

# BoardSite<sup>™</sup> 5100

---

Portable In-Circuit Programmer

User Manual

July 1997

981-0268-004

Data I/O has made every attempt to ensure that the information in this document is accurate and complete. Data I/O assumes no liability for errors, or for any incidental, consequential, indirect or special damages, including, without limitation, loss of use, loss or alteration of data, delays, or lost profits or savings, arising from the use of this document or the product which it accompanies.

No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose without written permission from Data I/O.

Data I/O Corporation  
10525 Willows Road N.E., P.O. Box 97046  
Redmond, Washington 98073-9746 USA  
(425) 881-6444

Acknowledgments:

BoardSite and Keep Current are trademarks and Data I/O is a registered trademark of Data I/O Corporation.

Data I/O Corporation acknowledges the trademarks of other organizations for their respective products or services mentioned in this document.

© 1991, 1992, 1997 Data I/O Corporation  
All rights reserved

# *Table of Contents*

---

## **1. Introduction**

What Is BoardSite 5100? . . . . .	1-1
Contents of Package . . . . .	1-2
BoardSite 5100 External Features . . . . .	1-3
BoardSite 5100 Glossary . . . . .	1-4
Using the BoardSite 5100 Display . . . . .	1-5
Specifications . . . . .	1-6
BoardSite 5100 Accessories . . . . .	1-8

## **2. Setting Up BoardSite 5100**

Setting Up BoardSite 5100 Hardware . . . . .	2-1
Checking and Replacing the Line Fuse . . . . .	2-2
Installing the Disk Cartridge . . . . .	2-3
Removing the Disk Cartridge . . . . .	2-4
Powering Up BoardSite 5100 . . . . .	2-6
Troubleshooting . . . . .	2-8

## **3. Programming a Board**

Board Programming Example . . . . .	3-1
BOARD Command Options . . . . .	3-4
Other Command Options . . . . .	3-5

## **4. BoardSite 5100 Operations**

DIAG Command . . . . .	4-1
To Run DIAG . . . . .	4-2
LOAD Command . . . . .	4-2
LOAD (Master Board to RAM) . . . . .	4-2
LOAD (Port to RAM) . . . . .	4-4
LOAD (Floppy Disk to RAM) . . . . .	4-5

DISK Command . . . . .	4-6
List Contents of Cartridge Disk . . . . .	4-6
Copy Floppy Disk to Cartridge Disk . . . . .	4-7
Update Cartridge Disk from Floppy . . . . .	4-8
PASSWD Command . . . . .	4-8
BoardSite 5100 Command Tree . . . . .	4-9

<b>5. Messages</b> . . . . .	5-1
------------------------------	-----

**Index**

**List of Figures**

Figure 1-1. Contents of the BoardSite 5100 Package . . . . .	1-2
Figure 1-2. External Features of the BoardSite 5100 . . . . .	1-3
Figure 1-3. Connectors – Pentium Version . . . . .	1-3
Figure 1-4. BoardSite 5100 LCD . . . . .	1-5
Figure 2-1. Opening the Side Cover . . . . .	2-1
Figure 2-2. AC Power Receptacle and Voltage Selector Window . . . . .	2-2
Figure 2-3. Lifting Up the Drive . . . . .	2-3
Figure 2-4. Release Lever and Lock Button . . . . .	2-4
Figure 2-5. Inserting the Cartridge into the Drive . . . . .	2-5
Figure 2-6. Lowering the Drive . . . . .	2-5
Figure 2-7. Power Switch and Ac Power Receptacle . . . . .	2-6
Figure 3-1. BOARD Command Tree . . . . .	3-4
Figure 4-1. BoardSite 5100 Command Tree . . . . .	4-10

# 1 Introduction

---

---

## What Is BoardSite 5100?

BoardSite 5100 is a portable in-circuit programmer with which you can program memory devices that are already installed on a circuit board. BoardSite programs and tests NMOS and CMOS EPROMs, EEPROMs, and single-chip microcomputers. BoardSite 5100 can program up to eight boards simultaneously.

BoardSite 5100 programming data can be stored on the internal cartridge disk drive or floppy disk. Data RAM provides temporary storage of programming data during the programming operations. By connecting a keyboard and monitor, BoardSite 5100 becomes a programming development system, with which your developer can customize the 5100 for your memory board programming operations.

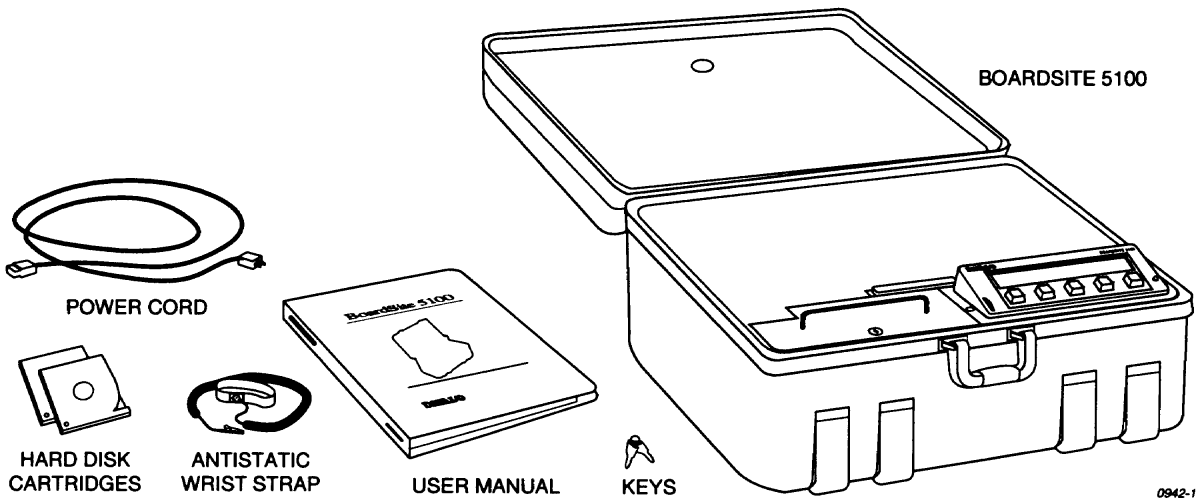
The BoardSite 5100 base unit contains:

- A Pentium CPU with 8MB of Dynamic RAM
- A 200MB cartridge disk drive with removable media, containing MS-DOS operating system and BoardSite 5100 application software
- A 3.5-inch 1.44MB floppy disk drive
- One serial port
- One parallel port
- One VGA video port
- One PC-AT Keyboard port
- Two IBM PC/AT-compatible bus interface slots

## Contents of Package

Figure 1-1 illustrates the contents of your BoardSite 5100 package. Check the contents of your package against this figure. Items that are part of the 5100 developer's tool kit are included in a separate package.

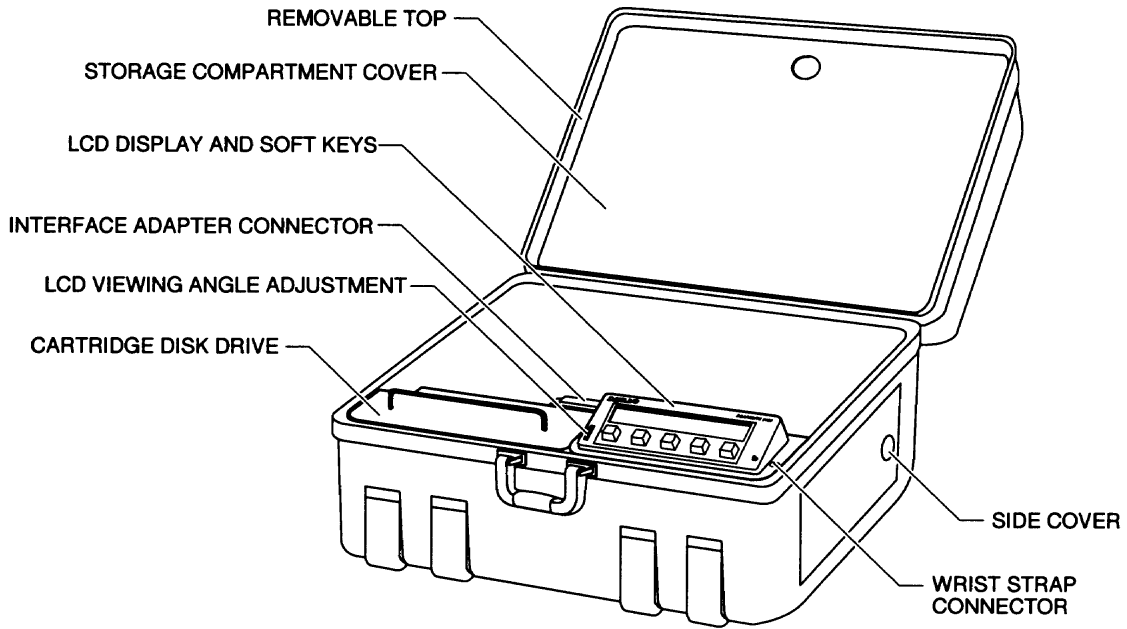
**Figure 1-1**  
*Contents of the BoardSite 5100 Package*



## BoardSite 5100 External Features

Figure 1-2 shows the external features of BoardSite 5100.

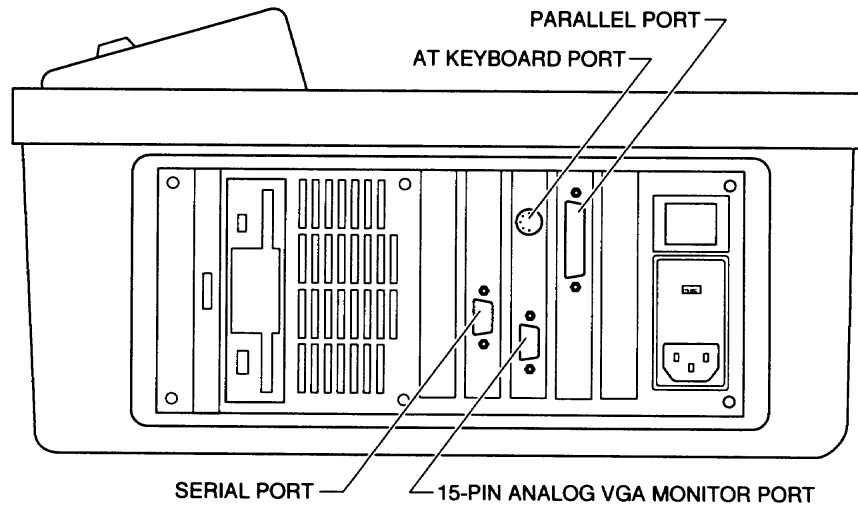
**Figure 1-2**  
External Features of the BoardSite 5100



0943-2

Figure 1-3 shows the floppy disk drive, ac power receptacle, power switch, and connectors, all of which are behind the side cover of BoardSite 5100.

**Figure 1-3**  
Connectors — Pentium Version



2565-1

---

## BoardSite 5100 Glossary

You should understand the following terms before operating the 5100.

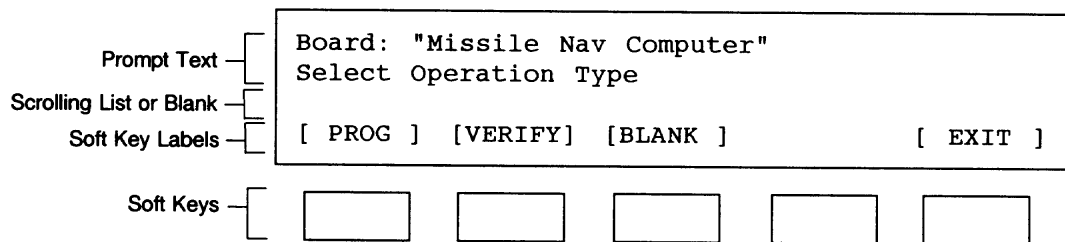
<b>Blank check</b>	A pre-programming test that checks the board to ensure that it is fully erased.
<b>Board name</b>	A name your developer assigns when creating the programming files. The 5100 uses the board name to refer to all the files that it uses to program the board. During operation, the 5100 may prompt you to select the board name.
<b>Cartridge disk drive</b>	A cartridge disk drive with removable disk. In the 5100, the cartridge disk has a storage capacity of 200MB. In this manual, the removable disk and its plastic enclosure are called the cartridge.
<b>Checksum</b>	A binary sum of every data word in a programmable device. By comparing a device's checksum against the data file's checksum, you can usually determine if a programming error has occurred.
<b>CRC (cyclic redundancy check)</b>	A method of encoding the data in a programmable device (and data file) for error detection. The CRC encoding algorithm may allow you to identify programming errors that a checksum cannot. Use both a checksum and CRC for the best programming error detection.
<b>Directory</b>	A name, assigned by your developer, that refers to a group of files on a disk.
<b>Floppy disk drive</b>	A disk drive that uses flexible disks. In the 5100, the floppy disk has a storage capacity of 1.44MB.
<b>Illegal bit test</b>	A pre-programming test that checks already-programmed bits in the board against the data to be programmed (source data). If the source data specifies that a bit is to be "unprogrammed," and it cannot be, the illegal bit test fails. If an erasable device fails the illegal bit test, you must erase it before programming.
<b>Interface adapter</b>	A custom-built adapter that interfaces the BoardSite 5100 to the memory boards you program. Different boards may require different interface adapters.
<b>Load</b>	A command that copies the programming data into the 5100. Load can be done from disk to RAM, from a master board to RAM, or from a port to RAM.
<b>Master</b>	A master board (or "golden board") already programmed with data. A master board can be used as the data source for programming other memory boards.
<b>Program</b>	A command that copies the programming data from the 5100 (from disk, floppy, master, or RAM) into the programmable devices on your board.
<b>RAM</b>	A kind of memory (Random Access Memory) that stores programming data. RAM is volatile, which means the data is lost when 5100 power is turned off.
<b>Verify</b>	A test that checks the board to ensure that the data copied into the board matches the programming data exactly. Verify is done after programming, and is usually done at high and low limits of the DC operating voltage of the memory devices on your board.



## Using the BoardSite 5100 Display

All user messages and prompts appear on a 40-character by 4-line LCD. The display is back-lit, so you can easily read the messages and prompts in dim ambient light conditions. Instead of dedicated function keys, BoardSite 5100 uses five soft keys. A soft key changes its function, depending on which 5100 menu is displayed. Because one soft key can represent many functions, the 5100 requires only five keys to perform all functions. BoardSite displays a soft key's current function immediately above the key. See Figure 1-6.

**Figure 1-4**  
BoardSite 5100 LCD



Some soft key labels appear in the same location in many menus, and always have the same function:

- EXIT** Pressing this key "backs" you out of the current menu. You can usually press **EXIT** repeatedly to navigate back to the top-level menu.
- REPEAT** Pressing this key repeats the operation that the 5100 just finished.
- PRINT** If your system is configured for a printer, and you have a printer attached to the printer port, you can press this key to print a report on the printer (or you can print a report file to the cartridge disk). The report summarizes the operation that the 5100 just finished.
- ABORT** The **EXIT** key changes to **ABORT** when the 5100 is performing an operation. For example, when you start programming a board, the **EXIT** key changes to **ABORT**. Pressing **ABORT** stops the operation.

The BoardSite 5100 menus, soft key labels, prompts, and messages can be fully customized by a developer. The developer could be responsible for designing the programmable board and interface adapter, as well as the software and data files for your 5100 application. By customizing the 5100, the developer can optimize the programmer for your requirements.

One way a developer could customize the 5100 is by changing the soft key labels. For example, the developer could change the **PRINT** soft key label to **LIST**. Also, if your programming operations don't require some of the standard 5100 commands, a developer can easily disable them. By customizing the BoardSite 5100 software, the developer can tailor the system to your exact requirements.

---

## Specifications

### Functional: Hardware Interface Signals

#### Power Supply Outputs

VCC1: 0 to 7V dc\* (for current, see below)  
VPP1: 0 to 25V dc\* (for current, see below)  
VCC2: 0 to 7V dc\* (for current, see below)  
VPP2: 0 to 25V dc\* (for current, see below)  
VNEG: 0 to -8V dc at 0.25A  
+12V dc at 0.25A  
-12V dc at 0.25A

\* *These supplies provide overvoltage, undervoltage, and overcurrent detection, and remote sensing.*

#### Power Supply Current Capability

For BoardSite 5100, the maximum current is:

- Combined VCC1 and VCC2 current, 6A
- Combined VPP1 and VPP2 current, 2A

#### Digital Interface

Signal	Description
A0-A15	16 low-order address lines
A16-A31	16 high-order address lines, or 16 individually programmable chip-enable lines (PCE0-PCE15)
D0-D31	32 bidirectional data lines
C0-C23	24 digital-control and status lines
BE0-BE7	8 board-enable lines
BD0-BD7	8 board-detect lines
ID0-ID7	8 adapter identification lines
PGM	1 program strobe line
XTAL0, XTAL1	2 clock lines with programmable frequency
ADAP0, ADAP1	2 adapter detect lines
LED0-LED7	8 status indicator control lines
GROUND	17 ground connections

## Functional: Software

### Commands and Functions

*Note: Several of the following software features may not be available in some BoardSite 5100 modes, depending on how your developer configures the BoardSite 5100 software.*

- Program/verify from disk file to circuit board (data files on cartridge disk or floppy)
- Program/verify from RAM to circuit board (data files in volatile RAM)
- Program/verify from master board to circuit board (using a "golden master" circuit board)
- Test board (blank check and illegal bit test)
- Update programming files from floppy
- Load data file from serial port, floppy disk drive, or master board
- List files on disk or floppy, or files in RAM
- Copy files between floppy disk, cartridge disk, and RAM
- Change operator modes through password entry
- Diagnostics (self-test)

### Power Requirements

<b>Operating Voltage</b>	90V ac to 132V ac or 180V ac to 264V ac
<b>Frequency Range</b>	47 to 63 Hz
<b>Power Consumption</b>	500 VA maximum 300W maximum
<b>Fuse Ratings</b>	For either 115V ac (nominal) or 230V ac (nominal) operation, 6A/250V fast blow

### Physical and Environmental

<b>Dimensions</b>	27h x 51w x 41d cm 10.5h x 20.0w x 16.0d inches
<b>Weight</b>	16.7 kg (37 lb)
<b>Temperature</b>	Operating: +5° to +45°C (+40° to +110°F) Storage: -20° to +70°C (-4° to +158°F)
<b>Relative Humidity</b>	Operating: 20% to 80% RH non-condensing Storage: 10% to 90% RH non-condensing
<b>Altitude</b>	Operating: To 3,000 meters (9,800 ft) Storage: To 8,500 meters (28,000 ft)

**Safety**

BoardSite 5100 complies with the following safety standards.

**Underwriters Laboratories** — UL 1244

**Canadian Standards Association** — CSA C22.2 No. 231

**International Electrotechnical Commission** — IEC 348 and IEC 1010-1

**Electrostatic Discharge (ESD)**

IEC 801-2 ± 15 kV

---

## BoardSite 5100 Accessories

Accessories	Description
<b>Ruggedized Transit Case</b>	A watertight and ruggedized transit case for the BoardSite 5100.
<b>Diagnostic Test Adapter</b>	An accessory that tests BoardSite 5100 power supplies and drivers.
<b>Additional Disk Cartridge</b>	A cartridge that includes the BoardSite 5100 software and provides additional disk capacity. Available for both the 44 MB drive and the 200 MB drive.
<b>UV Eraser</b>	A portable ultraviolet board eraser capable of erasing boards up to 9-inch by 12-inch, and contained within a larger 5100 lid. UV eraser bulbs and spare parts kit are also available.
<b>Upgrade Kit</b>	Service-installed upgrade kit converts any 5100 to a Pentium CPU with 8 MB of RAM, 200 MB hard drive, and SVGA.
<b>Prototype and Connector Kits</b>	The prototype kit contains items you need to build a BoardSite interface adapter. The mating BoardSite connectors are available separately.
<b>Software Update Kit</b>	This update kit brings your BoardSite up to the latest version.

# 2 Setting Up BoardSite 5100

This chapter describes how to set up your BoardSite 5100 system hardware, power up the system, and perform the self-test.

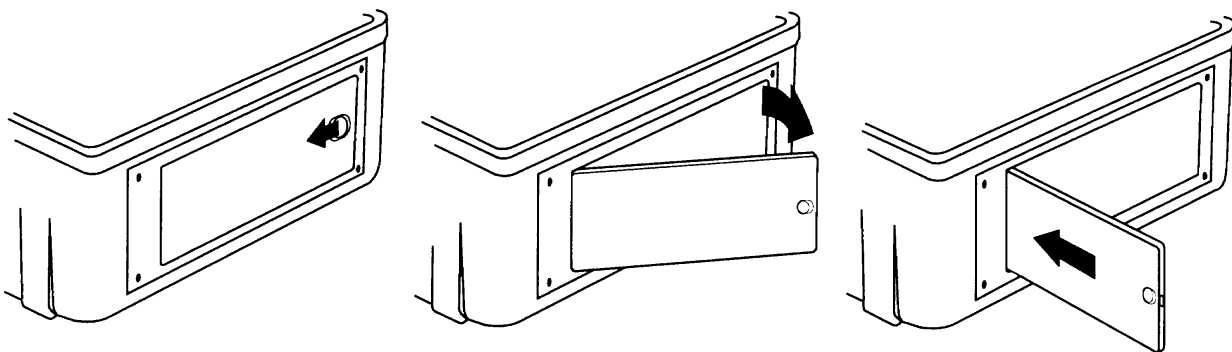
---

## Setting Up BoardSite 5100 Hardware

Use the following procedure to prepare your BoardSite 5100 for operation.

1. Place the 5100 on a large, level workbench or other appropriate area.
2. Remove the lid from the 5100 case and set it aside.
3. Open the side cover that protects the ac power receptacle and cable connectors. See Figure 2-1.

**Figure 2-1**  
*Opening the Side Cover*



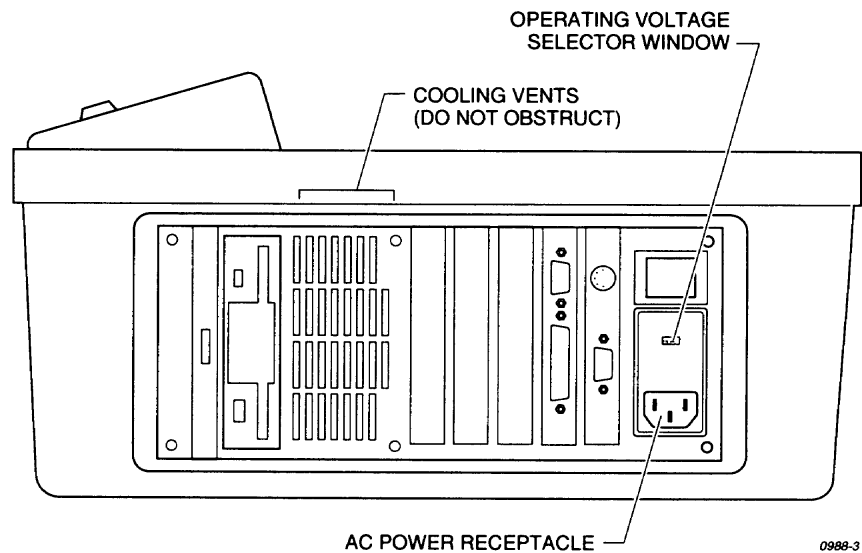
0945-1

4. Verify that the voltage that appears in the operating voltage selector window (see Figure 2-2) is correct for your location. If it isn't, perform the following procedure, "Checking and Changing the Operating Voltage."
5. Connect the power cable to the ac power receptacle. Plug the power cable into the ac power source. See Figure 2-2. Do not turn the power switch on.

---

**WARNING: Connect BoardSite 5100 ONLY to a properly grounded ac outlet to ensure proper grounding for electrostatic discharge (ESD) protection and to avoid electrical shock hazard.**

*Figure 2-2  
AC Power Receptacle and Voltage  
Selector Window*



6. If required by your system, install an interface adapter in the connector on the top of the BoardSite 5100.
7. Go to the section, "Installing the Disk Cartridge."

## Checking and Replacing the Line Fuse

The line fuse is located behind the same door that covers the voltage selector.

---

**WARNING: If the line fuse blows, always replace it with a new fuse of the same size and rating. Using a fuse of a different size and rating is a fire hazard.**

1. Using a flat-head screwdriver, gently pry open the door that covers the fuse holders.

---

*Note: The line cord module accepts two fuse sizes. The white fuse holder accepts U.S.-size fuses (0.25 x 1.25") and the black fuse holder accepts metric-size (5 x 20 mm) fuses. Only the right-hand fuse location is active in BoardSite 5100; the left-hand location is for fuse storage only.*

2. Pull the right-hand fuse holder out of its slot.

3. Check the fuse to determine if it's intact. If it is, proceed to step 4. If it is blown, install a new fuse.
4. Insert the fuse holder back into its slot so the arrow on the fuse holder points in the same direction as the arrows on the inside of the door.
5. Snap the door closed.

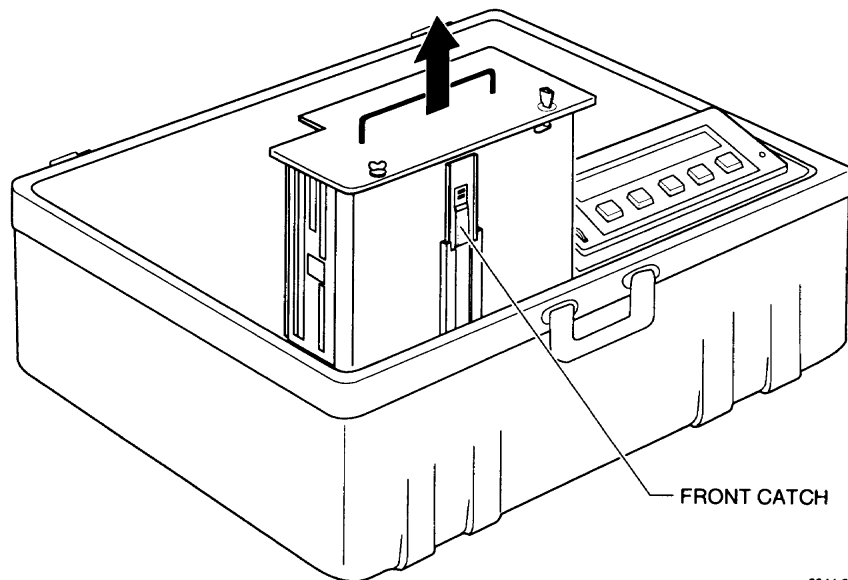
## Installing the Disk Cartridge

Before you power up the BoardSite 5100, ensure that the disk cartridge is in the cartridge disk drive. If the cartridge is not in the drive, install it according to the following procedure.

**Important:** *Always remove the disk cartridge from the drive before transporting the 5100 via a car, truck, or airplane. You do not have to remove the disk cartridge during normal day-to-day use, or when hand-carrying the 5100 from building to building.*

1. Ensure that the 5100 has been off for at least 30 seconds.
2. Unlock the drive lock, using the key provided with your system.
3. Turn the thumbscrew 1/4-turn counterclockwise.
4. Grasp the handle and slowly lift the drive straight up until the latch on the front and rear catches. See Figure 2-3.

**Figure 2-3**  
Lifting Up the Drive



0944-2

5. Insert the cartridge into the drive, as shown in Figure 2-5, until the release lever moves.
6. Lower the release lever until it latches. The cartridge is locked in the drive.
7. To lower the drive into the 5100, press the front catch and slowly slide the drive into the 5100. See Figure 2-6.
8. Secure the drive to the 5100 by turning the thumbscrew 1/4-turn clockwise.
9. Lock the drive lock.

## Removing the Disk Cartridge

To remove the disk cartridge, perform the following procedure.

**Important:** Always remove the disk cartridge from the drive before transporting the 5100 in a car, truck, or airplane. You do not have to remove the disk cartridge during normal day-to-day use, or when hand-carrying the 5100 from building to building.

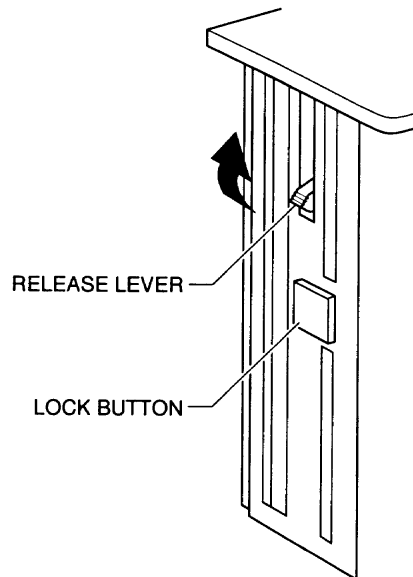
1. Ensure that the 5100 has been off for at least 30 seconds.

---

*Note:* If you don't wait at least 30 seconds before you remove the disk cartridge, it may be spinning, and you may damage the cartridge and the drive.

2. Unlock the drive lock.
3. Grasp the handle and slowly lift the drive straight up until it latches on the front and rear catches. See Figure 2-3.
4. Push the lock button on the drive to unlock the release lever. See Figure 2-4.

**Figure 2-4**  
Release Lever and Lock Button

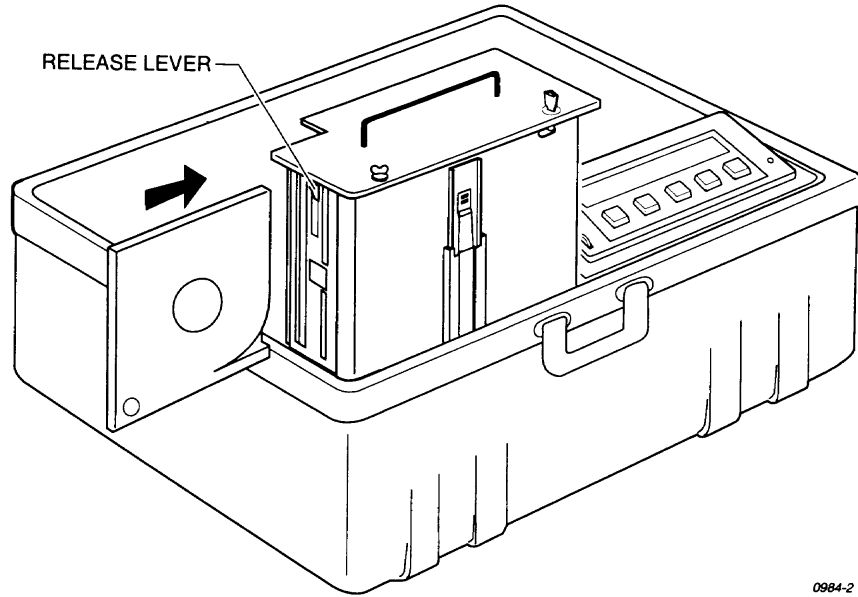


0992-1

5. Place your hand near the disk cartridge to prevent it from falling out of the drive. Lift the release lever; the cartridge should slide about half-way out of the drive.
6. Remove the cartridge from the drive, and place the cartridge in its protective sleeve.
7. Lower the release lever until it latches.
8. To lower the drive into the 5100, squeeze the rear catch and slowly slide the drive approximately half-way into the 5100. See Figure 2-6.
9. Squeeze the front catch. See Figure 2-6.
10. Slowly slide the drive completely into the 5100.
11. Lock the drive lock.

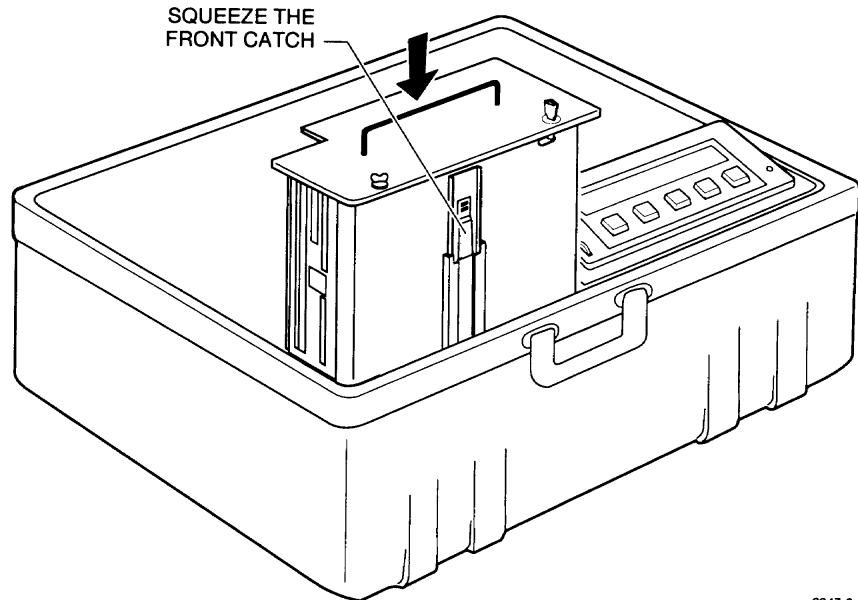


**Figure 2-5**  
*Inserting the Cartridge into the Drive*



0984-2

**Figure 2-6**  
*Lowering the Drive*



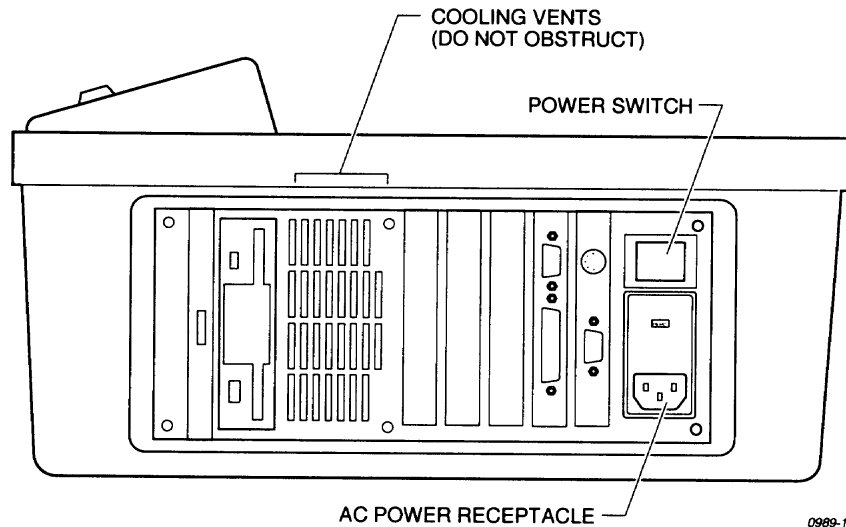
0947-2

## Powering Up BoardSite 5100

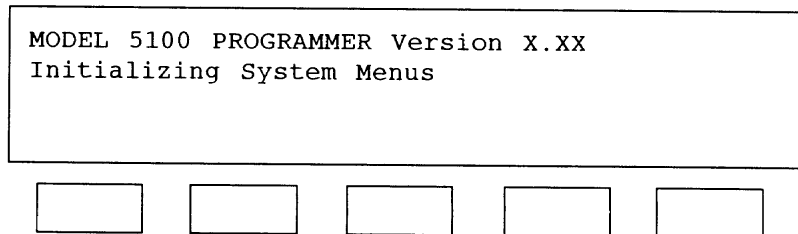
Use the following procedure to power up BoardSite 5100 and perform the self-test.

1. Be sure you have installed the disk cartridge, as described earlier in this chapter.
2. Ensure that the power cord is plugged into the ac power receptacle on the side of BoardSite 5100. See Figure 2-7. Also, ensure that the other end of the power cord is plugged into an ac power source, and that the voltage selector wheel indicates the correct voltage for your location. If the voltage selector wheel indicates the wrong voltage, refer to the preceding section, "Checking and Changing the Operating Voltage," to change to the correct voltage setting.
3. Turn the power switch on. See Figure 2-7. The LCD display should illuminate. The display remains blank for approximately 20 seconds while the 5100 loads the system software. You may want to adjust the LCD viewing angle adjustment, which is just to the left of the LCD display itself (see Figure 1-2), until the display angle is optimum for your room lighting conditions.

**Figure 2-7**  
*Power Switch and Ac Power Receptacle*



4. After the system software is loaded, the 5100 initializes the programming software. You should see the following display.



If nothing appears on the display after 30 seconds, refer to the following section, "Troubleshooting," for assistance.

- After initializing the software, the 5100 starts its self-test, which checks the hardware and software to determine if the equipment is functioning properly. When the self-test starts, you should see the following display.

```

Performing Self-Test

[ ] [ ] [ ] [ ] [ ]
    
```

- If the 5100 successfully completes its self-test, the following screen appears. Press **REPEAT** to run the self-test again, or press **EXIT** to exit the self-test and display the 5100 top level menu.

If a printer is attached to a 5100 port and your system has been configured for the printer, you can press **PRINT** to print a report to a printer (or to a file on the cartridge disk) containing the date, time, and results of the self-test. If the 5100 is not set up for report printing, the **PRINT** soft key label may not appear in the display.

```

Self-Test PASSED
Press EXIT to display main menu
Press REPEAT to run again
[REPEAT] [PRINT ] [EXIT ]

[ ] [ ] [ ] [ ] [ ]
    
```

- If the 5100 fails the self-test the Self-Test Failed screen appears. Press **ERRORS** to view the error messages, press **REPEAT** to run the self-test again, or press **EXIT** to exit the self-test and display the 5100 top level menu. In any case, if the 5100 fails the self-test, contact your developer or technician for assistance.

If you have a printer attached to one of the BoardSite 5100 ports, and your system has been configured for the printer, you can press **PRINT** to print a hardcopy report containing the date, time, and results of the failed self-test.

- If you have a printer attached and your developer has provided you with documentation files, you may see the following display after you press **EXIT**.

```

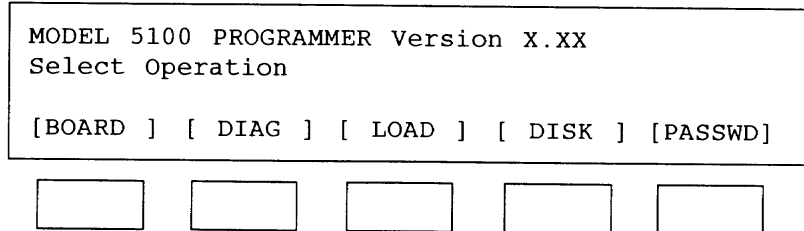
Pick Documentation File with ↑ ↓ , then SELECT
Press PRINT for hard copy
DOCS
[ ↑ ] [ ↓ ] [PRINT ] [EXIT ]

[ ] [ ] [ ] [ ] [ ]
    
```

Press **PRINT** to print a hard copy of the selected documentation file.

9. After the 5100 successfully completes its self-test, press **EXIT** until you see the following top level menu.

*Note: Your system developer may have customized the soft key labels and LCD screens for your specific application. Therefore, the screens may not match this example exactly.*



See Chapter 3, "Programming a Board," to learn how to use the programmer.

## Troubleshooting

If nothing appears in the BoardSite 5100 display after a minute or so, try the following corrective actions.

1. Slowly adjust the LCD viewing angle adjustment to the limits of its range. If you still see nothing in the LCD display, proceed to the next step.
2. Turn the power switch off, and then ensure that the power cord is plugged into the ac power receptacle on the side of BoardSite 5100. See Figure 2-2.
3. Ensure that the other end of the power cord is plugged into an ac power source, and that the source voltage is within the limits listed in the "Specifications" section in Chapter 1 of this manual.
4. Ensure that the disk cartridge is installed in the drive, and that the release lever is pushed all the way down until the cartridge locks securely in the drive. Refer to the section "Installing the Disk Cartridge" to inspect the drive and, if necessary, install the disk cartridge. Remember to wait at least 30 seconds after turning the power off before attempting to remove or replace the disk cartridge.
5. Ensure that a floppy disk is not installed in the floppy disk drive. If so, remove the floppy disk from the drive.
6. Turn the power switch on again. If the 5100 still appears to be inoperative, contact your developer or technician.
7. If the 5100 operates, but there are errors displayed after the 5100 completes its power-on self-test, contact your developer or technician.

*Note: Your system may require that the self-test be run with the optional BoardSite 5100 Diagnostic Test Adapter installed in place of an interface adapter. If so, install the Diagnostic Test Adapter before applying power to the 5100.*

# 3 *Programming a Board*

---

This chapter shows an example of how to program a board with the BoardSite 5100. The BoardSite 5100 menus, soft key labels, prompts, and messages can be fully customized by a developer, which means that your 5100 can be optimized for your particular programming requirements. Also, if you do not need some of the standard 5100 commands for your programming requirements, a developer can easily disable them. Therefore, your 5100 may not operate exactly as shown in this chapter.

The programming example in this chapter uses a BoardSite 5100 that has been customized to simplify the programming operation. Some of the optional commands have been disabled to make the example easier to understand, but all of the standard 5100 menus and prompts were left unchanged.

---

## Board Programming Example

Before you continue, make sure you have performed the setup procedures described in Chapter 2 of this manual, "Setting Up BoardSite 5100." If you followed the setup procedures, you should see the following top level menu on the LCD display. Your 5100 may have custom prompts and soft key labels, so the top level menu may be different than the standard top level menu in the illustration.

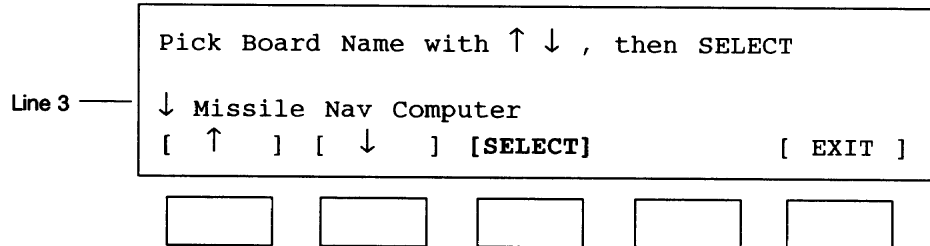
```
MODEL 5100 PROGRAMMER Version X.XX
Select Operation

[BOARD ] [ DIAG ] [ LOAD ] [ DISK ] [PASSWD]

[ ] [ ] [ ] [ ] [ ]
```

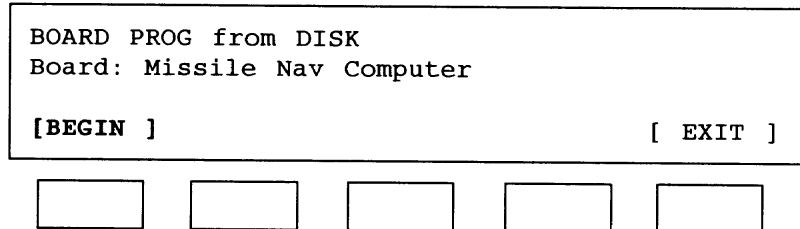
In the examples that follow, the soft key being discussed is highlighted by setting it in a bold typeface. The soft key label is not highlighted on the screen, however.

1. Ensure that you have installed the interface adapter for the board you want to program, as described in Chapter 2.
2. Insert the board to be programmed into the interface adapter.
3. From the top level menu (shown above), press **BOARD** .
4. Press **↑** and **↓** to scroll to the board name (you may have several board names to choose from). Be sure that the board name appears in line 3, as shown in the following display.

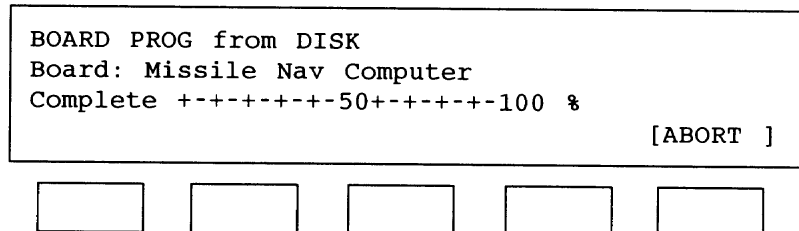


*Note: In this example, we use the board name "Missile Nav Computer." Contact your developer to determine the actual board name that you should select.*

5. With the board name displayed on line 3, press **SELECT** . The following display appears, which shows the 5100 set up for the "program board from disk" operation using the board name Missile Nav Computer.



6. When you're ready to begin programming the board, press **BEGIN** . The following display appears.



As programming progresses, an action symbol moves across the percent complete scale. To stop the programming operation, press **ABORT** .

7. When the board programs successfully, the following display appears.

```

PROG: "Missile Nav Computer"
PASSED

[ REPEAT ]                               [ EXIT ]

```

8. To program another identical board, remove the programmed board from the interface adapter, install a new board in its place, and then press **REPEAT** . Or to use another command, press **EXIT** .
9. If the programming operation failed, the following display appears.

```

PROG: "Missile Nav Computer"
FAILED
Press ERRORS to view error messages
[ REPEAT ] [ ERRORS ]                       [ EXIT ]

```

*Note: If the operation passed, but there were warnings (such as the non-blank device warning), then the soft key label **WARN** will be displayed instead of **ERRORS** . In this case, press **WARN** to review the warnings.*

10. Press **ERRORS** to see the error messages, as shown in the following display.

```

ERROR 1 of 1: FATAL ERROR 201: An
Adapter was not detected!

                                           [ EXIT ]

```

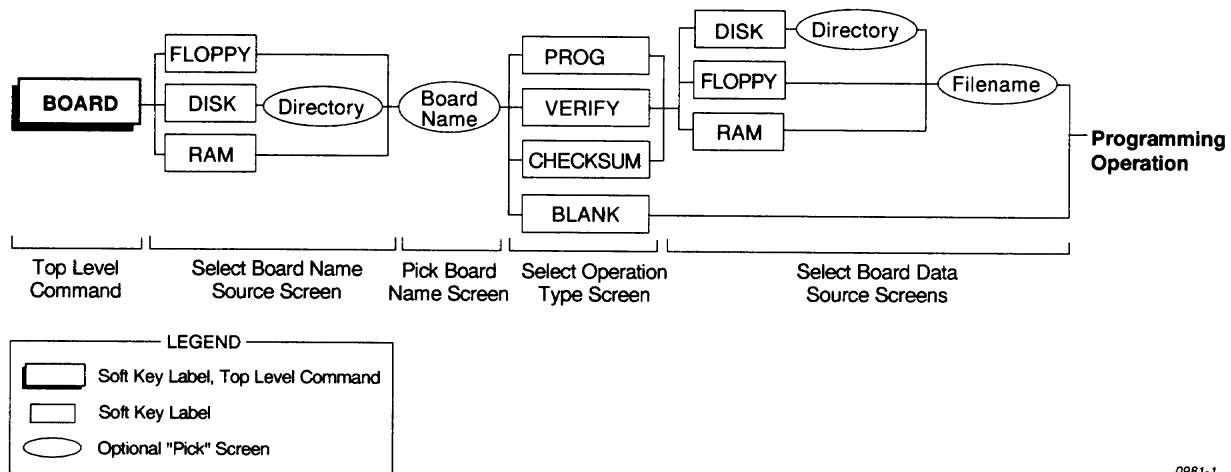
              

Correct the error condition, and then attempt to program the board again. You can press **EXIT** as many times as necessary to return to the menu shown in step 6 of this procedure.

## BOARD Command Options

The preceding example used a customized 5100 system with several commands and options disabled. Your developer may have optimized your 5100 differently, which means that other commands and options may be available to you. To understand the complete BOARD command, and to see how the command was customized for the example, see the BOARD command tree, Figure 3-1.

Figure 3-1  
BOARD Command Tree

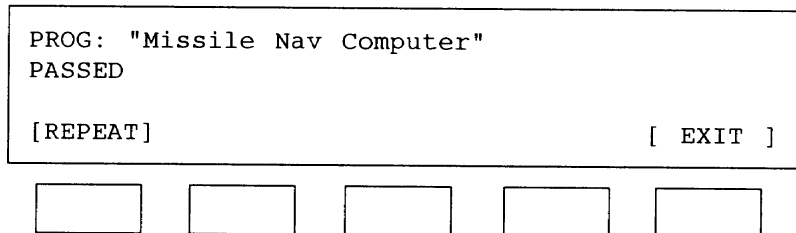


0981-1

The BOARD command tree is a visual representation of the screens you may see when you use the BOARD command. To see how the BOARD command works, follow the tree from left ("BOARD," which is the command on the 5100 top level menu) to right ("Programming operation," which represents the actual programming sequence).

Notice that the customized 5100 in the preceding example had many of the optional steps disabled. Because the developer wanted a system that was very easy to operate, the only choice the operator had to make was selecting the board name (steps 4 and 5 in the example, which correspond to the "pick board name screen" branch in Figure 3- 1).

The developer could also customize the menus, prompts, and soft key labels. For example, the display that appears after a board is successfully programmed:



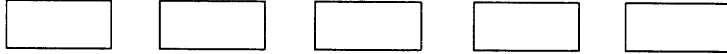


could be changed to look like this:

```

PROG: "Missile Nav Computer"
The board programmed correctly.
Remove it and attach the barcode label.
[REPEAT]                                     [ EXIT ]

```



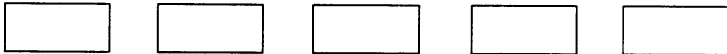
## Other Command Options

Notice that the top level menu on page 3-1 contained the BOARD, DIAG, LOAD, DISK, and PASSWD commands. One or more of these commands could be disabled by the developer. For example, if the DIAG, LOAD, and DISK commands were disabled, the top level menu would look like this:

```

MODEL 5100 PROGRAMMER Version X.XX
Select Operation
[BOARD ]                                     [PASSWD]

```



This configuration would allow you to use only the BOARD and PASSWD commands.

For more information on the DIAG, LOAD, DISK, and PASSWD commands, see the following chapter, "BoardSite 5100 Operations."



# **4** *BoardSite 5100 Operations*

---

This chapter describes the BoardSite 5100 DIAG, LOAD, DISK, and PASSWD commands. For information on the BOARD command, see Chapter 3.

The BoardSite 5100 menus, soft key labels, prompts, and messages can be fully customized by a developer, which means that your 5100 can be optimized for your particular programming requirements. This chapter describes all the commands and command options that may be available in your system.

This chapter also includes typical examples of each command. Because your 5100 may be customized, its menus and prompts may not match the examples. Contact your developer for complete information on your system.

---

## **DIAG Command**

DIAG runs the system diagnostic software. You can run the DIAG command with or without the optional BoardSite Diagnostic Test Adapter. If you run the DIAG command with the Diagnostic Test Adapter, the system diagnostics will verify all power supplies and programming signals up through the interface connector. Before running system diagnostics, install the Diagnostic Test Adapter on the interface connector located on the top of the 5100.

If you run system diagnostics without the optional BoardSite Diagnostic Test Adapter, the diagnostics test most of the power supplies and programming signals up to the interface connector only. The tests are also performed in a no-load condition. If you run the diagnostics without the Diagnostic Test Adapter, the 5100 displays a warning screen after the diagnostics are complete. If you press **WARN**, the system displays a warning reminding you that the diagnostics were run without the Diagnostic Test Adapter.

Whether you run the diagnostics with or without the Diagnostic Test Adapter, if the 5100 fails any of the tests, it displays an error screen. Press **ERRORS** to view the error messages.

## To Run DIAG

1. Press **DIAG** from the top level menu.
2. Press **BEGIN** to start the diagnostic software.
3. If the 5100 displays the error screen, press **ERRORS** to view the error messages, press **REPEAT** to run the diagnostics again, or press **EXIT** to display the top level menu.

If the 5100 displays the error screen, contact your developer or technician for assistance.

---

## LOAD Command

LOAD transfers data from one device to another. LOAD can do any one of the following transfers:

- Master board to RAM
- Master board to disk (cartridge disk)
- Master board to floppy
- Port to RAM
- Port to disk (cartridge disk)
- Port to floppy
- Floppy to RAM

Typically, you use the LOAD command to move programming data into RAM. This gives maximum data security, because RAM is volatile, and the programming data will be destroyed when the 5100 power is turned off.

Three examples of LOAD are described in the following procedures: master board to RAM, port to RAM, floppy disk to RAM.

### LOAD (Master Board to RAM)

Use the following procedure to transfer data from a master board to the 5100 RAM.

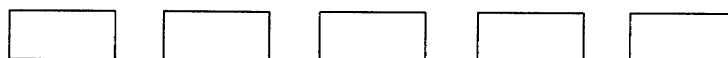
1. From the top level menu, press **LOAD**. The following display appears.

```

LOAD
Select LOAD Operation Type

[MASTER ] [ FLOPPY ]           [ PORT ] [EXIT]

```



2. Press **MASTER** to select the master board as the data source.
3. Let's assume that the developer customized the 5100 to assign a fixed board name source (in this case, DISK). You do not have to select the board name source, so the system skips that screen and proceeds directly to the screen shown below.

Line 3 —

```

LOAD MASTER
Pick Board Name with ↑ ↓ , then SELECT
↓ Missile Nav Computer
[ ↑ ] [ ↓ ] [SELECT] [ EXIT ]

```

4. Press **↑** and **↓** to scroll to the name of the board. With the board name on line 3, press **SELECT**. The following display appears.

```

BOARD: "Missile Nav Computer"
Select Destination of Data
[ DISK ] [ FLOPPY ] [ RAM ] [ EXIT ]

```

5. Press **RAM** to select RAM as the data destination. The following display appears.

Line 3 —

```

Select Board Number to be Loaded
with ↑ ↓ , then SELECT
↓ 1
[ ↑ ] [ ↓ ] [SELECT] [ EXIT ]

```

6. The interface adapter may have up to eight slots for programmable boards. You must tell the 5100 which slot contains the master board. Assuming that the master board is in slot number 1 (corresponding to the 1 that appears on line 3 of the LCD display), press **SELECT** to select slot 1.
7. Press **BEGIN**. The following screen appears when the operation is complete.

```

LOAD MASTER to RAM
PASSED
[REPEAT] [PRINT] [ EXIT ]

```

The 5100 reads the data in the master board in slot 1, and then writes that data to the 5100's RAM. With the data in RAM, you could remove the master board and then begin to program many boards with the master board data.

Refer to the section, "BoardSite 5100 Command Tree," later in this chapter, to see all available options for this procedure.

## LOAD (Port to RAM)

Use the following procedure to transfer data from the serial port to the 5100 RAM. Use this procedure to download programming data from a host computer.

1. From the top level menu, press **LOAD** .
2. Press **PORT** to select the port as the data source. The following display appears.

Line 3 —

```

LOAD PORT
Pick Configuration with ↑ ↓ , then SELECT
↓ Main Plant Central Computer
[ ↑ ] [ ↓ ] [SELECT]           [ EXIT ]

```

3. Press **↑** and **↓** to scroll to the name of the port configuration you want to use. The port configuration contains customized communications settings assigned by the developer. With the port configuration displayed on line 3, press **SELECT** .
4. Press **RAM** to select RAM as the data destination. The following display appears.

```

LOAD PORT to RAM
CONFIG: "Main Plant Central Computer"

[BEGIN ]           [ EXIT ]

```

5. Press **BEGIN** .
6. The following screen appears when the operation is complete.

```

LOAD PORT to RAM PASSED
Filename: "Nav Computer Data"
File Size = 1000h, Checksum 1E97h
[REPEAT]           [PRINT ] [ EXIT ]

```

The file size is a hexadecimal number that equals the number of bytes loaded from the port, and the checksum is the hexadecimal checksum of the data.

Refer to the section, "BoardSite 5100 Command Tree," later in this chapter, to see all available options for this procedure.

## LOAD (Floppy Disk to RAM)

Use the following procedure to transfer BoardSite files from a floppy disk to the 5100 RAM. If the RAM already contains files from a previous LOAD operation, you can choose to overwrite RAM files that have the same filename as the FLOPPY files, or you can choose to load only those FLOPPY files not already in RAM.

This example assumes that RAM contains no files from a previous LOAD operation.

1. From the top level menu, press **LOAD**. The following display appears.

```

LOAD
Select LOAD Operation Type

[MASTER ] [FLOPPY] [ PORT ]           [ EXIT ]

```

2. Press **FLOPPY** to select the floppy disk as the data source. The following display appears.

```

LOAD FLOPPY to RAM
LOAD: "Missile Nav Computer"

[BEGIN ]                               [ABORT ]

```

3. Press **BEGIN**. The following screen appears when the operation is complete.

```

LOAD FLOPPY to RAM
6 Files were Loaded onto RAM
Press PRINT for Report

                                           [PRINT ] [ EXIT ]

```

## DISK Command

DISK lists the contents of a disk, updates software on the cartridge disk, and transfers data from one file storage device to another. Three examples of DISK are described in the following procedures: list contents of cartridge disk, update software from floppy, and copy floppy disk to cartridge disk.

### List Contents of Cartridge Disk

When you list the contents of the cartridge disk, you must first select a directory on the disk. When you list the contents of the RAM or of a floppy disk, you don't have to select a directory. Except for this step, the procedures are identical.

1. From the top level menu, press **DISK** .
2. Press **LIST** .
3. Press **DISK** . The following display appears.

```

Pick Directory with ↑ ↓ , then SELECT
Line 3 ┌─┤ ↓ HOME
      │  │ [ ↑ ] [ ↓ ] [SELECT]           [ EXIT ]
      └─┘
      [ ] [ ] [ ] [ ] [ ]
  
```

4. Press **↑** and **↓** to scroll to the name of the directory. With the directory name displayed on line 3, press **SELECT** . The following display appears.

```

LIST "HOME"
↑ C:\HOME\DATA      2284K BYTES FREE
[ ↑ ] [ ↓ ]           [ EXIT ]
[ ] [ ] [ ] [ ] [ ]
  
```

5. This screen, the first in a series of screens, shows the name of the directory and the amount of free disk space. Press **↑** to see the next screen, which is the file information screen for the first file in the directory. Continue to press **↑** to scroll through all files in the directory. A file information screen appears for each file, an example of which is shown below.



```

FILE INFORMATION - FILE 1 of 16
  ↑ Missile Nav Computer (BOARD)
DATE: Tue Apr 02 1991 / SIZE 5280
[ ↑ ] [ ↓ ] [ EXIT ]

```



For more information on the files, contact your developer.

Refer to the BoardSite 5100 Command Tree to see all available options for this procedure.

## Copy Floppy Disk to Cartridge Disk

You can use DISK to copy a file from any source device (cartridge disk, floppy disk, or RAM) to any other device. The procedure is similar for all transfers, except that you specify a directory for the cartridge drive, and don't specify a directory for the RAM or floppy disk.

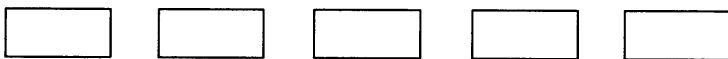
1. From the top level menu, press **DISK** .
2. Press **COPY** .
3. Press **FLOPPY** .
4. Press **DISK** . The following display appears.

Line 3 —

```

DISK COPY
Select Destination Directory
↓ Qual Test Files
[ ↑ ] [ ↓ ] [SELECT] [ EXIT ]

```



5. Press **↑** and **↓** to scroll to the name of the directory. With the directory name displayed on line 3, press **SELECT** . The following display appears.

Line 3 —

```

DISK COPY
Select filename with ↑↓, then SELECT
↓ Test File 1 (DATA)
[ ↑ ] [ ↓ ] [SELECT] [ EXIT ]

```



6. Press **↑** and **↓** to scroll to the filename Test File 1. The word (DATA) indicates that this file is a data file. With the filename Test File 1 displayed on line 3, press **SELECT** .
7. Press **BEGIN** to copy the file from floppy to cartridge disk.
8. The following screen appears when the operation is complete.

```
COPY FLOPPY to DISK
File: "Test File 1" Copied
PASSED
[REPEAT] [PRINT ] [ EXIT ]
```

Refer to the section, "BoardSite 5100 Command Tree," later in this chapter, to see all available options for this procedure.

## Update Cartridge Disk from Floppy

Use UPDATE to automatically update board and data files on the cartridge disk with new files stored on a floppy disk. You would use this command to update disk files to reflect a version change or other modification to a board as released by your developer.

1. From the top level menu, press **DISK** .
2. Press **UPDATE** .
3. Put the floppy disk containing the new programming files in the floppy disk drive.
4. Press **BEGIN** to update the 5100 software.
5. The following screen appears when the operation is complete.

```
UPDATE Software
6 Files were Updated onto DISK
Press PRINT for Report
[REPEAT] [PRINT ] [ EXIT ]
```

---

## PASSWD Command

Your developer can enable certain commands under password protection. This means that you have to type the correct password to use the commands. Contact your developer to obtain the password(s) you need. Use the following procedure to type passwords to use restricted commands.

1. From the top level menu, press **PASSWD** . The following display appears.

```
Enter 5-digit Password to change mode

[ 1 ] [ 2 ] [ 3 ] [ 4 ] [CLEAR ]
```

2. Passwords are a five-digit combination of the numbers 1 through 4. Press the correct keys to type the five-digit password. When you press a key, the screen indicates that you have typed a digit by displaying an "X" character. If you make a mistake before you type the last digit, press the **CLEAR** key and then start over. After you correctly type the fifth digit, the 5100 momentarily displays the operating mode it is switching to, and then switches to that mode. The top level menu changes accordingly.

---

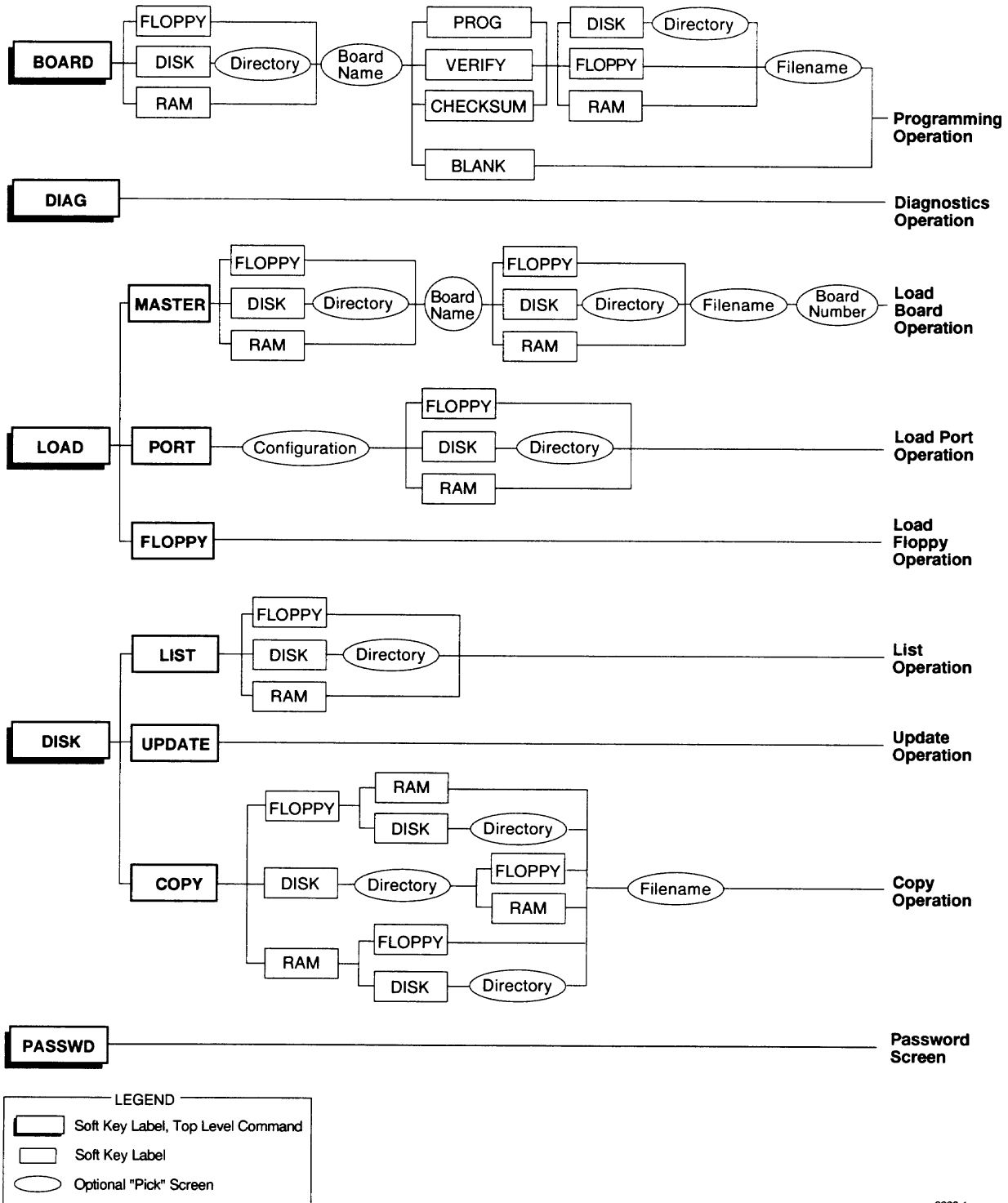
## BoardSite 5100 Command Tree

The following drawing shows the BoardSite 5100 command tree, which describes all the commands and command options available in the system.

Read the command tree from left to right, as described in the section "Board Command Options" in Chapter 3. Soft key labels (BOARD and DISK, for example) are in upper-case letters, just as they appear on the 5100 display. Whenever you encounter a branch, this means that there are several options from which to choose. Option screens or "pick screens" (the pick board name screen, for example) are enclosed in ovals. Finally, the actual operations (Programming Operation, for example) appear at the far right.

If your developer disables a command or an option, the system skips the associated screen or screens and proceeds to the next item in the tree. For example, the developer could disable the PROG/BLANK/VERIFY branch of the BOARD command, setting the option to PROG only. When the 5100 software encounters this branch, it skips the screen that prompts you for PROG/BLANK/VERIFY and goes on to the next screen.

Figure 4-1  
BoardSite 5100 Command Tree



0980-1

# 5 Messages

---

This chapter lists and describes the warning and error messages for BoardSite 5100.

## **ERRORS 1 - 36**

These messages indicate general system setup errors. Consult your system administrator or developer.

### **ERROR 37: The Printer has Timed Out.**

Check your printer, printer cable, or other items that may have caused the printer to time out.

### **ERROR 38: The Printer has returned an I/O Error.**

Check your printer, printer cable or other items that may have caused the printer to fail.

### **ERROR 39: The Printer is Out of Paper.**

Fill paper tray and then press any key to continue operation. You may press **EXIT** to abort the operation.

### **ERROR 40: The Printer is Busy.**

Wait until the printer is free and then press any key to continue. You may press **EXIT** to abort the operation.

## **ERRORS 41 - 50**

These messages indicate general system setup errors. Consult your system administrator or developer.

### **ERROR 51: The Floppy Disk Drive Door is Open**

BoardSite is unable to select the default drive and directory because the floppy disk drive is open. Consult your system administrator or developer. You may press **EXIT** to continue operation.

### **ERROR 52: The Floppy Disk is Write Protected**

BoardSite attempted to write to a file on the floppy disk drive and failed because the disk is write-protected.

## **ERRORS 53 - 69**

These messages indicate general system setup errors. Consult your system administrator or developer.

## **ERRORS 100 - 116**

These messages indicate general system setup errors. Consult your system administrator or developer.

**ERROR 117: Board Password does not match Board Profile.**

The board password specified by the Board Profile is different from the one you entered. Enter the correct 5-digit password to begin the programming operation.

**ERRORS 118 - 152**

These messages indicate general system setup errors. Consult your system administrator or developer.

**ERROR 200: Unidentified programming error, please contact Data I/O Customer Resource Center.**

An error was encountered during the programming operation that was probably caused by a hardware failure.

**ERROR 201: An Adapter was not detected!**

Adapter is not installed or connector pins are not fully engaged.

**ERROR 202: Adapter ID was not found or does not match board profile.**

The adapter ID read from the adapter ID lines does not match the ID specified in the Board Profile.

**ERROR 203: No master board detected!**

The master board is in the wrong position in the adapter, is missing, or its connector pins are not fully engaged in the adapter connector.

**ERROR 204: No boards were detected!**

No boards are installed, their connector pins are not fully engaged, or the board detect lines (BD0-BD7) are not wired correctly.

**ERRORS 205 - 213**

These messages indicate general programming setup errors. Consult your system administrator or developer.

**ERROR 215: OPERATION ABORTED.**

You aborted the operation by pressing **ABORT**.

**ERRORS 216 - 218**

These messages indicate general programming setup errors. Consult your system administrator or developer.

**ERROR 240: Over-Current error on interface board.**

Current exceeded the overcurrent value specified in the Board Profile. Check for improperly installed or defective devices.

**ERROR 241: Over-voltage error on interface board.**

The interface board has been shut down due to an over-voltage detection.

**ERROR 242: Under-voltage error on interface board.**

The interface board has been shut down due to an under-voltage detection.

**ERRORS 243 - 245**

These messages indicate general programming errors. Consult your system administrator or developer.

**ERROR 250: Device non-blank.**

The board is not erased. Erase the board and repeat programming.

**ERROR 251: Device erase.**

The device could not be erased. Replace device.

<b>ERROR 252: Device illegal-bit.</b>	The non-blank device cannot be programmed with the chosen data pattern. Erase the device and repeat programming.
<b>ERROR 253: Device lock.</b>	The device could not be locked. Replace device.
<b>ERROR 254: Device programming.</b>	The device failed to program. Replace the device.
<b>ERROR 255: Reading device.</b>	The device could not be read. Is the correct master board selected?
<b>ERROR 256: Device verify.</b>	The device failed to verify. Replace the device.
<b>ERROR 257: Board CRC.</b>	The value calculated for the board CRC is not the expected value.
<b>ERROR 258: Board Checksum.</b>	The value calculated for the board checksum is not the expected value.
<b>ERROR 259: Device CRC.</b>	The value calculated for the device CRC is not the expected value.
<b>ERROR 260: Device checksum.</b>	The value calculated for the device checksum is not the expected value.
<b>ERROR 261: User Error.</b>	An error specific to the user algorithm was received. Consult your system administrator or developer.
<b>ERRORS 280 - 293</b>	These messages indicate general programming setup errors. Consult your system administrator or developer.
<b>ERRORS 700 - 725</b>	These messages indicate general port operation errors. Consult your system administrator or developer.
<b>ERRORS 800 - 998</b>	These messages indicate general diagnostic errors. Consult your system administrator or developer.





# Index

---

- A**
  - ABORT soft key, 1-5
  - Ac power
    - applying, 2-6
    - fuse rating, 1-7
    - requirements, 1-7
  - Ac power receptacle, location of, 1-3
  - Accessories, 1-8
  
- B**
  - Binary file
    - See* Data file
  - Blank check, defined, 1-4
  - Board data file
    - See* Data file
  - Board name, defined, 1-4
  - BOARD soft key, 3-2, 3-4
  - Board, programming example, 3-1
  - BoardSite 5100
    - accessories, 1-8
    - described, 1-1
    - general specifications, 1-1
    - LCD display, 1-5
    - powering up, 2-6
    - setup instructions, 2-1 – 2-8
    - terms defined, 1-4
  - BoardSite binary file
    - See* Data file
  - Bulletin Board Service, xviii
  
- C**
  - Cartridge disk drive
    - defined, 1-4
    - described, 1-1
    - installing disk cartridge, 2-3
    - removing disk cartridge, 2-4
    - transporting, 2-3
  - Changing your address, xix

Checksum, defined, 1-4  
Circuit board  
    *See* Board  
CLEAR soft key, 4-9  
Command tree, 3-4, 4-9  
Commands  
    *See also* the proper name of the soft key, e.g., "LOAD soft key"  
Communications port  
    *See* Port  
Contents of shipping carton, 1-2  
Copying data, 4-2, 4-6  
Copying files, 4-7  
CPU, standard configurations, 1-1  
CRC (cyclic redundancy check), defined, 1-4  
Customer Support, xv  
Customizing BoardSite 5100, 1-5, 3-4, 4-9

## D

Data  
    loading, 4-2  
    transferring, 4-2, 4-6  
Data file, 4-2, 4-5, 4-7  
Data I/O  
    addresses, xv – xvi  
    Bulletin Board Service, xviii  
    contacting via BBS, xviii  
    contacting via telephone, xvii  
Developer, customizing BoardSite 5100, 1-5, 3-4, 4-9  
Device data file  
    *See* Data file  
DIAG soft key, 4-1  
Diagnostic Test Adapter, 1-8, 2-8, 4-1  
Diagnostic test, running, 4-1  
Directory, defined, 1-4  
Disk cartridge  
    installing, 2-3  
    removing, 2-4  
Disk files  
    copying, 4-7  
    listing, 4-6  
    updating, 4-8  
DISK soft key, 4-1, 4-6

## E

End user registration, xix  
Errors  
    *See* Error messages  
EXIT soft key, 1-5  
External features, 1-3

## F

File, data  
    *See* Data file  
Files  
    copying, 4-7  
    listing, 4-6

- 
- updating, 4-6, 4-8
  - Floppy disk drive
    - defined, 1-4
    - described, 1-1
    - location of, 1-3
  - FLOPPY soft key, 4-5
  - Fuse
    - rating, 1-7
    - replacement, 2-2
  
  - G** Glossary of terms, 1-4
  
  - H** Hard disk
    - See* Cartridge disk drive
  
  - I** Illegal bit test, defined, 1-4
  - Interface adapter, defined, 1-4
  - Interface board, current output, 1-6
  - Interface signals, specification, 1-6
  - Interface slots, 1-1
  
  - K** Keep Current Subscription Service, xix
  - Keyboard port, 1-1
  
  - L** LCD
    - described, 1-5
  - Line fuse, replacement, 2-2
  - LIST soft key, 4-6
  - Listing disk files, 4-6
  - LOAD soft key, 4-1 – 4-2
  - Load, defined, 1-4
  - Loading data
    - description, 4-2
    - floppy disk to RAM, 4-5
    - master board to RAM, 4-2
    - port to RAM, 4-4
  
  - M** MASTER soft key, 4-2
  - Master, defined, 1-4
  - Messages, listed, 5-1 – 5-4
  - Modes, typing passwords, 4-8
  
  - O** Operator modes, changing, 4-8
  - Options, BOARD command, 3-4
  
  - P** Parallel port, 1-1
  - PASSWD soft key, 4-1, 4-8
  - Passwords, typing, 4-8
  - PORT soft key, 4-4

- Power supply, voltage output specifications, 1-6
- Power switch, location of, 1-3
- Power, applying power to BoardSite 5100, 2-6
- PRINT soft key, 1-5
- Printing reports, 2-7
- Problems, troubleshooting, 2-8
- Program messages, listed, 5-1 – 5-4
- Program, defined, 1-4
- Programmable board
  - See Board
- Programming example, 3-1
- Prompts, customizing, 1-5, 3-4, 4-9

## R

- RAM, 1-1
  - defined, 1-4
  - standard configurations, 1-1
- Registration, xix
- Repair Service
  - information, xix
  - ordering, xix
- REPEAT soft key, 1-5
- Reports, printing, 2-7
- RS-232 port
  - See Port

## S

- Safety, 1-8
- Self-test
  - description, 2-7
  - troubleshooting if failed, 2-7
- Serial port, 1-1
- Setup instructions, 2-1 – 2-8
- Soft key
  - ABORT, 1-5
  - BOARD, 3-2, 3-4
  - CLEAR, 4-9
  - DIAG, 4-1
  - DISK, 4-1, 4-6
  - EXIT, 1-5
  - FLOPPY, 4-5
  - LIST, 4-6
  - LOAD, 4-1 – 4-2
  - MASTER, 4-2
  - PASSWD, 4-8
  - PASSWD , 4-1
  - PORT, 4-4
  - PRINT, 1-5
  - REPEAT, 1-5
  - UPDATE, 4-8
  - WARN, 3-3
- Soft keys
  - customizing labels, 1-5, 3-4, 4-9
  - described, 1-5
- Specifications
  - digital interface, 1-6

---

- external features, 1-3
- general, 1-1, 1-6
- hardware interface signals, 1-6
- physical and environmental, 1-7
- power requirements, 1-7
- power supply current, 1-6
- power supply outputs, 1-6
- RFI/EMI, v-vi
- software, 1-7

**Support**

- See* Customer Support

- System setup, 2-1 – 2-8

**T**

- Technical assistance, xvii
- Terms, glossary of, 1-4
- Test, BoardSite 5100 diagnostics, 4-1
- Top level menu, 2-8, 3-1
- Transferring data, 4-2, 4-6
- Troubleshooting, 2-8
- Typographic conventions, xx

**U**

- Unpacking shipping carton, 1-2
- UPDATE soft key, 4-8
- Updates
  - Keep Current Subscription Service, xix
- Updating files, 4-8

**V**

- Verify, defined, 1-4
- Video port, 1-1

**W**

- WARN soft key, 3-3
- Warning messages, listed, 5-1 – 5-4
- Warranty
  - information and service, xix

