

UNISYS

**BTOS
Modular
Diagnostics
Operations
Guide**

Relative to
Release Level 4.0

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Overview

The modular diagnostics package helps you identify problems that are not related to an application you're running on your system, but are a result of a problem with a hardware module on your BTOS workstation.

The Modular Diagnostics Package

The modular diagnostics package consists of the following:

- *BTOS Modular Diagnostics Operations Guide*
- Four 5 1/4-inch write-protected floppy disks

Note: The release level of the modular diagnostics package is indicated on the product disks. During the installation process, this release level is displayed by the submit file. However, when diagnostics are running, the release level of each test manager is displayed before each test is executed. Each kernel displays its release level at all times. Therefore, the release level of a kernel or test manager will not necessarily match the release level of the package.

What You Should Have on Hand

- Modular diagnostics package
- Blank initialized floppy disks (at least six) to make working back-up copies of the diagnostics product disks and to test any floppy disk drives on your system
- Unisys authorized disk drive cleaning kit
- If you are testing a tape streamer module, you need a blank tape cartridge
- If you have X.21 communications, an Intelligent Datacommunications Slice (IDS) module, a Local Area Network (LAN) module, a voice processor module, or if you wish to run the RS-232 test on the CPU or 4-Port I/O modules, refer to Appendix B for additional test connectors that you will need

Creating Back-Up Disks

Make back-up copies of the product disks (using the Floppy Copy command) before installing or running the diagnostics on your system. See the *BTOS Standard Software Operations Guide* for details.

Deciding Which Test Method to Use

Note: If you cannot install the modular diagnostics software on your system, you can run diagnostics directly from your back-up copies of the product disks. Disk #1 will boot on B 28/38 systems, disk #2 will boot on B 26 systems, disk #3 will boot on B 27 systems, and disk #4 will boot on B 39 systems.

Modular diagnostics can be run from:

- The product floppy disks
- A hard disk
- A custom floppy disk

To run modular diagnostics from the product floppy disks, you must meet the minimum system requirements (see "Minimum System Requirements" in this section). Then follow the procedures under "Running Diagnostic Programs from Product Disks" in Section 3.

To run modular diagnostics from a hard disk, the modular diagnostics must already be installed on the hard disk, or a hard disk and floppy disk must be available on one cluster at your site. If modular diagnostics were previously installed, go to "Local Hard Disk (Master, Cluster, or Standalone Workstation)" or "Master Workstation Hard Disk (From a Cluster Workstation)" in Section 3. Otherwise go to "Section 2, Software Installation."

To run modular diagnostics from a custom floppy disk, either the custom floppy disk must already exist, or you must have a hard disk and floppy disk available on one workstation at your site. If the custom floppy disk already exists, go to either "Local Floppy (Master, Cluster, or Standalone Workstation)" or "Master Workstation Floppy Disk (From a Cluster Workstation)" in Section 3. Otherwise go to "Creating a Bootable Custom Disk" in Section 2.

Minimum System Requirements

To run the modular diagnostics on your workstation, you need a minimum of a CPU, monitor, a floppy disk drive, keyboard, and power supply modules.

Diagnostics can be run on cluster workstations that do not have disk drive modules by using files from the master workstation.

A specific number of power modules must be used to meet the power requirements of your system. Make certain that the proper number is maintained when subtracting or adding modules to the system.

Before You Begin

Before you can run the diagnostic tests on your system:

- Make sure that the modules in your system are connected in the correct order and that all cables and power cords are plugged in correctly. (See the *BTOS Hardware Installation Guide*.)
- Clean all disk drive modules with a Unisys authorized disk drive cleaning kit.
- Make sure that the fan for each module is operating: Listen for its operation or place your hand at the air discharge to feel for air flow and vibration. See Tables 1-1 and 1-2.

Descriptions

Monitor descriptions that reference normal and reverse background are written to describe monitors that have a blanked (dark) screen when no information is displayed. For this type of monitor, the term "normal background" means light letters or lines on a dark background, while "reverse background" means dark letters or lines on a bright background.

Another type of monitor, called a Positive Polarity Monitor by Unisys, has a white screen when no information is displayed. For this type of monitor, the term "normal background" means dark letters or lines on a bright background and "reverse background" means light letters or lines on a dark background.

Table 1-1 Fans on B 26/B 28/B 38/B 39 Modules

Abbreviated Module Name	Fan Installed?	Air Discharge Location
CPU	Yes	Rear
EXP	Yes	Rear
EPP	Yes	Rear
D1	No	N/A
D2	No	N/A
D3	No	N/A
D5	No	N/A
PD7	No	N/A
FXC	No	N/A
GRA	Yes	Rear
GPP	Yes	Rear
K1	No	N/A
K2	No	N/A
K5	No	N/A
M1	Yes	Rear
M3	Yes	Rear
M4	Yes	Rear
MS7	Yes	Rear
MU5	Yes	Rear
MX3	No	N/A
MX4	No	N/A
MX5	No	N/A
TS	Yes	Rear
IDS	Yes	Rear
DCX	No	N/A
PD8	No	N/A
PS1	Yes	N/A
Tel	No	N/A
MC5	Yes	Rear
MC6	Yes	Rear
CD3	No	N/A
EN3	Yes	Rear
PS	No	N/A
XS7	Yes	Rear
TS2	Yes	Rear
XS8	Yes	Rear
MS8	Yes	Rear
B 28-EV	Yes	Rear
B 38-EV	Yes	Rear
B 39-1	Yes	Rear
B 39-2	Yes	Rear
B 39-A	Yes	Rear
B 39-B	Yes	Rear

Software Installation

Master and Cluster Workstations with Hard and Floppy Disk Drives

Note: If you have the minimum system configuration (see "Minimum System Requirements" in Section 1), the diagnostic software need not be installed; diagnostic programs can run directly from the product or back-up disks. If you have the minimum system configuration, go directly to "Running Diagnostic Programs from Product Disks" in Section 3.

If you have more than the minimum system configuration (see "Minimum System Requirements" in Section 1) you should first install the software as follows, and then make a bootable custom diagnostic disk.

- 1 Insert product disk #1 in a floppy disk drive.
- 2 At the Command line, type **Software Installation** and then press GO.
- 3 Follow the prompts displayed on the screen, inserting product disks #2, #3, and #4 when instructed.
- 4 When a message informs you that the installation is complete, remove the product disk from the floppy disk drive and store the set of disks in a safe place. Table 2-1 lists the files available for your system.

Note: See Section 3 for instructions on installing diagnostics from a cluster workstation onto a master workstation.

Creating a Bootable Custom Disk

- 1 Insert a blank floppy disk into a floppy disk drive.
- 2 At the Command line, type **Create Diagnostic Disk** and then press GO.
- 3 Follow the prompts displayed on the screen to create a bootable custom working disk with the files needed to test your particular system. (If you plan to boot the diagnostics from a local hard disk, this step may be skipped. However, it is recommended that you create and keep a bootable floppy disk on hand.)

- 4 Back up the bootable floppy disk you created in step #3 using the Floppy Copy command.
- 5 Go to Section 4, "Qualifying Your Hardware."

Master Workstation Without Floppy Disk Drive

Modular diagnostics can be installed on a master workstation that does not have a floppy disk drive using any of the following three methods (procedures follow the descriptions):

Method	Description
1	Install diagnostics on a cluster workstation, and then copy them from the cluster workstation to the master workstation hard disk.
2	Copy diagnostics from the custom floppy disk at the cluster workstation to the master workstation hard disk.
3	Install the diagnostics from the floppy product disks on the cluster workstation to the master workstation hard disk.

Method 1

- 1 Install diagnostics on the cluster workstation as described in "Master and Cluster Workstations with Hard and Floppy Disk Drives."
- 2 Copy *[ClusterWorkstationVolumeName]<Diags>** to *[MasterWorkstationVolumeName]<Diags>**

Method 2

- 1 Copy *[ClusterWorkstationCustomFloppyVolumeName]<Diags>** to *[MasterWorkstationVolumeName]<Diags>**

Method 3

- 1 Copy each product disk from the floppy disk drive on the cluster workstation to the master workstation hard disk:

Copy

[ClusterWorkstationFloppyVolumeName]<diags> to
[MasterWorkstationVolumeName]<Diags>**

Table 2-1 Files on the Product Disks

Disk #1	Volume Name: CuModDiags-1
SysImage.sys	B26/28/38Diag.Font
B27Diag.Font	B26/28/38_LVM
B27Kernel_CU	B26Kernel_CU
Install.Sub	CreateDiagnosticDisk.Sub
InstallTstManager.run	IVOL files
Disk #2	Volume Name: CuModDiags-2
SysImage.sys	K2_Mgr
K1_Mgr	B26CPU_Mgr
	B26/28/38_LVM
K3/K5_Mgr	B26/28/38Monitor_Mgr
B28/38CPU_Mgr	B26/28/38Graphics_Mgr
	SCSI_Test_Mgr
B26/28/38Dual_FL_Mgr	Winch_Mgr
B26/28/38Combo_Mgr	IVOL Files
B26/28/38Diag.Font	
Disk #3	Volume Name: CuModDiags-3
SysImage.sys	B27Diag.Font
B27Dual_FL_Mgr	B27Combo_Mgr
B27Graphics_Mgr	B27Monitor_Mgr
B27CPU_Mgr	PC_Mgr
Voice_Mgr	Tape_Mgr
LAN_Mgr	IDS_Mgr
Four_Port_Mgr	2ButtonMouse_Mgr
3ButtonMouse_Mgr	IVOL Files
Disk #4	Volume Name: CuModDiags-4
SysImage.sys	B39/EVDiag.Font
B39CPU_Mgr	EV_LVM
	IVOL Files

Note: The LCW workstation is diagnosed using the B 27 diagnostic software.

Table 2-2 Booting Diagnostic Disks

System	Disk
B 28/38 Systems	Disk #1
B 26 Systems	Disk #2
B 27 Systems	Disk #3
B 39 Systems	Disk #4

Running Diagnostic Software

The diagnostics software can be run from a variety of locations in a cluster system. For example, diagnostics can be run from a cluster workstation even though the diagnostics software may be located elsewhere on the master.

This section explains how to run diagnostics on a:

- Product floppy disk located on the cluster, master, or standalone workstation.
- Local hard disk (master, cluster, or standalone workstation)
- Local floppy disk (master, cluster, or standalone workstation)
- Master workstation hard disk (operated from a cluster workstation)
- Master workstation floppy disk (operated from a cluster workstation)

If the screen goes blank during testing, the suspect module is the module being tested at the time the screen went blank.

Before running diagnostic software, become familiar with the illustrations in Appendix A. Distorted patterns may not be detected by the software; they must be detected by the systems operator.

Running Diagnostic Programs from Product Disks

B 26 Systems

- 1 Using product disk #2, follow the procedures under "Local Floppy (Master, Cluster, or Standalone Workstation)" or "Master Workstation Floppy Disk (From a Cluster Workstation)," as appropriate.

B 27 Systems

- 1 Turn off the system.
- 2 Insert product disk #3 into a floppy disk drive.
- 3 Turn on the system.
- 4 When booting is complete, the screen should display the Diagnostic ID. If it does not, go to Section 4, "Qualifying Your Hardware."
- 5 Mark all modules to be tested except the keyboard and hard disk. After answering queries, press FINISH. Remove product disk #3 and insert product disk #2. Mark all modules that were marked on product disk #3 in the exact order they were marked when product disk #3 was in the disk drive. (This retains the previously selected tests in memory. If this is not done, tests selected from product disk #3 will be overwritten in memory by tests selected from product disk #2.)
- 6 Mark all additional modules to be tested from product disk #2, including the keyboard and hard disk.

After diagnostics are loaded, proceed to run the diagnostics by responding to the prompts that appear on the screen.

B 28, B 38, and B 39 Systems

- 1 Turn off the system.
- 2 Insert product disk #1 (disk #4 for B 39 systems) into a floppy disk drive.
- 3 Turn on the system.
- 4 When booting is complete, the screen should display the Diagnostic ID. If it does not, go to Section 4, "Qualifying Your Hardware."
- 5 Insert product disk #2 (for B 39 systems leave disk #4 in the drive) and follow the procedure under "Selective Testing."

Local Hard Disk (Master, Cluster, or Standalone Workstation)

Note: The following procedure uses B 26 system diagnostics. If your system is not a B 26, substitute the appropriate file names.

- 1 At the Command line, type **Bootstrap** and press RETURN.
- 2 Complete the following form as shown:
 Command Bootstrap
 Bootstrap
 File to bootstrap from [VolumeName]<Diags>B26Kernel_CU
 [Sys volume or wsNNN] VolumeName
- 3 Press GO.
- 4 Wait while the system bootstraps.
- 5 The screen should display the Diagnostic ID. If it does not, go to Section 4: "Qualifying Your Hardware." This display is divided into three windows:
 - The top window describes the options and the meaning of display terms in the bottom window.
 - The middle window displays questions pertaining to the test routines. This window scrolls up as the diagnostics proceed.
 - The bottom window displays the symbols representing the modules in your system and the current state of the test. Faulty modules are indicated by the following:
 - The diagnostic test stops running.
 - The symbol of the faulty module flashes.
 - Additional error messages *may* be displayed.
- 6 If an error message is displayed describing a configuration error in your system, see the *BTOS Hardware Installation Guide* and correct your system configuration. Follow the instructions on your screen.
- 7 Go to "Selective Testing."

Local Floppy (Master, Cluster, or Standalone Workstation)

- 1 Turn off the system.
- 2 Insert the bootable (product or custom) diagnostic disk into a floppy disk drive.
- 3 Turn on the system. Wait while the system bootstraps.
- 4 The screen displays the Diagnostic ID. If it does not, go to Section 4, "Qualifying Your Hardware." This display is divided into three windows:
 - The top window describes the options and the meaning of display terms in the bottom window.
 - The middle window displays questions pertaining to the test routines. This window scrolls up as the diagnostics proceed.
 - The bottom window displays the symbols representing the modules in your system and the current state of the test. Faulty modules are indicated by the following:
 - The diagnostic test stops running.
 - The symbol of the faulty module flashes.
 - Additional error messages *may* be displayed.
- 5 If an error message is displayed describing a configuration error in your system, see the *BTOS Hardware Installation Guide* and correct your system configuration. Follow the instructions on your screen.
- 6 Go to "Selective Testing."

Master Workstation Hard Disk (From a Cluster Workstation)

Note: Diagnostics must first be installed on the master workstation hard disk.

Note: The following procedure uses B 26 system diagnostics. If your system is not a B 26, substitute the appropriate file names. Prompts shown in the following steps are typical and may not exactly match the prompts provided on your system.

1 Copy the file

[MasterWorkstationVolumeName]<Diags>B26Kernel_CU
to

[MasterWorkstationVolumeName]<Sys>WS186>SysImage.Sys.

2 Turn off the cluster workstation.

3 Press and hold down the spacebar.

4 Turn on the cluster workstation. When you see any disk controller light go on, release the spacebar. For LCW, hold the spacebar down for 10 seconds. If the cluster workstation has no disk controller, hold the spacebar down for five seconds. Respond to the screen prompts as follows:

At the prompt *B,C,D,L,P,T*: type **T** and press RETURN.

At the prompt *OS*: or *OS: 125* type **186** and press RETURN.

At the prompt *B,C,D,L,P,T*: type **B** and press RETURN.

The diagnostics should now be loading. After diagnostics are loaded, proceed to run the diagnostics by responding to the prompts that appear on the screen.

5 The screen should display the Diagnostic ID. If it does not, go to Section 4, "Qualifying Your Hardware." This display is divided into three windows:

- The top window describes the options and the meaning of display terms in the bottom window.
- The middle window displays questions pertaining to the test routines. This window scrolls up as the diagnostics proceed.
- The bottom window displays the symbols representing the modules in your system and the current state of the test. Faulty modules are indicated by the following:
 - The diagnostic test stops running.
 - The symbol of the faulty module flashes.
 - Additional error messages *may* be displayed.

- 6 If an error message is displayed describing a configuration error in your system, see the *BTOS Hardware Installation Guide* and correct your system configuration. Follow the instructions on your screen.
- 7 Go to "Selective Testing."

Master Workstation Floppy Disk (From a Cluster Workstation)

- 1 Insert the bootable (product or custom) diagnostic disk into floppy disk drive [F0], [F1], [F2], or [F3] on the master workstation.
- 2 At the Command line, type **Bootstrap** and press RETURN.
- 3 Complete the following form (the response shown applies when a disk is inserted into [f0]):

Command Bootstrap

Bootstrap

File to bootstrap from[IF0]<Sys>Sysimage.Sys
[Sys volume or wsNNN]

- 4 Press GO.
- 5 Wait while the system bootstraps.
- 6 The screen should display the Diagnostic ID. If it does not, go to Section 4, "Qualifying Your Hardware." This display is divided into three windows:
 - The top window describes the options and the meaning of display terms in the bottom window.
 - The middle window displays questions pertaining to the test routines. This window scrolls up as the diagnostics proceed.
 - The bottom window displays the symbols representing the modules in your system and the current state of the test. Faulty modules are indicated by the following:
 - The diagnostic test stops running.
 - The symbol of the faulty module flashes.
 - Additional error messages *may* be displayed.

The Diagnosis

Be patient as you proceed through the diagnosis. Because you are involved in a task of elimination, you must begin the task at the first step of the flow diagram and continue through exactly as you are directed until you find the faulty module.

Caution: Always turn off the power *and* unplug all power supply modules from the wall outlets before connecting or disconnecting any modules or damage to your system could result.

When you've found the faulty module or need technical help, call the Unisys customer support center or the dealer from whom you purchased your Unisys system.

A: Configure and Test a Basic System

Reduce your system to the minimum functional system as follows (for LCW go to step A3):

- A1** Unplug all the power supply modules from the AC wall outlet.
- A2** Disconnect all modules except the CPU, monitor, keyboard and power supply. If a graphics module was installed, disconnect the monitor from the graphics module and connect the monitor to the CPU. Disconnect the mouse and magnetic card reader, if any, from the keyboard. Reconnect a power supply to the CPU module. (Your system should now be made up of only a CPU module, monitor, keyboard, and one power supply module.) For B 39 systems, remove any X-Bus option boards (but not the memory expansion board or the video controller board located next to the floppy disk drive). X-Bus option boards will be added later in Section D.
- A3** Plug the power supply line cord into the AC wall outlet.
- A4** Turn on the system while observing the screen, CPU module lights, and any keyboard lights.

- A5** Observe the following indications: Some keyboard lights should come on, and then go out. On B 27 modules, lights behind the grilles will blink while the built-in self test, the Confidence Test Routine (CTR), is performed automatically, and then go out. The CTR lights on the LCW are not visible. The power lights on the front of the CPU will be on. (The power light for the B27-LCW is visible through the grille at the front left side of the base.) The monitor screen will light up, and the following message will be displayed on all systems except the B 27.

```
T
*****
L
```

(number of asterisks depends on the amount of memory installed in your system.)

The following message is displayed on B 28, B 38, and B 39 systems if they are unable to find a system image and thus cannot boot:

```
T
*****
L
E:A2
```

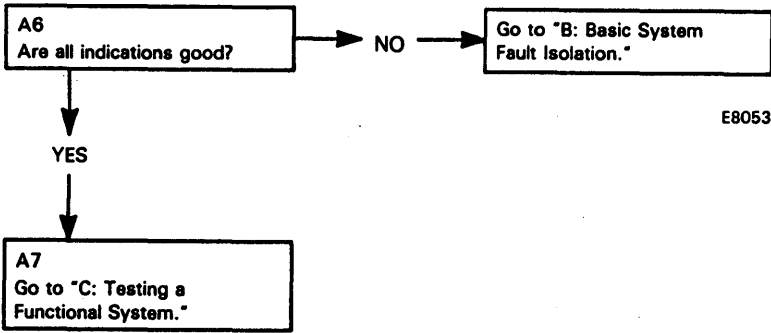
(number of asterisks depends on the amount of memory installed in your system. The error message is repeated and the message scrolls up the screen.)

The following message is displayed on the B 27:

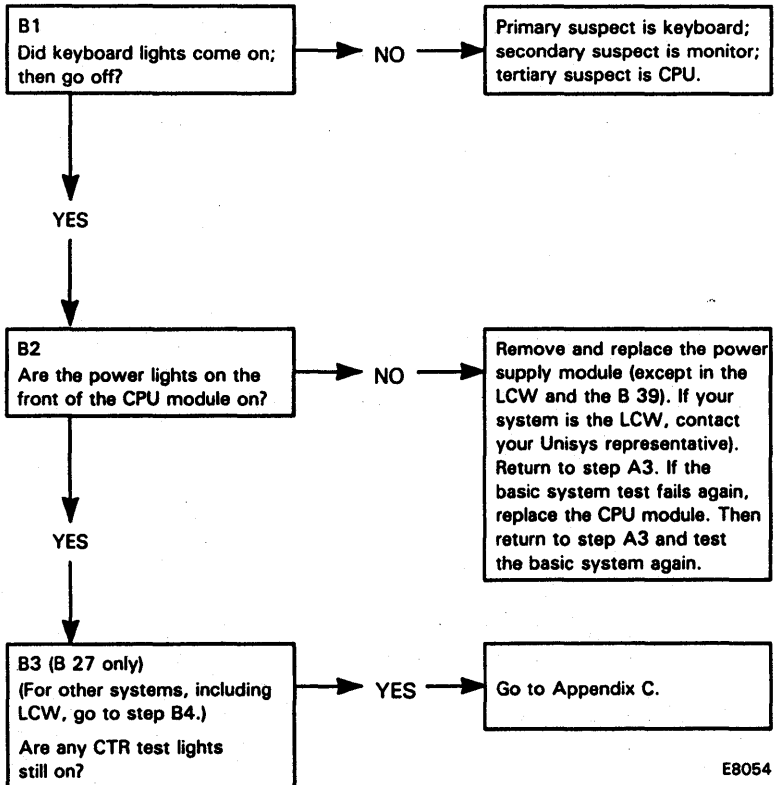
```
Unisys Corporation      (x denotes the version of the firmware
Rx.x.xxxx B27 CPU FW   number of asterisks depends on the
****                  amount of memory installed in your
CB                    your system.)
```

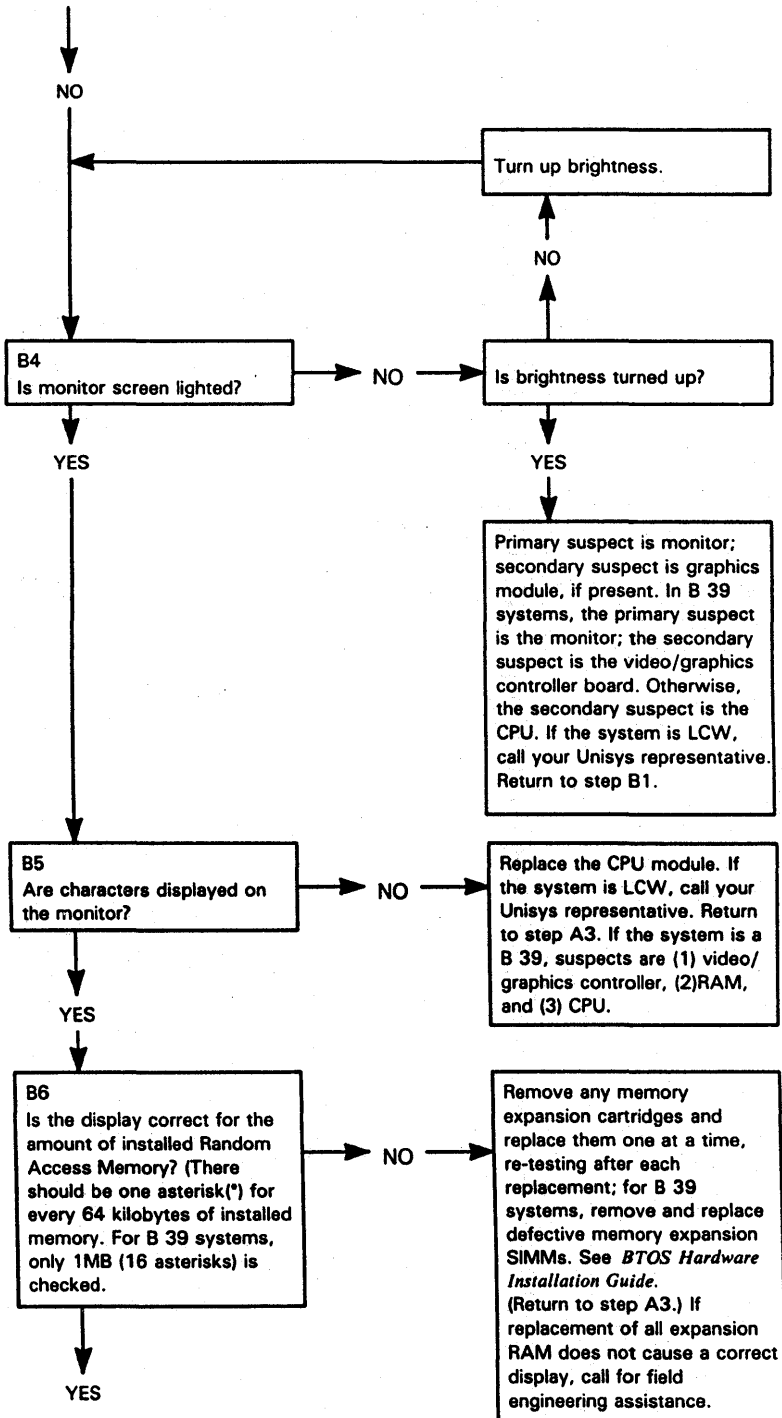
The following message is displayed on the LCW:

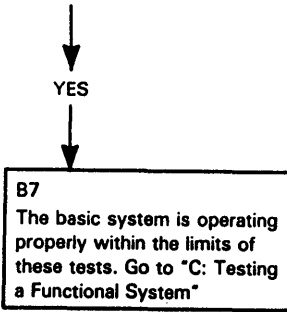
```
Unisys Corporation      (x denotes the version of the firmware
Rx.x.xxxx B27 LCW FW   number of asterisks depends on the
****                  amount of memory installed in your
CB                    your system.)
```



B: Basic System Fault Isolation



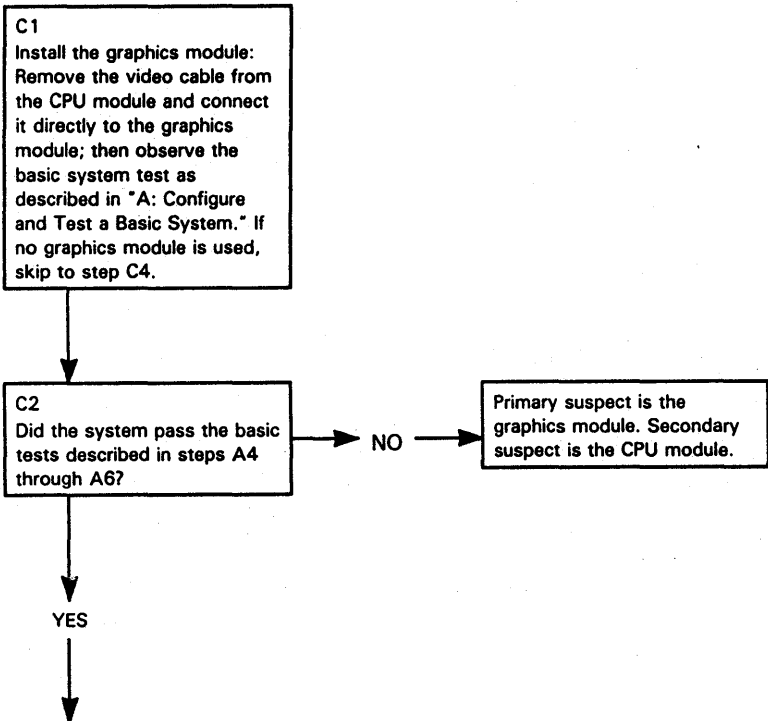


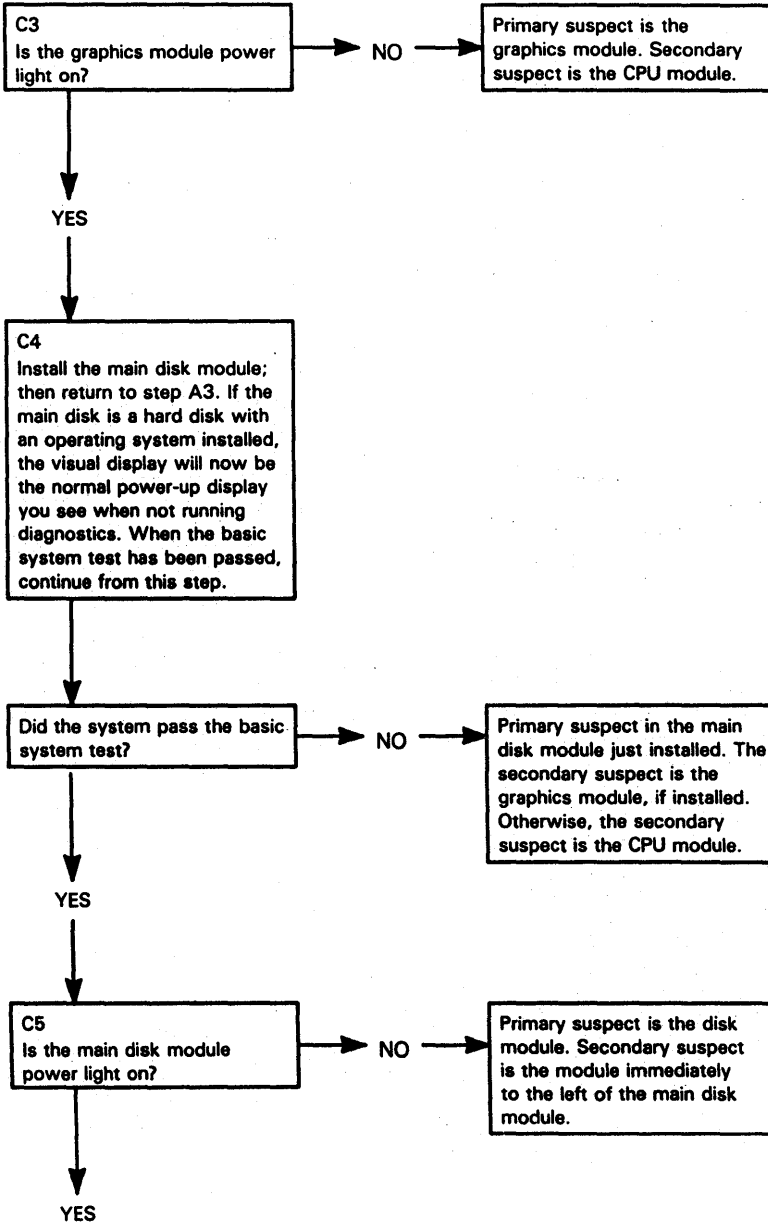


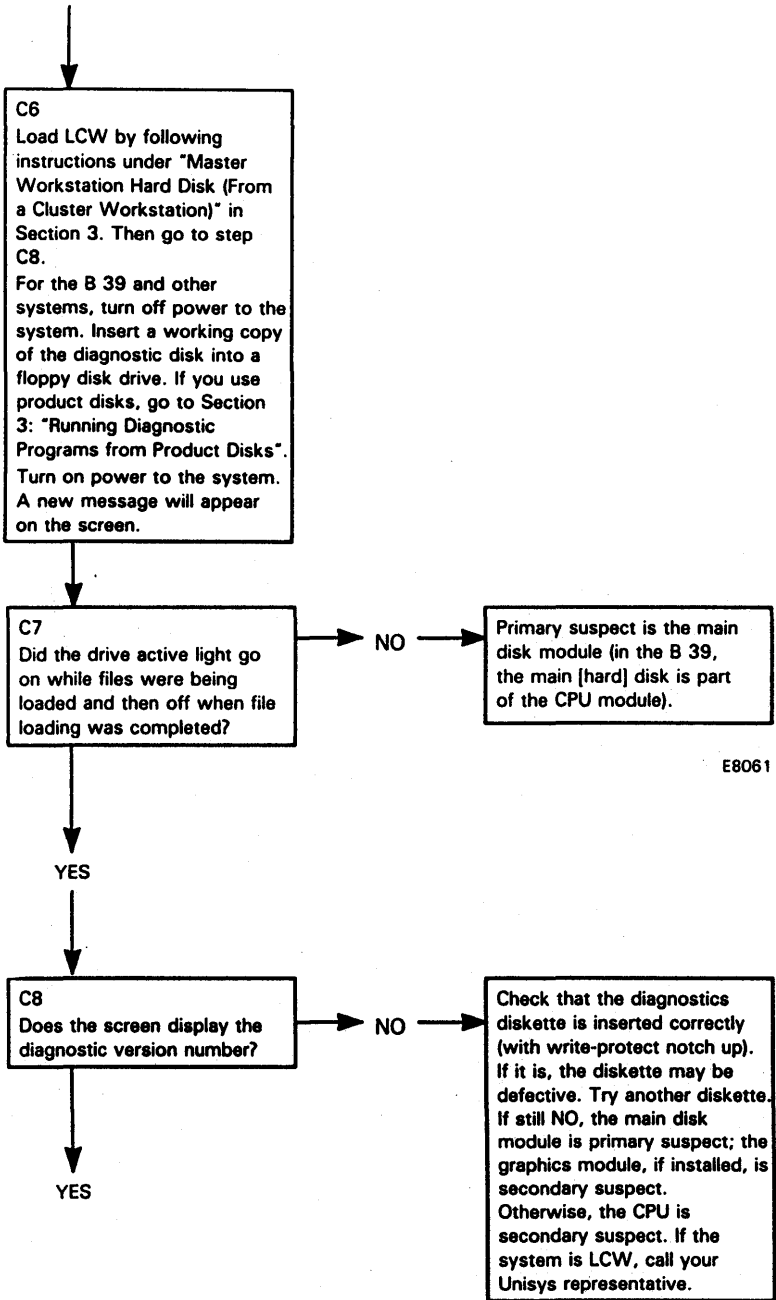
C: Testing a Functional System

Note: A B 39 system's hard disk drive and floppy disk drive are part of the CPU module.

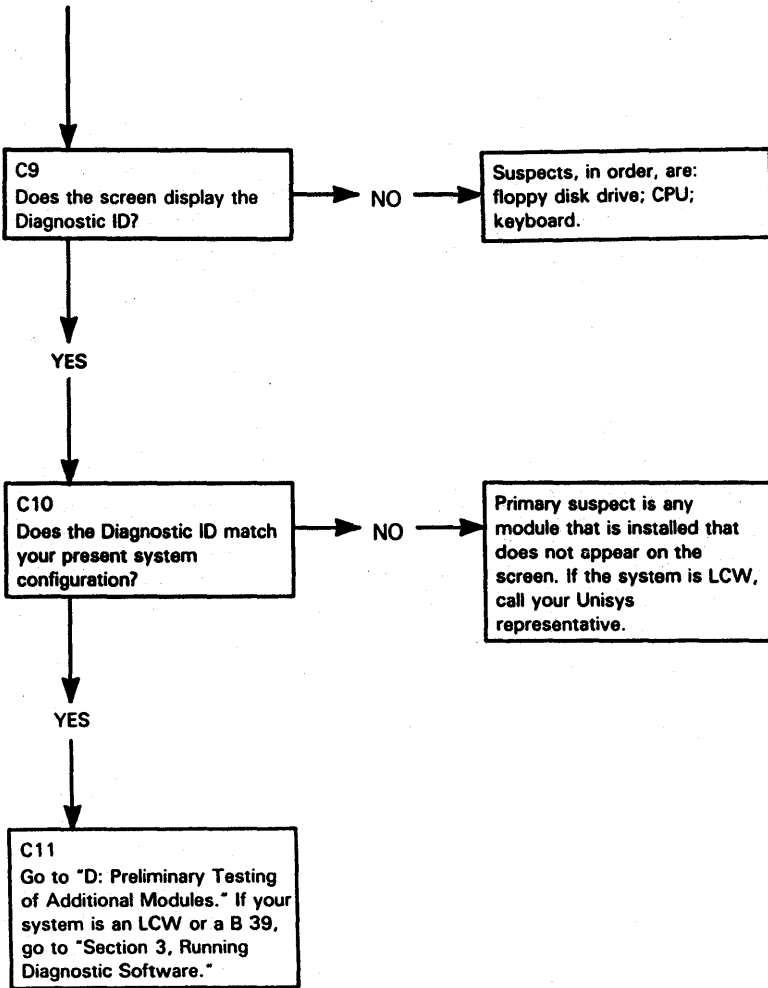
In the following diagnosis, you will add one module at a time to your system and then test it; therefore, any faults you encounter will probably be in the module you've just added, or in the module to the left of the module just added. For LCW and B 39 workstations, begin at step C6.





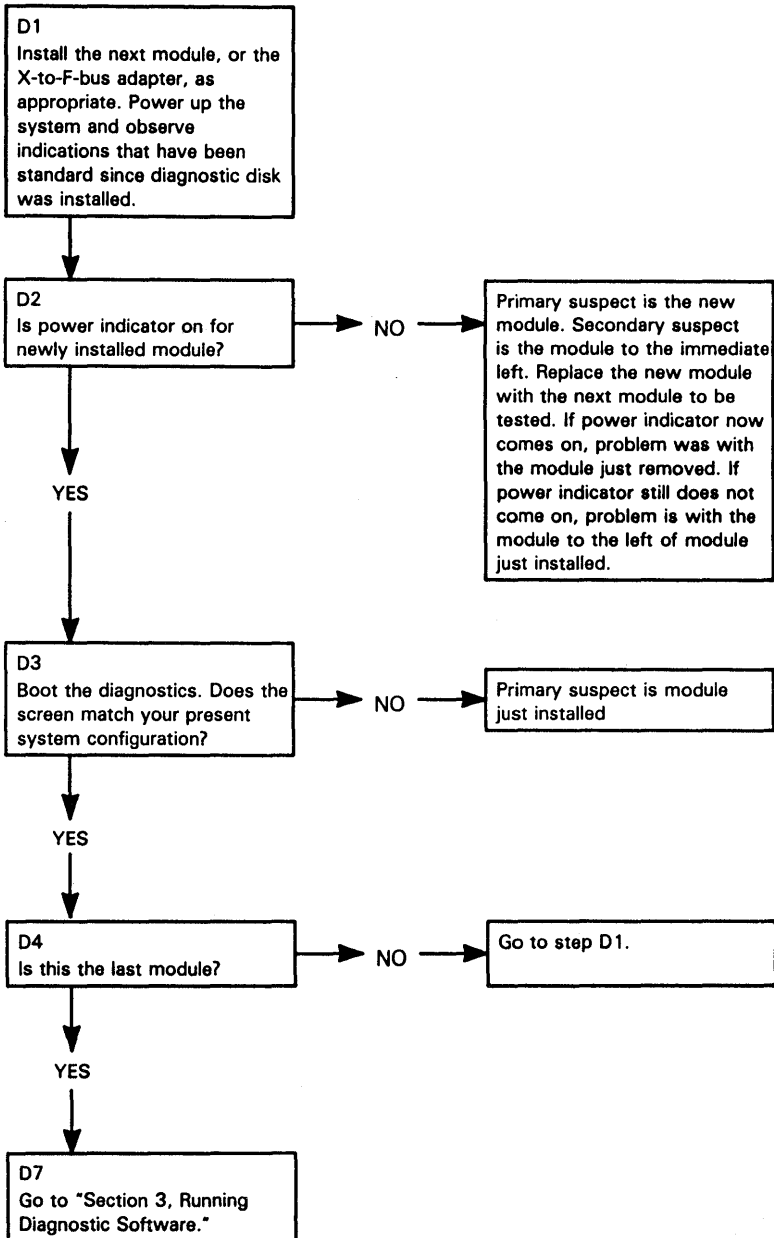


E8061



D: Preliminary Testing of Additional Modules

For testing purposes, B 39 internal X-Bus option boards appear as external modules.



Adding New Test Managers (Updating Diagnostics)

Master, Cluster, and Standalone Workstations

- 1 Insert the floppy disk containing the new test programs into a floppy disk drive.
- 2 Type **Software Installation** on the Command line and press GO.
- 3 Follow the prompts that appear on the screen to complete the installation.

Master Workstations Without Floppy Disk Drives

- 1 Insert the floppy disk containing the new test programs into a cluster workstation floppy disk drive [F0].
- 2 Type **Software Installation** on the Command line and press GO.
- 3 Follow the prompts that appear on the screen to complete the installation.

