

# **GRIDCASE 1500 FIELD DIAGNOSTICS**

## **Reference Guide**

## CONTENTS

<b>INTRODUCTION</b> .....	2-3
<b>PART ONE: DIAGNOSTIC PROGRAM DESCRIPTIONS</b> .....	2-4
Application ROM Check (APPSCHK.EXE) .....	2-6
8087/8028/8038 Numeric Data Processor Test (CHK8087.EXE) ..	2-7
Time of Day Clock Test (CLOCKTST.EXE) .....	2-8
Visual Display Test (DISPLAY.EXE) .....	2-12
Expanded Memory Test (EMSTEST.EXE) .....	2-13
Extended Memory Test (EXTENDED.EXE) .....	2-17
Keyboard Test (KEYTEST.EXE) .....	2-19
Storage Device Media Check (MEDIACHK.EXE) .....	2-20
Modem Test (MODEMTST.EXE) .....	2-22
System Configuration Check (NCONFIG.EXE) .....	2-24
Printer Check (PRNCHECK.EXE) .....	2-25
Printer Port Loopback Test (PRNLOOP.EXE) .....	2-26
System RAM Check (RAMTEST.EXE) .....	2-27
BIOS/Peripheral ROM Check (ROMCHECK.EXE) .....	2-32
RS-232 Serial Loopback Test (SIOLOOP.EXE) .....	2-33
Speaker Check (SPKRCHK.EXE) .....	2-35
Video RAM Test (VIDEORAM.EXE) .....	2-36
<b>PART TWO: SYSTEM UTILITIES</b> .....	2-37
FORMAT.EXE .....	2-38
DISKCOPY.EXE .....	2-39
XCOPY.EXE .....	2-40
CHKDSK.EXE .....	2-41
MODE.EXE .....	2-42
DEVICES.EXE .....	2-43
FDISK.EXE .....	2-44
GRiDSCAN.EXE .....	2-45

## INTRODUCTION

This reference guide explains the software contents of the GRIDCASE 1500 Field Diagnostics Diskette in two chapters: Diagnostic Program Descriptions and System Utilities. The diskettes provides the software necessary to perform the tests described in the chapters that follow.

## **PART 1: DIAGNOSTIC PROGRAM DESCRIPTIONS**

The diagnostic programs for the GRiDCASE 1500 are functional in nature. They test various functions of the system, rather than directly identifying malfunctioning components. They provide information that can verify a system's mode of failure, allowing a trained technician to diagnose system failures down to the sub-assembly level.

Each diagnostic program is generally devoted to testing just one of the functions of the system. Each program is an MS-DOS executable file. To run a diagnostic program, enter its eight letter filename onto the MS-DOS command line, followed by the appropriate parameter(s) as required. The names of the tests are generally self-explanatory.

The programs display pass/fail information in a screen format: At the start of a program, the screen is cleared, a one line heading describing the program is added to the top of the display, and a screen of pass/fail test results are displayed. In their normal use, the programs require some keyboard input to function completely. Each diagnostic is described in detail in the sections which follow.

The following pages cover the diagnostic programs used. Each diagnostic program has a section devoted to it; each section contains a description of the program, any command line options (or parameters) which can be used with the program, the sequence of operation, the diagnostic program's "monitor" (if it exists), and any relevant reference documents.

### **Command Line Options**

The command line options or parameters used modify the program's operation to a specific purpose. They proceed the name of the program, separated from the program by a space or a slash "/" character. An example follows:

A > SPKRCHK/SA

In the example, the parameter /SA modifies the program to run in an unattended or stand-alone mode. (This is used when performing a burn-in of the system after it has been repaired.) Command line options are given below for each of the diagnostic programs.

### **Diagnostic Program Monitors**

“Monitors” only exists in a few of the programs used on this diskette. They allow more specific testing of the system function under test. Some diagnostics have two monitors: a generic monitor, which allows I/O and memory reads and writes; and a secondary monitor more specific to the test being performed. This document only covers the secondary monitors. Where applicable, the monitors of the various programs are described.

### **Diagnostic Batch Files**

At the end of the chapter are listings for the batch files used to test the GRiDCASE 1500. The batch files run the diagnostic programs in an order designed to fully test the system. The batch file @BURNIN.BAT is used to test the system before it has been repaired, after it has been repaired, and after it has been taken out of the burn-in mode.

All units should be self-tested for a 24 hour period; this insures that the systems are functioning properly, and any “borderline” modules can be identified and replaced. Self-testing (burn-in) is accomplished by copying the batch file @BURNIN.BAT.

## **APPLICATION ROM CHECK (APPSCHK.EXE)**

### **Description**

The program checksums any present application ROMs and displays the ROM-types if found. Slots 0-1 are tested in the GRIDCASE 1500.

### **Command Line Options**

- /SA*        *Puts test in stand-alone mode for Burn-in purposes. Test will not ask for keyboard input unless there is a failure.*
- /S#*        *Starts test at slot #. # is valid from 0 to 1. If # is omitted, test will default to slot 0.*
- /E#*        *Ends test at slot #. # is valid from 0 to 1. If # is omitted, test defaults to 1.*
- /L#*        *Enables looping mode of test for # of times. # is valid from 0 to 65535. If # = 0 or is omitted, the test will loop until a key is pressed.*

### **Operating Examples**

An example of the displayed information from a passing test follows:

```
APPLICATIONS ROM CHECKPYTHON (286) VERSION 87.0130-1200
SLOT #0 - GRIDPLAN.....(300348-00) - Pass
SLOT #1 - << EMPTY ROM SOCKET >> - Pass
UNIT PASSES APPLICATIONS ROM CHECKI
PRESS ANY KEY TO CONTINUE
```

An example of a failing test follows:

```
APPLICATIONS ROM CHECKPYTHON (286) VERSION 87.0130-1200
SLOT #0 - GRIDPLAN.....(300348-00) - Pass
SLOT #1 - !!!!!!!!! ROM ERROR !!!!!!!!! - FAIL
UNIT FAILS APPLICATIONS ROM CHECKI
PRESS ANY KEY TO CONTINUE
```

### **Sequence Of Execution**

The test first reads the first few bytes of the ROM space to determine if there is a ROM at that location. If anything other than FFH (unoccupied ROM sockets float to a high level) is read, then a ROM is assumed to be at that location. Next, the program attempts to read the beginning of the ROM header identifying word BB66h. (BB66h indicates a valid application ROM of some sort.) Finally, the program checksums the ROM location and reads the header information to determine the type of the ROM.

If an FFH (buss float) is read, the program returns the message,  
“ < < Empty ROM slot > > ”.

- If BB66h header is not present, the program returns the message,  
“!!!!ROM ERROR!!!!”.

If checksum does not agree with ROM table, the program returns the message, “ < < Checksum ROM error > > ”.

- If the ROM type is not found in the program table, the program returns the message, “ < < Unknown ROM > > ”.





An example of the displayed information from a system with 80287 follows:

```
8087/80287/80387      PYTHON (286)      Version 87.1116-2100
Copyright (C) 1987 GRiD Systems Corporation
80287 Present
NI N 1/NI
```

```
-----
0000000002.0 P 1 P 0.5000000000
0000000006.0 P 2 P 0.1666666752
0000000024.0 P 3 P 0.0416666688
0000000120.0 P 4 P 0.0083333336
0000000720.0 P 5 P 0.0013888889
0000005040.0 P 6 P 0.0001984125
0000040320.0 P 7 P 0.0000248015
0000362880.0 P 8 P 0.0000027557
0003628800.0 P 9 P 0.0000002755
```

Press any key when ready

### Sequence of Execution

The program first checks for the presence of a coprocessor in the system. Then the calculation  $N!$  (factorial) and  $1/N!$  is done for numbers 2 through 10. Factorial represents the calculation which follows.

$$N! = 1*2*3*...*N$$

The answers are checked against a table of expected values. If an error occurs, a message is displayed, and the test halts without returning to MS-DOS.

## TIME OF DAY CLOCK TEST (CLOCKTST.EXE)

### Description

The program tests the real time clock chip and allows the user to set the chip's internal time. The test also checks access to the chip's I/O ports, proper rollover, and proper incrementing of the clock.

### Command Line Options

**/SA** *Puts test in stand-alone mode for burn-in purposes. The test will not ask for keyboard input unless there is a failure. The original time and date will be saved, the clock registers and functions will be tested, the original time and date will be restored, and the time will be displayed in incrementing fashion for approximately 30 seconds.*

**NOTE:** The time of day clock will lose approximately 10 seconds every time CLOCKTST.EXE is run in stand-alone mode. Please take this under consideration when running a unit for extended periods of time in stand-alone mode.

### Operating Examples

An example of the displayed information from a passing test follows:

```
Real Time Clock Check  PYTHON (286)  VERSION 87.0130-1200
*** 146818 CHIP INSTALLED ***
TEST REGISTERS - 23456789ABCDE
CHECK CLOCK ROLLOVER
LOST TIME CHECK...0123456789
ENTER DESIRED DATE BY USING:
RIGHT ARROW TO INCREMENT
LEFT ARROW TO DECREMENT
USE ESCAPE KEY TO START OVER AGAIN
USE CONFIRM TO ENTER
AUG 12 08:12 WED 1990
CLOCK HAS BEEN SET
ENTER ANY KEY TO EXIT
WED AUG 12 1987 08:12:02.0 am
```

### Sequence of Execution

The internal registers are tested by writing incrementing values to the registers and reading them back. Clock rollover is checked by running a fifty year cycle and checking registers for proper rollover. The user is prompted to set the time by making appropriate choices listed in the menu and pressing the RETURN key. The clock will start when the user presses the RETURN key to set time.

### Monitor

Should an error occur during the test, the program will jump into the monitor. The ? or at the left of the screen is the command prompt for the monitor. The monitor for clocktest includes the following commands:

- A)BORT DIAGNOSTIC: Terminates the program and returns to MS-DOS.
- D)ISPLAY REGISTERS: Displays the 16 registers used in the 146818.
- E)XIT MONITOR: Exits the monitor and returns to the test.
- L)OOP ON READ/WRITE: Forces a loop on read/write to the selected register of the 146818.
- R)EAD REGISTER: Reads the selected register.
- S)ET CLOCK: Set time in the 146818.
- T)IME DISPLAY: Display the current time.
- W)RITE REGISTER: Writes to the selected register.
- ? (HELP): Displays this Menu

## VISUAL DISPLAY TEST (DISPLAY.EXE)

### Description

The test provides visual checks of screen integrity and color circuitry failure.

### Command Line Options

**/SA**        *Puts the test in stand-alone mode for burn-in purposes. The test will not wait for keyboard input to advance to next screen, but will automatically increment from one screen to the next — terminating after the last screen.*

**NOTE:** This test is meant to be used for detecting defects in display panels and associated circuits and can only be useful in that capacity if an observer is present to verify the integrity of the displayed screens. In stand-alone mode, this test provides a means of burning-in the display circuitry.

### Diagnostic Entry

Test can be selected by typing display on the command line.

### Sequence of Execution

13 possible screens are directed to the display depending on which keys the user presses. The screens consist of the above mentioned patterns, third panel on tests, horizontal lines, vertical lines, 80 x 25 character mode and 40 x 25 character mode. The available screens are listed on the menu screen. The menu screen itself provides a check for inverse, underline, and blinking characteristics of the display circuitry's alphanumeric mode. By pressing the number which corresponds to the number of the screen desired, the screens can be selected in any order and can be jumped over as necessary.

**NOTE:** Pressing the ESC key in any screen but the diagonal line screen, ends the test.

## EXPANDED MEMORY TEST (EMSTEST.EXE)

### Description

This diagnostic tests any EMS (Expanded Memory Specification) RAM in the system. The diagnostic tests the EMS I/O ports and memory data circuitry by performing a data and address integrity check.

**NOTE:** This test does not function on the 1530.

### Command Line Options

- /SA**      *Puts test in stand-alone mode for burn-in purposes. Test will not ask for keyboard input unless there is a failure.*
- /Q**        *Puts test in a quick mode. Only Test 0 through 3 and a short version of Test 4 of the EMS test are executed.*

### Operating Example

An example of the information the diagnostic displays for a 1530 follows:

EMS RAM CHECK COBRA (386) VERSION 87.0130-1200

UNIT DOES NOT SUPPORT EMS MEMORY

COBRA (386) USES EXTENDED MEMORY ONLY!

Press any key to continue

### Sequence of Execution

The program first determines if there is EMS capability in the computer. Next, the program tests the address and data integrity of the I/O ports. After determining that the EMS port can be communicated with reliably, the program quickly scans for the ram-size of the EMS board. After determining the ram-size, the program begins testing the ram data and address integrity.

## EMS ADDRESS INTEGRITY TEST - TEST 4/5

Each of the following tests are performed in 64K chunks. There are up to 22 64K chunks in EMS memory. Each of these tests are described for one 64K chunk. 8 or 16 such chunks are executed before the program advances to the next test.

### TEST 4 - Byte Access

The program begins accessing the EMS in page chunks of 64K bytes. First, an incrementing pattern consisting of the lower 8 bits of the address bus are written to consecutive bytes. This is done for 64K addresses.

The program then reads the data back and compares it with expected values. If the value is correct, the value is inverted and written to the same location. If the value read is incorrect, the test falls into a monitor and the address, data written, and data read are displayed.

The program then reads back the inverted data and compares that with an expected value. If the values are identical, then the program moves to the next 64K block. If the values are not identical, the test falls into the monitor.

### TEST 5 - Word Access

The same sequence of events as described in TEST 4 are run but this time the data is written to word (16 bit) locations.

If no errors are found, the program proceeds to TEST 6/7. If errors are found at any location, the program falls into the monitor.

**CHECKERBOARD DATA INTEGRITY - TEST 6/7**

**TEST 6 - Byte access**

The program writes alternating FFH and 00H to successive byte locations for 64K addresses.

The data is read back and compared to expected value. If there are no errors, the program inverts the data value and writes it to the same location. An error will cause the program to drop into the monitor.

The inverted value is read back and compared to an expected value. If there is an error, the monitor is entered.

**TEST 7 - Word Access**

Runs the same as TEST 6 above, but writes out alternating FFFFH and 0000H to word locations.

Any error will pop the program into the monitor and indicate the failing address, expected data and actual data.

If no errors are found then program proceeds to TEST 8/9.

**RANDOM DATA INTEGRITY ACCESS - TEST 8/9**

**TEST 8 - Byte Access**

The program writes a randomly generated byte to successive locations for 64K addresses.

The data is read and compared to expected value. If an error is encountered the program falls into the monitor and the failing address and data is displayed.

## TEST 9 - Word Access

The test is similar to TEST 8 but the data is written to word locations.

If no errors are encountered, the EMS test concludes and brings the user back to the prompt.

Errors will cause the program to fall into the monitor.

### Monitor

The program jumps into the monitor mode when an error occurs in the test. The following is a listing of the available monitor commands:

- |                                 |                             |
|---------------------------------|-----------------------------|
| A)BORT                          | I)O ACCESS SELECTED         |
| B)YTE MODE SELECTED             | L)OOP MODE ENABLED/DISABLED |
| F)ILL 9000:0 100 0              | M)EMORY ACCESS SELECTED     |
| E)XT                            | W)RITE                      |
| W)ORD MODE SELECTED             | R)EAD                       |
| H)ALT ON ERROR DISABLED/ENABLED | D)ISPLAY                    |



## **EXTENDED MEMORY TEST (EXTENDED.EXE)**

### **Description**

This program allows testing of the additional RAM (non-system RAM) in the GRiDCASE 1500 series systems. In the GRiDCASE 1520, up to 2MB of additional RAM can be tested with the expanded memory test (EMSTEST.EXE). For testing larger amounts of additional RAM in the GRiDCASE-1520 and for testing any of the additional RAM in the GRiDCASE 1530, the extended memory test (EXTENDED.EXE) must be used.

### **Command Line Options**

The extended memory test can take up to 56 minutes to run completely. Two of the parameters listed below, /QUICK and /SHORT, are used to limit the scope of the testing in order to shorten test execution time.

- /QUICK**     *Tests Zero and One test only every 100h memory location in the extended RAM.*
- /SHORT**    *Affects the walking bit test (Test Zero) by testing four bits of RAM at a time (rather than testing one bit at a time normally).*
- /SA**        *Puts the test in a stand-alone mode for burn-in purposes. The test will not ask for keyboard input unless there is a failure.*

### **Sequence of Execution**

The diagnostic program performs four tests on RAM. These tests are as follows:

#### *Memory Size Test*

The system, using the address as data, writes out to every other 400h (1K) memory address. The system reads back the same addresses, and compares the values. A discrepancies in the written and read data indicates the top limit of extended RAM.

*Address Test*

The system, using the address as data, writes to and reads from every byte of RAM. The system compares the data written to the data read back from RAM. Any discrepancies in the compared data generate an error.

*Test Zero - Walking Bit Test*

The system runs a walking bit pattern and the ones complement of the walking bit pattern through the extended RAM. The system compares the data written to the data read back from RAM. Any discrepancies in the compared data generate an error.

*Test One - Random Pattern Test*

The system writes a pseudo-random bit pattern to RAM. The system compares the data written to the data read. Any discrepancies in the compared data generate an error.

## KEYBOARD TEST (KEYTEST.EXE)

### Description

The program tests the function and integrity of the keyboard switch matrices. Each key must be pressed as they are outlined on the display screen. The test will not continue until the proper key has been pressed.

### Command Line Options

**/BOARDTEST** *Allows a quick check of scan/sense lines. Only tests intersections of scan and sense to detect stuck lines.*

### Sequence of Execution

The user is asked if a special keyboard ROM is installed. For the standard/English systems, the correct response is no (press the "N" key). The program then displays an image of the keyboard, and highlights a key on the display. The user presses the key on the keyboard which corresponds to the highlighted key on the display to continue with the test. If the wrong key is pressed, the test emits a warning tone and the correct key must be pressed before the program will continue. When all of the keys have been pressed, the program terminates.

The **/BOARDTEST** option will only highlight the keys that intersect scan and sense lines. As a result, this test is much shorter. However, it can only be used to test the integrity of the main logic board. Only the un-optioned keyboard test described above can test the entire keyboard.

## STORAGE DEVICE MEDIA CHECK (MEDIACHK.EXE)

### Description

This program tests the integrity of hard or floppy disk systems. The test offers a choice of Sequential or Random, Read or Write tests and provides some protection against destructive testing of hard drives.

### Command Line Options

- /SA** *Puts the test in stand-alone mode for burn-in purposes. The test will not ask for any keyboard input unless there is an error. In this mode, the test will first run the File Access Check (read/write of unused sectors) and then run the Sequential Read (a full surface read of the media) on the default drive and any secondary drives connected to the system.*
- /D##** *Specifies only one drive to be tested. "##" can be 00 (floppy drive 00), 01 (floppy drive 01), 02 (floppy drive 02), 87 (internal hard drive). This parameter can either be used alone, or with the /SA parameter above.*

### Sequence of Execution

The program loads into memory and will attempt to access the internal drive if given a test to perform. The user is given a choice of six tests. By pressing the number (1 to 6) which corresponds to the test desired, the test will execute.

**WARNING!** The test will begin immediately after pressing the number for the test. If a destructive test is to be run (Access Test, Random Write, Sequential Write) insert a formatted scratch disk into the drive before pressing the number for the test.

To perform a series of tests on the drive or to loop in a single test, press "M" to enter the monitor. Once in the monitor, you can select the test menu by pressing "S."

### Monitor

The monitor can be entered by typing "M" before selecting a test to run. Also, the program will fall into the monitor should an error occur or the "ESC" key be pressed during a test.

The following commands exist in the MediaCheck monitor:

- (A) **ABORT DIAGNOSTIC** - Aborts the test and returns control to MS-DOS.
- (B) **CHECK DEFECT MAP** - Checks the selected head, track, and sector's defect status from the File Allocation Table (FAT).
- (C) **COMPARE READ/WRITE BUFFERS** - Compares contents of read and write buffers
- (D) **DISPLAY** - Displays the contents of the buffer specified below.
- (R) **READ BUFFER**
- (W) **WRITE BUFFER**
- (E) **EXIT MONITOR** - Exits the monitor and returns to the previously executing test. (F) **FILL WRITE BUFFER WITH:**
  - (B) **READ BUFFER**
  - (D) **DATA OF ...**
  - (R) **RANDOM DATA**
- (G) **DISPLAY GET STATUS RESULT** - Get status of current drive. Displays drive number under test, heads/disk, tracks/head, sectors/track and bytes/sector.
- (H) **HARD FORMAT MEDIA** - Issues Format-Disk command for hard disks, soft-format of floppy drives.
- (I) **TOGGLE ONLY INNER TRACK ACCESS [FLOPPIES]** - Limits sectors scanned by the mediachk tests to just the inner tracks when active.
- (L) **LOOP ON READ/WRITE** - Will continuously run the test selected.
- (P) **TOGGLE PARTIAL READ/WRITE** - Limits mediachk tests to partial use of the media.
- (R) **READ SECTOR** - Read head #, track #, and sector #. Read data is stored in the read buffer.
- (S) **SELECT TEST** - Displays the original menu of six tests that can be selected by a number.
- (T) **TOGGLE 4**
- (D) **DELAY ENABLE [FLOPPY DISKS ONLY]** - Delay mode toggle waits for the motor on floppy units to turn OFF between each sector written or read.
- (W) **WRITE ENABLE [HARD DISKS ONLY]** - Write mode toggle enables or disables the write protection mechanism for overwriting hard disks. Once write protected, the program will prompt the user with the question "Do you REALLY want to write to the hard disk?" before continuing with any destructive testing of the hard drive.
- (W) **WRITE SECTOR** - Write head #, track # and sector #. Data from the write buffer is written to the disk.
- (X) **EXCHANGE FOR NEW DEVICE** - Allows user to change the drive under test from the default (boot) drive. Drives are numbered 00 to 03 for floppy drives and 80 to 83 for external hard disks. Internal hard disks are 87.
- (Z) **DISPLAY FILE ALLOCATION TABLE** - Displays current File Allocation Table (FAT) of hard disks only.

**NOTE:** Pressing the "?" key at the monitor's prompt displays a menu of the available commands.

## MODEM TEST (MODEMTST.EXE)

### Description

This diagnostic tests the function of the internal modem. To fully test the modem, a "host" system, and a two phonelines would be needed. For this test's use in the field, command line options must be used to limit the test to only an internal check of the modem.

### Command Line Options

**/SA** *Puts the test in stand-alone mode for burn-in purposes. The test will not wait for keyboard input unless there is a failure. The test will look at and display the current system configuration. The test does not require external lines or a host system to operate.*

**/ANALOG** *Performs analog loopback testing of the modem. This test does not require phonelines or a host system to operate.*

### Sequence of Execution

This diagnostic performs four tests on the modem for each of the available baud rates for the modem option (300 and 1200 baud for modem option 330; 300, 1200, and 2400 baud for modem option 331, 332). The four tests performed are as follows:

1. Check serial controller (COM1) response
2. Check modem response
3. Check analog loopback (answer)
4. Check analog loopback (originate)

## **Monitor**

The **monitor** of this diagnostic uses the following commands:

**B**)aud rate select

**C**)ycle serial port power (not used in 1500 systems)

**D**)isplay - **A**)ll of the receive buffer **R**)ead **W**)rite

**F**)lush receive buffer

**H**)ardware information block

**J**)ump out of loop

**L**)oop on - **D**)ata of **XX** (**XX** = 1 byte hex number) **I**)ncrementing data

**M**)anually enter modem commands

**T**)oggle RTS/DTR

**W**)ake up modem (set DTR active)

## SYSTEM CONFIGURATION CHECK (NCONFIG.EXE)

### Description

This diagnostic verifies the configuration of the unit. It tests for unit-type, display type, RAM size, presence of modem, presence of 8087, presence and function of EMS, and types and configurations of Application ROMs.

**NOTE:** This test is used by GRiD Manufacturing to produce barcode output. **DO NOT RUN THIS PROGRAM WITHOUT ONE OF THE FOLLOWING COMMAND LINE OPTIONS!**

### Command Line Options

- /SA**                    *Puts the test in stand-alone mode for burn-in purposes. The test will not wait for keyboard input unless there is a failure. The test will look at and display the current system configuration.*
- /CONFIG**              *This option makes the program look at and display the various parts of the system configuration which are present.*
- /REPAIR**              *This option is similar to the /CONFIG option, but will not freeze if an error is detected.*

### Sequence of Execution

The test checks all status ports of the system: checks RAM type, power source, peripherals attached, and any application ROMs present.



## **PRINTER CHECK (PRNCHECK.EXE)**

### **Description**

This program sends five (5) lines of text to a printer connected to the Centronics port to check function of the Centronics circuitry under realistic situations.

### **Command Line Options**

There are no command line options for this test.

### **Sequence of Execution**

The test initializes the Centronics hardware to communicate with the printer (Epson, H-P Thinkjet, or Diconix). If the test is unable to initialize the printer, an error message will be displayed. The user is prompted to align paper in the printer and then press any key. The test sends five (5) lines of ASCII data to the printer. The data is printed and the results must be checked visually.

## **PRINTER PORT LOOPBACK TEST (PRNLOOP.EXE)**

### **Description**

This diagnostic loops data through the printer port and tests Centronics port circuitry and cabling to main logic board. Unfortunately, it only uses data bits 3-7 and can be misleading if a PrnCheck test is not also done. (Uses GRIDCASE loopback connector P/N 103161-00)

**\*\*\*This test can only be run with the Centronics loopback in place.\*\*\***

### **Command Line Options**

*/SA            Puts the test in stand-alone mode for burn-in purposes. The test will not ask for keyboard input unless there is a failure.*

*/L#            Puts the test in loop mode for # of times. # is valid from 0 to 65535. If # = 0 or is omitted, the test will loop until a key is pressed.*

### **Sequence of Execution**

The program first tests the status port of the Centronics port by writing data out and looping it back to a read-only status port and comparing the two values. This is repeated with a marching bit, i.e.;

7 - - - 0	Databit
00001XXX	First byte
00010XXX	-
00100XXX	-
01000XXX	-
10000XXX	Last byte

Next, the program writes data to the command port output and reads back command port input. The data block is similar to the one above for the status port. Data is not looped through the external cable/loopback when testing this port.

Finally, a one bit is written to each data port output and read back on the data port input. Data is not looped through external cable/loopback when testing this port.

This cycle is repeated 50 (32 Hex) times. The test jumps into the monitor should an error occur.

**Monitor**

The commands available in the test's monitor are as follows:

A)abort Diagnostic

E)xit Monitor

R)ead an Input Port (Prompts you for an input port number in hex) W)rite to an Output port (Prompts you for an output port number in hex)

## **SYSTEM RAM CHECK (RAMTEST.EXE)**

### **Description**

This program tests the integrity of the system RAM (up to the first 640K). As the test is destructive in nature, the system will have to be rebooted after the diagnostic has finished to return the system to MS-DOS. This test runs a Data/Address integrity check, inverse pattern check, random pattern check, and a checkerboard pattern check.

**NOTE:** Some software configurations may affect the performance of this test. If you encounter problems, reboot the system and do not install background or memory resident programs before re-executing this diagnostic.

### **Command Line Options**

**/R or /SA**                    *Puts diagnostic in rebooting (stand-alone) mode for burn-in purposes. The test will automatically reboot the system after the test is completed successfully. If an error should occur, the test will display an error message and freeze.*

**NOTE:** If placed in the batch file AUTOEXEC.BAT, make sure RAMTEST/R is the last command in the file. If there are any commands following RAMTEST/R in the batch file, they will not be executed. After completion of RAMTEST/R, the system reboots, reloads AUTOEXEC.BAT and re-executes the commands in the batch file.

### Operating Examples

Below are two of the possible displays encountered during RAMTEST. The first display illustrates the RAM test during normal operation. The second display illustrates a typical failure.

#### Normal Display During RAMTEST

```
Relocating Ram Test    GRIDCASE 1520    VERSION 87.12-15-1414
                        Copyright (C) 1987 GRiD Systems Corporation

                        640K Of RAM Installed
                        -----
                        CODE At 4FFD:16D6
                        TEST At 4FFD:3D14
                        DATA At 542F:0716
                        STACK At 542F:07C6
                        -----
                        Testing 0000:0000 To 4000:FFFF
Pass 00000 0wwwwwwrrrrr 1wwwwwwrrrrr 2wwwwwwrrrrr 3wwwwwwrrrrr
```

#### Error Displayed During RAMTEST

```
Relocating Ram Test    GRIDCASE 1520    VERSION 87.12-15-1414
                        Copyright (C) 1987 GRiD Systems Corporation

                        640K Of RAM Installed
                        -----
                        CODE At 4FFD:16D6
                        TEST At 4FFD:3D14
                        DATA At 542F:0716
                        STACK At 542F:07C6
                        -----
                        Testing 0000:0000 To 4000:FFFF
Pass 00000 0wwwww

                        ERROR DETECTED IN TEST NO 00 ON BYTE ACCESS!
                        ADDRESS = 0000:0000
                        WROTE = 0000
                        READ = 00FF
                        ERRORS IN BITS 0, 1, 2, 3, 4, 5, 6, 7
```

## **Sequence Of Operation**

### **Lo-Bank Test:**

#### *Part 0 - Byte Checkerboard*

Starting at address 00000H, the entire bank is filled with alternating FF's and 00's.  
(Byte address)

The test returns to beginning byte address, reads it, then inverts it. The next address is read and inverted, and so on for the entire bank.

The entire bank is read and verified again.

#### *Part 1 - Word Checkerboard*

This part follows the same sequence as part 0 except that all accesses are word (16-bit) accesses.

#### *Part 2 - Byte Random*

A seed value is run thru a formula that generates random values of data. These random values are written, starting at first byte address, to entire bank.

The test returns to the beginning address and reads it. The program remembers the initial seed value and by running the generator again can obtain the same random values for verification. As each location is read, it is inverted.

The test starts over, and the inverted data is read and verified again.

#### *Part 3 - Word Random*

This part is the same as part 2, except that it does word (16-Bit) accesses instead of bytes.

## GRIDCASE 1500 FIELD DIAGNOSTIC Reference Guid

---

### Hi-Bank Test:

After Lo-bank is tested, the program relocates itself to the Lo-bank so it can test the Hi-bank. The test does a verify on the code as it is moved.

The Hi-bank is tested using the same four steps as were used in testing the Lo-bank.

Should an error occur, the system will "lock-up" and display the address, the data written to the RAM, the data read back from RAM, and the RAM data bits tested as bad.

## **BIOS/PERIPHERAL ROM CHECK (ROMCHECK.EXE)**

### **Description**

This program checksums the system ROMs (BIOS) and any peripheral ROMs in devices attached to the expansion bus of some GRiD systems. The test displays the checksums and dates of any the ROMs it finds.

### **Command Line Options**

**/SA**        *Puts the test in stand-alone mode for burn-in purposes. The test will not ask for any keyboard input unless there is a failure.*

**/L#**        *Puts the test in loop mode for # of times. # is valid from 0 to 65535. If # = 0 or is omitted, the test will loop until a key is pressed.*

### **Sequence of Execution**

The test first scans the BIOS ROM area and performs a checksum on the data in those ROMs. The checksum must be 00 or the program returns an error. The program will return a PASS message if the checksum is 00 and will display the date of the ROMs. The test then scans the area reserved for Peripheral ROMs, checksums any ROMs present, and displays the dates of the ROMs found.



## **RS-232 SERIAL LOOPBACK TEST (SIOLOOP.EXE)**

### **Description**

**NOTE:** The clock must be operational before sioloop is run. If the clock is not operational, the test will display messages to the effect that the clock doesn't work.

**NOTE:** This test requires the installation of an AT-compatible serial loopback connector (GRID P/N 104162-00) prior to running this test.

The program tests access to the 8250 by writing to and reading from the UART's internal registers. Next the program checks the RS-232 control lines via the loopback connector. Then the program configures the UART to transmit data out the port. The data is routed through the loopback connector and back into the UART receive input. The data is compared, and if different than the transmitted data, an error occurs.

### **Command Line Options**

- /SA**        *Puts the test in stand-alone mode for burn-in purposes. The test will not wait for keyboard input unless there is an error/failure.*
- /L#**        *Puts the test in loop mode for # of times. # is valid from 0 to 65535. If # = 0 or is omitted, the test will loop until a key is pressed.*

### **Diagnostic Entry**

The test can be selected by typing sioloop on the command line.

### **Sequence of Execution**

1. Data is written and read from each of the 8250's internal registers, testing connections to the UART and the chip's internal registers.
2. Serial port handshake lines are tested. (CTS, RTS, DCD, DSR, RI/SI, etc.)
3. Data write/read test at baud rates from 300 to 38K. This test is run in asynchronous mode.
4. Character size test of 5, 6, 7, and 8 bits/character.

## **Monitor**

If an error occurs, the test will jump into the monitor. A list of the available monitor commands follows:

- A) BORT DIAGNOSTIC - Terminates program.
- B) AUD RATE - Allows selection of baud rates.
- C) CYCLE SIO POWER - Cycles the SIO power at a rate selected by the user.
- E) EXIT MONITOR - Returns execution to the diagnostic.
- I) INFORMATION BLOCK - (Presently not implemented here.)
- H) - Special case: Provides information block data.
- J) JUMP OUT OF LOOP - See RS-422 GRiDLink diagnostic program's monitor above.
- L) LOOP ON D)ata of / I)ncrementing data - See RS-422 GRiDLink diagnostic program's monitor above.
- R) REGISTER - Allows access to registers of 8250 SIO chip.
- S) STATUS - Displays status of 8250.
- T) TOGGLE RTS/DTR - Toggles RTS and DTR lines for observation with an oscilloscope.
- X) MIT Data of - Transmits data byte selected by user.

## **SPEAKER CHECK (SPKRCHK.EXE)**

### **Description**

This program internally checks the speaker control circuitry, and performs an aural test of the circuitry as well by outputting to the speaker various frequencies and amplitudes.

*NOTE: To fully test the speaker, an observer must be present to listen to the steps taken by the test and thus verify the operation of the speaker.*

### **Command Line Options**

*/SA            Puts test in stand-alone mode for burn-in purposes. The test will not require keyboard input unless an error occurs during the speaker control circuitry testing.*

### **Sequence of Execution**

1. The internal testing of the speaker control circuitry is done by alternately setting the system's tone source high and low and reading the resulting status in the keyboard interface's speaker control. Any errors that occur during the internal testing are displayed.
  2. Next, a smooth, varying tone is sent to the speaker through the timer and keyboard interface, and the system prompts the user to verify that the speaker is operational.
  3. Next, the tone is sputtered and sent to the speaker, and the system prompts the user to verify that the tone from the speaker is sputtered.
  4. Finally, the speaker is turned off, and the system prompts the user to verify that the speaker is no longer operating.
-

## VIDEO RAM TEST (VIDEORAM.EXE)

### Description

This diagnostic tests the integrity of the video RAM. The test runs a Data/Address Integrity, inverse pattern, random pattern and checkerboard pattern to test integrity.

### Command Line Options

**/SA**        *Puts the test in stand-alone mode for burn-in purposes. The test will not wait for keyboard input unless there is a failure.*

### Sequence of Execution

The video RAM buffers are written to and read from. Bytes and words of data are written, also an addressing and random data check are done. This data appears on the screen as checkerboards, incrementing patterns or a random dot pattern.

### Monitor

A summary of the available monitor commands follows. Please note: The monitor in VideoRAM.EXE is not particularly powerful.

**ERROR IN TEST 0 ACCESS AT B800:09B9 B9/B1**

**A)BORT DIAGNOSTIC**

**B)YTE/WORD MODE TOGGLE**

**E)XIT MONITOR**

**H)ALT ON ERROR ENABLE/DISABLE TOGGLE**

**L)OOP MODE ENABLE/DISABLE TOGGLE**

**M)EMORY/IO ACCESS TOGGLE**

## **PART 2: SYSTEM UTILITIES**

The programs described in this section are used to maintain the GRIDCASE 1500 Field Diagnostics Diskette, generate scratch diskettes, modify batch files, and supplement the diagnostics. The programs `FORMAT.EXE`, `DISKCOPY.EXE`, and `XCOPY.EXE` allow for the copying of diskettes and their software. The programs `CHKDSK.EXE`, `MODE.EXE`, and `DEVICES.EXE` are used to supplement the diagnostics programs already described in chapter one of this document.

## FORMAT.EXE

### Description

FORMAT.EXE soft-formats floppy or hard disks for use with MS-DOS. If the parameter /S proceeds FORMAT on the command line, the system files IO.SYS, MSDOS.SYS, and COMMAND.COM will be transferred to the newly formatted media.

### Command Line Options

**A:, B:, C:, etc.**      *Immediately following the word FORMAT on the command line, include a space, the letter of the desired drive to be formatted, and a colon. If this first parameter is not included, FORMAT.EXE will format the default drive.*

*Transfers the system files IO.SYS, MSDOS.SYS, and COMMAND.COM onto the newly formatted media.*

### Sequence of Execution

1. FORMAT.EXE first scans the disk for previously written information. If the disk to be formatted is a hard disk, FORMAT.EXE warns the user that all data will be lost and asks the user whether or not to continue. If the drive to be formatted has removable media (floppy drive or 2137 hard drive), FORMAT.EXE prompts the user to insert a disk into the specified drive and press RETURN.
2. FORMAT.EXE starts formatting the tracks of the disk.
3. FORMAT.EXE transfers the system files onto the disk.
4. FORMAT.EXE displays the status of the disk: available space, system space, and bad sector space.

## DISKCOPY.EXE

### Description

DISKCOPY.EXE transfers all data between the SOURCE DISK and the TARGET DISK. If the TARGET DISK is not formatted, DISKCOPY.EXE will format it before transferring data.

### Command Line Options

**A:, B:, C:, etc.**      *a SOURCE drive and a TARGET drive must be selected.  
Typical use of the DISKCOPY utility follows:*

### DISKCOPY A: B:

To prevent errors associated with duplicating Application ROM files, either turn off the Application ROMs with the MODE.EXE command, or copy disks using a drive not associated with the Application ROM files.

### Sequence of Execution

1. The program first prompts the operator to insert the SOURCE diskette into the SOURCE drive (first parameter after DISKCOPY on the command line), and the TARGET diskette into the TARGET drive (second parameter after DISKCOPY on the command line).
2. If the SOURCE and TARGET drives are the same, the program only prompts the operator to insert the SOURCE diskette. The program reads in approximately 500 KB of data from the disk. If the SOURCE and TARGET drives are the same, the program first prompts the operator to insert the TARGET diskette before continuing.
3. The program checks the TARGET diskette to see that the disk is formatted, if not, the program begins formatting the TARGET diskette. Then the program transfers the data it previously read from the SOURCE diskette onto the TARGET diskette.
4. If more than 500 KB of data is stored on the SOURCE diskette, the program will reprompt the user in order to repeat the process.

## **XCOPY.EXE**

### **Description**

**XCOPY.EXE**, like **DISKCOPY.EXE** transfers data from one disk to another, but does not format the **TARGET** disk for you.

### **Command Line Options**

- /S**                      *Sub-directory transfer: allows the copy utility to copy files not found in the default or root directory.*
- /V**                      *Verify: verifies correct transfer of data between the two devices.*
- A:, B:, C:, etc.**        *Typical use of the XCOPY utility follows:*

**XCOPY A: B:/S/V**

### **Reference Documentation**

**GRIDCASE MS-DOS Reference**



## CHKDSK.EXE

### Description

CHKDSK.EXE displays the storage status of the media in the selected drive. The information provided includes:

- Total storage space on the media
- Storage space used by the system
- Storage space lost to bad sectors
- Available storage space on the media

### Command Line Options

**WARNING!** Do NOT run this option with application ROM(s) installed.

**/F**      *This command line option allows CHKDSK to repair any damaged files found.*

### Reference Documentation

GRIDCASE MS-DOS Reference

## **MODE.EXE**

### **Description**

MODE.EXE provides user control of a number of system functions. SEE Command Line Options for examples of some of the available commands. MODE.EXE requires command line options.

### **Command Line Options**

MODE ROM = OFF - Turns off Application ROMs

MODE ROM = A:, B: or C: - Assigns the Application ROMs to the A:, B:, or C: drive.

MODE BACKLITE = ON - Sets characteristics for EL backlite to always be on.

### **Reference Documentation**

GRiDCASE MS-DOS Reference

## **DEVICES.EXE**

### **Description**

DEVICES.EXE displays the available storages and the types of storage devices connected to the system.

### **Command Line Options**

No command line options exist for the DEVICES utility. Typical use of the utility is as follows:

**DEVICES**

### **Reference Documentation**

**GRiDCASE MS-DOS Reference**

## FDISK.EXE

### Description

FDisk is a fixed disk "set-up" program which allows you to create, change and delete partitions. You will use this program to DISPLAY partition data only.

1. From a "C:" or "A:" prompt...

Type: FDISK

Press: Return

2. The following menu will appear...

GRID Fixed Disk Setup Program Ver. X.XX  
Copyright (c) 1984,85,8X,8X GRID Systems

Press ESC to return to DOS

FDISK Options

Choose one of the following:

1. Create DOS Partition
2. Change Active Partition
3. Change DOS Partition
4. Display Partition Data

Enter choice: [4]

3. Select Option 4 (Display Partition Data) and the following screen will appear:

Display Partition Information

Current Fixed Disk Drive: XX

Partition	Status	Type	Start	End	Size
C:1	A	PRI	DOS	XX	XXXXXXX
:2		EXT	DOS	XXX	XXXXXXX **

Total disk space is XXX cylinders

The extended DOS Partition contains logical DOS drives. Do you want to display drive information? [Y] \*\*

Press ESC to return to FDISK Options

\*\* This message will display only if an extended DOS partition exists.

4. To exit FDISK...

Press: Escape

## **GRIDSCAN.EXE**

### **Description**

The GRiDSCAN program is a utility program, located in the DOS directory, that reports the status of input/output devices attached to your computer.

### **Command Line Options**

### **Sequence of Execution**

1. At the "C:" prompt, type "GRiDSCAN" and press RETURN.
2. The screen will clear and the following prompt will appear:  
Checking configuration. Please wait
3. A table similar to the one below will display your system's configuration.

Your present configuration is:

ROM BIOS Date	MM/DD/YY	
Processor	80XXX	
80XXX	(Not	
(Coprocessor)	Installed	
Conventional RAM	XXXX total	XXXX free
EMS Memory	XXXX total	XXXX free
Extended Memory	XXXX total	XXXX free
Internal Hard Disk	XXX MBytes	GRID Type X
Keyboard Firmware Date	MM/DD/YY	
Modem	(Not) Present	
Press Return to Continue...		

4. To display the next screen, press RETURN.

Serial Port	COM2
Color Map	Method X
Application ROMs	(Not) Present
Scanning complete-Press return to exit.	

5. To exit GRiDSCAN, press RETURN (until a "C:" prompt appears on the screen).