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applied magic for the arts

# **EMULATOR II HD CONVERSION MANUAL**

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## EII to EII+ HD Conversion Procedure

### Overview

The Emulator II+ HD Conversion Kit was an upgrade for the base Emulator II that provided a 20 Mbyte hard drive in place of the second floppy diskette drive, and an extra 512kbyte of sample memory. The conversion was available from E-mu Systems, and a qualified service centre normally installed it. The conversion adds two additional circuit boards, as the Emulator II was not designed originally for SCSI. One circuit board from E-mu Systems plugs into the SIO Z80 socket to enable the disk interface electronics to be added. The second board is a standard Adaptec SCSI board to interface to the Hard Drive. It also replaces the digital board (to upgrade to 1Mbyte sample memory) and the metal chassis of the Emulator II.

These parts are now obsolete, although the hard disk and even the Adaptec card may be able to be sourced second hand.

### Conversion Kit Contents

- MiniScribe 20MB 8425S SCSI Hard Disk with LED assembly
- Adaptec disk controller ACB-4000A with 2764A EPROM masked as A10041-00 (c.1985)
- E-mu Systems E2 SCSI Board p/n AE343
- E-mu Systems E2 Digital Board Revision 1 p/n AE337
- E-mu Systems main processor EPROM - E2+ Revision 2.5 HDDM
- Bezel p/n 004041204 Revision C Plastic
- Side Rails for Bezel Mounting
- Drive mounting brackets
- P/S mounting plate
- E-mu Systems E2+ OS Version 2.6 p/nZD601
- Augat 40-pin DIP socket
- 12" 22awg stranded wire RED
- 12" 22awg stranded wire BLACK
- 48" 22awg stranded wire ORANGE
- 12" and 36" heat shrink
- 3 tie wraps
- 4 ribbon cable hold downs
- 4 x 3/8" standoffs
- 1 x 22-18 butt end terminator
- 2 x 1/2" nylon standoffs 3/16" OD
- 2 x 3/4" 4-40 nylon bolts
- 1 x 1/2" 4-40 threaded hex standoff
- 2 x 8-32 x 3/8" pan head Philips with perm nuts
- 4 x 6-32 x 1/8" pan head Philips

## Conversion Procedure

### 1) Verify that the Emulator II is operational!

### 2) Disassembly;

Remove the plastic housing from chassis, disconnect all cables and set aside. Remove the Disk Drive assembly from chassis and set aside. Remove the Power Supply assembly and set aside. Remove the nuts and washers from the back panel jacks. Also remove the two screws on either side of the RS232 connector on the back panel. Put all these parts in a safe place so they don't run away and hide from you.

Now, remove the Keyboard assembly and set it aside. Next, remove all the little circuit board screws from the circuit boards. Again, put these little buggers someplace where they won't get lost.

**Carefully** remove the two circuit boards. They can be separated from each other by inserting a flat blade screwdriver between them. Set the circuit boards aside in a **VERY** safe place.

Next, remove the rubber feet from the chassis. Remove the serial number sticker and transfer it to the new chassis. Put the old chassis anywhere (we don't care if you lose this).

### 3) Chassis Reassembly;

Transfer the rubber feet to the new EII+ chassis. Get the new Digital board and the old Output board and re-install them on the new chassis making sure that you have inserted the fish paper insulator between the boards and back panel.

Replace all the little board screws except the one below CN1 on the Output board and the one above connector CN9 on the Digital board (see Figure 3).

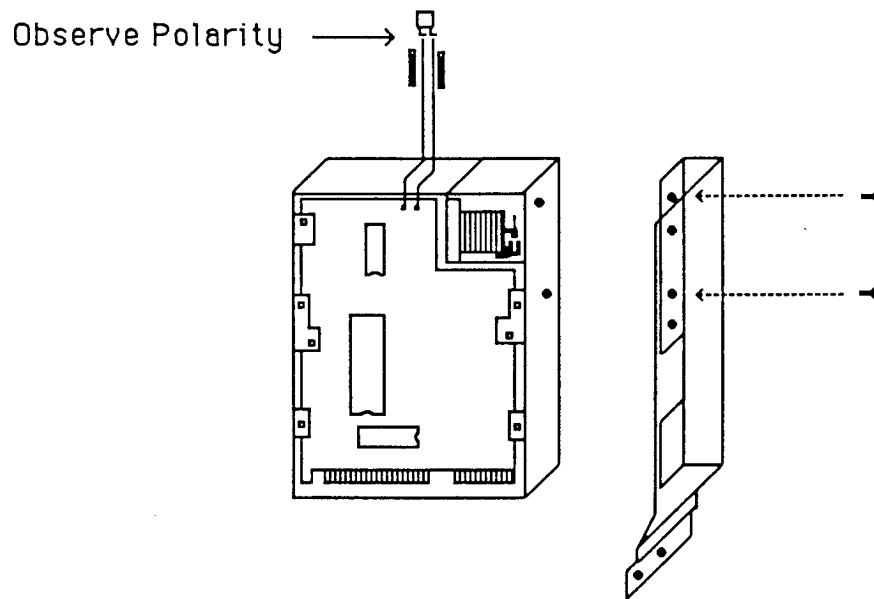
Replace the rear panel jack nuts and washers and also the two screws that secure the RS422 connector to the back panel. OK...

Now find the Adaptec Hard Disk Controller board and it's associated L-bracket. Snap the 4 nylon standoffs into the holes on the L-bracket. Mount the L-bracket to the right rear panel using the (2) locking nuts provided. Now snap the Adaptec board into place on the standoffs with the red LED facing toward the front right corner of the unit (see Figure 5).

### 4) Disk Drive Assembly

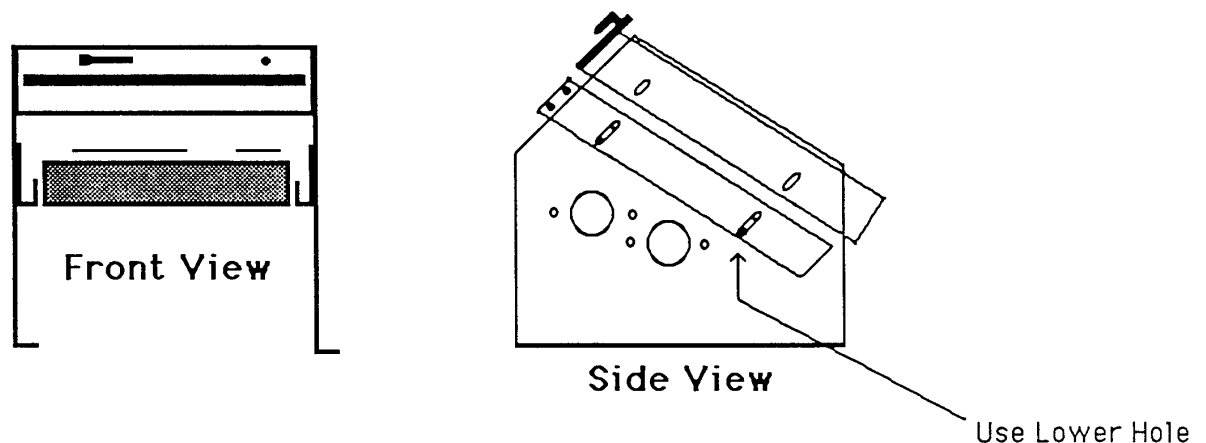
Find the Hard Disk drive, Mounting Bezel, and associated screws. Copy the error list (if any) exactly as it appears on the bottom of the Hard Disk on a piece of paper. **Carefully** desolder the LED from the rear of the Hard Disk drive. Keep the leads of the LED bent for polarity identification. Solder the red and black wires

onto the Hard Disk circuit board in place of the LED. Next solder the LED to the other end of the wires observing polarity (see Figure 1). Use heat shrink.



**Figure 1 : Hard Disk LED configuration and mounting rails**

Mount the Hard Disk drive to mounting bezel as shown in Figure 1. The bezel will be at a slight angle in relation to the Hard Disk drive. Find the new disk drive brackets. Remove the top drive from the old drive assembly and install it between the new brackets. Now mount the Hard Drive and Bezel assembly below the Floppy drive as shown in Figure 2 with connectors facing forward.



**Figure 2 : Hard Disk mounting**

The Hard drive should not touch the bottom of the chassis. It should be installed so that there is a slight gap underneath it. Place this assembly into position, but do not attach to the chassis just yet.

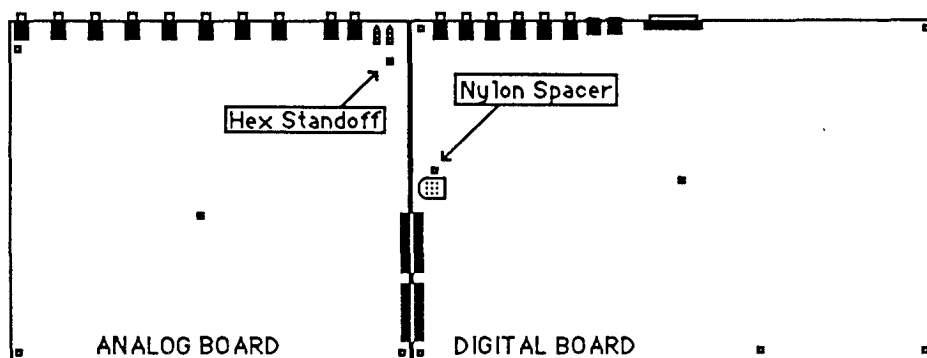
**5) SCSI (Scuzzy)**

Find the SCSI board and the gold plated 40-pin socket. On the Digital board, remove the SIO from IC location 128 and insert the 40-pin socket. Carefully plug in the SIO into the SCSI board (Observe Polarity). Install the Hex standoff below CN1 on output board as shown in Figure 3.

Now.... CAREFULLY, seat the SCSI board in the 40-pin socket being **VERY** careful not to bend the **VERY** fragile header pins.

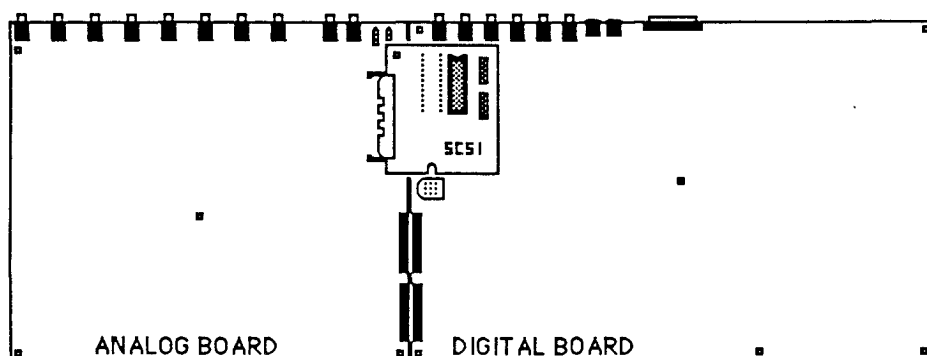
**HINT:** Line up the hole in the board with the Hex standoff.

OK ...now get the Nylon spacer and Nylon screw. Place the spacer between the SCSI and the Digital boards and screw in the Nylon screw. This little guy breaks pretty easily too. Now screw in the other screw securing the SCSI to the Hex standoff.



**Board Screw Locations**

**Figure 3 : Board Screw Locations**



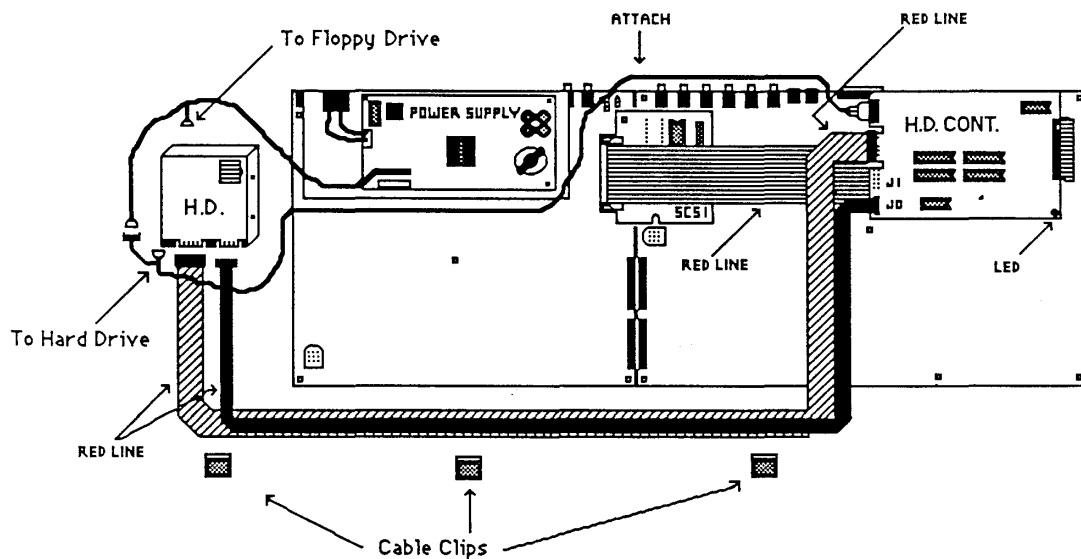
**Figure 4 : SCSI Board Location**

## 6) Cable Routing and Reassembly

Find the BIG grey 50-pin ribbon cable. Plug this big guy into the SCSI connector so that the red line faces the front of the machine. Route the cable under the Hard Disk controller and plug in as shown in Figure 5.

Now find the 35-pin ribbon cable. Plug this into the Hard Disk Controller board as shown with the red line facing the rear of the unit. Now route this cable along the front of the boards and plug into Hard Disk drive with the red line facing to the LEFT.

YEA!!... Get the 20-pin ribbon and plug this into location J0 with the red line also facing to the rear. Again, route the cable as shown in Figure 5. Plug this one into the Hard Drive with the red line again facing LEFT. At this point you may want to reconnect the rest of the ribbon cables to the Digital board. Do you remember how?



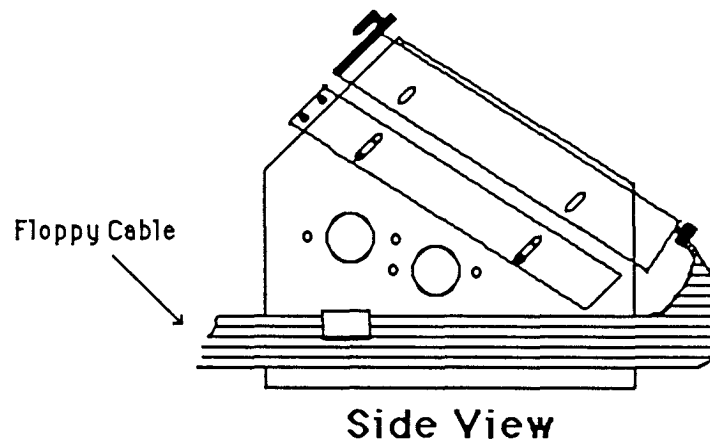
**Figure 5 : Hard Disk Cable Routing Scheme**

OK we're getting there. Now reinstall the Power Supply assembly to the back panel. Install the new Power Harness supplied with the kit. Find the long, 3 pin power cable. Again, plug this cable in as shown in Figure 5. You can secure this to the back panel using the little square tie wrap holders. At this time also secure the ribbon cables using the cable clips provided.

Now connect the power connector to the Hard Drive. This is kind of tricky. The female power connector that plugs into the Hard Drive should plug in smoothly. If there are any little ridges on this part, cut them off with your dykes.

Next connect the other plug to the Power Supply harness **UNDER** the Hard Drive. At this time also connect power to the Floppy Drive. The ribbon cable for

the Floppy Drive gets routed along the outside of the Disk Drive assembly and is secured with a cable clip to the side of the assembly (see figure 6).



**Figure 6 : Floppy Diskette Cable Routing Scheme**

When the cables are all in place, then the Disk Drive assembly can be loosely screwed onto the bottom panel. Reattach the Keyboard to the Bottom Panel and reconnect the ribbon cable. The Power Supply Cable assembly (mess) should be secured to the Power Supply bracket using the tie wraps provided. Use these things liberally (No cables should be flopping around).

We are now getting very close. Find the plastic Hard Disk panel faceplate thing and snap the LED into the hole. The LED gets mounted on the left side. Screw this faceplate onto the Hard Disk bezel with (4) screws.

Get the Top Panel assembly and remove the two front panel boards. Slowly peel off the label. Now, this is probably the worst part of the whole procedure. You are just going to **LOVE** this! The glue remaining on the plastic housing **MUST** be removed before the new one can be stuck on. We have found that Automobile Starting Fluid works very well to dissolve the old glue. Spray the starter fluid on the old glue and wait approx. 10 seconds. Take an old rag and rub-a-dub-dub. Get every little bit off or there will be a lump under the new label. When the panel is completely clean, grab the new HD label. You only get one chance at this operation.

Reinstall the two front panel boards and use the protruding LED's to line up the new sticker. Line up the label starting at the top and work down. Work slowly and carefully to avoid bubbles. Reattach cables to the chassis. Now we are ready to test and format the new Drive.

**7) Formatting the Hard Disk**

Boot up the Emulator II with the OS 2.6 software disk supplied with the kit. Assuming the unit boots up OK, go into the Special Module and choose function 19 (Enter Error List). At this point, Refer to the Hard Disk Supplement and following the instructions, enter the Error List written on the bottom of the Hard Disk Drive.

Next, go on to the Formatting instructions (special 22) in the Hard Disk Supplement and Format the Disk. When this is complete, the Emulator II will ask to Reload Backup Floppies?. SAY NO! and it will save all banks as Null Presets which is what we want.

Try saving and loading to and from the Hard Disk to verify proper operation. Hard Disk tests can be run at this time to test the SCSI, or the Hard Disk itself. Bear in mind that a read/write test (in the media test) will erase the format of the Hard Drive.

Everything OK? Good. You're all done.



