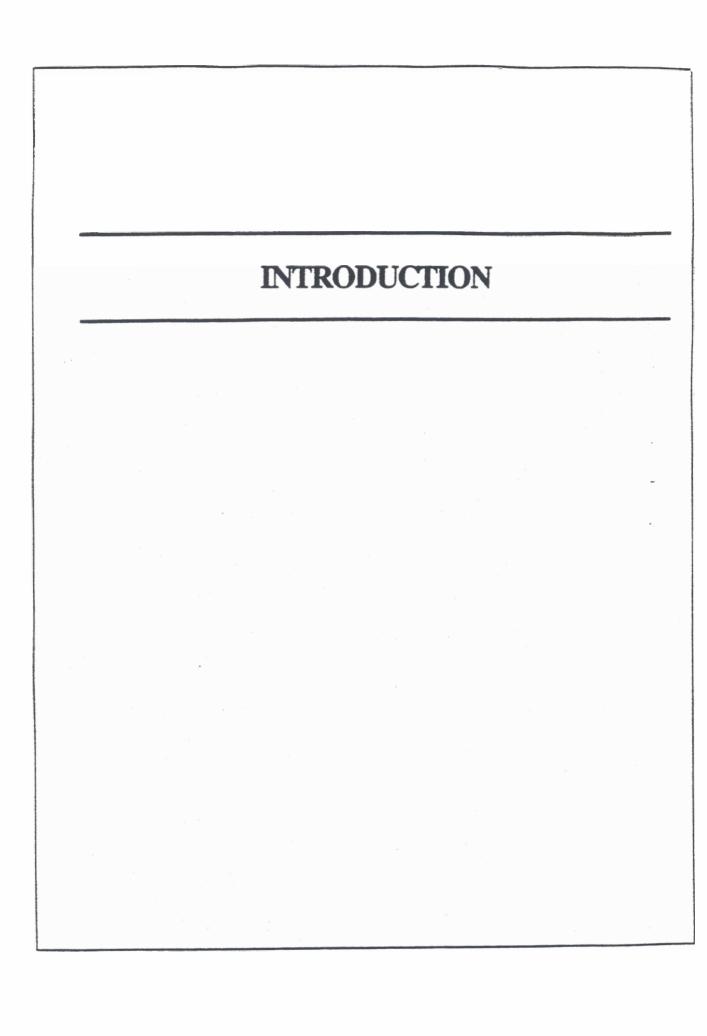# GRiD 1500 SERIES HARDWARE SERVICE COURSE

GRiD

INTRODUCTION

Purpose of the Course

The purpose of the GRiDCASE 1500 Series Service Course:

- Give you the knowledge and techniques necessary to perform modular (sub-assembly) level repair of GRiDCASE 1500 series units.

- Learn the procedures and guidelines neccessary to returning defective units and sub-assemblies to GRiD Systems for repair.

Training Objectives

- **Peform modular repair of the GRiDCASE 1500 systems**

  Perform modular repair of pocket/pouch storage peripheral

What is a GRiDCASE 1500 Series System?

- IBM/AT compatible laptop computer

- Battery powered

- About 12 pounds

An External View of the 1500 Systems

- 72-key keyboard

- 2 half-height 3.5" FDD

    or

- 1 FDD and a 20 or 40 MB HDD

    or

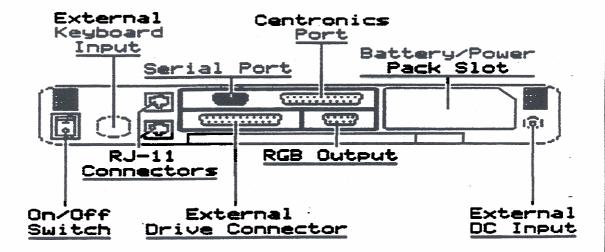- 40/100 MB HDD only

- 640 x 400 pixel plasma

    (or)

- Blue LCD

    or

- Yellow LCD internal display (640 x 200 plasma also available)

- 2 user-accessable application ROM sockets above the keyboard

- Major connectors on the rear panel

GRiDCASE 1500 REAR PANEL

External
Keyboard
Input

Centronics
Port

Serial Port

Battery/Power
Pack Slot

RJ-11
Connectors

RGB Output

On/Off
Switch

External
Drive Connector

External
DC Input

Major Connectors on the Rear Panel

- 9-pin (IBM AT compatible) RS232 serial connector

- Centronics parallel connector

- Grid specific external peripheral port

- RGB port

- DC input connector (+16 volts on the center conductor)

- Battery slot/expansion bus connectors

- 2 parallel-wired RJ-11 connectors

- IBM AT compatable external keyboard port

- On/Off switch

- I/O Eapansion bus 40x60 pin edge connectors

Three Sacred Cautions

- DO NOT connect or remove peripherals with the system power on

- DO NOT turn off the system while the hard drive activity light is on

- NEVER confuse the Centronics port and the external peripheral port (both female DB-25 connectors)

The GRiDCASE 1500 Test Configuration

You need the following items in order to fully test 1500 Series Systems:

- Pocket/pouch storage peripheral

- +16V @ 5A (75W) external DC power supply

- Battery pack

- 9-pin RS-232 serial loopback connector

- Centronics loopback connector

System Software Terms to be Covered

- Boot ROMs

- POST

- ROM BIOS

- Operating System

Boot ROMs

Read Only Memory containing code to initialize the system and run and load the operating system

- Memory locations:

    - F0000h to FFFFFh (normal memory mode)

    - FF0000h to FFFFFFh (virtual memory mode)

- Boot ROMs contain the following software modules:

    - System initialization routine or POST

    - ROM BIOS

POST

- Power On Self Test

- Initializes system and tests critical system components

- Halts system operation on a test failure, system emits a "beep code" to indicate error

- Follows the IBM AT POST

ROM BIOS

- Low-level sub-routines which directly manipulate the hardware

- Interrupt service routines

- Provides flexibility between different machines

- MS-DOS only accesses hardware through the BIOS

- GRiD's BIOS developed by Phoenix Compatibility Corporation

- Fully IBM AT compatible

Defining "Operating System"

- Provides an interface between the user, software applications and the hardware

- Composed of three functional blocks:

- User interface

- File control system

- System resource manager

- The MS-DOS Operating System

- Console based, single-tasking, command-line oriented system

- Console based: interfaces with the user via a teletype or video terminal form

- Single-tasking: MS-DOS only performs one program at a time

- Command-line oriented: all commands to the system are entered onto a single command line

MS-DOS User Interface

- Terminal emulation

- Command-line oriented

- Characters mapped to the screen from the character generator

MS-DOS File Control System

- Media consists of logical "sectors" in groups or "clusters"

- Files have "filenames" and are accessible as entries in a "directory" or "sub-directory"

- Directory entries (filenames) point to a location in a "file allocation table" which points to another location in the table

- Locations in a table correspond to clusters on the disk which comprise the file

MS-DOS Resource Manager

- Driven by interrupts

- Primary interrupt is the "system tick"

- 640 KB RAM maximum

MS-DOS: How it is Loaded

1. System is reset
2. Boot ROMs initialize system...

   "Phoenix ROM BIOS Ver X.XX, MM/DD/YY"

   NOTE: date in "Phoenix prompt" indicates the release date of the boot ROMs.

3. Boot ROMs load and execute an MS-DOS bootstrap program
4. Bootstrap loads the files IO.SYS and MSDOS.SYS and executes MSDOS.SYS...

   "GRiD Systems Corp. MS-DOS BIOS Ver X MM/DD/YY

   Copyright (c) 1986,87,88,89,XX GRiD Systems Corporation

5. MSDOS.SYS loads the file CONFIG.SYS and the device drivers listed in CONFIG.SYS
6. MSDOS.SYS loads and passes execution to the file COMMAND.COM
7. COMMAND.COM loads and executes the file AUTOEXEC.BAT or prompts you for the time and date
8. COMMAND.COM prompts you with the command line...
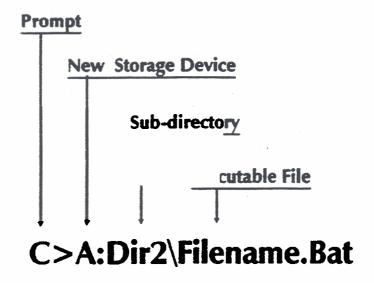
   A:>

MS-DOS Concepts

- Command line

- Storage devices

- Directories and sub-directories

    Built-in commands

- MS-DOS files:

    - Executable files

    - Batch files
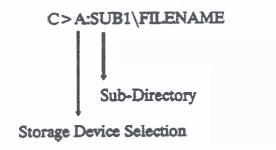
- Parameters

- I/O Devices

Command Line Components

Prompt

New Storage Device

Sub-directory

cutable File

C>A:Dir2\Filename.Bat

Storage Devices

- **Application ROMs**

- **Floppy disk drives**

- **Hard disk drive**

  Pocket/pouch floppy disk drive

- **MS-dos assigns a consecutive letter to each of the storage device (A:,B:,C:, etc)**

- **Application ROMs are usually associated with disk drive**

Sub-Directories

- Allow expansion of the number of files accessible on the disk

- Allow further organization of the disk

- Are accessed by putting the name of the sub-directory desired, followed by a back-slash(\) between the storage device selection and the filename

C> A:SUB1\FILENAME

Sub-Directory

Storage Device Selection

MS-DOS Built-in Commands

BREAK
CH OR CHDIR
CLS
COPY
CTTY
DATE
DEL OR ERASE
DIR
EXIT
MD OR MKDIR
PATH
PROMPT
RD OR RMDIR
REN OR RENAME
SET
TIME
TYPE
VER
VERIFY

MS-DOS Files

- All files have names up to 8 characters long

- Optional 3 character extensions

- The extensions .EXE and .COM are reserved for executable files

- The extension. BAT is reserved for batch files

Executable Files

- An executable file is any file that MS-DOS can execute directly

- Machine language files

- There are two types of executable files:

  - filename.com

  - Filename.EXE

Parameters

- Parameters are used to pass information to a file to be executed

- Used to alter or specify the behavior of an executed file

- Parameters are separated from the filename by a space or a slash (/) character

C > FORMAT A:/S

$\uparrow$

Parameter

Batch Files

- A batch file is a specialized type of text file

- Batch files are used to enter commands into the MS-DOS command into the MS-DOS command line that are repetitive, ungainly or impractical to do by hand

- Typical batch files are as follows:

    - BURNIN.BAT

A Listing of Batch File @BURNIN.BAT

- A TYPE @BURNIN.BAT

- ROMCHECK

- APPSCHK SA

- CHK8087 SA

  CLOCKTST SA

- MEDIACHK SA

- DISPLAY SA

- SIOLOOP SA

- MODEMTST SA

- PRNLOOP SA

- VIDEORAM SA

- SPKRCHK SA

- RAMTEST R

MS-DOS Utilities Exercise

- **During this exercise, you will connect the following devices to the system:**

    - **Pocket floppy disk drive**

    - **External power supply**

The MS-DOS Exercise

Turn to the System Utilities exercise in part 2 of the GRiDCASE 1500 Field Diagnostics Reference Guide.

GRiDCASE 1500 DESIGN OVERVIEW

Design Requirements

- IBM AT Compatibility

- Portability

- Power-saving abilities

IBM AT Compatibility

- **From the software point-of-view**

- **As it affects hardware**

IBM AT Compatibility: The Software Point-of-View

- Programs written to run on the IBM AT run the same way on the GRiDCASE 1500

- Compatible machine language

- Same or compatible BIOS

Compatibility :As It Affects the Hardware

- 80C286/803386 processor

- Similar memory mapping

- Similar I/O mapping

- Similar DMA, timer, and interrupt functions

- Compatible or the same major functions/components

Portability:How It Affects Hardware

- Battery powered

- Small, light construction

- Require smaller 3.5 inch, high-density, floppy and hard drive technologies

- Up to 256 KB of application ROMs

Power Saving In The GRiDCASE 1500

- CMOS hardware is used

- VLSI technology used where possible

- Non-CMOS hardware limited as much as possible

- 80287 coprocessor

Construction Practices

Main logic board performs most of the
operations of the system

- Video card follows the main logic board in
level of complexity

- Mass storage devices and the display are
monolythic (no serviceable parts)

- The other system components are fairly
passive