

Running Diagnostics

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Objectives

This chapter describes the Confirmation and Diagnostics software package: what it does and how to run it. Other chapters describe the actual tests and how to use them for troubleshooting.

What is Confirmation?

Confirmation is used primarily by the operator to quickly verify that the system is functional. It takes only a few minutes to run and should be executed at the beginning of every shift or whenever performance problems are suspected. Confirmation generates a **PASS/FAIL** message only; it does not indicate which parts of the system are defective.

Confirmation does not verify performance; it only verifies functionality. However, when Confirmation fails, a record of the failed tests is written to a history file, which can be accessed via Diagnostics. This history information can be useful for troubleshooting by determining a starting point for running Diagnostics.

What is Diagnostics?

Diagnostics is your main troubleshooting tool. You can use it to check the hardware configuration, verify performance, and isolate failures to a field-replaceable unit (FRU). The Diagnostic tests are structured in such a way that the failing part is usually indicted by the first few test failures.

Some Diagnostic tests require that a Pin Verification Fixture be installed on the testhead; other tests require that it not be installed. The Diagnostics program senses whether a fixture is installed or not and automatically runs the appropriate tests.

What is a Diagnostic Test?

Diagnostic tests are part of system software. Most tests actually test something – that is, they make a measurement, compare actual and expected results, and make a pass/fail determination. However, some tests do not actually test anything; they just set something up or perform a procedure. For example, Test 1 sets a flag that tells the system that Manual Intervention has been selected in the Diagnostics Configuration (DGN Config). This flag, in turn, will ensure that those tests requiring manual intervention are run when Full Diagnostics is executed.

What is AutoAdjust?

AutoAdjust is a series of software routines designed to optimize system accuracy. AutoAdjust runs automatically after a five-degree Centigrade temperature change or 1,000 hours of operation since the last AutoAdjust.¹

AutoAdjust can also be run manually from within Diagnostics. You **must** run AutoAdjust under the following conditions:

- If a new card has been installed in the testhead
- If a card has been swapped from one slot or module to another
- If Diagnostics indicates a non-catastrophic (marginal) test failure
- After testhead calibration (preventive maintenance)

When to AutoAdjust During Troubleshooting

- 1 Log on and run Diagnostics (see [How to Run Diagnostics](#)).
If Diagnostics passes, assume that the hardware is normal. If Diagnostics fails, proceed to step 2.
- 2 If the diagnostic test failure was catastrophic,² replace the indicted hardware. If the failure was non-catastrophic (i.e., marginally out of tolerance), run AutoAdjust. If AutoAdjust fails, replace the hardware that was indicted by Diagnostics. If AutoAdjust passes, proceed to step 3.
- 3 Run Diagnostics again. To save time, you can run Diagnostics selectively on the part of the system that failed. If Diagnostics fails again, replace the indicted hardware. If Diagnostics passes, assume that the hardware is normal and that AutoAdjust has compensated for a change that has occurred due to component aging.

If AutoAdjust caused a failure to disappear, regard the hardware as suspect to future failures; the hardware may have a chronic drift or aging problem. If the hardware fails again soon, with the same failure mode, replace it. AutoAdjust will compensate for many timing failures, but it will not compensate for shorted or open relay test failures, digital failures in which data bits are incorrect, or incorrect voltage amplitude.

1. Automatic AutoAdjust can be turned on or off using the BT-BASIC statement **autoadjust on/off**. The actual temperature of the testhead is ignored for 15 minutes after booting the testhead to allow the temperature to stabilize.
2. For this purpose, a catastrophic failure is defined as a test result whose value exceeds the test limits by greater than 10 percent of nominal. For example, if the nominal value is 5.0 and the limits are +4.8 to +5.2, a catastrophic failure would be a reading less than +4.3 or greater than +5.7 (the low limit minus 10 percent of nominal and the high limit plus 10 percent of nominal).

NOTE

After troubleshooting, always run AutoAdjust All. Only AutoAdjust All autoadjusts the timing between modules for optimum accuracy.

NOTE

Before running AutoAdjust All on the testhead, ensure that the testhead has been booted for at least 30 minutes to allow the temperature to stabilize.

How to Run Diagnostics

- [Tools Needed for Diagnostics](#)
- [Running Diagnostics](#)
- [Manual Intervention](#)
- [Using the Pin Verification Fixture](#)
- [Installing the Fixture on the Testhead](#)
- [Editing and Compiling the Config Files](#)

Tools Needed for Diagnostics

- Pin Verification Fixture (PVF) – The PVF to be used depends on your system model (see *Parts List*).
- BNC(M)-to-dual banana cable – Used to test debug ports.
- BNC(F)-to-BNC(F) adapter or cable – Used to test functional port cables.

NOTE

You can run Diagnostics with or without a Pin Verification Fixture on the testhead, but we recommend that you use the fixture. See [Using the Pin Verification Fixture](#) and [Functions Not Tested Without a Fixture](#).

Running Diagnostics

Log on

- 1 Log on as **calibrate**.
- 2 Open a Korn Shell window and execute **dgn** on the command prompt.
The Diagnostics Service Package - Level 1 menu will appear.

Boot the Testhead

From the **Service Package** screen, boot the testhead by pressing **Testhead Funct**s (F3) and then **Testhead Power On** (F1). This turns on power to the modules and initiates the self-test and boot routines on the System Card and Module Control Cards.

After a few minutes the testhead boot messages will appear. The boot messages **must** indicate that the System Card and Module Control Cards successfully booted. See [Control Subsystem Troubleshooting](#) if there are boot error messages.

After booting, press **Exit** (F8) to return to the **Service Package** screen.

Run Diagnostics

NOTE

Before running Diagnostics on the testhead, ensure that the testhead has been powered up for at least 30 minutes to allow the temperature to stabilize, thereby minimizing circuit drift.

From the Diagnostics Level 1 screen you can perform a wide variety of tasks. The tasks are described [Diagnostics Service Package Functions](#). The function keys are described under [The Function Keys](#).

Manual Intervention

Manual intervention is required for Diagnostics to test some functions. These tests require that an external connection be made using a probe or cable, or that a person observe and report on an action or test result that the system is incapable of detecting by itself.

Diagnostics will pause at the appropriate time and instruct you to connect cables or answer questions. The following functions require manual intervention:

- Probe, debug ports
- Analog functional ports
- ASRU TestJet signal paths
- Some board handler functions¹

To run the manual intervention tests you must set **Manual Intervention** to **Yes** in the **DGN Config** screen ([DGN Config](#)). Then, manual intervention tests will automatically be included when you run **Full Diagnostics**, **Full Testhead**, or **Module Tests**, or **Board Handler**¹ tests. You can also run specific manual intervention tests from the **Odds & Ends** screen or from **Test Number Entry**.

1. Mux systems only

Using the Pin Verification Fixture

While it is recommended that you use a PVF when running Diagnostics, it is not mandatory that you do so. If you choose not to use a fixture, a very small number of functions will not be tested (see [Functions Not Tested Without a Fixture](#)). For instructions on using the PVF, see [Using the Pin Verification Fixture](#).

When Diagnostics runs, it looks for the presence of a PVF which has autofile code 0. If the fixture is found, all tests except those that require no fixture are run; if the fixture is not found, only those tests that do not need a fixture are run. If Diagnostics finds a fixture other than the PVF, it unlocks the fixture, prints an error message, and continues with the tests that do not require a fixture. If you set Fixture Required to **Yes** in **DGN Config** (the default is No), and you do not have the fixture installed, an error message will be displayed but all tests that do not need a fixture will run anyway. This also applies to running Confirmation and the **Confirm Config** screen.

If you are running Diagnostics on a 3- or 4-module system with a PVF on one bank, you will get the message **TO COMPLETE THE TESTING, MOVE THE FIXTURE TO BANK<X>. Then run Fixture Tests.** Press **Operator Break** to pause the test, move the fixture to the other bank, and press **Enter** to continue testing.

If you want to run only those tests that require a PVF, execute **Fixture Tests** from the **System Diagnostics** screen.

Functions Not Tested Without a Fixture

The most obvious thing that cannot be tested without a PVF is the continuity of the fixture interface pins (MINT pins) themselves. Without a fixture there is no way to route a signal from a pin back to the measurement circuits. Therefore, it is recommended that you always run Diagnostics with a PVF. Functions that are not tested without a fixture are listed below.

Module Control Card Functions

- GP Relays (16 pins) – The functionality of the relays is tested, but the relay contacts themselves are not.
- Autofile (12 pins)
- Safety Enable (1 pin)
- Fixture Enable (2 pins)
- Debug Ports (3 pins)
- User Clock (1 pin)
- Event Trigger (6 pins)
- Clock Receivers (2 pins)
- Switched Grounds (5 pins)
- Unswitched Grounds (30 pins)

ASRU Card Functions

- DUT Power Supplies (24 pins)
- Calibration Ports (2 pins)
- G and L Buses (4 pins)
- X Buses (8 pins)
- Switched Grounds (2 pins)

Utility Card Functions

- Plug-in card relays channels (18 pins each)
- Muxed power supplies (14 pins each)

Hybrid-144 Non-multiplexed Pin Card Functions (UnMux system)

- Fixed Ground Relays can be closed and opened (12 pins)

Installing the Fixture on the Testhead

NOTE

You must install the fixture in the correct orientation on the testhead, with the fixture's four terminals toward the middle of the testhead. Read the instructions printed on the fixture when installing it.

- 1 Log on and boot the testhead.
- 2 Place the fixture on a bank that contains a module.
- 3 Execute **Testhead Functs > Fixture Lock** to pull the fixture down onto the MINT pins.

To remove the fixture, execute **Testhead Functs > Fixture Unlock**.

WARNING

DO NOT execute **Fixture Unlock** with the testhead in the service (90-degree) position, or the fixture may fall off the testhead causing bodily injury or damage to the fixture.

Installing the Fixture in the Board Handler

This procedure describes how to install a PVF in a 44990A EFS Board Handler. It assumes that the board handler is installed on a testhead and functioning normally.

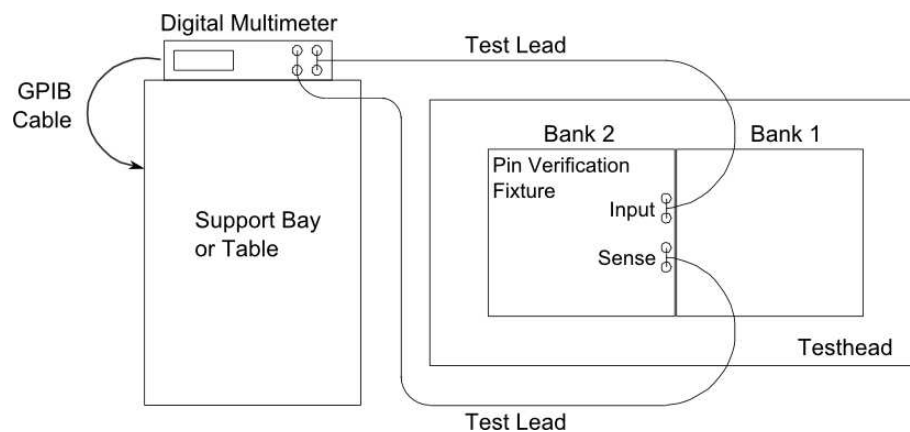
CAUTION

DO NOT install the PVF in the board handler if you intend to run board handler Diagnostics. The board handler must be free to move the press and rails during diagnostic tests. You can install the fixture in the board handler to run testhead Diagnostics or to calibrate the ASRU Card.

- 1 Log on as **calibrate** and boot the testhead (**Testhead Power On**).
- 2 Open a BT-BASIC window.
- 3 On the command line, type the following commands to take control of the testhead and move the press to the fixture load position:
`testhead is 1`
`handler press to load`
- 4 Insert the fixture through the board handler's loading door. With the fixture laying flat on the door guides, slide the fixture all the way into the board handler's press.
 If you are installing the fixture to calibrate the ASRU Card, perform the following steps; otherwise proceed to **step 5**.
 - a Remove the top cover from the board handler.
 - b Slide the fixture half-way out of the press so that, looking down from above the handler, you can see the fixture's Input and Sense terminals between the press and the front panel.
 - c Route the test leads into the handler, from the top, between the press and the front panel. Connect the leads to the fixture and multimeter as shown in **Figure 1-1**. Be sure to connect the Input and Sense ports correctly.
 - d After connecting the test leads, slide the fixture all the way into the press.
- 5 On the command line of the BT-BASIC window, type the following command to install the fixture:
`handler fixture install`
- 6 After the fixture is locked down on the testhead, type the following statement to release control of the testhead:
`testhead is *`
- 7 Return to the Diagnostics window. (Do not exit the BT-BASIC window; you will use it again to remove the fixture.)

You can now run any testhead confirmation or diagnostic tests. At the completion of the tests, the fixture will be released from the testhead and raised to the install position automatically.

Figure 1-1 Calibration set-up



Removing the Fixture from the Board Handler

- 1 In a BT-BASIC window, enter:

```
testhead is 1
handler fixture remove
```
- 2 Slide the fixture out of the handler's press.
 If the fixture was connected to an external multimeter for ASRU Card calibration, disconnect the test leads before removing the fixture completely.
- 3 After removing the fixture from the board handler, release control of the testhead:

```
testhead is *
```
- 4 Return to the Diagnostics window.
- 5 Replace the top cover on the board handler and restore the system to normal condition.

Editing and Compiling the Config Files

The system `config` file must match the system hardware for Diagnostics to perform properly.

The system `config` file describes:

- `testhead name is "testhead1" "module0" <etc>` statement
- Which modules are installed in the testhead
- Which cards are installed in each module
- Which modules the DUT power supplies are connected to
- Which module the probe and debug ports are connected to
- The power line frequency
- Whether the EFS Board Handler is present (if applicable)

Look at the `config` screen and verify that it reflects the actual hardware. You can use the BT-BASIC editor to edit the file. The BT-BASIC editor checks syntax.

Editing the Config File

- 1 Open a BT-BASIC window.
- 2 Open the `config` file by typing:
`get "config"`
- 3 Edit the configuration.
- 4 Save the `config` file by typing:
`re-save`

Compiling the Config File

If you have changed the system `config` file, you must compile the `config` file.

To compile, enter:

```
compile 'config'; testhead
```

When the `config` file has compiled without errors, exit to the **Service Package** screen by typing `exit` on the BT-BASIC command line.

The Diagnostics Service Package

- [Diagnostics Menu Levels](#)
- [Diagnostics Service Package Screen](#)
- [Test Execution Screen](#)
- [Keyboard Functions](#)
- [Organization of the Diagnostic Tests](#)

Diagnostics Menu Levels

Running Diagnostics displays the Service Package screen ([Figure 1-2](#)). Select an item from this level 1 menu displays a level 2 menu or information screen. The level 1 and 2 menus are shown in [Table 1-1](#). The level 2 menu functions are described in [Diagnostics Service Package Functions](#) on page 1-18.

Table 1-1 Diagnostics Service Package

Level 1 Menu	Level 2 Menu
System Diagnostics	Full Diagnostics Pin Card Relay Tests Fixture Tests BSI Self-Tests Confirmation Full Support Bay Board Handler (Mux systems only) No-Wire Interface Tests (Mux systems only)
Support Bay	System Card DC DUT Power Supplies Module Power Units
Configuration	Testhead Config DGN Config Programmable Card Config System Config Confirmation Config
AutoAdjust	All Tests Control Card ASRU Card Pin Cards
Module Cards	All Tests Control Cards ASRU Cards Pin Cards

Table 1-1 Diagnostics Service Package

Level 1 Menu	Level 2 Menu
Odds & Ends	Probe Debug Ports Functional Ports Manual Intervention
Test Number Entry	
History	

Diagnostics Service Package Screen

Figure 1-2 shows the areas of the Diagnostics Service Package screen.

Figure 1-2 The Diagnostics Service Package Screen



Table 1-2 Diagnostics screen

Item	Description
Status Area	Displays the status of the system during test execution.
Status Line	Indicates where you are in the Diagnostics package. If you are at Level 1, this field displays Service Package - Level 1 . Under any Level 2 item, this field displays the menu item selected: for example, System Diagnostics - Level 2 .
Work Area	Displays menu items when in a menu selection mode, or data when in the test execution mode.
Function Keys	The functions of F1 through F8 change depending on where you are in the Diagnostics package.

Test Execution Screen

When a diagnostic test is running, the **Test Execution** screen appears as shown in [Figure 1-3](#). The **Work Area** shows where a PVF was found, indicated by one or more asterisks (*). The work area also displays a list of passed or failed tests (use F7 to select between **Display Failures / Results / All / None**).

Figure 1-3 The Test Execution Screen

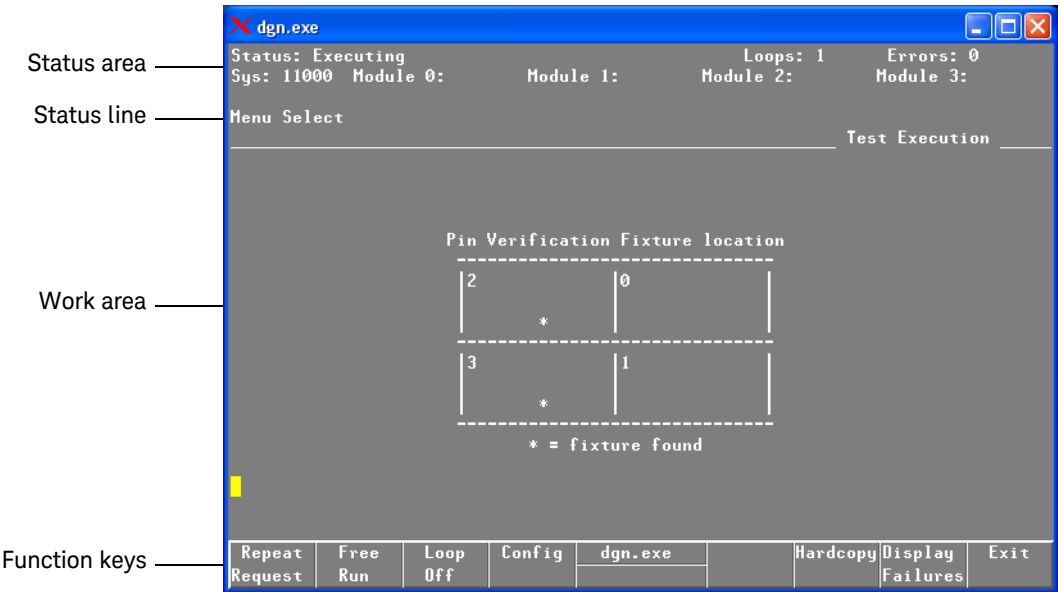


Table 1-3 Test Execution Status

Item	Description
Status	<div>Displays the following status:</div> <ul style="list-style-type: none">Booting... appears when Testhead Power On is executed.Compiling Tests appears for a few seconds after pressing the Execute key (F1) to indicate that the selected test is being compiled.Complete appears after test execution is completed.Executing appears while the selected tests are being executed. During test execution, the other status fields are updated on a real-time basis.Operator Break appears after the Break key (on the keyboard) has been pressed and testing is suspended. Testing can be resumed from where it stopped by pressing the Enter key, or the test can be re-started from the beginning by pressing Repeat Request (F1). <div>NOTE: Never press the Break key more than once. If you press the Break key three times while waiting for the break to occur, when the system finally recognizes the breaks, it will log you out of the system.</div> <ul style="list-style-type: none">Unbooting... appears when Testhead Power Off is executed.

Table 1-3 Test Execution Status

Item	Description
Loop Count	Displays the number of times a test has been executed when the Loop On function (F3) is enabled.
Error Count	Displays the number of errors that have occurred in the last test selection executed.
Module <0-3>	Displays the number of the test currently being executing in each module on a real-time basis.

Keyboard Functions

NOTE

Certain keys on the keyboard are re-mapped to different functions when Diagnostics is run. Use a keyboard overlay which shows these functions.

On the keyboard, between function keys F4 and F5, are two keys labeled **Menu** and **System/User**. The functions of these keys are explained below.

Table 1-4 Keyboard Functions

Item	Description
Menu	Turns on and off (toggles) the function keys displayed on the screen.
System	Displays the terminal function keys.
(Shift) User	Displays the last set of function keys that were displayed in the Diagnostic screen.
Break	If the Break key is pressed once while a test is executing, the sequence will stop when the current test is finished. This may take several seconds if the test has many subtests. If the Break key is pressed three times (triple Break), Diagnostics will immediately halt, the process will be killed, and a login prompt (login:) will be displayed. To return to Diagnostics after a triple Break , login again.
Enter	This key is marked Enter on the keyboard. Do not confuse it with the Enter key on the numeric keypad. In the test execution mode, pressing the Enter key causes the test sequence that was interrupted by the Break key or by the Step mode to continue from where it stopped. In a Level 1 or Level 2 menu, the Enter key acts the same as the Tab key which moves the selection bar from one menu item to the next.

Organization of the Diagnostic Tests

Diagnostic tests are organized in blocks of 1,000 numbers. Not every number in each block is used. The blocks are organized as follows:

- 0000–0999 – System Tests
- 1000–1999 – Module Control Card Tests
- 2000–2999 – ASRU Card Tests
- 3000–3999 – HybridPlus and AnalogPlus Pin Card Tests (Mux systems)
- 4000–4999 – AutoAdjust Tests
- 6000–6999 – AccessPlus Pin Card Tests (Mux systems)
- 8000–8099 – Utility Card Tests
- 11000–11099 – Miscellaneous Hardware
- 13000–13999 – Hybrid32 Pin Card Tests (Mux systems)
- 14000–14999 – Hybrid-144 Non-multiplexed Pin Card Tests (UnMux systems)

Diagnostics Service Package Functions

This section describes the functions in the Diagnostics Service Package.

- [System Diagnostics](#)
- [Support Bay](#)
- [Configuration](#)
- [AutoAdjust](#)
- [Module Cards](#)
- [Odds & Ends](#)
- [Testhead Test Number Entry](#)
- [History](#)

System Diagnostics

Figure 1-4 The System Diagnostics Screen

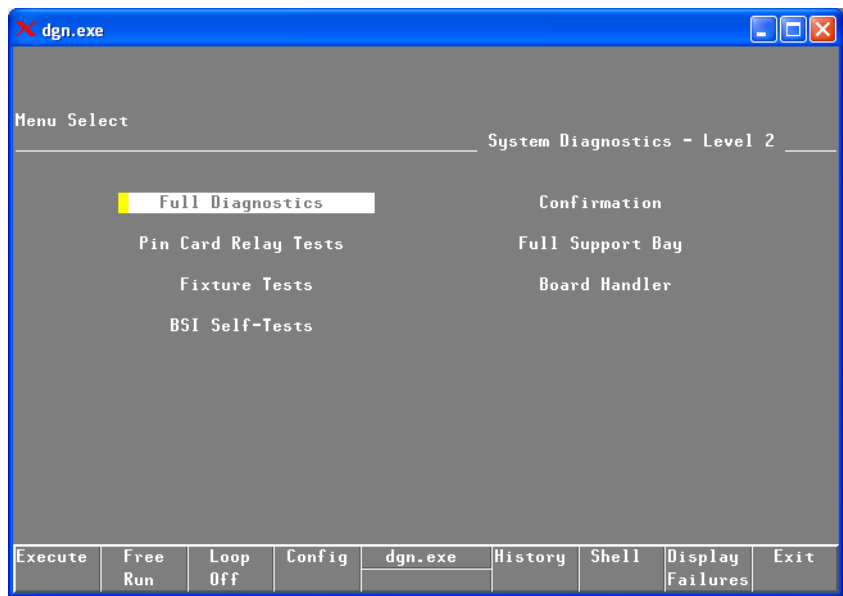


Table 1-5 System Diagnostics functions

Item	Description
Full Diagnostics	Executes all support bay and testhead diagnostic tests.
Pin Card Relay Tests	Executes all relay tests on all pin cards.
Fixture Tests	Executes only the diagnostic tests that require the Pin Verification Fixture.
BSI Self-Tests	Executes all self-tests and diagnostic tests on the ScanWorks boundary-scan hardware.
Confirmation	Executes the Confirmation tests of Diagnostics Service Package.
Full Support Bay	Executes all support bay diagnostic tests.
Board Handler	(Mux systems only) Executes all diagnostic tests on the EFS board handler.
No-Wire Interface Tests	(Mux systems only) Executes all No-Wire Interface diagnostic test.

Support Bay

Figure 1-5 The Support Bay Screen

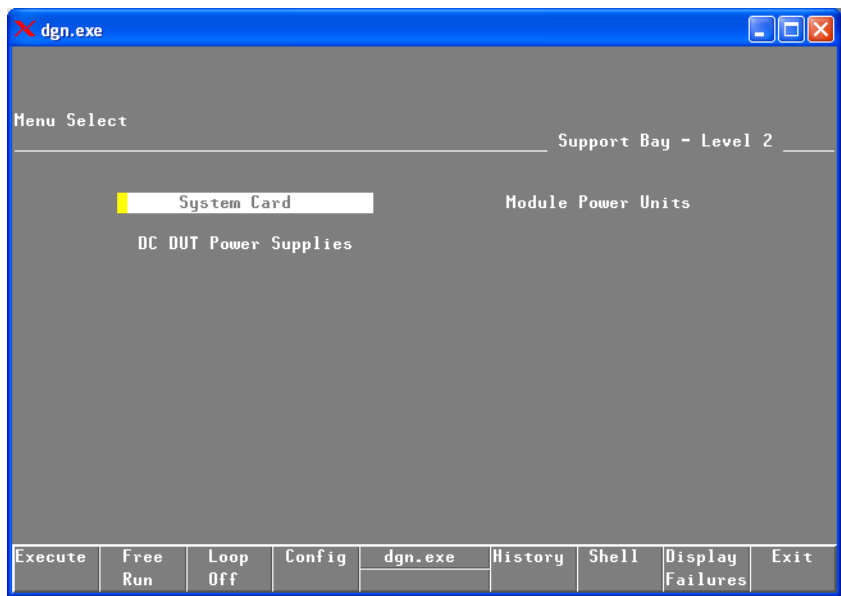
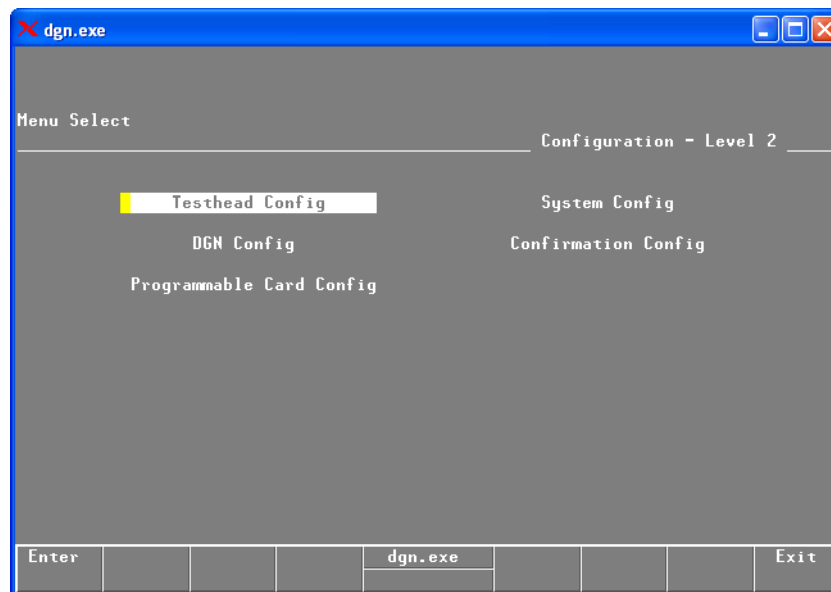


Table 1-6 Support Bay functions

Item	Description
System Card	(No function)
DC DUT Power Supplies	Executes the DUT supplies diagnostic tests.
Module Power Units	(No function)

Configuration

Figure 1-6 The Configuration Screen

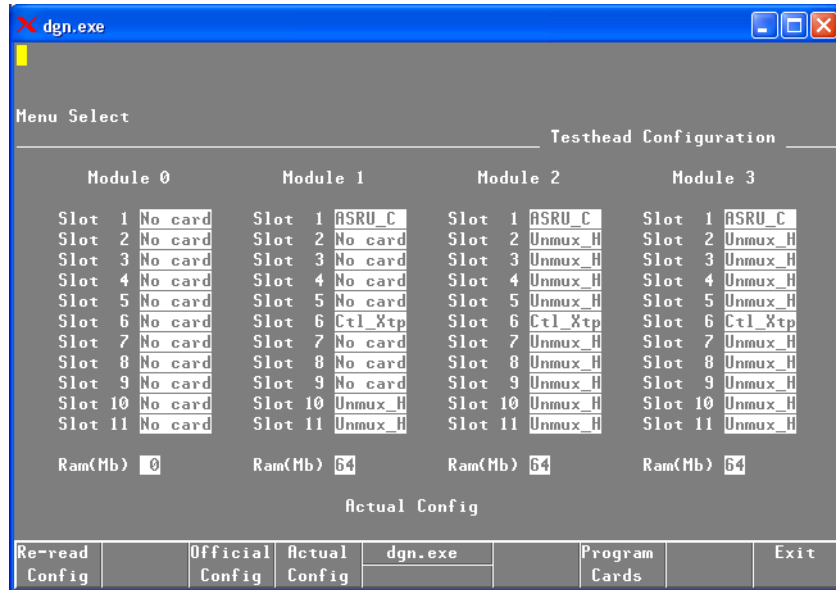


Selecting an item on the Configuration menu displays the following screens:

- Testhead Config
- DGN Config
- Programmable Card Config
- System Config
- Confirm Config

Testhead Config

Figure 1-7 The Testhead Config Screen



In the Testhead Config screen, each slot displays the type of card installed, or shows **No card** if none is installed.

Table 1-7 Card Types in Testhead Config (Mux systems)

Card Type	Description
No card	Denotes that there is no card in that slot.
Access	AccessPlus Pin Card, 6/12/20 MP/s
Analog	AnalogPlus Pin Card, 6/12/20 MP/s
Ana_DD	AnalogPlus Pin Card, double-density, 6/12/20 MP/s
ASRU_C	ASRU revision C Card, 6/12/20 MP/s
Ctl_Xt	ControlXT Card, 6/12/20 MP/s
Ctl_Xtp	ControlXTP Card, 6/12/20 MP/s
CtlXtpA	ControlXTPA Card, 6/12/20 MP/s
H_StdDD	HybridPlus Pin Card, 6 MP/s, double-density
HStdDD2	HybridPlus Pin Card, 6 MP/s, double-density, programmable
HStd_32	Hybrid32 Pin Card, 6 MP/s, 32-channel, double-density, programmable
The above two programmable cards are the same.	

Table 1-7 Card Types in Testhead Config (Mux systems)

Card Type	Description
H_AdvDD	HybridPlus Pin Card, 12 MP/s, double-density
HAdvDD2	HybridPlus Pin Card, 12 MP/s, double-density, programmable
HAdv_32	Hybrid32 Pin Card, 12 MP/s, 32-channel, double-density, programmable
	The above two programmable cards are the same.
H_HA_DD	HybridPlus Pin Card, 20 MP/s, double-density
HHA_DD2	HybridPlus Pin Card, 20 MP/s, double-density, programmable
H_HA_32	Hybrid32 Pin Card, 20 MP/s, 32-channel, double-density, programmable
	The above two programmable cards are the same.
NASRU	ASRU Revision N Card
Unprog	HybridPlus Pin Card that is not programmed
Unprog32	Hybrid32 Pin Card that is not programmed
Uti_xxx	Utility Card; xxx represents the presence (1) or absence (0) of the three plug-in cards. For example, Uti_100 indicates a Utility Card with a plug-in card installed in the first slot.

Table 1-8 Card Types in Testhead Config (UnMux systems)

Card Type	Description
No card	Denotes that there is no card in that slot.
ASRU_C	ASRU revision C Card
Ctl_Xtp	ControlXTP Card
CtlXtpA	ControlXTPA Card
NASRU	ASRU Revision N Card
Unmux_H	Hybrid-144 Non-multiplexed Pin Card
Uti_xxx	Utility Card; xxx represents the presence (1) or absence (0) of the three plug-in cards. For example, Uti_100 indicates a Utility Card with a plug-in card installed in the first slot.

An asterisk (*) indicates that the actual configuration does not agree with the official configuration for that slot. This means that either the actual configuration has been changed or that a card is not being recognized (a hardware problem). Test 2 will fail if the configurations do not agree.

An equal sign (=) denotes that an acceptable replacement has been made, so no test failures will occur: for example, replacing **Hyb_Adv** with **Hyb_B** is acceptable.

Select **Re-read Config** (F1) to ensure that the data shown on the screen represents the latest actual configuration.

The data in the official configuration screen cannot be changed via the screen; it is read from the `config` file. The actual configuration must be the same as the official configuration; if they are not, edit the `config` file accordingly.

DGN Config

Figure 1-8 The DGN Config screen

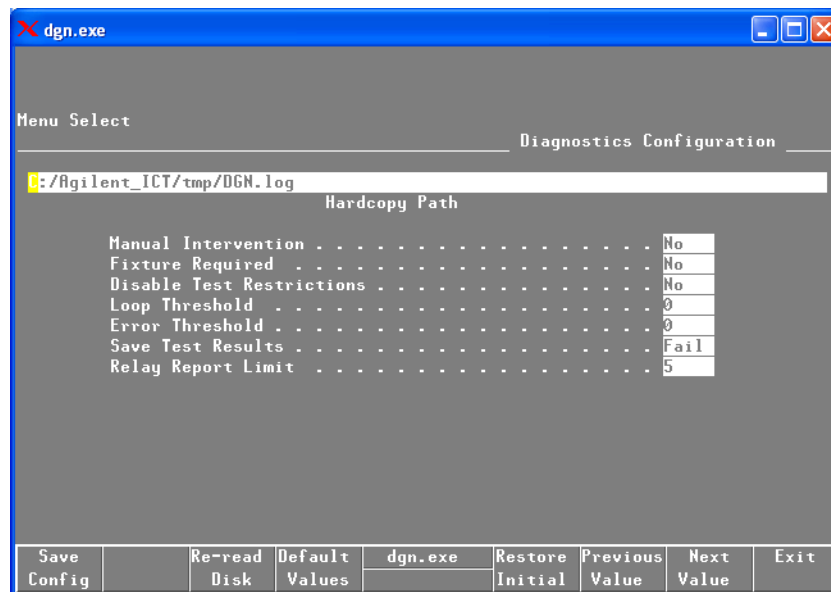


Table 1-9 DGN Config functions

Item	Description
Hardcopy Path	Specifies where data will be sent when the Hardcopy function key (F6) is pressed in the Text Execution screen. The default hardcopy file path is shown in the field. If you want data to go to a printer, the field must contain the spooling system's name for the printer. It is then up to the spooler to direct the file to a printer.
Manual Intervention	Controls whether diagnostic tests requiring manual intervention are run. If Yes is selected, the probe, debug ports, functional ports, and board handler will be tested, requiring manual intervention to test them. The default is No .
Fixture Required	If Yes is selected, Diagnostics will expect to find a Pin Verification Fixture (PVF) installed on the testhead; if a PVF is not installed, an error message will be displayed and only the tests that do not require a fixture will be run. If No is selected, and a PVF is installed, the PVF tests will be run. It is recommended that you always run Diagnostics with a Pin Verification Fixture. The default is No .

Table 1-9 DGN Config functions

Item	Description
Disable Test Restrictions	<p>Controls whether prerequisite tests are run before selected tests. This function applies only to running tests from the Test Number Entry screen.</p> <p>Some tests must be run with passing results before other tests are run. For example, if you run test 2341 to test the DUT power supply cables, you must run test 2340 first to verify that there are no ground faults. If you run test 2341 with test restrictions <i>not</i> disabled (Disable Test Restrictions = No), test 2340 will automatically run first. If you run test 2341 with test restrictions disabled (Disable Test Restrictions = Yes), test 2341 will be run without first verifying ground faults. The default is No.</p>
Loop Threshold	(0-99999) Controls the number of times a test will repeat itself in the loop mode. 0 equals infinity (loop forever). The default is 0 .
Error Threshold	(0-99999) Controls how many failures can occur before a test is halted. The default is 0 (infinity).
Save Test Results	<p>Determines what test results are logged into history files:</p> <p>Failures – failed tests only</p> <p>All – all tests (passed and failed)</p> <p>None – no tests</p>
Relay Report Limit	(0-99999) Controls how many relay failures are reported. The default is 5 .

Programmable Card Config

Figure 1-9 Programmable Card Configuration - FPGA Firmware Revision Management

Mod	Slot	CardName	HardwareID	Actual	Expected
1	6	ControlXTP	Seq FPGA	02020812_1	02020812_1
1	10	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
1	11	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
2	2	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
2	3	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
2	4	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
2	5	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
2	6	ControlXTP	Seq FPGA	02020812_1	02020812_1
2	7	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
2	8	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
2	9	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
2	10	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
2	11	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
3	2	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>
3	3	Unmuxed Hybrid	Unmux CF	<NO CODE>	<NO CODE>

Update All	Goto Start	Halfway to Start	Previous Page	dgn.exe	Next Page	Halfway to End	Goto End	Exit
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Programmable Card Config lets you manage the firmware in the Hybrid-144 and ControlXTPA/XTP's field programmable gate arrays (FPGAs). The use of FPGAs allows future enhancements to add features to the hardware. New software releases can add features requiring an update to the firmware. The hardware, as it is programmed into the FPGA, can be modified by updating the firmware through an update or patch, and then by updating the FPGA firmware.

On the Mux system, **Programmable Card Config** does not support ControlXT. Once a software update or patch has been installed on the test system, the FPGA firmware must be updated using this function.

Select F1 **Update All** to update all programmable modules that are out of date to the current expected revision. This updates the FPGAs and verifies the success of the update.

System Config

The data in the **System Config** screen is read from the `config` file and cannot be changed on the screen. These fields must reflect the actual configuration. If they do not, edit the `config` file accordingly.

Figure 1-10 The System Config Screen

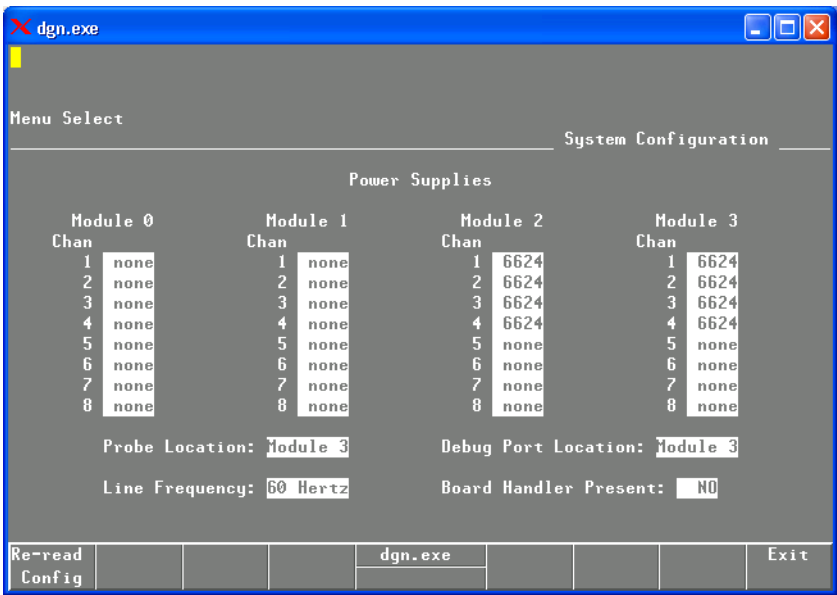


Table 1-10 System Config data

Item	Description
Power Supplies	Indicates which type of DUT power supply is connected to the ASRU Cards (channels 1 to 6) and Utility Card (channels 7 and 8) in each module.
Probe Location	Indicates which module the probe is connected to (normally, to Module 3).
Line Frequency	Indicates the frequency of the AC line power: 50 or 60 hertz.

Table 1-10 System Config data

Item	Description
Debug Port Location	Indicates which module the debug ports are connected to (normally, to Module 3).
Board Handler Present	<p>(Mux systems only) Indicates whether the EFS Board Handler is installed on the testhead. The default is No. The field is updated from the System config file.</p> <p>Diagnostics software looks for the presence of the board handler statement in this file. If there is a board handler statement in the file, the testhead will unlock the fixture and the board handler will raise the fixture to the install position, with both events occurring automatically at the completion of a confirmation or diagnostic test. If there is no board handler statement, but a board handler is present, the automatic unlocking and raising of the fixture will not occur.</p>

Confirm Config

Figure 1-11 The Confirm Config Screen

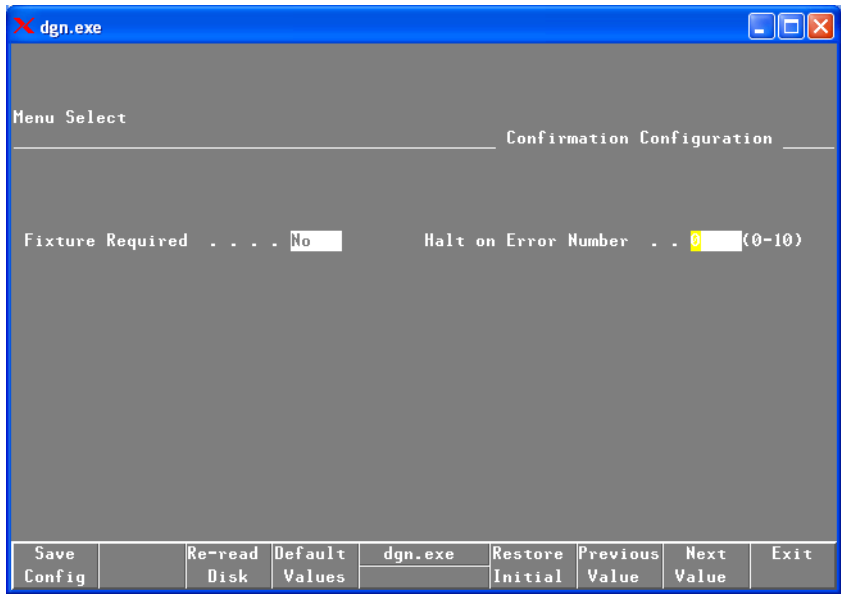
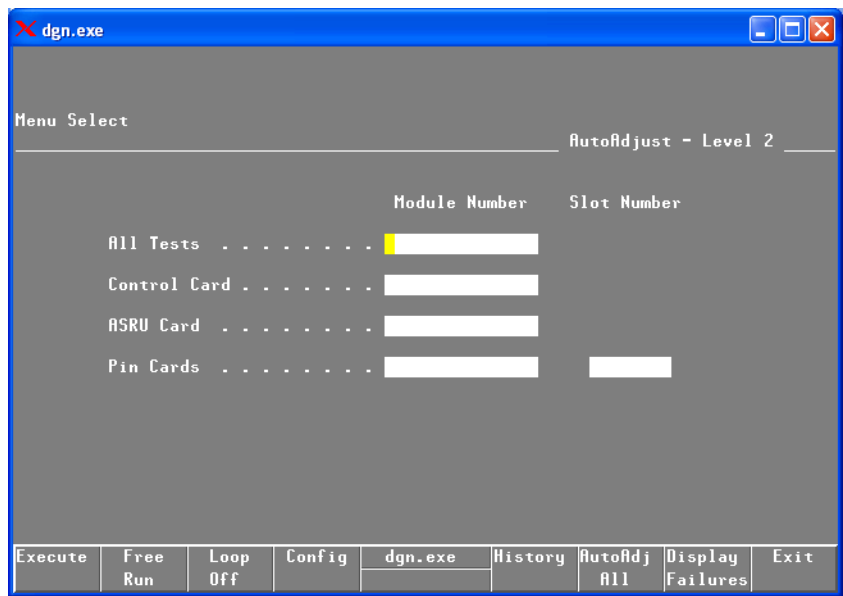


Table 1-11 Confirm Config Functions

Item	Description
Fixture Required	<p>If Yes is selected, Diagnostics will expect to find a Pin Verification Fixture (PVF) installed. If the PVF is not installed, an error message will be displayed and only the tests that do not require a fixture will be run. If No is selected (the default is No), several confirmation tests will not be run.</p> <p>It is recommended that you always run Confirmation with a Pin Verification Fixture.</p>
Halt on Error Number	(0-10) Controls how many failures can occur before Confirmation is halted. 0 equals infinity. The default is 0 .

AutoAdjust

Figure 1-12 The AutoAdjust Screen



NOTE Partial runs of Autoadjust may not fully calibrate the tester. You should always select AutoAdj All (F6).

Table 1-12 AutoAdjust functions

Item	Description
All Tests	Autoadjusts all cards in the specified module or modules.
Control Card	Autoadjusts the Module Control Card(s) in the specified module or modules.
ASRU Card	Autoadjusts the ASRU Card(s) in the specified module or modules.
Pin Cards	Autoadjusts the Pin Card(s) in the specified slot or slots of the specified module or modules.

Module Cards

Figure 1-13 The Module Cards Screen

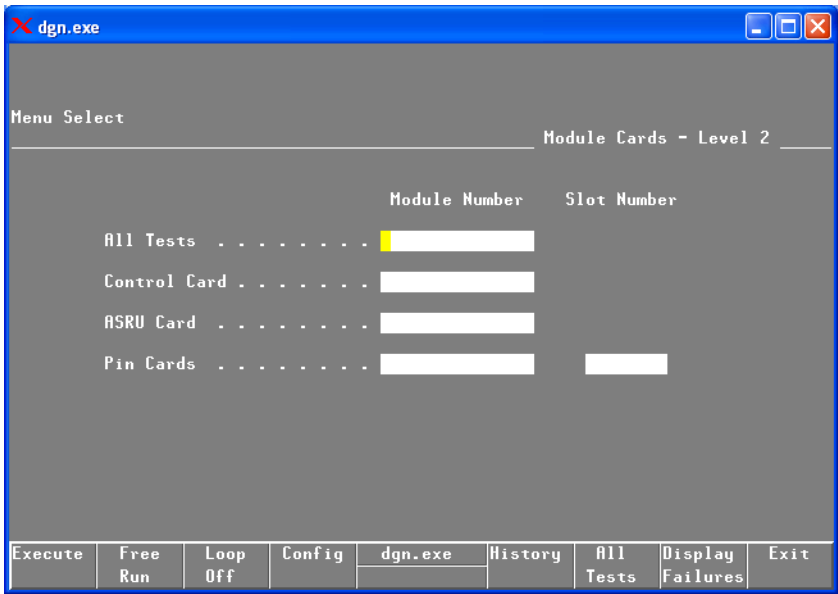


Table 1-13 Module Cards functions

Item	Description
All Tests	Executes all tests on all cards in the specified module or modules.
Control Card	Executes all Module Control Card tests in the specified module or modules.
ASRU Cards	Executes the ASRU Card tests in the specified slot or slots of the specified module or modules.
Pin Cards	Executes the Pin Card tests in the specified slot or slots of the specified module or modules.

Odds & Ends

Figure 1-14 The Odds & Ends Screen

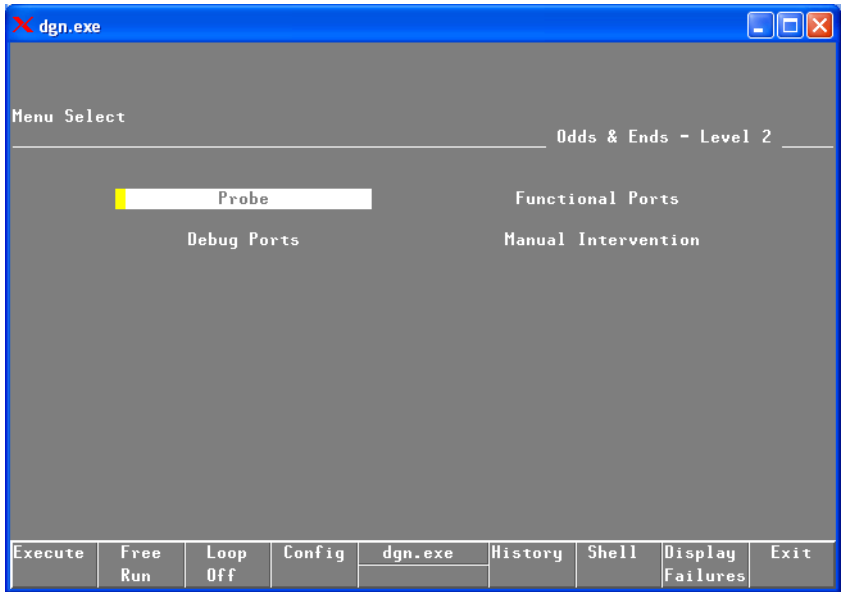


Table 1-14 Odds & Ends functions

Item	Description
Probe	Executes the guided probe diagnostic tests.
Functional Ports	Executes the diagnostic tests on the functional ports to the ASRU Card(s).
Debug Ports	Executes the diagnostic tests on the debug ports.
Manual Intervention	Executes all tests requiring manual intervention. This includes the probe, functional ports, debug ports, and ASRU TestJet signal paths. This is the only way to test the ASRU signal paths used for TestJet.

Testhead Test Number Entry

This function lets you execute specific tests by entering the test numbers (see Table 1-15).

Figure 1-15 The Testhead Number Entry Screen

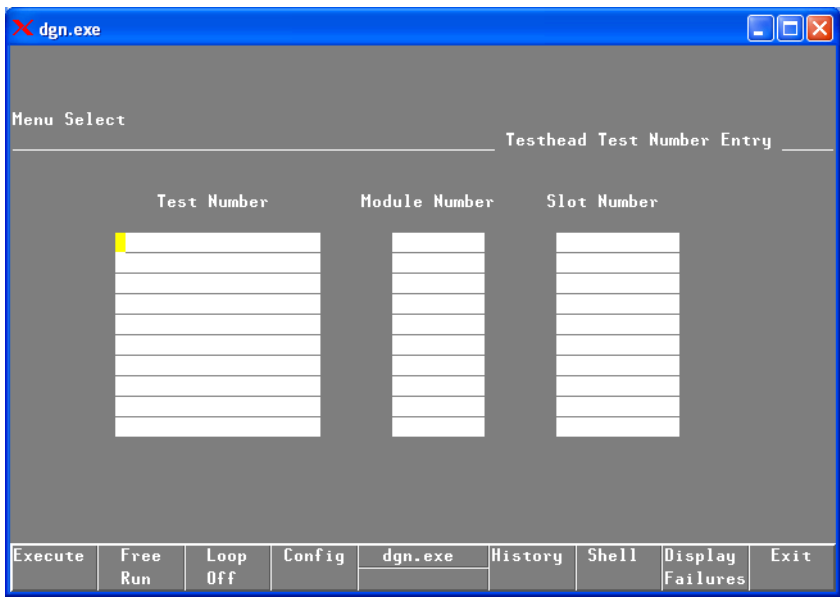


Table 1-15 Testhead Test Number Entry

Item	Description
Test Number	<p>On each line, you can enter a single test number, a range of numbers (e.g., 2340-2350), a group of numbers (e.g., 2340,2345,2348), or any combination (e.g., 2340, 2345-2350).</p> <p>Multiple test numbers entered on the same line will not necessarily run in the order in which they are entered. Test numbers entered on different lines will run in the order entered: first line first, second line second, etc.</p>
Module Number	<p>(0-3, all) On each line you can enter a single module number, a range of numbers (e.g., 0-2), a group of numbers (e.g., 2,3), a combination (e.g., 0,2-3), or all.</p>
Slot Number	<p>(1-11, all) On each line you can enter a single slot number, a range of numbers (e.g., 2-5), a group of numbers (e.g., 2,4,11), a combination (e.g., 2-5,7-11), or all.</p>

History

In the History screen the Run Number indicates when tests were executed on the testhead. The prefix indicates what type of run was performed (Table 1-16). Selecting a history item and pressing F1 **Select** will display details for the selected item.

Figure 1-16 The History Screen

Menu Select		History - Level 2	
Run Number	Date	Summary	
D 15	Fri Apr 29 17:45:37 2005,	tests run:	3, error count: 1
D 16	Fri Apr 29 17:45:38 2005,	tests run:	3, error count: 1
D 17	Fri Apr 29 17:45:39 2005,	tests run:	3, error count: 1
D 18	Fri Apr 29 17:45:40 2005,	tests run:	3, error count: 1
D 19	Fri Apr 29 17:45:41 2005,	tests run:	3, error count: 1
B 20	Fri Apr 29 17:48:00 2005,	tests run:	0, error count: 0
D 21	Fri Apr 29 19:02:12 2005,	tests run:	144, error count: 0
D 22	Fri Apr 29 19:37:36 2005,	tests run:	3, error count: 1
D 23	Fri Apr 29 19:41:24 2005,	tests run:	3, error count: 1
D 24	Mon May 2 14:26:46 2005,	tests run:	3, error count: 1
D 25	Mon May 2 14:58:34 2005,	tests run:	3, error count: 1
D 26	Mon May 2 15:00:47 2005,	tests run:	231, error count: 0
B 27	Fri May 13 13:52:56 2005,	tests run:	0, error count: 1
B 28	Fri May 13 14:33:06 2005,	tests run:	0, error count: 1

Select	Goto Start	Halfway to Start	Previous Page	dgn.exe	Next Page	Halfway to End	Goto End	Exit
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Table 1-16 Run Number Prefixes

Prefix	Description
A	AutoAdjust run from BT-BASIC; AutoAdjust run from Diagnostics is logged as D.
B	Booting or unbooting the testhead from Diagnostics; Booting from outside Diagnostics is not logged.
C	Confirmation run from BT-BASIC; Confirmation run from Diagnostics is logged as D.
D	Diagnostics (anything run from Diagnostics).
L	Logout message.

The Function Keys

- **Diagnostics Function Keys**
All function keys that appear in the Diagnostics Service Package screens are described in [Table 1-17](#). Note that some of the functions may not apply to all i3070 ICT systems.
- **BT-BASIC Function Keys**
- **Testhead Functs Function Keys**

Table 1-17 Diagnostics Function Keys

Function Key	Description
Actual Config	The Actual Config function key (F4) displays the actual configuration as last read from the testhead (see Official Config).
All Cards	The All Cards function key (F4) in the Program Pin Card IDs screen allows you to program all programmable Hybrid Pin Cards for speed at once instead of individually.
All Tests	The All Tests function key (F6) in the Module Cards screen executes all tests on all cards in the specified module or modules.
AutoAdj All	Pressing the AutoAdj All function key (F6) from the AutoAdjust screen causes the AutoAdjust routines to be executed on the entire testhead (see AutoAdjust).
BASIC	The function keys invoked when running BT-BASIC are shown in Table 1-18 .
Config	Pressing the Config function key (F4) displays the configuration function keys without changing the screen. Each function key displays a configuration screen. All configuration screens are described under Configuration .
Diagnose Relays	<p>The Diagnose Relays function key (F5) appears in the Test Execution screen when Diagnostics is executed on a single module/slot in the Module Cards menu.</p> <p>If Diagnostics has been run on one slot, this function key invokes a tool that analyzes the test results and reports the most probable relay or relays to replace.</p> <p>If Diagnostics has been run on more than one slot when Diagnose Relays is pressed, the following error message appears:</p> <p>Tests for more than one pin card have been run. Please re-run on only one pin card.</p>
Display Failures / Results / All / None	<p>This function key (F7) controls what is displayed in the work area during test execution. It also controls what is logged in the history files. The function key functions cycle in the following sequence: Display Failures, Display Results, Display All, Display None.</p> <p>Display Failures – Displays data only for the test(s) that failed.</p> <p>Display Results – Displays data for all tests – those that passed as well as those that failed.</p> <p>Display All – Displays data for all tests – those that passed and failed – including data used to calculate pass/fail results. Display Failures and Display Results only display after-calculation data.</p> <p>Display None – Does not display any test results.</p>
Enter	The Enter function key (F1) invokes the item selected in a Level 1 or Level 2 menu.

Table 1-17 Diagnostics Function Keys

Function Key	Description
Execute	The Execute function key (F1) executes the test(s) selected in a Level 2 screen.
Exit	The Exit function key (F8) exits a Level 2 screen and returns to the Level 1 screen of the Diagnostics Service Package.
Fixture Lock / Unlock	<div style="background-color: red; color: white; padding: 5px; text-align: center;">WARNING</div> <p>DO NOT execute Fixture Unlock with the testhead in the service (90-degree) position, or the fixture may fall off the testhead causing bodily injury or damage to the fixture.</p> <hr/> <p>Pressing the Fixture Lock function key (F5) causes a test fixture to be pulled down onto the testhead. The Fixture Unlock function key (F6) releases the fixture.</p> <p>These function keys also invoke the Test Execution screen. The Fixture Lock / Unlock function keys are invoked from the Testhead Funct's function key (F3) in the Diagnostics Service Package screen.</p> <p>(Mux systems only) If a Board Handler is installed on the testhead (and is present in the <code>config</code> file), the Fixture Lock / Unlock function keys are not present.</p>
Free Run / Test Step / Measure Step / Function Step	<p>This function key (F2) controls how tests are executed. Each time the function key is pressed, it cycles to the next option. These options are used to observe the low-level set-up and measurements that occur within a test sequence.</p> <p>Free Run – The selected test sequence executes continuously from beginning to end unless interrupted by the Break key.</p> <p>Test Step – The selected test sequence executes until the end of a test, and then stops and waits. The last test displayed in the work area is the next test that will be executed when you press the Return key.</p> <p>Measure Step – The selected test sequence executes until the end of a measurement within a test, and then stops and waits. This is a subset of Test Step. The last test step displayed in the work areas is the next test that will be executed when you press the Return key.</p> <p>Function Step – The selected test sequence executes until the end of a function step (setup) within a measurement step. This is a subset of Measure Step. The last function step displayed in the work area is the next test that will be executed when you press the Return key.</p>
Hardcopy	The Hardcopy function key (F6) causes the data displayed in the work area to be sent to a printer or file, as specified in the Hardcopy Path field of the DGN Config screen.
History	The History function key (F5) displays the History screen.
Logout	The Logout function key (F6) displays the Logout screen. At the prompt, you can type a message which will be stored in the history file. Press the Return key to log out of the system.
Loop Off / On	This function key (F3) toggles between Loop Off and Loop On . If Loop Off (the default) is selected, the tests are executed once. If Loop On is selected, the tests are executed the number of times specified in the DGN Config screen.
Next Value	The Next Value function key (F7) changes the value in the selected field to the next value. This function key only functions for fields that have two or more fixed values (e.g., Failures / Results / All / None or Yes / No).

Table 1-17 Diagnostics Function Keys

Function Key	Description
Official Config	The Official Config function key (F3) displays the Official testhead configuration; that is, the contents of the config file.
Previous Value	The Previous Value function key (F6) changes the value in the selected field to the previous value. This function key only functions for fields that have two or more fixed values (e.g., Failures / Results / All / None or Yes / No).
Program Cards	<p>The Program Cards function key (F6) in the Testhead Config screen displays a Program Pin Card IDs screen. This screen allows you to program the card ID of any exchange Hybrid Pin Cards you may have just installed in the testhead. This applies only to programmable Hybrid Pin Cards. Exchange Hybrid Pin Cards have a Unprog (unprogrammed) ID. When Diagnostics detects an Unprog ID, it runs a super-set of the pin card tests on that card to verify that it works at all test speeds. If you leave an unprogrammed card in the testhead and do not program it, testhead is 1 cannot be executed. This renders the testhead useless to the operator.</p> <p>To program one or more cards, you can enter their module and slot numbers in fields just as you would in other Diagnostics screens and press Execute (F1). Or to program all cards at once, press All Cards (F4). F4 will program all unprogrammed pin cards found in the testhead. When you press F1 or F4, you will be prompted to verify that's what you want to do. When you program a card, it will be programmed to the current speed of the testhead. You can only program a card once. To be re-programmed, the card must be returned to the factory.</p>
Re-read Config	When the Re-read Config function key (F1) is pressed in the Testhead Config or System Config screens, the system reads the official configuration from the disk and polls the testhead for the actual configuration. It also updates whichever config screen (official or actual) is invoked. Conflicts between the official and actual configurations are indicated by an asterisk (*).
Re-read Disk	When the Re-read Disk function key (F3) is pressed (in the DGN Config or Confirm Config screens, the system reads in the applicable configuration from the disk and updates the screen.
Repeat Request	The Repeat Request function key (F1) appears in the test execution mode. It is used to repeat or rerun the selected test. It can be used after an operator Break or after a test is completed.
Restore Initial	The Restore Initial function key (F5) restores the values that were present when you initially invoked the menu, unless you pressed the Save Config function key (F1) in the interim.
Save Config	The Save Config function key (F1) in the Config screen saves the screen values to the disk.
Select	The Select function key (F1) in the History screen displays the data stored for the index item selected on the screen.
Shell	Pressing the Shell function key clears the Diagnostics screen and displays an Unix shell prompt (\$). To leave the shell and return to Diagnostics, type exit or press CTRL+D . The Shell function key is F2 in the Level 1 menu, or F6 in the Level 2 menu.
System Config	The System Config function key (F4) displays the System Config screen.
Testhead Config	The Testhead Config function key (F5) displays the Testhead Config screen.

Table 1-17 Diagnostics Function Keys

Function Key	Description
Testhead Functs	The Testhead Functs function key displays the function keys in Table 1-19 .
Testhead Power Off/On	<p>Pressing the Testhead Power On function key (F1) boots the testhead, enables (turns on) the MPUs, and turns on the testhead fans.</p> <p>The Testhead Power Off function key (F2) unboots the testhead, disables the MPUs, and turns off the fans.</p> <p>The Testhead Power Off/On function keys also invoke the Test Execution screen. The Testhead Power Off/On function keys are invoked from the Testhead Functs function key (F3). To avoid Process Manager problems, always use Testhead Power Off rather than switching power off at the PDU.</p>

Table 1-18 BT-BASIC Function Keys

Function Key	Description
command / edit	This function key (F1) moves the cursor between the command line and the work area. If the cursor is on the command line, pressing F1 moves it to the work area and changes the function key label to command . If the cursor is in the work area, pressing F1 moves it to the command line and changes the function key label to edit .
recall plus / recall minus	Commands (statements) are stored in a stack (register). recall minus copies the previous command from the stack to the command line. recall plus copies the next command from the stack to the command line. recall plus will only function if you have already moved into the stack with the recall minus function key. As commands are executed, they are added to the stack. When the stack fills up, the oldest command drops off.
execute	Executes the command displayed on the command line.
mark	Marks (defines) a group of lines in the work area to be operated on as a block. This function key changes its definition each time it is pressed, switching from mark to second mark to remove marks .
test consult t	Invokes Test Consultant.
pb qstats	Invokes Pushbutton Q-STATS.
store line	Copies a line from the command line into the work area. The line is inserted at the current position of the cursor.

Table 1-19 Testhead Functs Function Keys

Function Key	Description
Testhead Power On	Boots the testhead, enables (turns on) the MPUs, turns on the module fans, and displays the Test Execution screen.
Testhead Power Off	Unboots the testhead, disables (turns off) the MPUs, turns off the module fans, and displays the Test Execution screen.
Fixture Lock	<p>Activates the fixture pull-down mechanisms, pulling a fixture down onto the testhead, and displays the Test Execution screen. (Mux systems only)</p> <ul style="list-style-type: none"> ▪ This function key is not present if a board handler is installed. ▪ DO NOT execute Fixture Unlock with the testhead in the service (90-degree) position, or the fixture may fall off the testhead causing bodily injury or damage to the fixture.
Fixture Unlock	<p>Deactivates the fixture pull-down mechanism, releasing a fixture from the testhead, and displays the Test Execution screen. (Mux systems only) This function key is not present if a board handler is installed.</p>
Exit	Exits the Testhead Functions function keys and returns to the Level 1 function keys.

1 Running Diagnostics