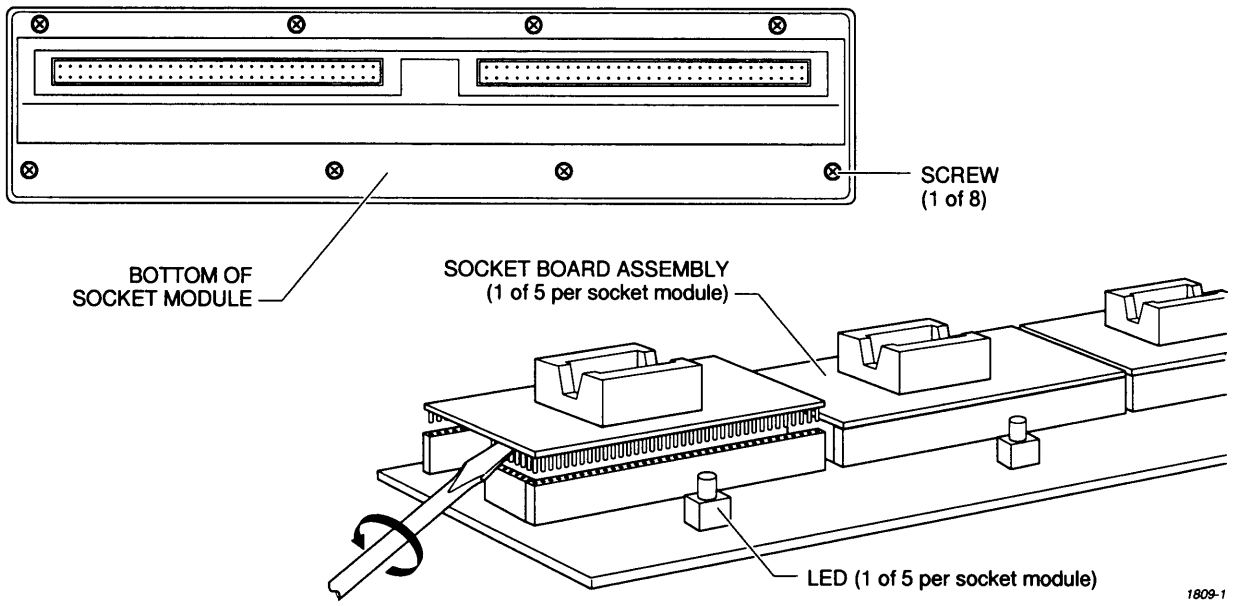
Disassembly

1. Power down the programmer.
2. Place the dial in the **open** position.

Note: Socket modules cannot be removed when the dial is in the closed position.

3. Firmly grasp the socket module and pulling straight up, remove the socket module from the rail.
4. Turn the socket module over on the antistatic workstation so the sockets and LEDs are down and the LEDs are toward you.
5. Using a Phillips screwdriver, remove the eight screws securing the bottom cover to the top cover (see Figure D-32).
6. Remove the bottom cover.
7. Remove the socket module board assembly from the top cover. Set the top cover aside.

Figure D-32
PLCC, SOIC, or TSOP Socket Module Assembly



Removing Old Socket Board Assemblies

1. Set the socket module board assembly on the antistatic workstation with the LEDs toward you.

Note: You will be removing and replacing the five socket board assemblies attached to the socket module board assembly.

2. Using the flat-blade screwdriver and working alternately at several points around a socket board assembly, gently separate the socket board assembly from the socket receptacle (see Figure D-32).
3. Repeat step 2 for each of the five socket board assemblies.

Installing New Socket Board Assemblies

1. Hold a socket board assembly directly over the socket receptacle, aligning the pin 1 position of the receptacle with the pin 1 position of the socket board assembly.
2. Lower the socket board assembly straight down into position until the connector engages.
3. Press the socket board assembly firmly in place.
4. Install the rest of the new socket board assemblies in the same way.

Reassembly

1. Set the top cover upside-down on the antistatic workstation with the LED overlays toward you. Place the socket module board assembly in the top cover with the LEDs down and toward you.
2. Replace the bottom cover.
3. Using a Phillips screwdriver, replace the eight screws securing the bottom cover to the top cover.
4. Starting in the upper left of the upper rail, insert the socket module into the upper left slot by lowering it straight down into position until the connector engages.
5. With the palms of both hands and using equal and constant pressure, press the socket module firmly in place. When the connector is fully engaged, the bottom of the socket module rests flat against the rail chassis.
6. Power up the programmer.
7. Clear the socket cycles statistics as directed in the "Clear Socket Cycles" section on page 4-45.

Socket Replacement for PLCC Hinged-top Socket Modules

This section describes how to replace sockets in your PLCC hinged-top (HT) socket module.

CAUTION: The procedures in this section must be performed by a qualified electronic service technician. Do not attempt to perform these procedures if you are not qualified to do so.

WARNING: Disassembling the programmer when power is applied can cause severe electric shock.

CAUTION: Removing or installing rails or socket modules when power is applied to the programmer can damage the programmer, rails, and socket modules and voids the warranty.

Package Contents

The socket replacement kit contains the hardware to replace the sockets in your PLCC socket modules. Each kit includes five sockets.

Tools You Will Need

To replace the sockets in a PLCC hinged-top socket module, you need the following tools:

- Antistatic workstation
- Antistatic wrist strap
- Phillips screwdriver
- Flat-blade screwdriver

WARNING: To avoid electric shock, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

Disassembly

1. Power down the programmer.
2. Place the dial in the **open** position.

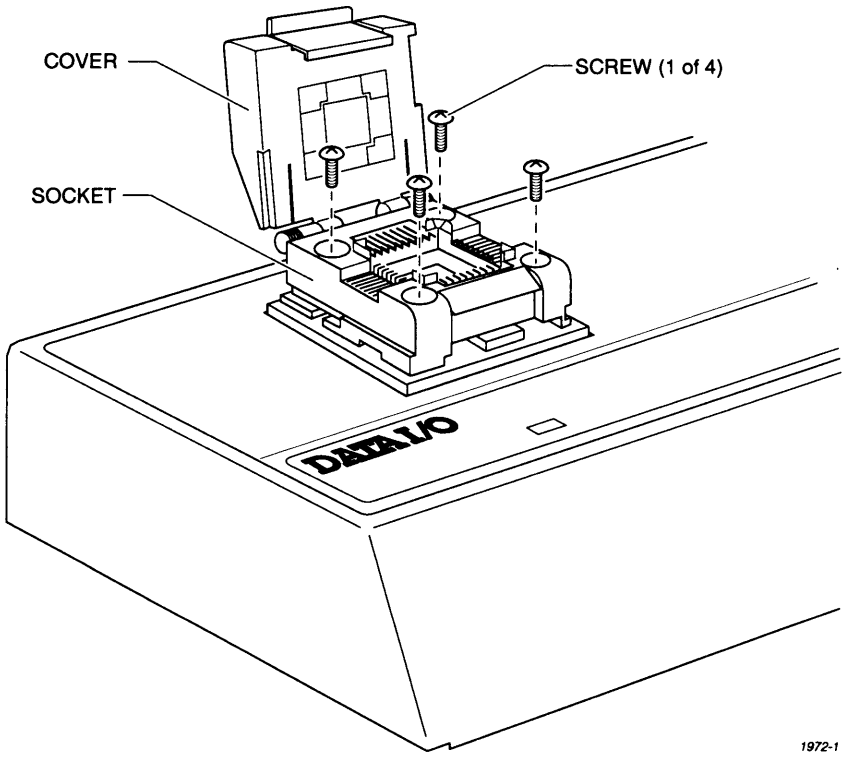
Note: Socket modules cannot be removed when the dial is in the closed position.

3. Firmly grasp the socket module and pulling straight up, remove the socket module from the rail.
4. Set the socket module on the antistatic workstation right side up with the LEDs toward you.

Removing Old Sockets

1. Open a hinged-top socket. Using a Phillips screwdriver, remove the four screws securing the socket to the socket receptacle (see Figure D-33).
2. Grasp the socket and pull straight up to remove the socket. If necessary, use the flat-blade screwdriver to gently separate the socket from the socket receptacle.
3. Repeat steps 1 and 2 for each of the five sockets.

Figure D-33
PLCC Hinged-top Socket Removal



Installing New Sockets

1. Hold a new hinged-top socket directly over the socket receptacle, aligning the pin 1 position of the receptacle with the pin 1 position of the socket.
2. Lower the socket straight down into position until the connector engages. Press the socket firmly in place.

Reassembly

1. Open a hinged-top socket. Replace the screws securing the socket to the socket receptacle.

CAUTION: For the following step, tighten the screws to a maximum of 0.3 in./lb torque (finger-tight). Exceeding this value may cause the socket to bow slightly, creating intermittent contact between the socket and the devices.

2. Using a Phillips screwdriver, tighten each screw.
3. Install the rest of the new sockets in the same way.
4. Starting in the upper left of the upper rail, insert the socket module into the upper left slot by lowering it straight down into position until the connector engages.
5. With the palms of both hands and using equal and constant pressure, press the socket module firmly in place. When the connector is fully engaged, the bottom of the socket module rests flat against the rail chassis.
6. Power up the programmer.
7. Clear the socket cycles statistics as directed in the "Clear Socket Cycles" section on page 4-45.

Socket Board Replacement for 68MEMCARD Socket Modules

68MEMCARD socket modules require a socket board replacement when sockets need replacement. This section describes how to replace the socket board assemblies (daughter boards) in a 68MEMCARD socket module.

CAUTION: The procedures in this section must be performed by a qualified electronic service technician. Do not attempt to perform these procedures if you are not qualified to do so.

WARNING: Disassembling the programmer when power is applied can cause severe electric shock.

CAUTION: Removing or installing rails or socket modules when power is applied to the programmer can damage the programmer, rails, and socket modules and voids the warranty.

Package Contents

The socket replacement kit contains the hardware to replace the PCMCIA card sockets in your 68MEMCARD socket modules. Each kit includes five socket board assemblies.

Tools You Will Need

To replace the socket board assemblies in the 68MEMCARD socket modules, you need the following tools:

- Antistatic workstation
- Antistatic wrist strap
- Phillips screwdrivers
- Flat-blade screwdriver

WARNING: To avoid electric shock, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

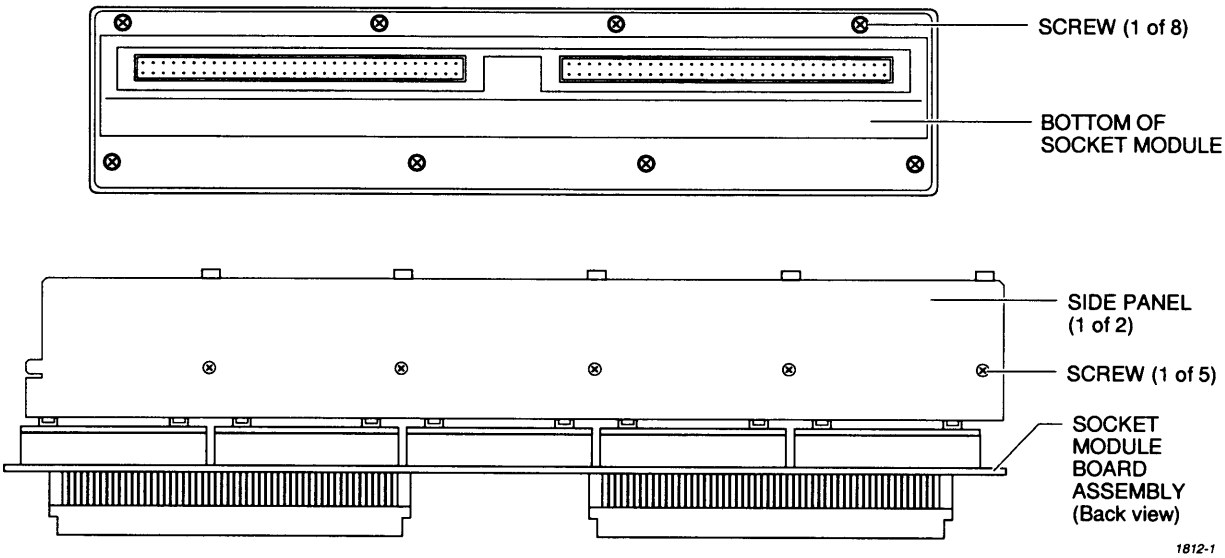
Disassembly

1. Power down the programmer.
2. Place the dial in the **open** position.

Note: Socket modules cannot be removed when the dial is in the closed position.

3. Firmly grasp the socket module and pulling straight up, remove the socket module from the rail.
4. Turn the socket module over on the antistatic workstation so the sockets and LEDs are down and the LEDs are toward you.
5. Using a Phillips screwdriver, remove the eight screws securing the bottom cover to the top cover (see Figure D-34).
6. Remove the bottom cover.

Figure D-34
68MEMCARD Socket Module Disassembly



7. Remove the socket module board assembly from the top cover. Set the top cover aside.
8. Using a Phillips screwdriver, remove the screws connecting the side panels of the card sockets (see Figure D-34). Set the side panels aside.

Removing Old Socket Board Assemblies

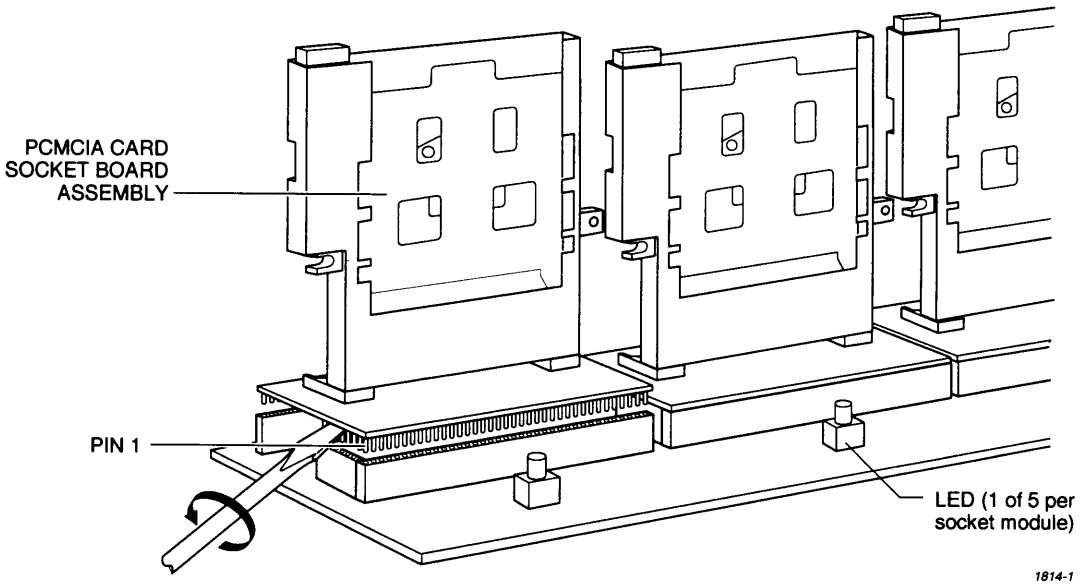
1. Set the socket module board assembly on the antistatic workstation.

Note: There are five PCMCIA card socket board assemblies (daughter boards) attached to the socket module board assembly. You will be removing and replacing the five socket board assemblies.

2. Using the flat-blade screwdriver and working alternately at several points around a socket board assembly, gently separate the socket board assembly from the socket receptacle (see Figure D-35).

3. Repeat step 2 for each of the five socket board assemblies.

Figure D-35
PCMCIA Card Socket Module Assembly



Installing New Socket Board Assemblies

1. Hold a socket board assembly directly over the socket receptacle, aligning the pin 1 position of the receptacle with the pin 1 position of the PCMCIA card socket board assembly.
2. Lower the socket board assembly straight down into position until the connector engages.
3. Press the socket board assembly firmly in place.
4. Install the rest of the new PCMCIA card socket board assemblies in the same way.

Reassembly

1. Replace the side panels. Using a Phillips screwdriver, reinstall the screws connecting the side panels of the card sockets.
2. Set the top cover upside-down on the antistatic workstation with the LED overlays toward you. Place the socket module board assembly in the top cover with the LEDs down and toward you.
3. Replace the bottom cover.
4. Using a Phillips screwdriver, replace the eight screws securing the bottom cover to the top cover.

5. Starting in the upper left of the upper rail, insert the socket module into the upper left slot by lowering it straight down into position until the connector engages.
6. With the palms of both hands and using equal and constant pressure, press the socket module firmly in place. When the connector is fully engaged, the bottom of the socket module rests flat against the rail chassis.
7. Power up the programmer.
8. Clear the socket cycles statistics as directed in the "Clear Socket Cycles" section on page 4-45.

Socket Replacement for Micro, 40-pin, and 28-pin Rails

This section describes how to replace sockets on the Micro, 40-pin, and 28-pin rails.

CAUTION: The procedures in this section must be performed by a qualified electronic service technician. Do not attempt to perform these procedures if you are not qualified to do so.

WARNING: Disassembling the programmer when power is applied can cause severe electric shock.

CAUTION: Removing or installing rails or sockets when power is applied to the programmer can damage the programmer and rails and voids the warranty.

Package Contents

The socket replacement kit contains the hardware to replace the sockets on your Micro, 40-pin, or 28-pin rail. The parts included in the replacement kits are listed in Table D-3.

Table D-3
Contents of Socket Replacement Kits for Micro, 49-pin, and 28-pin rails

Name of Kit	Number of Rail Sockets	Number of 0-80 x 3/8" Screws	Number of Rail Tools
Micro and 40-pin rail	10	22	5
28-pin rail	15	32	5

Tools You Will Need

To remove a socket from a rail, you need the following tools:

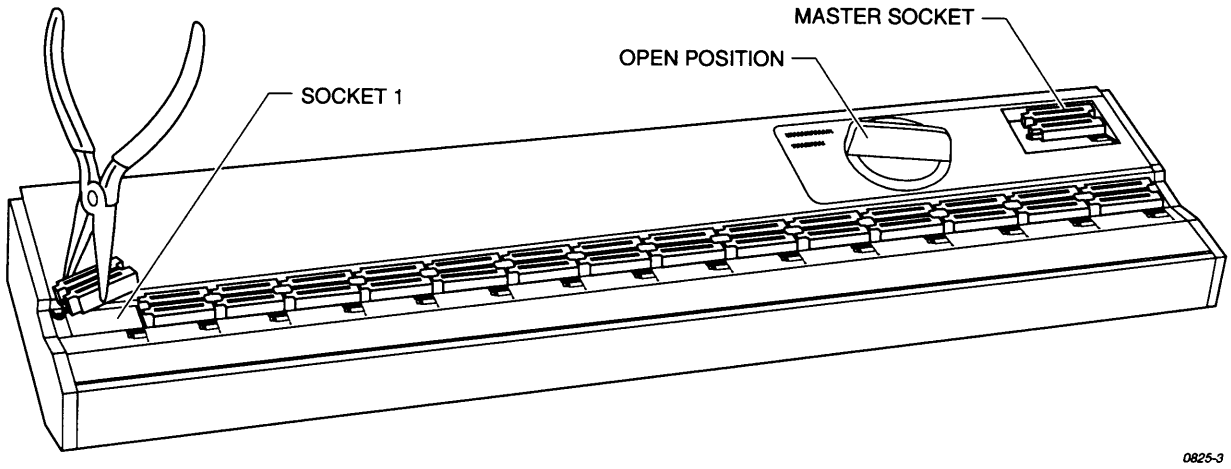
- Antistatic workstation
- Antistatic wrist strap
- Phillips screwdriver
- Needle-nose pliers

WARNING: To avoid electric shock, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor. An antistatic wrist strap receptacle is located at the right end of each rail.

Removing Old Sockets

1. Power down the programmer.
2. Remove the rail from the control module (see "Disassembling the PSX" on page 7-3).
3. Place the rail on the antistatic workstation so the sockets and LEDs are toward you.
4. Place the dial in the open position as shown in Figure D-36.

Figure D-36
Socket Rail Dial Open



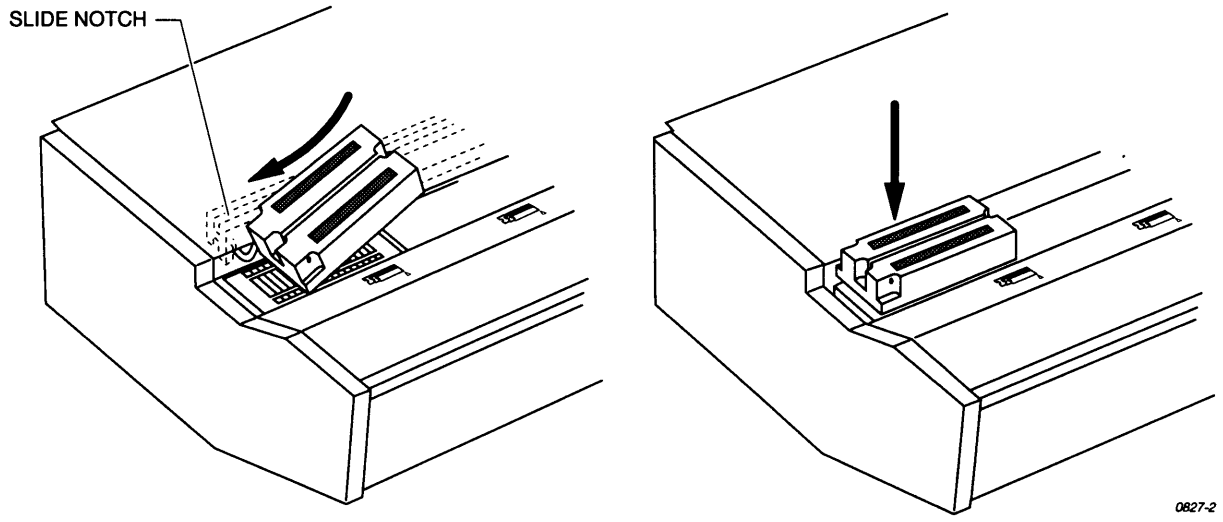
CAUTION: For the following step, make sure you use a Phillips screwdriver that fits the screw head. Using a screwdriver that is too large could strip the screw head.

5. Starting with socket 1 (see Figure D-36), completely loosen the screws at each end of the socket with firm downward pressure on the screwdriver. It is not necessary to remove the screws; they will lift out when you lift the socket out. Loosen the screws on all the sockets.
6. Using the needle-nose pliers, grasp socket 1 on either side. Lifting up as you use a back and forth motion, dislodge the socket and screws. Move the socket to the right, tilt and lift the lever away from the unit. Repeat with the other sockets.

Installing New Sockets

1. Make sure the dial is in the open position as shown in Figure D-36.
2. With the lever away from you and in the closed (out) position, use the needle-nose pliers to hold a socket directly over and to the right of the pin 1 position of the socket 1 receptacle.
3. Insert the lever in the groove between the socket and the socket module or rail case and move the socket to the left until the lever fits into the slide notch (see Figure D-37).

Figure D-37
Inserting the Socket



4. Once the lever is in the slide notch, move the socket to the left, making sure the socket is raised enough over the socket receptacle that the socket pins are not damaged as you move the socket.
5. As you move the socket to the left, match pin 1 with pin 1 of the receptacle, then press the socket firmly into place.
6. Test to make sure the socket is inserted properly by carefully turning the dial. (The socket should open and close smoothly. If the socket does not actuate properly, the lever has been inserted into the wrong slot in the socket module or rail case. Remove the socket and repeat the insertion procedure until the socket opens and closes smoothly.)
7. Repeat the procedure with the remaining sockets.

Note: Once the sockets are in place, the dial should actuate all sockets (except the master socket) simultaneously.

8. Use the needle-nose pliers to pick up a flat-head screw and place it into one of the screw holes in socket 1. Replace all the screws at the ends of each socket.

CAUTION: For the following step, tighten the screws to a maximum of 0.3 in./lb torque (finger-tight). Exceeding this value may cause the socket to bow slightly, creating intermittent contact between the socket and the devices.

9. Tighten each screw with the screwdriver.
10. Install the rail on the control module (see the "Installing Rail(s)" section on page 2-2).
11. Power up the programmer.
12. Clear the socket cycles statistics as directed in the "Clear Socket Cycles" section on page 4-45.

Master Socket Replacement

This section describes how to replace the master socket on the PSX rails.

CAUTION: The procedures in this section must be performed by a qualified electronic service technician. Do not attempt to perform these procedures if you are not qualified to do so.

WARNING: Disassembling the programmer when power is applied can cause severe electric shock.

CAUTION: Removing or installing rails or sockets when power is applied to the programmer can damage the programmer and rails and voids the warranty.

Tools You Will Need

To remove the master socket from a rail, you need the following tools:

- Antistatic workstation
- Antistatic wrist strap
- Phillips screwdriver
- Needle-nose pliers

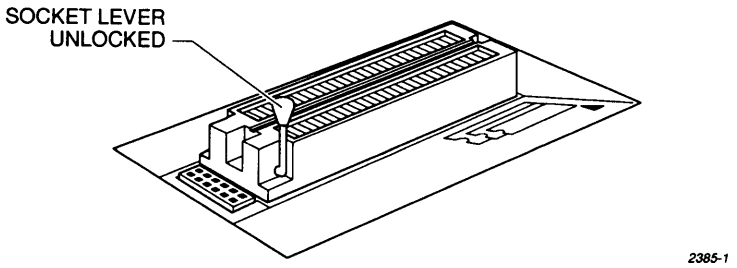
WARNING: To avoid electric shock, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor. An antistatic wrist strap receptacle is located at the right end of each rail.

Removing Old Socket

1. Power down the programmer.
2. Remove the rail from the control module (see "Disassembling the PSX" on page 7-3).
3. Place the rail on the antistatic workstation so the sockets and LEDs are toward you.

4. On the master socket, make sure the lever is in the open or up position (see Figure D-38).

Figure D-38
Master Socket Lever in Open Position

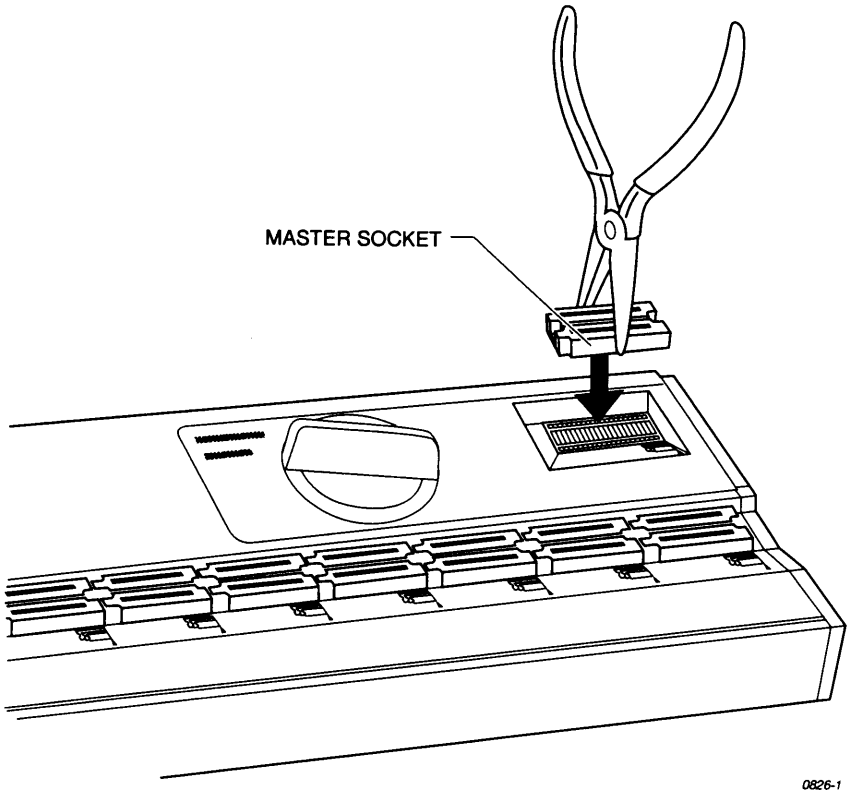


CAUTION: For the following step, make sure you use a Phillips screwdriver that fits the screw head. Using a screwdriver that is too large could strip the screw head.

5. Completely loosen the screws at each end of the master socket with firm downward pressure on the screwdriver. It is not necessary to remove the screws; they will lift out when you lift the socket out.

6. Using the needle-nose pliers, grasp the master socket on either side. Lifting up as you use a back and forth motion, dislodge the socket and screws (see Figure D-39).

Figure D-39
Master Socket



Installing New Socket

1. On the master socket, make sure the lever is in the open or up position.
2. Match pin 1 of the master socket with pin 1 of the receptacle, then press the master socket firmly into place.
3. Use the needle-nose pliers to pick up a flat-head screw and place it into one of the screw holes in the master socket. Do the same for the other screw.

CAUTION: For the following step, tighten the screws to a maximum of 0.3 in./lb torque (finger-tight). Exceeding this value may cause the socket to bow slightly, creating intermittent contact between the socket and the devices.

4. Tighten each screw with the screwdriver.
5. Install the rail on the control module (see the "Installing Rail(s)" section on page 2-2).
6. Power up the programmer.

Verifying the Performance of the PSX

To ensure correct programming voltages and maximum programming yields, Data I/O recommends that you turn your PSX off and then on again at least once every 3 months to run the system self-test and automatic performance-verification routines. If the software cannot compensate for current voltage variations, the PSX displays any of several performance-related messages. You should verify the performance of the PSX power supply whenever the PSX displays these messages. Verification procedures are described on the following pages.

The PSX verifies internal voltages every time it is powered up, every time a complete self-test is run, and every time a device operation is run. The voltage verification is performed by software and is compared to a laser-trimmed voltage reference. Contact Data I/O for information on checking the reference voltage and the master clock.

To ensure that your PSX continues to meet product performance specifications, Data I/O recommends that it be returned to an authorized Data I/O Service Center every 12 months for a complete performance evaluation.

Disassembly

WARNING: Dangerously high voltages are present. The procedures in this section must be performed by a qualified electronic service technician. Do not attempt to perform these procedures unless you are qualified to do so.

WARNING: Disassembling the programmer when power is applied can cause severe electric shock.

CAUTION: Assembling or disassembling the programmer when power is applied can damage the programmer, rails, and socket modules, and voids the warranty.

CAUTION: When calibrating the PSX power supply, complete the entire procedure. Do not attempt to perform selected sections of the procedure.

Tools You Will Need

To verify the performance of your PSX power supply, you need the following tools:

- Antistatic workstation
- Antistatic wrist strap

WARNING: To avoid electric shock, use an antistatic wrist strap containing a 1 MΩ (minimum) to 10 MΩ (maximum) isolating resistor.

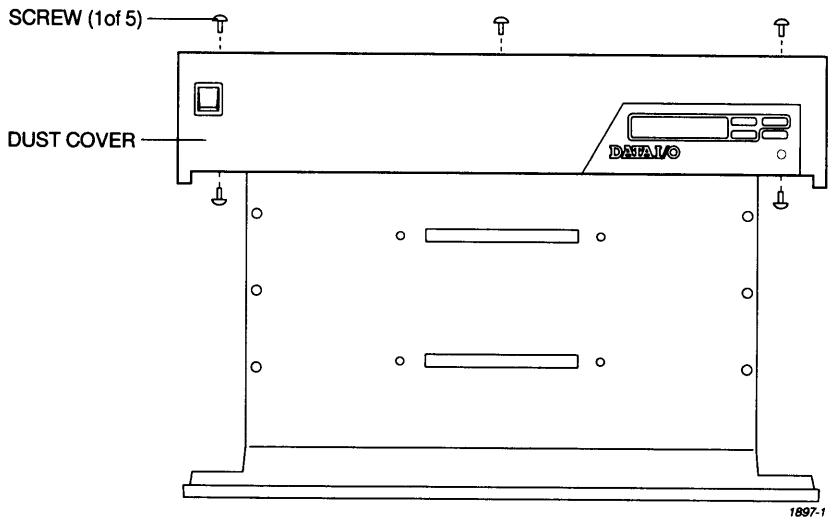
- A 3.5-digit Digital Multimeter (DMM) with an accuracy of ±0.25%V dc (for example, a Fluke 8050A DMM)
- Insulating material such as an antistatic bag or rubber mat
- Phillips screwdrivers
- Potentiometer tweaker or very small flat-blade screwdriver
- Hook tool or needle-nose pliers

Procedure

1. Power down the programmer and disconnect the power cord and any shielded I/O port cables from the programmer.
2. Remove any installed rails (see "Disassembling the PSX" on page 7-3). You do not need to remove socket modules from a rail before removing it from the control module.

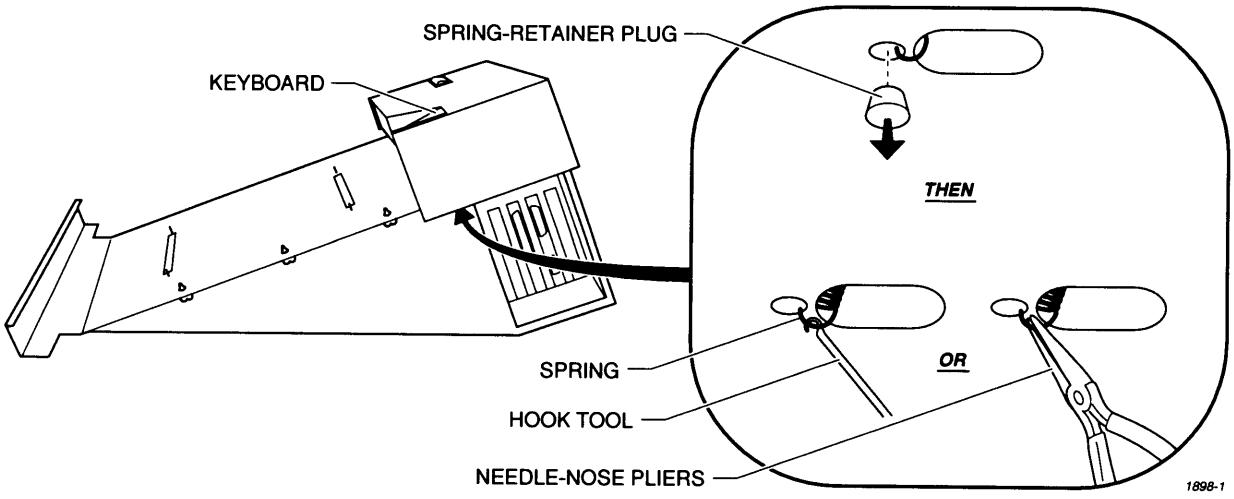
3. Remove the five screws from the dust cover (see Figure D-40). Retain the screws for replacement of the dust cover.

Figure D-40
Location of Screws on Dust Cover



4. Underneath the keyboard, remove the spring-retainer plug. Using the hook tool or needle-nose pliers, unhook the spring (see Figure D-41).

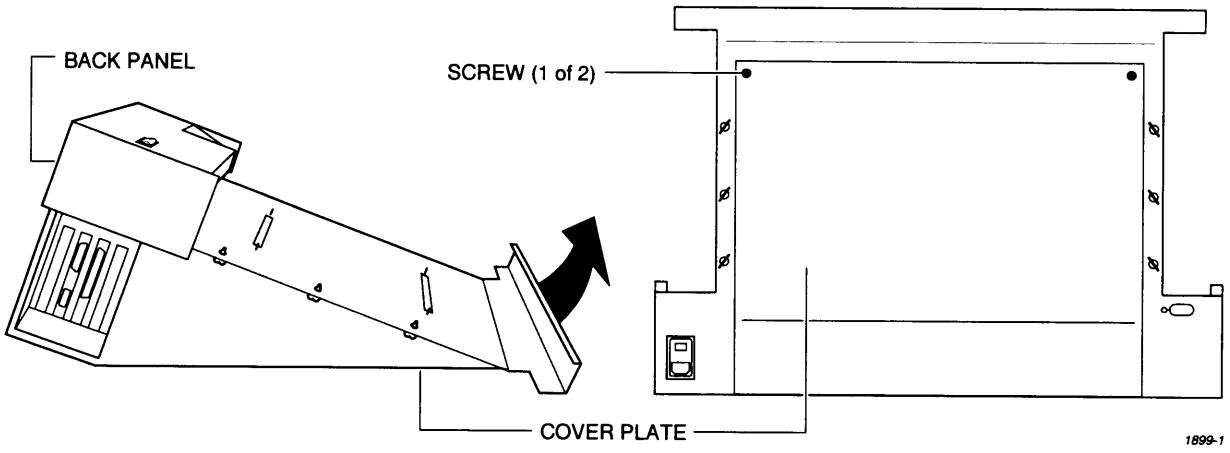
Figure D-41
PSX Keyboard and Dust Cover Removal



5. Lift the keyboard out of the dust cover. Put the keyboard through the keyboard opening and place on the programmer chassis.
6. Remove the dust cover.
7. To ensure that the keyboard doesn't short, place it on an insulating material such as an antistatic bag or rubber mat.

8. Place the programmer upright on its back panel with the bottom cover plate toward you (see Figure D-42).

Figure D-42
PSX Bottom cover Plate Removal



9. With the Phillips screwdriver, remove the two screws securing the bottom cover plate to the frame. Retain the screws for replacement of the bottom cover plate.
10. Lift the bottom cover plate clear of the programmer and set it aside.
11. Reconnect the power cord (see the "Connecting the Power Cord" section on page 2-8).
12. Power up the programmer (see the "Turn on the Power" section on page 2-10).

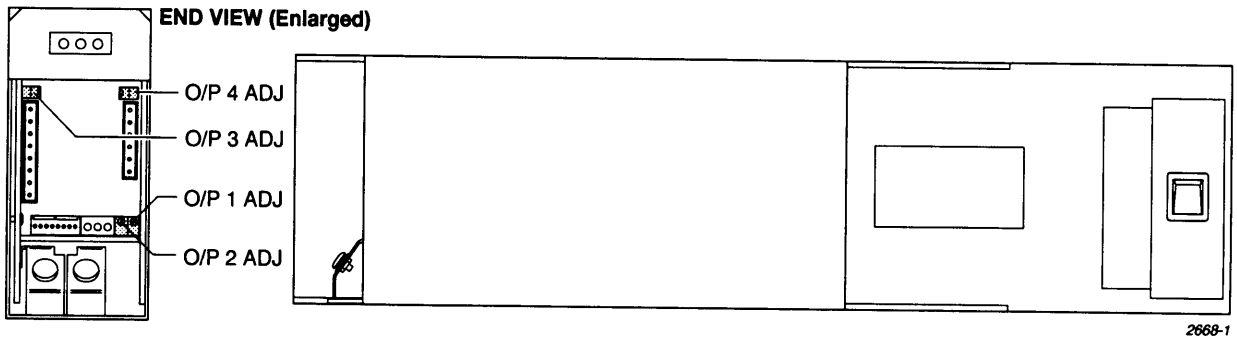
    Wait at least 30 minutes before continuing the performance-verification procedure. This allows the power supply to stabilize and helps ensure accurate results.

Performance Verification Procedure

The power supply in your PSX programmer is one of four kinds. Examine the power supply installed in your programmer to determine which of the following power supplies your programmer uses. The adjustment location for each test point depends upon the power supply installed.

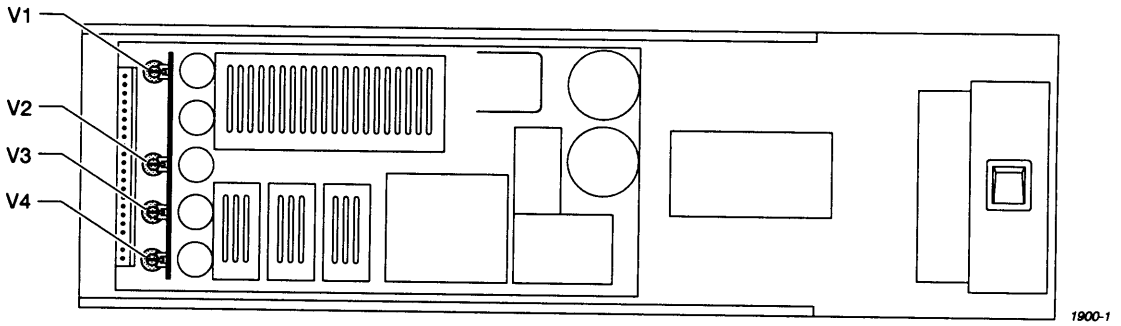
The Advance Power™ power supply (part number 806-0165) is shown in Figure D-43.

Figure D-43
Advance Power Supply Potentiometer Locations



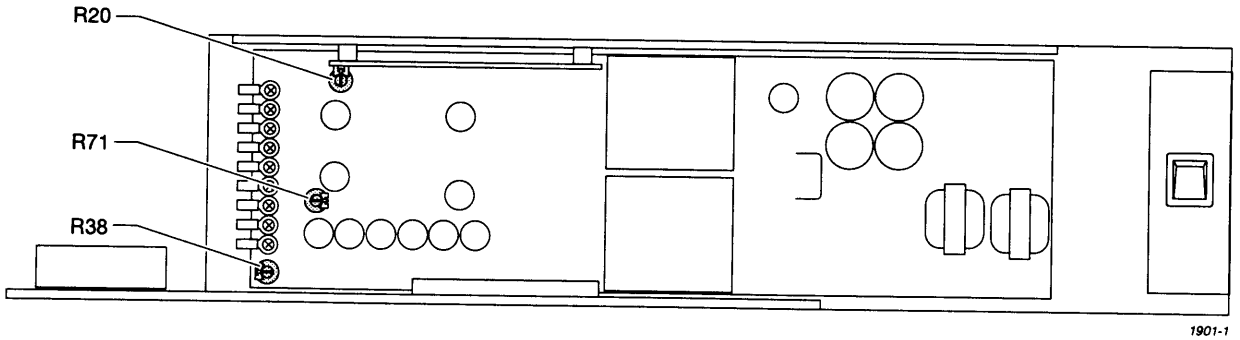
The PSI™ power supply (part number 806-0165) is shown in Figure D-44.

Figure D-44
PSI Power Supply Potentiometer Locations



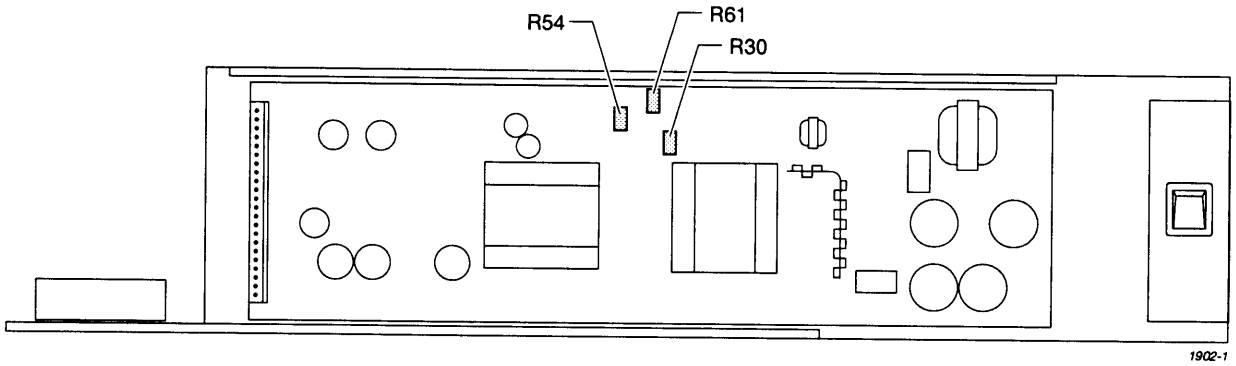
The Power One™ power supply (part number 806-0150) is shown in Figure D-45.

Figure D-45
Power One Power Supply Potentiometer Locations



The Boschert™ power supply (part number 806-0150) is shown in Figure D-46.

Figure D-46
Boschert Power Supply Potentiometer Locations



WARNING: When performing the following steps, avoid electric shock by observing extreme caution while adjusting the voltage. Dangerously high voltages are present at several locations inside the power supply, including some heatsinks. Do not touch heatsinks or exposed circuitry.

1. For each voltage listed in Table D-4, connect the DMM test leads between **TP1 (ground)** and the test point listed.

   All test points are shown on the CPU board (701-2408) in Figure D-47.

2. Using the potentiometer tweaker or very small flat-blade screwdriver, adjust the potentiometer specified in Table D-4 (see Figure D-43, D-44, D-45, or D-46 for potentiometer locations) until the voltage reading on the DMM is at the **nominal** voltage level for that test point.

3. Use the test points that are not adjustable to verify that the voltage is at or near the **nominal** voltage level for that test point.

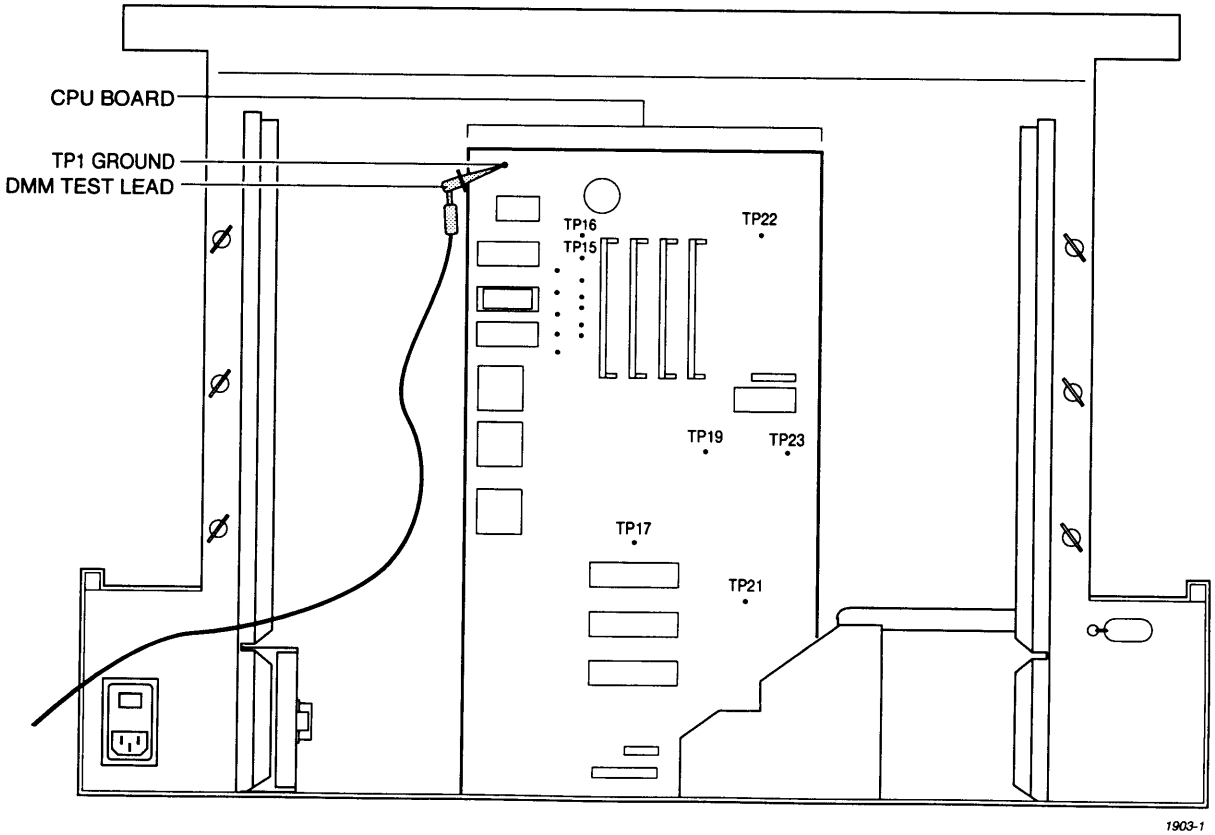
4. If any of the non-adjustable test points are not at or near the **nominal** voltage level for that test point, repeat the performance-verification procedure. If the non-adjustable readings are still out of tolerance, replace the power supply (part numbers for the power supplies are listed starting on page D-29).

Table D-4
PSX Verification Voltages

Voltage*	Test Point	Min. *	Nom. *	Max. *	Potentiometer Location: *Advance Power*	*PSI*	*Power One*	*Boschert*
+32.0	TP23	+31.500	+32.070	+32.640	O/P 4 Adj.	V4	R71	R61
+12.0	TP17	+12.120	+12.250	+12.370	O/P 2 Adj.	V1	R20	R54
+5.0	TP22	+5.075	+5.100	+5.125	O/P 1 Adj.	V2	R38	R30
-12.0	TP19	-12.600	-12.300	-12.000	O/P 3 Adj.	V3	–	–
-12.0	TP19	-12.360	-12.000	-11.640	–	–	†	†
-5.0	TP15	-5.250	-5.000	-4.750	†	†	†	†
-3.6	TP16	-4.100	-3.600	-3.100	†	†	†	†
+10.0 (REF)	TP21	+9.900	+10.000	+10.100	†	†	†	†

* *All voltages are in V dc.*
† *These test points are for verification purposes only—they are not adjustable.*

Figure D-47
Calibration Test Points on PSX CPU Board



5. Remove the DMM test leads.
6. To run the self-test on the CPU board, power down the programmer, then power it up again. The programmer displays:
   `CPU OKAY`
7. Power down the programmer for reassembly.

CAUTION: Assembling or disassembling the programmer when power is applied can damage the programmer, rails, and socket modules, and voids the warranty.

Reassembly

Reassemble the PSX as follows:

1. Replace the bottom cover plate in its original position.
2. Reinstall the two Phillips-head screws securing the bottom cover plate to the chassis.
3. Place the programmer in normal operating position, placing the keyboard on the programmer chassis.
4. Replace the dust cover, putting the keyboard through the keyboard opening and placing it on the dust cover.
5. Center the dust cover over the power switch and reposition the keyboard.
6. Lift the right side of the programmer up and use the hook tool or needle-nose pliers to grasp the lower end of the keyboard spring through the oval opening on the chassis.
7. Replace the hook on the end of the spring in the nearby circular opening.
8. Secure the hook with the spring-retainer plug.
9. Replace the five screws securing the dust cover to the programmer chassis.
10. Return the programmer to its upright position and reconnect any shielded I/O port cables (see the "Connecting I/O Port Cables" section on page 2-9).

CAUTION: Installing rails when power is applied to the programmer can damage the programmer, rails, and socket modules and voids the warranty.

11. Reinstall the rail(s) as directed in the "Installing Rail(s)" section on page 2-2.
12. Power up the programmer (see the "Turn on the Power" section on page 2-10).

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