

Discovery System Firmware ERS
Version 0.05

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Revision History

V0.01	June 16, 1988	Initial Release
V0.02	June 29, 1988	More complete than initial release
V0.03	July 5, 1988	Updated Key Micro description
V0.04	September 22, 1988	Rev D refs changed to Discovery
V0.05	October 13, 1988	Pulled out the reference to Stereo Support and reworded the descriptions of how AppleTalk works.

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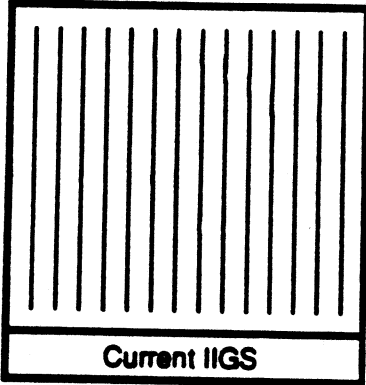
Scope

This document describes the functional differences between the IIGS ROM and the Discovery ROM. (Since the Discovery ROM is a revision / expansion of the existing GS ROM, a complete Discovery Firmware specification includes all the existing //GS ERS, as well as the existing ToolBox ERS.)

Overview

Discovery is a GS with 256K ROM, 1 MB RAM, and a M50741 keyboard micro controller (4K ROM). It has a new and improved FPI chip called the CYA which allows for the accessing of 1MB of onboard RAM as well as power up detection hardware and text page 2 shadowing. It has improved sound hardware.

Discovery is...



- + More slots (!)
- + Enhanced 800K drive support (faster)
- + Enhanced Tools in ROM
- + Enhanced ADB Support

The Discovery firmware is a combination of existing GS firmware (with bug fixes) plus most of the Toolbox (currently in RAM).

The amount of firmware on Discovery is twice that on the GS. The bulk of the new code is the Toolbox converted to work in ROM. This significantly decreases the load time of anything that requires the Toolbox (system disk boot will be faster, for example).

Tools

Most of the tools which ship on Universe are built-in to the Discovery ROM. There are no functional differences between the tools running in RAM off the System Disk and the tools in the Discovery ROM.

Please see the Discovery ToolBox ERS for information.

More Slots

There really aren't any more slots in a Discovery than in a //GS . The firmware in Discovery enforces less restrictions about which slots are available for cards when on board hardware is in use. Slots 4 and 7 are now available for cards more often since the Mouse Tools no longer require the presence of internal firmware in slot 4, and since AppleTalk firmware has been moved from slot 7 to slots 1 and 2. Only Apple //e programs making mouse card calls will require slot 4 to be internal; all those using the mouse tools will have slot 4 free for card hardware. Slot 7 can be set to 'Your Card' even when using AppleTalk when using Universe or later.

AppleDisk 3.5 Driver / SmartPort

There are a number of bug fixes and performance enhancements which Discovery provides for the 3.5" disk.

The Discovery ROM has code that allows 2:1 interleaving on 800K 3.5" disks which allows greater throughput on these drives. GS/OS based software running on Discovery will be able to take advantage of this 2X increase in raw data transfer rate. The driver uses less zero page. In addition to the 2 to 1 interleave enhancement, Discovery's improved volume status and disk switched recognition will better serve the needs of GS/OS.

SmartPort has the GetFormatOptions and SetFormatOption commands. There are some small bug fixes.

AppleTalk

The AppleTalk implementation on Discovery is largely unchanged from that on the current GS. The LAP, ATP, NBP, DDP and RTMP protocols are completely supported. There are two major areas where the implementation of AppleTalk on Discovery and the GS differ, the LAP code and transparent printing.

The code that implements the LAP (lowest) level protocol is changed in Discovery to accommodate AppleTalk specification changes made since the writing of the GS version. The rest of the code is identical to that on the GS.

Transparent printing over AppleTalk with the original GS ROMs was largely unsatisfactory. Originally, using Appletalk made two slots unavailable for external cards, slot 7 and either slot 1 or 2. This is necessary since the AppleTalk code

(accessible through slot 7) leverages off of printing support in the serial firmw in slots 1 or 2, and the latter code must use the screen holes in that slot. This is corrected in Discovery by moving the 'transparent' AppleTalk access out of slot 7 and into either slot 1 or 2 (selectable through the control panel). Though Slot 7 is required to be set to 'AppleTalk' for compatibility, it can be set to 'Your Card' for Universe and later. Since the new solution is wholly a firmware one, it is available on a GS with Discovery ROMs.

Serial Ports

The GS Serial Code has two minor bugs which are fixed in Discovery. In addition limited RAM patching is supported by bank \$E1 vectors through which control passes on every serial call. Slots 1 and 2 are modified so that an application can print over AppleTalk transparently.

Key Micro

The Discovery's key micro has a larger ROM allowing added functionality over that available in the GS. Enhancements include new mouse scaling options, sticky keys, and keyboard mouse. Support for the matrixed keyboard and keypad input is not available in Discovery ROMs.

Sound

The Sound Tools, the Note Synthesizer, and the Note Sequencer are all in ROM on Discovery. The Sound Tools and the Note Sequencer are unchanged in Discovery aside from alterations to make the modules ROMable.

Discovery has amplifiers and analog filters for two channel sound, in contrast to the single channel on the GS. The Note Synthesizer is slightly different from the GS in that it supports stereo.

Monitor/Control Panel

The control panel has added functionality to support the new keyboard and mouse features, as well as differences in the slot configuration and serial port / AppleTalk operation. Each serial port can now be explicitly set to either Printer, Modem, or AppleTalk settable with the control panel. A RAMDisk Reset function appears in the control panel which when activated causes the RAMDisk to be reinitialized at Reset time (Alternatively, you can do an open-apple reset with the shift key down.).

The monitor code in Discovery supports the Step and Trace commands (not in the GS), and memory commands (display, modify, move, verify, fill memory, pattern search) operate across bank boundaries.

A memory mover and an access vector is resident to support any memory moves. Everyone (firmware, OS, applications) should start using the memory mover since this vector could be changed to point to code that leverages off of memory mover hardware if that were to become available.

Built In Diagnostics

The Discovery diagnostic code supports a 1MB RAM test in keeping with the enhanced amount of onboard RAM. One other addition is the testing of the CYA, notably the text page two shadowing.