MICRO INNOVATIONS

ColecoVisionADAM.com - ADAM Hardware Preservation Project
In Association with A.N.N./Micro Fox Technologies

SASI/BlueSCSI Hard Disk Installation and Operating Instructions

Congratulations on acquiring one of the rarest pieces of ADAM hardware ever produced! You are now the owner of a Micro Innovations SASI interface card, originally prototyped by Mark Gordon in the early 1990s but never released to the public. This card represents Mark's experimental work to bring SCSI-based storage to the Coleco ADAM computer following his successful Powermate IDE hard disk systems.

The original SASI cards were designed to interface with physical SCSI hard drives using a Xebec controller. However, the complexity of configuring period SCSI drives with the correct head, cylinder, and sector parameters—combined with the challenges of making the EPROM communicate properly with SCSI media—meant these cards never reached production. The exact specifications Mark programmed into the controller remain unknown.

Thanks to modern technology, we have revived these prototype cards using a BlueSCSI solution. A Blue Pill microprocessor mounted atop a BlueSCSI adapter board now handles SCSI emulation, allowing a standard SD card to serve as the storage medium. The result is a fully functional SCSI-based hard disk system for your ADAM, running the same proven software that powered Mark's Powermate units.

This document contains all the information you'll need to get your SASI hard disk up and running. Detailed instructions take you from unpacking and inventory through connecting cables, plugging in the interface board, booting the software, and configuring the system. Please read all the way through the instructions before you actually start the installation.

A WORD OF WARNING ABOUT STATIC ELECTRICITY!

Before you get started, just a word of warning about static electricity. The integrated circuit chips used on the SASI interface board can be destroyed by static charges. If you notice that you get shocks when you touch metal appliances after walking around the room, then you should take precautions to prevent static discharges when handling the interface board.

One precaution you can take is to discharge yourself each time before you touch the interface board. You can do this by performing your installation near an appliance that you can touch to discharge the static electricity just prior to handling the interface board. Another way is to connect a wire to a water pipe or the metal frame of a grounded appliance (like a refrigerator). AC power outlets in modern homes and businesses also can be a ground source (you can pick up the ground from the screw that

holds the cover plate onto the receptacle). Wrap the other end of this wire around your wrist or a finger. Make sure you are using the frame of a grounded appliance.

By the way, the interface board chips are not particularly sensitive to static electricity, but like all integrated circuits, they can be destroyed if hit with a big enough discharge.

UNPACKING

Your SASI/BlueSCSI hard disk system comes as a complete kit. Inside the package, you'll find the following items:

(1) the SASI interface card (either v1.0 with soldered jumper or v2.0 with moveable jumper),
(2) a Blue Pill microprocessor mounted on a BlueSCSI adapter board (attached to the SASI card),
(3) an external power supply for the BlueSCSI assembly,
(4) a data disk pack (DDP) or disk boot media with TDOS and utilities, and
(5) an SD card (pre-configured with hard disk images).

Please make sure that you have all of the components before going any further. If anything is missing, please contact your source so arrangements can be made to ship you what you're missing. Assuming that everything is accounted for, let's proceed to installation.

ABOUT THE CARD VERSIONS

Two versions of the SASI card exist. The v1.0 card has a soldered-in jumper, while the v2.0 card features a moveable jumper for configuration options. Both versions function identically with the BlueSCSI solution and connect to expansion slot 2 (the center slot) of your ADAM.

Cards may include an autoboot EPROM. This EPROM was originally programmed to boot into Mark's Powermate MFM system (the square black-fronted Micro Innovations enclosure with disk drives and hard disks). The BlueSCSI software is based on this same Powermate code, modified to work with the SASI cards and modern SCSI emulation.

INSTALLATION

The BlueSCSI assembly sits atop the SASI interface card. Make sure the Blue Pill processor is firmly seated on the BlueSCSI adapter board, and that the entire assembly is properly connected to the SASI card's SCSI header.

Place the interface board in front of you on the table or desk you're working at, with the printed circuit board edge connector towards you. The BlueSCSI assembly should be on top, clearly visible.

Now you're ready to plug the interface board into the computer. The SASI card goes into the center expansion slot (slot 2). Because the card is keyed, it can only be installed in one orientation (the correct one).

If you already have a board in the center slot, it will have to be removed. If you have a parallel printer interface board there, the SASI card's functionality may include that capability depending on your configuration. You can now take the spare printer interface board to your next club meeting and sell it to someone who doesn't have a SASI system.

If you are installing the card and have a memory expander board installed in slot #3 (the right slot), you'll have a wire running from it to whatever board you're removing. Detach the wire at the board end. The SASI interface board provides the same signal to your memory expander board if needed.

Insert the interface board into the center expansion slot. Adjust the cables so they exit the computer on the left side. Make sure that the interface board sits straight up in the center slot (the cables can pull it towards the left so adjust the tension they place on the interface board so that the board sits up straight in the slot). The top cover can be put back in place but won't close all the way unless you cut a narrow slot along the left side of the cover for the power cable to exit.

POWERING UP

Plug the external power supply into the BlueSCSI assembly (it will only go in one way). Now plug the power supply into the same wall outlet or outlet strip you have your ADAM plugged into. With no disks or tapes in the ADAM, turn the ADAM on first.

If you have a card with the autoboot EPROM, a sign-on screen that says "ADAM hard drive system by Micro Innovations" should come up first. Without the autoboot EPROM, the screen will change to the familiar SmartWriter screen. If the screens come up properly as described here, then skip the next paragraph.

If the screens do not come up as described, turn off the power and remove the interface board and try it again. If SmartWriter comes up fine without the interface board installed, you probably have a bad interface board.

After the Micro Innovations sign-on screen will appear, followed by the TDOS version 4.5 sign-on screen. The BlueSCSI's LED will flicker as the hard disk image is accessed from the SD card (this takes about 2 seconds). Your system is now ready to use.

SELECTING THE DEFAULT OPERATING SYSTEM

All SASI/BlueSCSI systems come with the 40 column version of TDOS installed on the hard disk as the default operating system. If you prefer to boot up the EOS hard disk operating system instead, simply run the SETBOOT program to switch the default operating system. Type "SETBOOT" and hit the return key. The SETBOOT program will ask you to select which operating system you want to boot at RESET time. Enter your selection. The program will write your selection to the hard disk and the next time you hit the RESET key, your selected operating system will boot up.

If you want the 80 column version of TDOS to boot up at RESET time, you'll need to install it. Simply type "80ITD459" and hit the return key. TDOS will prompt you for information about your setup, then install your custom configuration on the hard disk for boot-up by the EPROM. It will also allow you to create a boot diskette or tape.

A NOTE ABOUT THE DISK DRIVE DISPLAY

There is one quirk in this SASI card setup that you should be aware of. On the opening screen, you may see "MI disk 1 (SK I)" displayed. This display is

NOT present for normal use to switch between disk drive 1 and 2. However, both drives

ARE present when using TDOS and File Manager—although not as physical disk drives but as storage media.

This behavior is inherited from Mark's original Powermate software, from which the BlueSCSI boot code was derived and modified to work with these cards. Think of the SASI/BlueSCSI system as a compact version of the original Powermate unit,

much like how compact flash card setups are miniaturized versions of physical IDE units.

RE-INSTALLING TDOS

The TDOS operating system can be re-installed directly from the distribution diskette by executing the appropriate version of the TDOS installation program—either 40ITD459 or 80ITD459.

When TDOS signs on, the TDOS release number is shown on the top line. The first screen asks for you to specify which ADAM disk or tape drive to write the boot block to. It checks immediately after your selection to see if the device is connected. If not, it gives you an error message and lets you try again. You can get out of the installation program at any prompt by typing CONTROL-C (that is holding down the CONTROL key and hitting the "C" key).

If TDOS finds an expansion memory board, it will then ask you whether you want it placed before or after the disk and tape drives. The following screen tells you what your TDOS drive assignments are. Drives A through D are the hard disk. The expansion memory board will be next if you selected "before". ADAM disk drives are next, if any. ADAM tape drives are next, at least one. The expansion memory board will be last if you selected "after".

A distribution diskette is provided for your use in case you need to reinstall either EOS or TDOS on the hard disk. This is normally needed only after a hard disk "crash". Keep in mind that the hard disk should not be reformatted or repartitioned unless you have read the instructions and know what you are doing. Unless you have backed up all of the programs provided on the hard disk, they will be lost when you reformat or repartition it.

DRIVE ASSIGNMENTS

An example drive assignment for a stock single tape drive ADAM with a single ADAM floppy disk drive and a memory board (selected as "after") is:

A - Hard Drive Volume 1

B - Hard Drive Volume 2

C - Hard Drive Volume 3

D - Hard Drive Volume 4

E - Disk Drive 1

F - Tape Drive 1

G - Ram Disk

FLOPPY DISKETTE FORMATS

The next screens ask you to specify the size of the ADAM floppy disk drives it found—one screen for each drive. The choices are:

1 - 145K Standard Coleco single-sided 40 track format

2 - 254K Medium sized double-sided 40 track format

3 - 304K Full-sized double-sided 40 track format

4 - 356K IBM-sized double-sided 40 track format

5 - 702K Quad density 80 track format

6 - 714K Quad density 80 track format

7 - 1418K High density 80 track format

Formats 1 through 4 are normally used for 5 1/4" floppy diskettes and formats 5, 6, and 7 for 3.5" diskettes. Any format can be selected but may be meaningful only on the proper size diskette. The proper operation of the format also depends on the PROM installed in your ADAM or Micro Innovations floppy disk drive. All formats except the 356K, the 714K, and 1418K

formats are compatible with existing ADAM formats.

RE-INSTALLING EOS

To re-install the EOS hard disk operating system, use the CLONE program to place a bootable image of EOS on a formatted disk or tape. Then reset the computer and EOS will boot entirely from the boot disk or tape. After EOS signs on, select a maintenance function (SMART key V) to install EOS on the hard disk. It will also allow you to create a boot disk or tape if you need to.

To install the EOS operating system on the hard disk, you will need two formatted tapes or diskettes. Use the CLONE.COM program to copy the EOSHD??.IMG file to a diskette or tape by typing "CLONExx EOSHD???.IMG Y:" and hitting the return key. The ??? characters are the actual release number of the EOSHD program on the distribution diskette. Y: is the TDOS or CPM name of the drive you are copying to.

EOS will sign on with a nice ADAM graphic screen which identifies the release version of the program and the authors. It immediately goes to a second screen that indicates that this version of EOS is for the Micro Innovations hard disk (it will not run on any other hard disk). This screen tells you what hard disk partition you are using and shows the SMART key definitions along with explanations of the functions associated with each (it will also show that you can go to TDOS by hitting the "WILDCARD" key and to SmartWriter by hitting the "ESCAPE" key).

INCLUDED SOFTWARE

We've included quite a lot of software for you on the hard disk. All of the critical programs needed to recover from a hard disk crash and configure the system are also on the distribution media—either diskette or tape.

Hard disk drive A: contains all of the TDOS distribution files (programs and documentation) and some public domain utilities we thought you would normally need to use to the hard disk.

Hard disk drive B: contains all of the public domain files we felt might be of interest to you. They are usually compressed in some manner for transmission to bulletin board systems. You will need to use one of the uncompressing programs provided on the A: drive. LBR files will require the DELIB program and then the UNCR program. ARC files will require the UNARC program.

Hard disk drive C: is empty for your use.

Hard disk drive D: contains all of the EOS hard disk programs and documentation. Also included are a couple of the public domain applications programs for your enjoyment.

USING SMARTWRITER WITH HARD DISK PARTITIONS

SmartWriter works fine with the hard disk partitions. You have to remember, however, that all EOS application programs, including SmartWriter, think that the hard disk is tape 2. Therefore, you can only use one hard disk partition at a time. You don't lose the ability to use the tape drives—File Manager can read and write all of the drives, so you can copy to and from them. You just can't execute programs from them or get or send data to them from an application.

IN CASE OF TROUBLE

We have attempted to provide a solid product. We have tested each SASI/BlueSCSI unit before delivery. It is possible, however, for problems to crop up. If you purchased your unit from a dealer, please go to him for your first level assistance. After all, he pocketed a profit from selling you the unit. Make him earn it. We will provide assistance if he cannot.

If you obtained your unit directly from the ADAM community preservation effort, feel free to contact the source. Technical assistance is normally available through the ADAM community forums and mailing lists.

BLUESCSI SPECIFIC NOTES

The BlueSCSI assembly uses a Blue Pill (STM32F103) microprocessor to emulate a SCSI hard drive. The SD card contains disk image files that appear to the ADAM as standard SCSI hard disk volumes.

The LED on the BlueSCSI board indicates disk activity. Brief flickers are normal during boot and file access. A solid or rapidly flashing LED during boot may indicate a problem with the SD card or disk images.

If you need to replace the SD card or modify disk images, the BlueSCSI documentation provides details on file naming conventions and supported image formats. The pre-configured SD card included with your system should not need modification for normal use.

ALWAYS park the hard disk when powering it down. The SHIFT-WILDCARD combination performs this function from either EOS or TDOS. While the BlueSCSI emulation is more tolerant of sudden power loss than physical hard drives were, it's still good practice to park before powering down.

TECHNICAL BACKGROUND

For those interested in the history: Mark Gordon of Micro Innovations attempted to develop a SASI/SCSI solution for the ADAM after his successful Powermate IDE systems. The Powermate used a Xebec controller in a square black-fronted enclosure containing both disk drives and hard disks.

Whether Mark couldn't tame the physical SCSI drives of the era, or couldn't get the hard drive specifications (the endless combinations of heads, cylinders, sectors) to cooperate with the ADAM's requirements, is unknown. What we do know is that these SASI cards were prototyped but never released.

Trying to determine what specifications Mark programmed into the controller EPROM proved essentially impossible. The solution was to use modern SCSI emulation via the BlueSCSI project, which allows an inexpensive microprocessor and SD card to perfectly emulate SCSI storage devices. The software running on the BlueSCSI was adapted from Mark's original Powermate code.

The SASI card traces have been mapped and confirmed to match the ADAMnet side of Mark's IDE interface card. The SCSI portion maps out correctly as well. The original EPROM-to-SCSI communication remains the unknown element, which the BlueSCSI solution elegantly bypasses.

WARRANTY

These SASI/BlueSCSI units are provided as-is for historical preservation and hobbyist use. The original SASI cards are vintage prototype hardware from the early 1990s. The BlueSCSI assemblies are modern reproductions.

Given the experimental nature of this hardware and its age, no formal warranty is provided. However, the ADAM community stands behind its preservation efforts. If you experience problems, please reach out through community channels for assistance.

If, in the opinion of those providing support, the failure of a unit is deemed to have been caused by neglect or abuse, a reasonable fee may be requested for repair.

ACKNOWLEDGMENTS

This project would not have been possible without:

Mark Gordon of Micro Innovations, whose original engineering work on the Powermate systems and these SASI prototypes laid the foundation for everything that followed.

Doug and Robert Slopsema, for ongoing work mapping the card and exploring its possibilities. Truly bring this project to life through creative forward thinking and reverse engineering to allow the ADAM to utilize the **BlueSCSI Project**, whose open-source SCSI emulation made it possible to bring these prototype cards to life using modern technology.

The ADAM Community, whose dedication to preserving Coleco ADAM hardware and software keeps this remarkable computer alive decades after its commercial life ended.