Emax SE SCSI Port
Emax Plus Retrofit Instructions (FI360)

Tools needed:
Exacto Knife, Vacuum Desoldering Tool, Soldering Iron, Solder, Phillips Screwdriver, Needle Nose Pliers, 1/2" Nut Driver, 5/8" and 1/8" Drill, Diagonal Cutters, RTV adhesive or glue, File.

Instructions:
Before doing anything ensure the Emax is an "SE" and is fully functional! Next, find out which version

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There are 3 versions of Emax CPU boards:

<u>**Rev. 1**</u>
Rev. 1 CPU boards cannot be updated and must be replaced.
Call us for a replacement.

<u>**Rev. 2**</u>
Rev. 2 boards are most common and need extensive cuts and jumps.

<u>**PC333**</u>
PC333 boards need very few modifications and are the easiest to update.

CPU board you are dealing with. Emax's with Rev. 2 CPU boards and a Hard Disk - Call E-mu immediately to order a SCSI adapter board (AF259).

In order to test the SCSI interface after installation it will be necessary to have an Emax compatible hard disk drive. Have the customer bring in their hard disk if they have one. This way you can also format the drive for them and have it all ready to start loading sound banks. If there is no HD available to test, you will just have to hope that the interface works whenever the customer gets a hard disk, or they *will* be back!

A recommended SCSI device for the Emax is the Data Technology 20Mb Floppy. This device is available from authorized E-mu dealers. Service Centers may also purchase these drives for in house use or resale. Contact E-mu for additional information. The Rodime RO-652 20Mb is also compatible with Emax.

(Kit 2007) Emax Keyboard to SCSI
Materials:

(1) SCSI Retro Instructions (FI360)	(1) SCSI user instructions (FI363)
(1) SCSI mounting plate (EM404)	(1) 5380 SCSI interface chip (II349)
(1) SCSI cable (AF240)	(1) Emax HD firmware (IP355)
(1) 28 pin IC socket (JC 308)	(1) Emax HD TIM PAL (IP356)
(1) Emax Plus software disk (ZD856)	(4) 4-40 kepf nut (HN 304)
(4) 4-40 x 1/2" screw (HS118)	(1) SCSI port hardware set (HS400)
(2.6') 28 gauge wire-wrap wire (WW130)	(3) adhesive cable clips (HC312)
(1) Hard Disk Supplement (FI342)	(1) HD Retro label (ZL371)
(1) SCSI adapter board (AF259)	

(Kit 2008) Emax Keyboard HD to SCSI
Materials:

(1) SCSI Retro Instructions (FI360)
(1) SCSI mounting plate (EM404)
(1) SCSI cable (AF240)
(4) 4-40 x 1/2" screw (HS118)
(1) Emax Plus software disk (ZD856)

(1) SCSI user instructions (FI363)
(4) 4-40 kepf nut (HN 304)
(1) SCSI port hardware set (HS400)
(3) adhesive cable clips (HC31 2)

(Kit 2009) Emax Rack to SCSI
Materials:

(1) SCSI Retro Instructions (FI360)
(1) Rack bottom panel SCSI (EM406)
(1) SCSI cable (AF240)
(1) 28 pin IC socket (JC 308)
(1) Emax Plus software disk (ZD856)
(2.6') 28 gauge wire-wrap wire (WW130)
(1) Hard Disk Supplement (FI342)
(1) SCSI adapter board (AF259)

(1) SCSI user instructions (FI363)
(1) 5380 SCSI interface chip (II349)
(1) Emax HD firmware (IP355)
(1) Emax HD TIM PAL (IP356)
(1) SCSI port hardware set (HS400)
(3) adhesive cable clips (HC312)
(1) HD rack retro label (ZL372)

(Kit 2011) Emax Rack HD to SCSI
Materials:

(1) SCSI Retro Instructions (FI360)
(1) Rack bottom panel SCSI (EM406)
(1) SCSI cable (AF240)
(1) Emax Plus software disk (ZD856)

(1) SCSI user instructions (FI363)
(1) SCSI port hardware set (HS400)
(3) adhesive cable clips (HC312)

1.   Disassembly

a)   Place the Emax upside down on a padded surface and remove the (10) bottom panel screws from the perimeter of the bottom panel. Put the screws aside in a safe place.

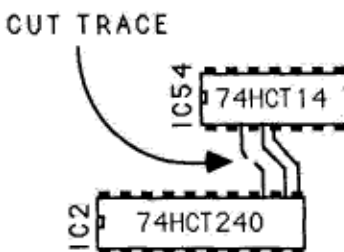If the Emax already has a Hard Disk installed, jump to step 4.

If the Emax has a PC 333 CPU board, jump to step 3.

b)   Remove the bottom panel. Be especially careful on rack units not to stress the ribbon cable.

c)   Carefully disconnect all cables from the CPU board taking care not to stress ribbon cable CN8. Next remove the (6) screws that attach it to the housing. Put these screws safely aside.

d)   Remove the CPU board from the housing and place it on a padded surface. Take care not to lose the (4) beryllium washers (keyboard unit only) on the phone jacks Set the plastic housing aside in a safe place.
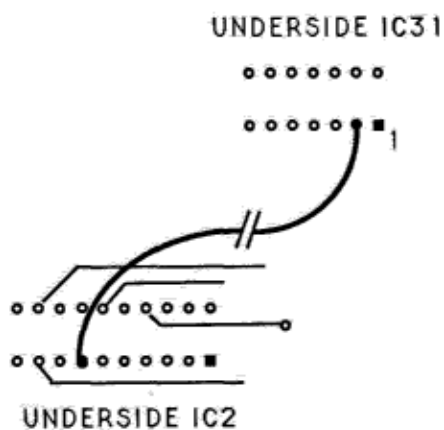
2. CPU Board Modifications (Rev2 board)

Check the CPU board to make sure that it is a Version 2 board before proceeding
Be careful making cuts and jumps (refer to diagrams) Glue down wires with RTV.
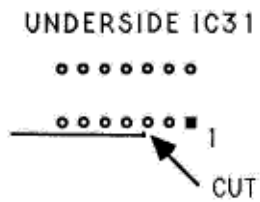Check your work with an ohmmeter when you are finished.

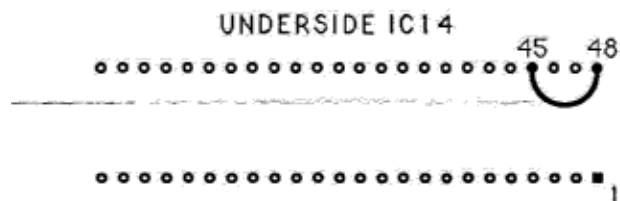a)   Cut the trace that emerges from between pins 12 and 13 on **IC2.**

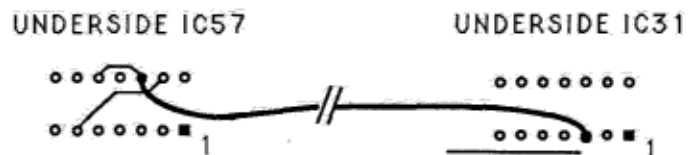b)   Solder a wire between **IC2** pin 7 and **IC 31** pin 2.
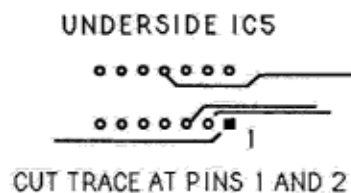
c)   Cut trace at **IC31** pin 3.

UNDERSIDE IC31

CUT

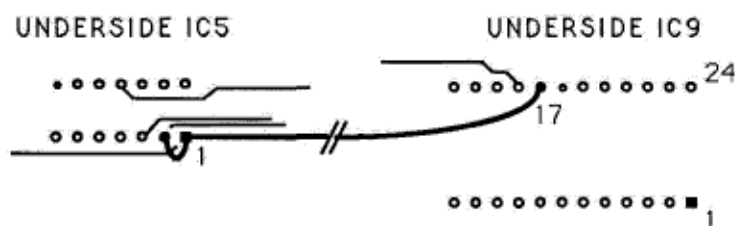d)   Solder a wire between **IC14** pin 45 and **IC14** pin 48.

UNDERSIDE IC14

45   48

e)   Solder a wire between **IC31** pin 3 and **IC57** pin 12.

UNDERSIDE IC57   UNDERSIDE IC31

f)   Cut trace at **IC5** pin 1 and **IC5** pin 2.

UNDERSIDE IC5

CUT TRACE AT PINS 1 AND 2

g)   Solder a wire between **IC5** pin 1, **IC5** pin 2 and **IC9** pin 17.
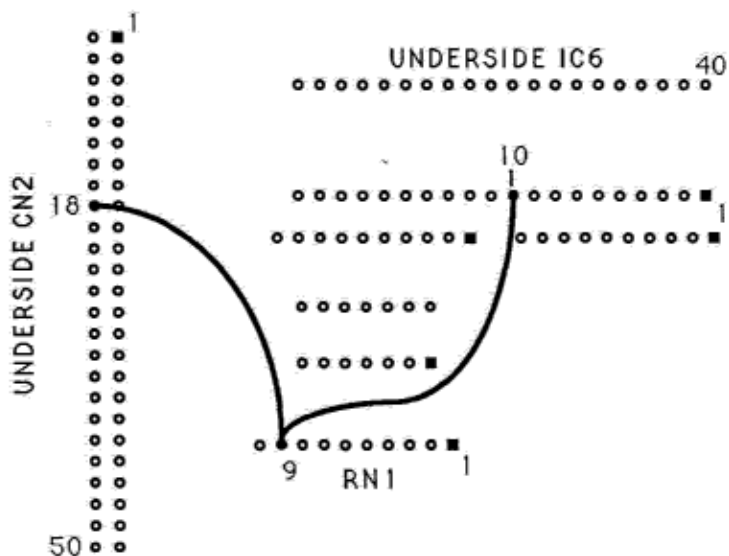
UNDERSIDE IC5   UNDERSIDE IC9

h)   Remove **IC13** and carefully desolder and remove the 24 pin socket. Clean out the solder
        from all 28 holes and solder a 28-pin socket into the **IC13** location.

i) Cut the trace leading **to IC13** pin 23.

j) Solder a wire between **IC13** pins 26, 27,28 and 1.

k) Solder a wire between **IC13** pin 2 and **IC14** pin 11.

l) Solder a wire between **IC13** pin 23 and **IC14** pin 12.

UNDERSIDE IC14   48

12 11

CUT

28

23

UNDERSIDE IC13   1

m) Solder a wire between **IC 6** pin 10, **RN1** pin 9 **and CN2** pin 18 as shown.

UNDERSIDE IC6   40
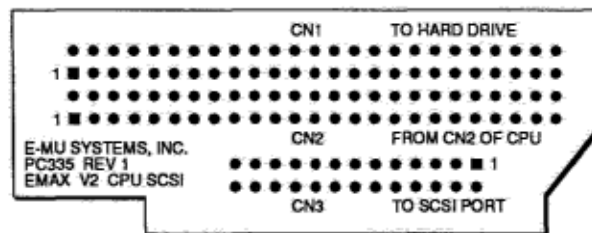
10

1

UNDERSIDE CN2

18

50

9   RN1   1

3.   Install the SCSI Chips

a)   Locate the **Emax HD** Firmware chip (IP355) and carefully insert it into the socket at location **IC13,** taking care that the polarity is correct and that all pins are seated correctly.

b)   Next locate **IC49** and remove the chip from this location. Insert the Emax HD TIM PAL (**IP356**) in its place.

c)   Locate the **5380 SCSI interface chip** (II349) and carefully insert it in the **IC6** location with its notch aligned with the one on the IC socket.

d)   The modifications to the CPU board are now complete OK. Now go back and re-check each step. Finding mistakes at this point will allow you the thrill of having the unit work the first time you power on.

4.   Install the SCSI Adapter Board

PC333 CPU boards do not need to have an adapter board installed. Skip to step 5.

a)   The SCSI adapter board needs to be soldered over the 50-pin connecter on the Rev 2 CPU boards The small side of the board should be positioned toward the center of the CPU board and the connecters should point up Check your work for cold solder joints and spills
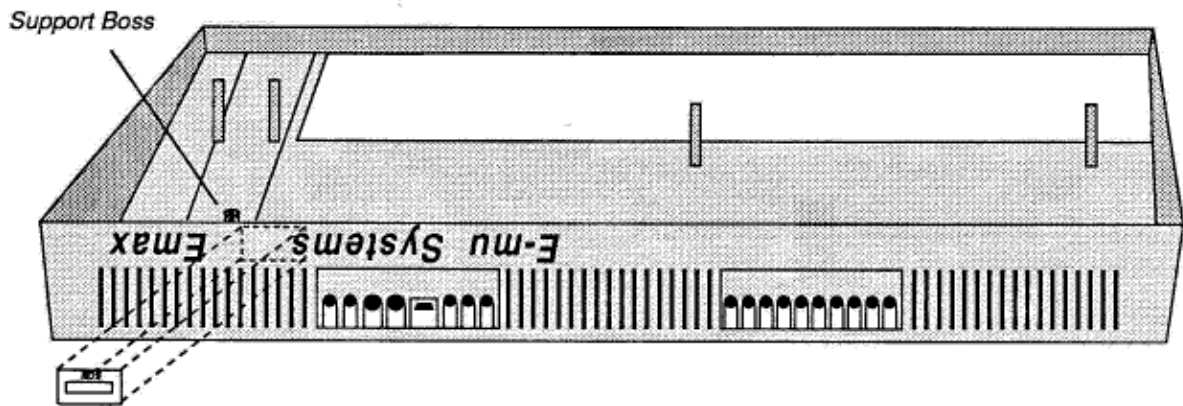

This end goes toward the center of the CPU board.

5.   Install the SCSI Port Hardware
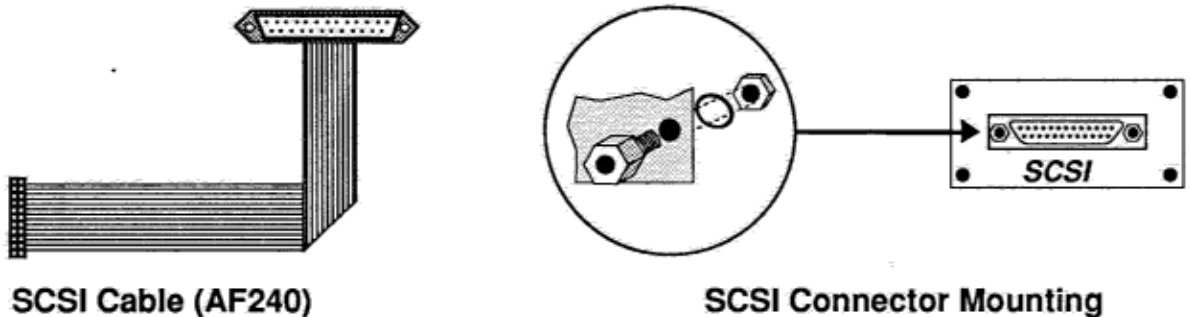
Rack Emax
Transfer the output board to the new bottom panel provided. Next, mount the SCSI cable directly to the new bottom panel using the hex screws, lock washers and nuts provided (see diagram on page 8). Now jump to step 6.

Keyboard Emax
a)   Cut out the template provided with scissors and tape it to the back of the Emax housing as shown in the diagram on the following page.

b)   With the housing turned upside-down, the template should be placed immediately to the right of the housing support boss midway between the edge of the housing and the vertical vents On housings with *"E-mu Systems"* silk screened on the back, the "S" in *Systems* should be covered. Be careful that the holes are not too close to the support boss. Mark the center of all the holes with an Automatic Center Punch, and then remove the paper template.
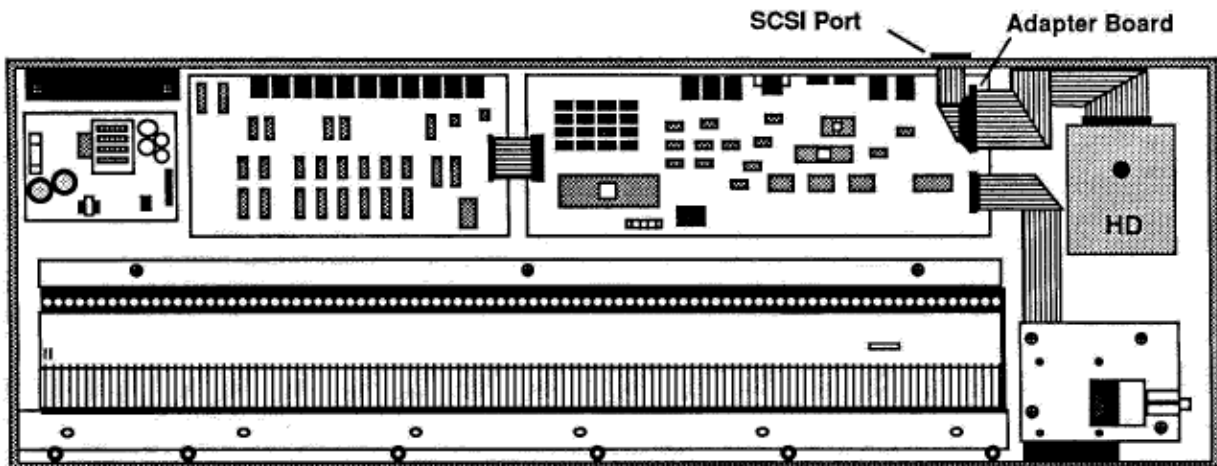
Support Boss

The SCSI mounting plate should be installed as shown. Be careful not to drill too close to the support boss.
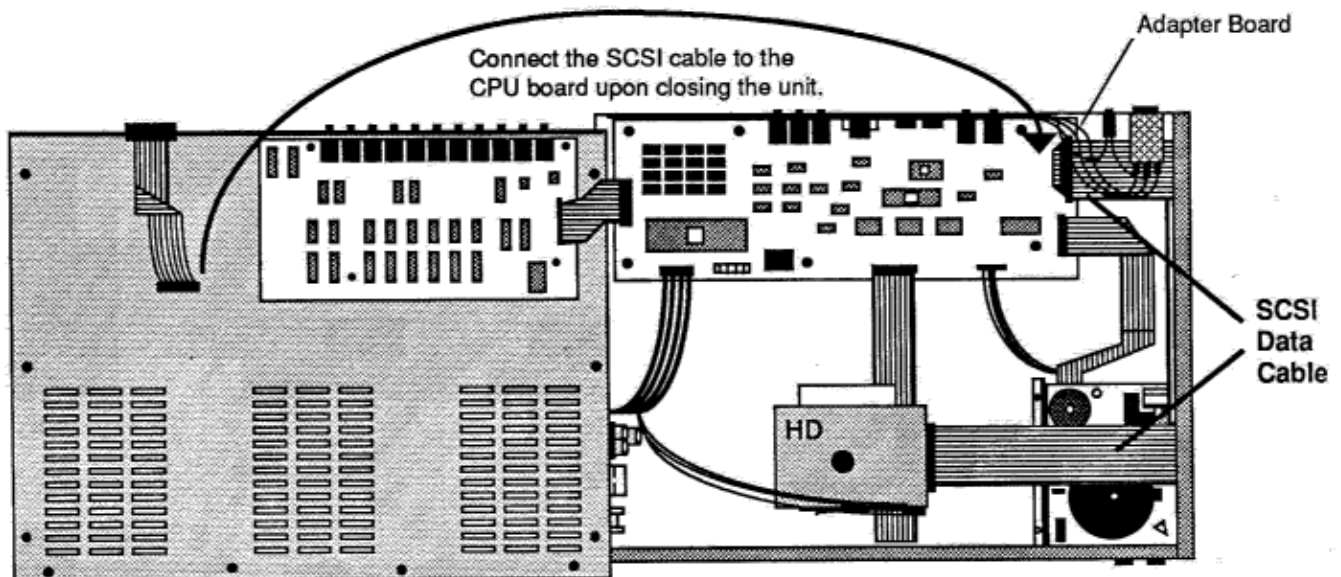

SCSI Cable (AF240)

SCSI Connector Mounting

c)   Turn the housing right-side-up to keep the bits of plastic from falling into the housing. Carefully drill the center (3) 5/8" holes into the plastic housing then clip out the plastic left between them. File the edges smooth to make room for the SCSI connector

d)   Next carefully drill out the four 5/32" holes used to attach the metal mounting plate to the housing. Deburr all holes.

e)   Attach the DB-25 connector to the metal plate with the hex screws, lock washers and nuts provided.

f)   Attach the SCSI metal plate to the housing using the four 4-40 x 1/2" screws and 4-40 Kepf nuts. The nuts should be on the inside of the housing.

g)   ***Clean all traces of debris from the inside of the housing.*** The plastic is coated with conductive paint, which could cause severe damage to the Emax if left inside the housing
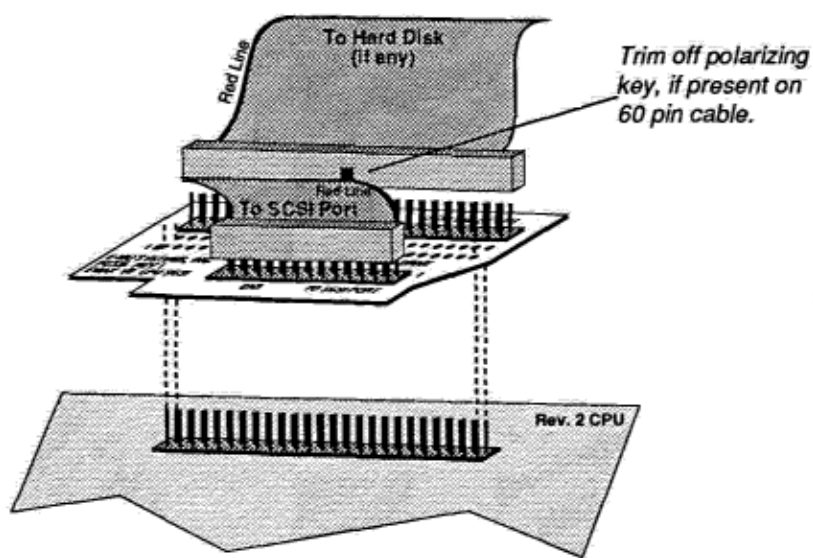
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6. Reassembly

a) Reinstall the CPU board in the housing (Where did you put those six screws?). On keyboard units, remember to replace the (4) beryllium washers on the jacks In case you forgot where they go, the center jack of the trio is the one without the washer.

b) Connect all the cables back to the CPU board as they were originally. Most cables only plug in one way but make sure that you plug the hard disk data cable in correctly with the Red Line to pin 1. You may need to trim off a polarizing key on some cables. PC333 boards have a SCSI connector mounted next to the phone jacks and do not need the SCSI adapter board

Carefully fold the SCSI cable diagonally in order to correctly align the HD connector to Pin 1

Route the SCSI data cable around the side of the unit as shown and secure with ribbon cable clips as needed.

The SCSI Adapter Board

c)   The diagrams on the previous page show how the SCSI cables should be routed. Use cable clips to secure the cables neatly and without stress.

d)   As mentioned earlier, PC 333 CPU boards will have a separate connector for the internal hard disk and the SCSI port and do not need to have the adapter board installed.

e)   Now it's time to look everything over one more time just to make sure that everything is as it should be before we apply power.

f)   Everything looks OK? Then fasten down the bottom panel of the unit with the ten screws and flip the Emax over into the playing position Now plug it in The moment of truth arrives as we *APPLY POWER.*

7. Power On

a)   Insert the SCSI software disk into the drive then, get ready, set, Power On!

      Note: The SCSI disk will not boot in a Non-SE Emax or if there are no SCSI devices attached.

b)   If everything is OK, the display will light up and say:
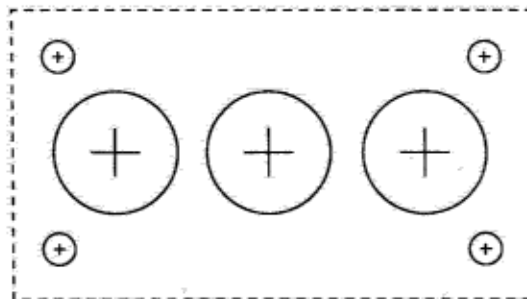
           E-mu Systems Inc.
           Diagnostics

This display will remain for a few seconds while Emax checks itself out, and then the display will change to:

E-mu Systems Inc.   Just a Moment..
Loading Software   then   Loading Bank

c)   If the Emax has given you these displays, Congratulations! Everything is probably AOK. Give the unit a complete functional test anyway, just to make sure. If the customer brought in their HD, you can test the interface by formatting the HD for them and saving and loading a few banks. The back-up software diskette belongs to the customer in case the hard disk ever crashes. You should advise the customer to BACK-UP everything that they would hate to lose.

d)   If the Emax has NOT booted up and loaded the bank, your fun is just beginning.

Turn off power immediately and re-check all your work. The chances are very good that you made a mistake somewhere along the line. If the CPU isn't running, then start with the cuts and jumps. Possibly re-heat the EPROM socket pins. Still not working? Try reinserting the old boot PROM. If the unit boots up with the old PROM it means either that the new PROM is bad or your mistakes were related to the EPROM socket modifications. Give everything a good going over before calling us for assistance.

SCSI Mounting
Template