What to do first

READ THIS ENTIRE MANUAL BEFORE DOING ANYTHING ELSE!

Be certain you can follow the instructions, and have a sufficient level of skill to complete the installation. This is very important! The fitting of the memory board is not inherently enormously difficult, but requires a steady hand and a good soldering ability. If the installation is not done correctly you stand a good chance of damaging your empegCAR/RIOCAR motherboard severely, and possibly irreparably. Removal of an incorrectly fitted board is much more difficult than fitting one in the first place and will almost certainly cause damage that will prevent the easy reattachment of it correctly. If you are not sure if you can successfully complete the installation you are strongly advised to locate someone who can.

Disclaimer

Fitting of this memory expansion board is undertaken entirely at the purchasers own risk, and I cannot be held responsible in any way for any damage, direct or indirect, caused as a result.

What you will need to complete this kit

In addition to the memory expansion board, you will require the following items:

- A low wattage soldering iron with a point of about 1mm, well tinned
- A damp sponge to clean the soldering iron tip
- A couple of meters of 0.25mm rosin cored electronics solder
- Fine pointed tweezers
- A small pair of sharp side cutters
- A multimeter capable of measuring at a minimum resistance, voltage, and continuity
- Isopropyl alcohol (rubbing alcohol to Americans)
- Cotton buds
- Small scalpel with new blade
- Solder braid, about 2.5mm wide
- 15cm of fine insulated wire, about 0.2-0.5mm diameter
- 15cm of insulated wire about 1mm diameter
- Hot melt glue
- A pozidrive screwdriver to fit the M3 board screws
- A pozidrive screwdriver to fit the M2.5 drive cradle screws
- A small flat-blade screwdriver
- A 5mm nut driver
- A 2.5mm allen key
- Masking tape
- Magnifying glass
- High-viscosity cyanoacrylate glue (superglue)

Arrange a good place to install the memory expansion, with adequate ventilation, in a well-lit area where you won't be disturbed.

Preparation of the car player before fitting the memory board

First, apply the latest release version of the car player software, then the latest version of Mark Lord's Hijack kernel, if this has not already been done. Check that the player works normally before continuing.

Before the expansion board can be fitted, the car player motherboard must be removed from the case. This requires complete disassembly of the player. I recommend reading the drive upgrade procedure excellently documented here:

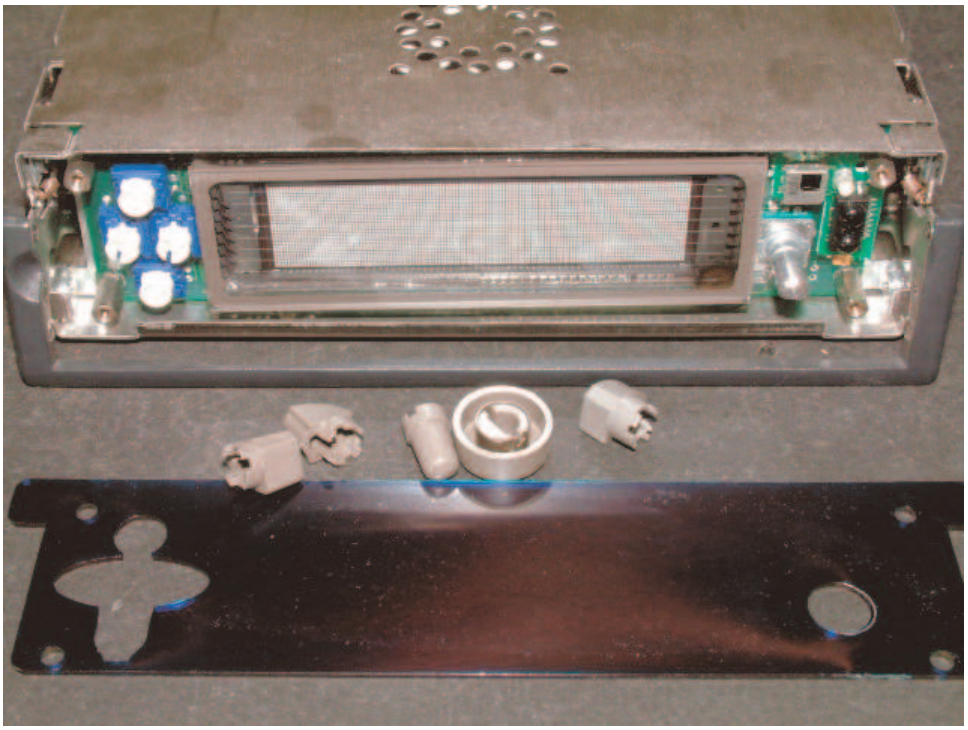
http://www.riocar.org/modules.php?op=modload&name=Drive_Upgrade&file=index

before opening the case of the player. Note that the screws will probably be quite tight due to the threadlock used during manufacture. Be careful not to strip the heads or shear them off.

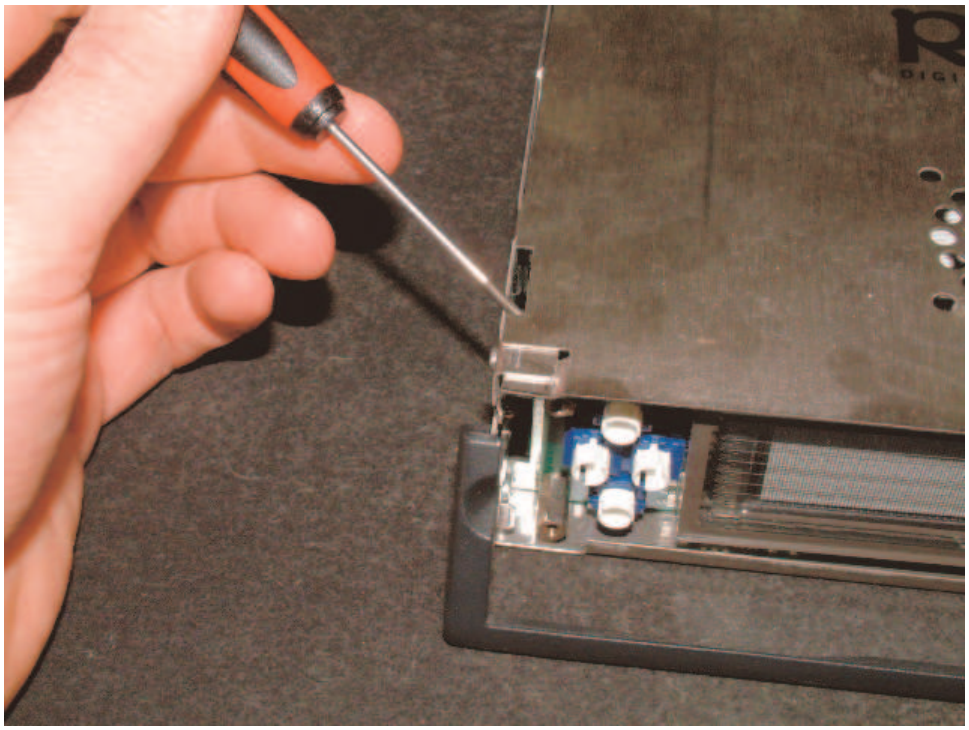
The procedure is as follows:

Remove the front panel of the player by unscrewing the four cap head bolts at the corners.

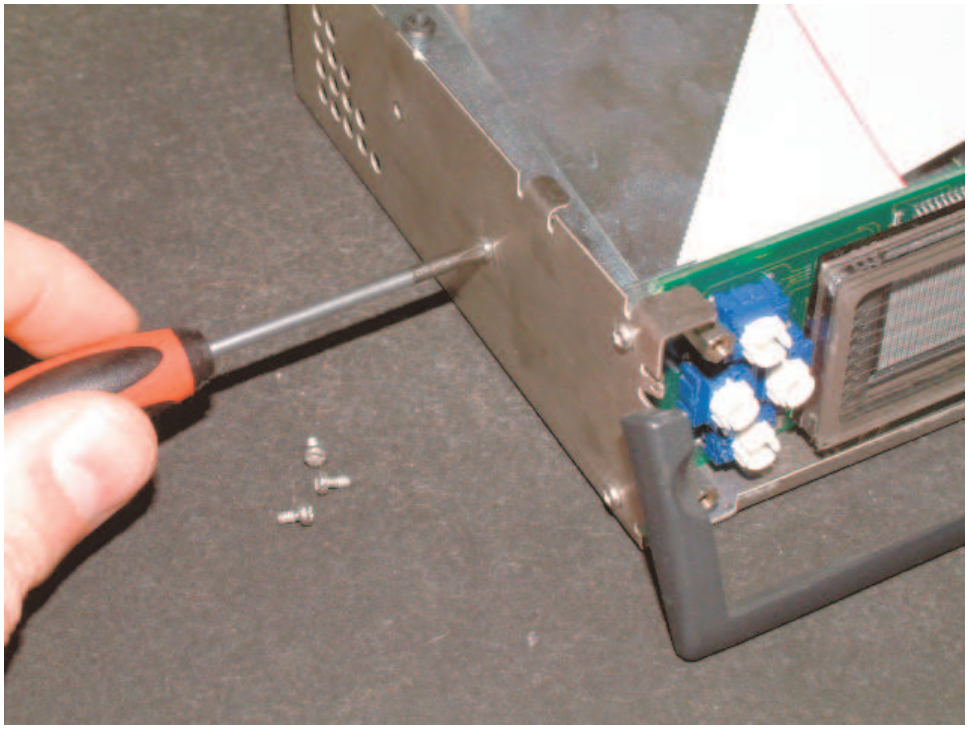
Remove the rotary knob, buttons, and lens.



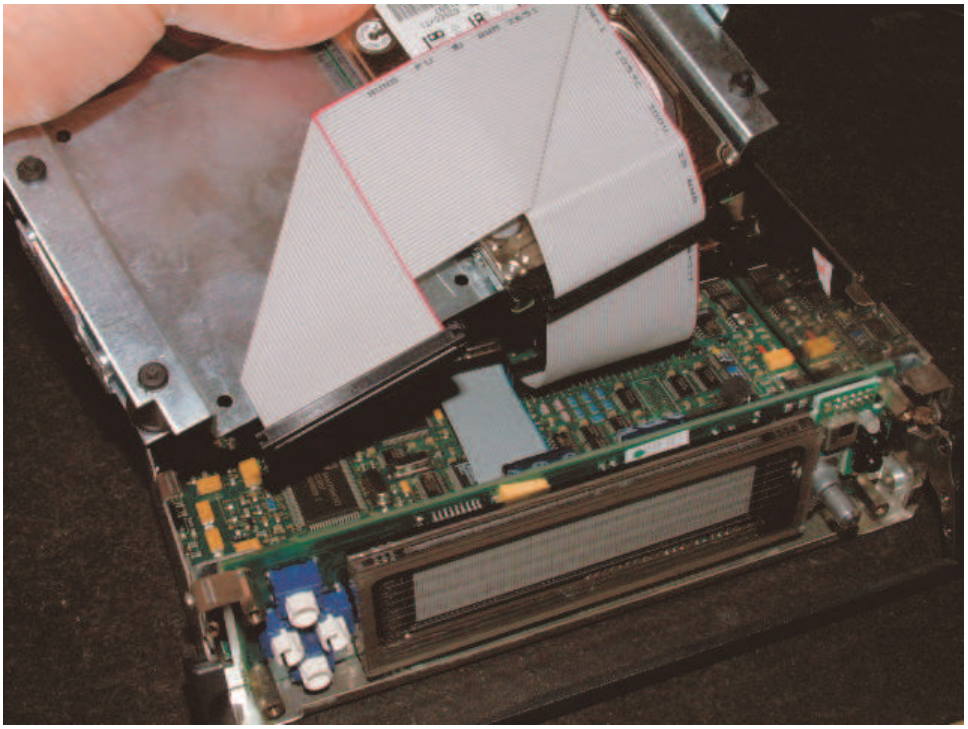
Remove the lid by gently lifting the front tabs at either side with a small flat blade screwdriver and pushing the lid forward, with the handle pulled forward.



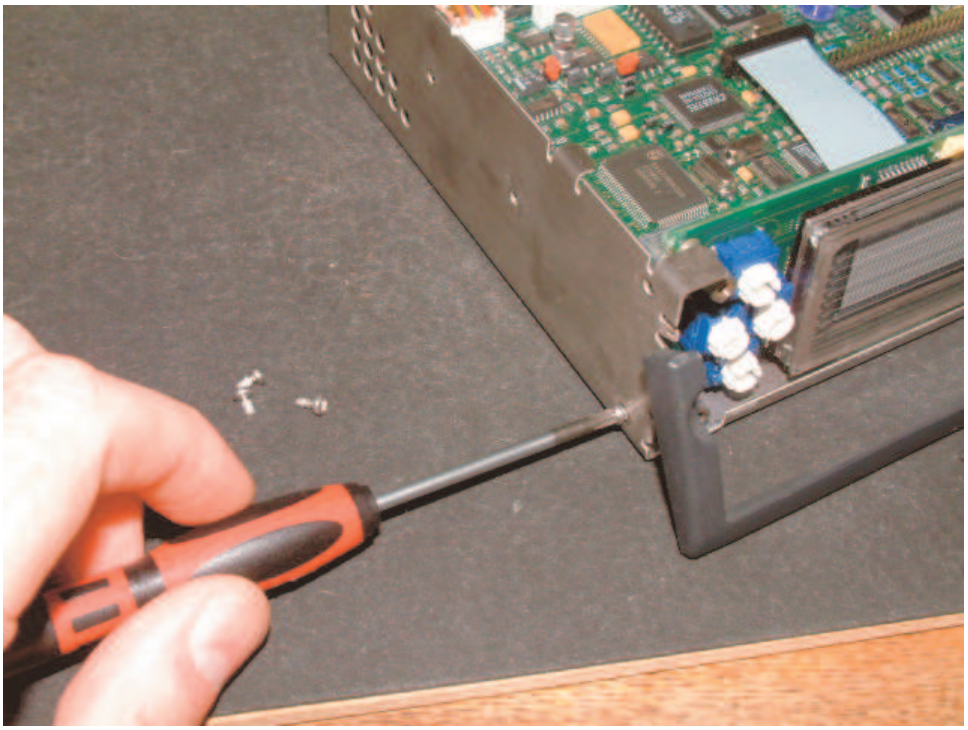
Remove the four M2.5 screws retaining the drive tray.



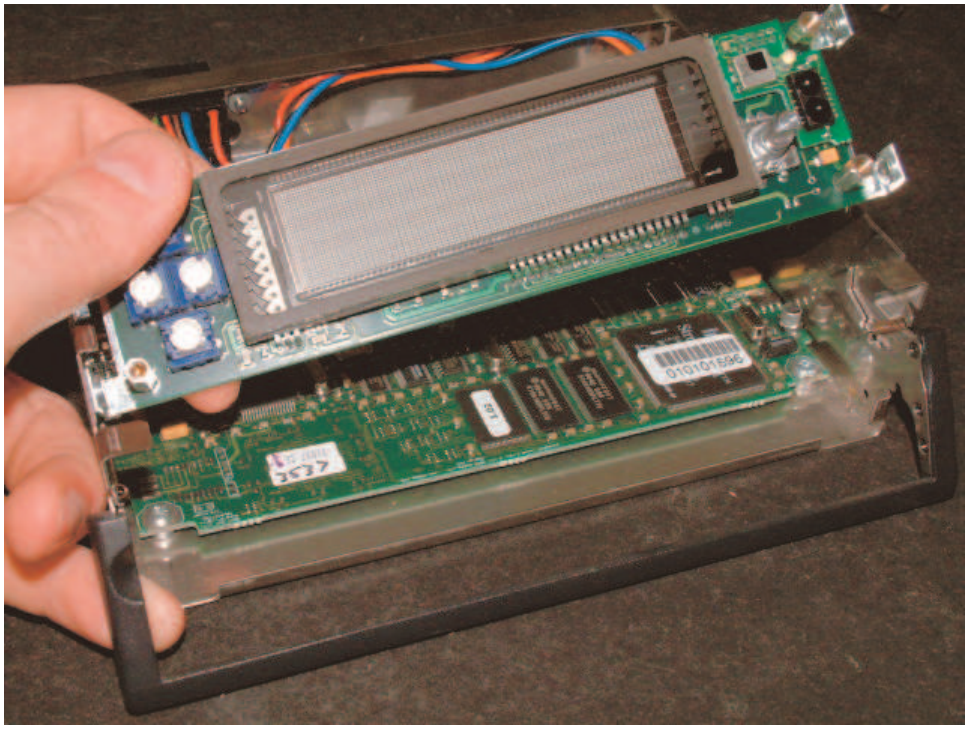
Lift it out and carefully unplug the drive cable.



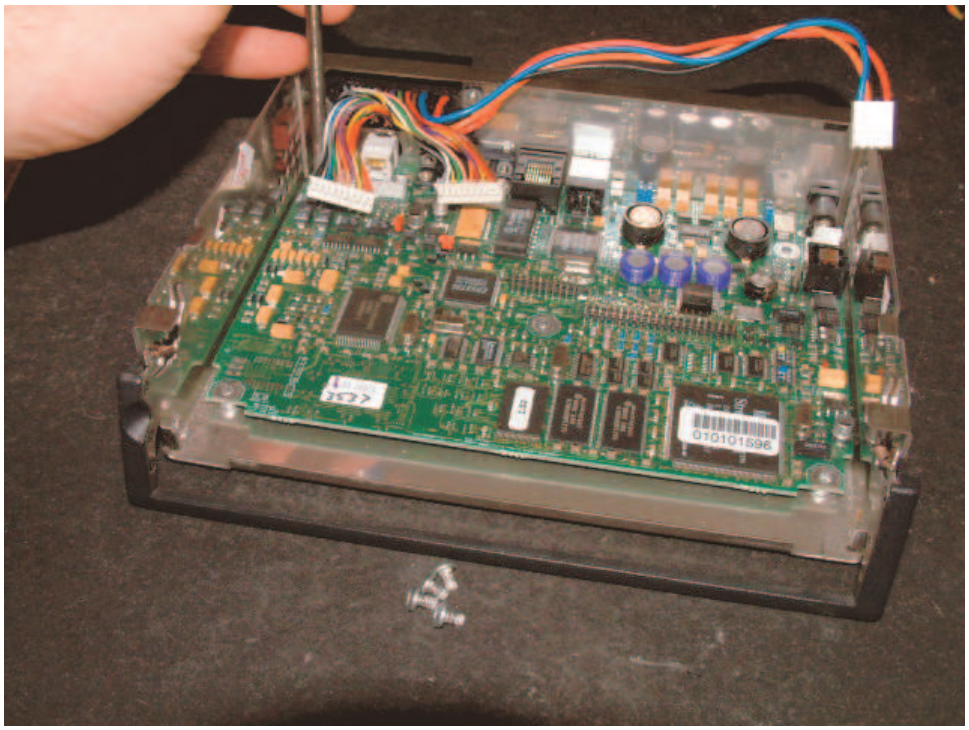
Remove the four M2.5 screws retaining the display board.



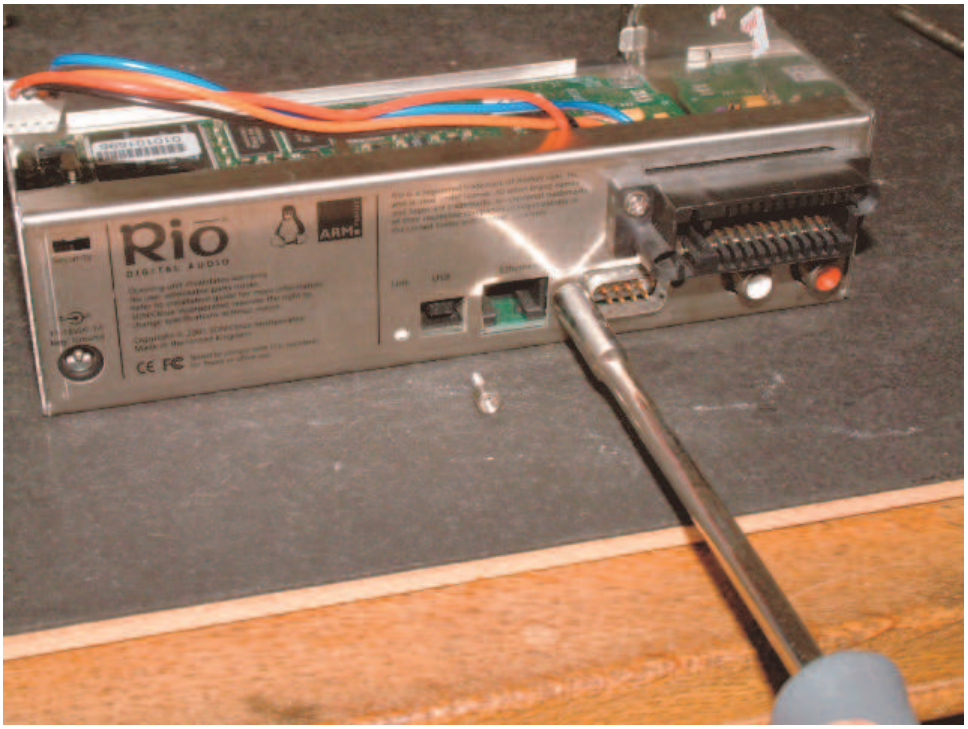
Carefully unplug the display cable and lift the board out and back while pulling the handle all the way forwards.



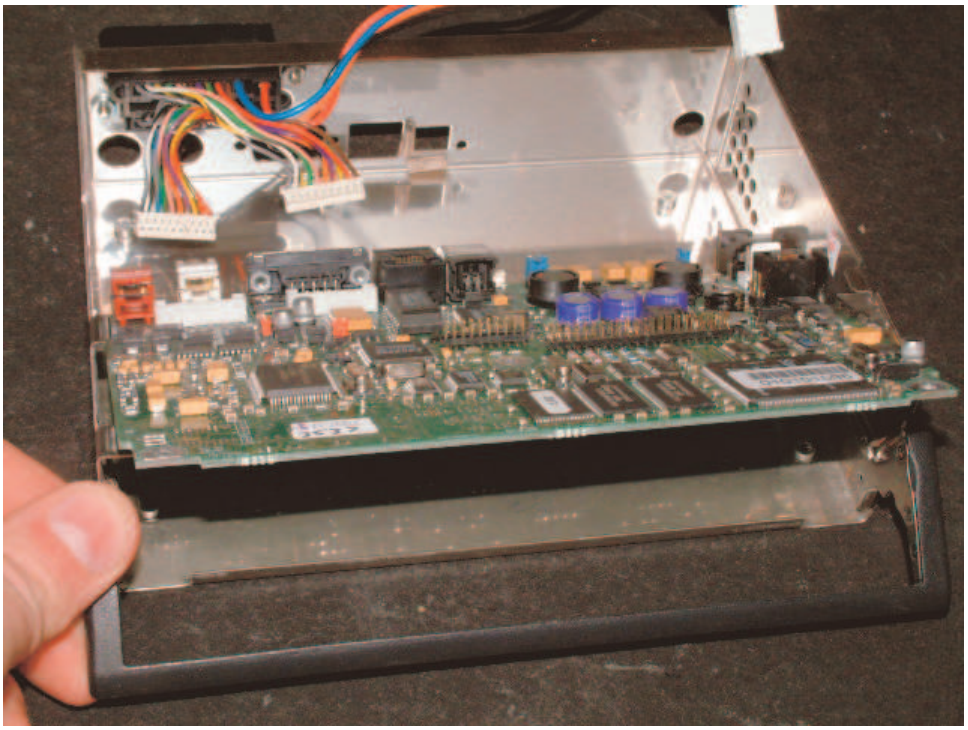
Carefully unplug the power cable and the two docking connector cables from the motherboard.



Unscrew the two 5mm mounting posts from the serial connector on the back of the case.



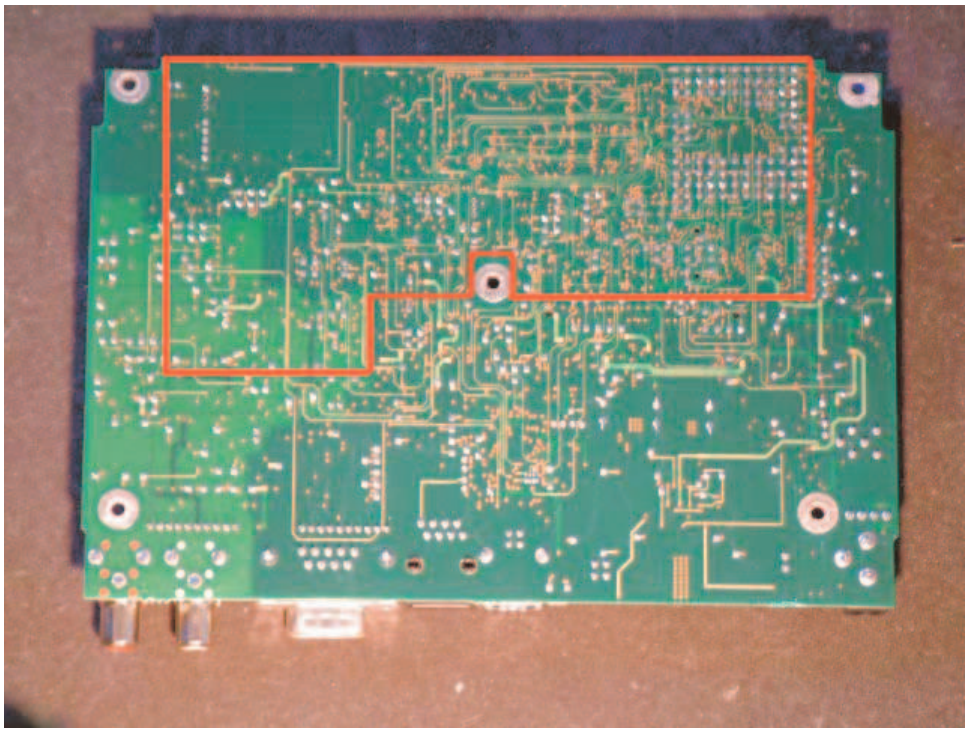
Remove the motherboard by lifting it up and forwards while pulling the handle all the way forwards, and slide the board out.



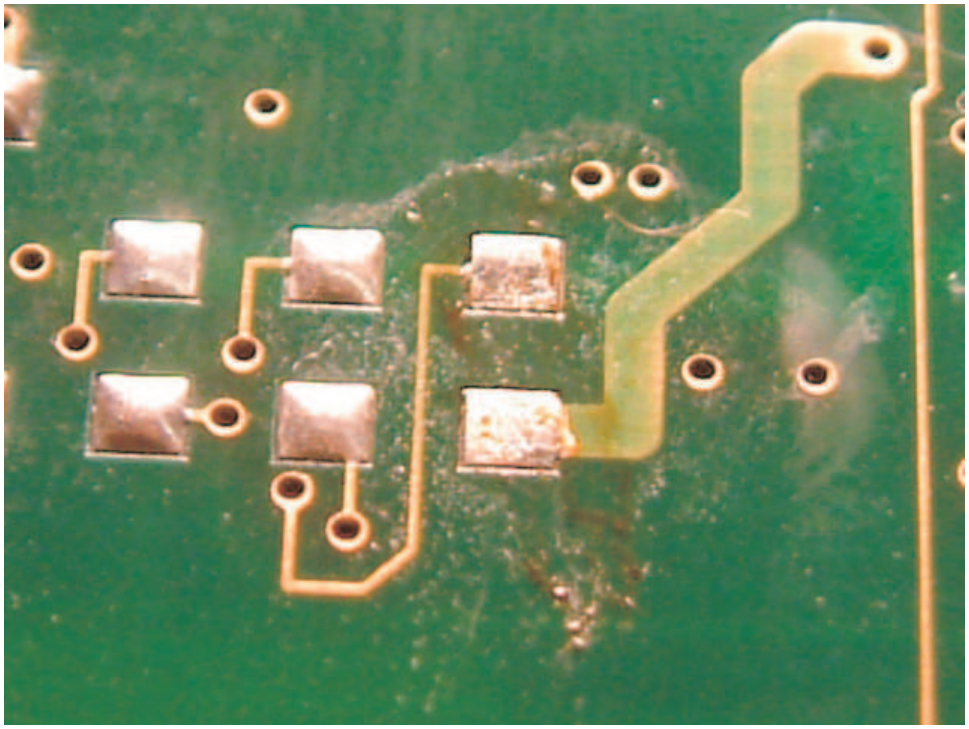
At this point, determine whether you have a MK2 or MK2A player. If you do not already know, this can be discovered by checking the number of ram chips on the motherboard. The MK2 has six, the MK2A has two. The installation process is essentially the same, but there are some additional steps that need to be done before a MK2 player can be upgraded. Go to the section that corresponds to the unit you are upgrading.

Procedure for upgrading a MK2A player

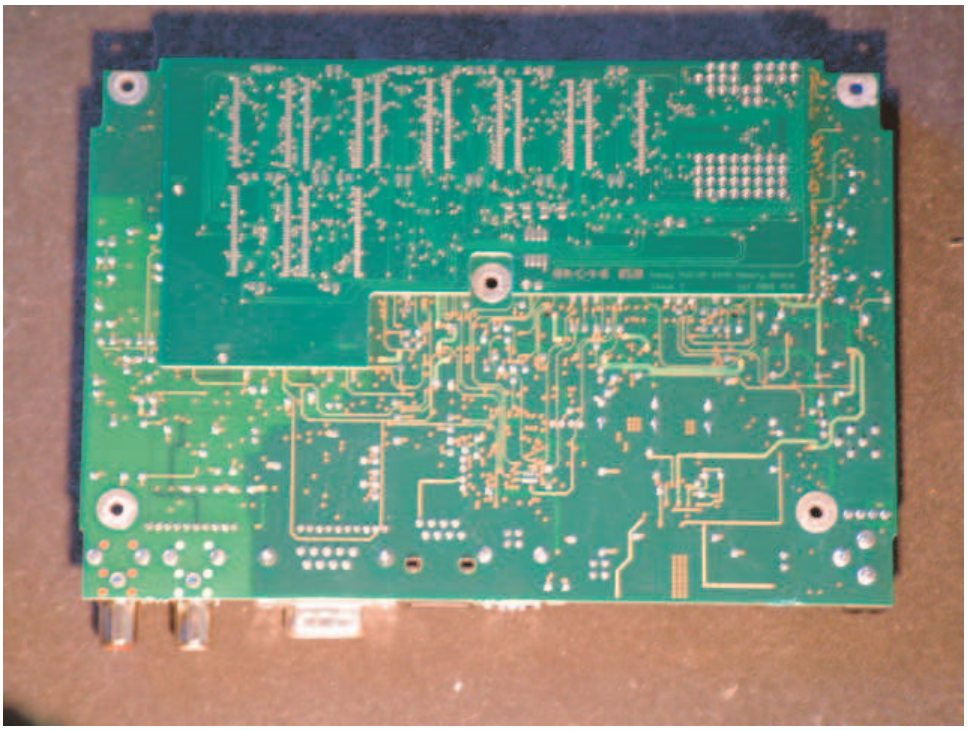
The memory board occupies the space on the bottom of the main board outlined in red below.



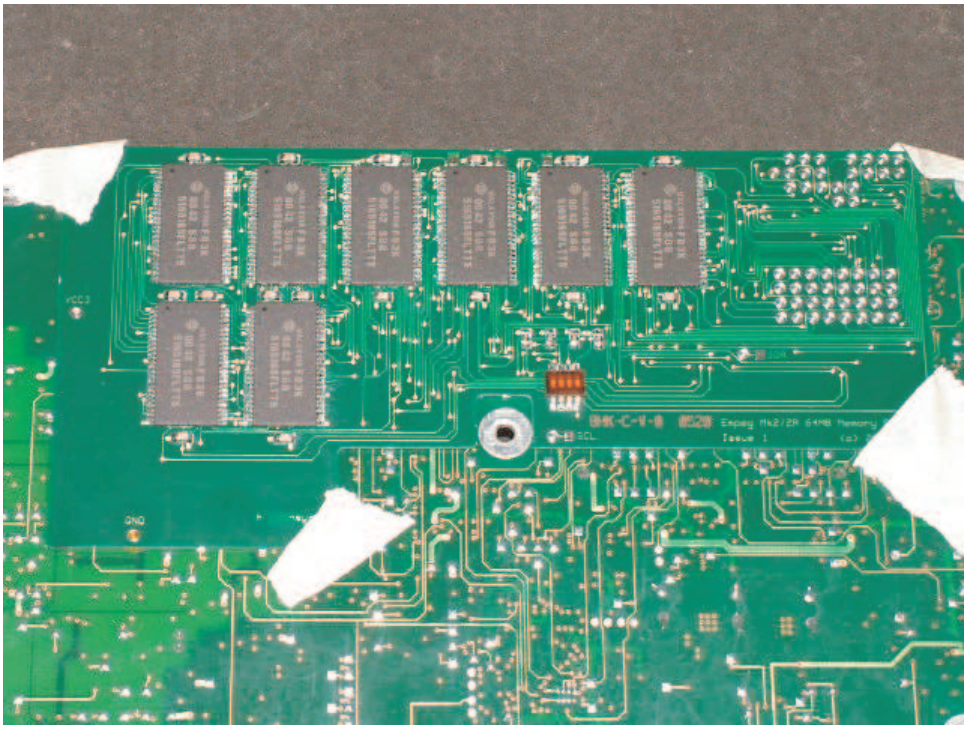
Using the solder braid, remove any excess solder that may be present on the square test point pads that lie within this region. Be careful not to overheat the pads, as the glue holding them to the board can soften and allow them to shift or tear loose. It is advisable to paint some flux onto the pads before applying the solder braid and soldering iron. Don’t apply too much pressure and keep the heating time to no more than a second or two. The desired end result is pads that are flat and smooth, rather than rounded or protruding, as shown in the photo below.



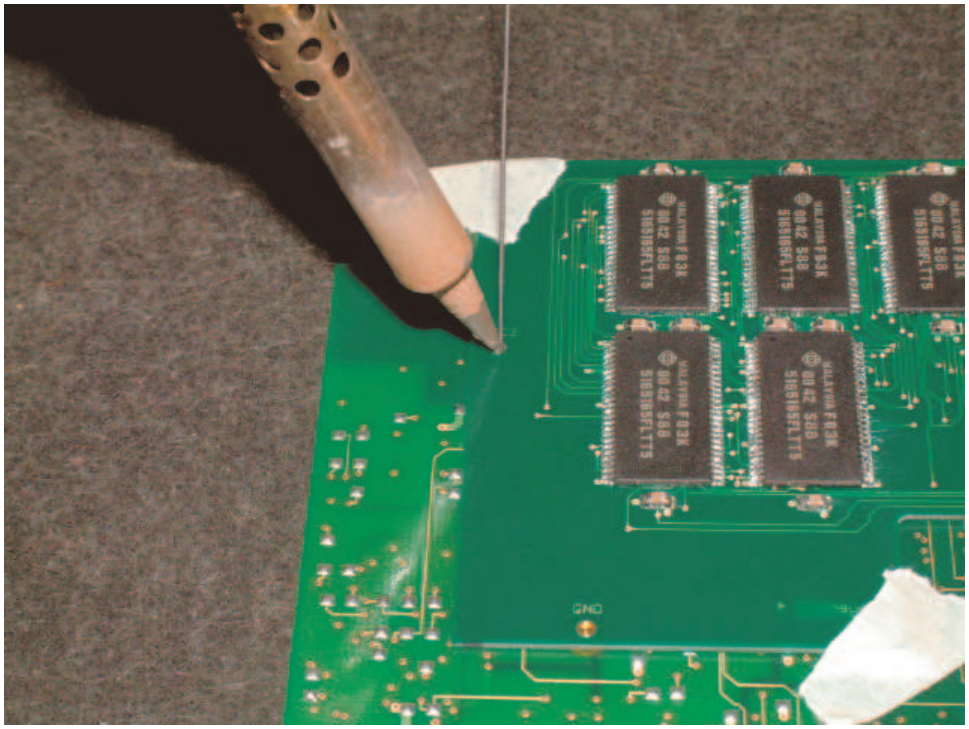
Remove the small circular piece of kapton tape that is fitted over the bottom of the hole labelled GND, located on the lower left-hand edge of the memory board. Do not remove any of the other lengths of tape on the underside of the board. Test-fit the board as shown in the photo below. You should be able to see a test pad through each hole on the memory board. Pay especial attention to the VCC3, GND, SCL, and SDA holes, and the topmost hole on the right side. If these are correct the board is located properly. The top edge of the memory board should run parallel with, and almost in line with, the front edge of the motherboard.



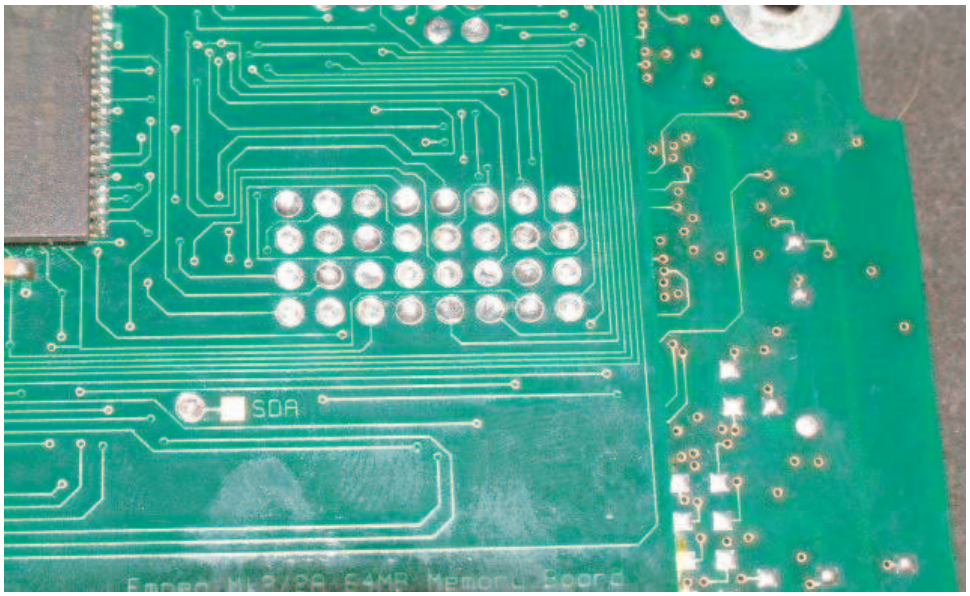
Remove the board, and apply flux to both the test pads on the motherboard and the holes in the memory board. Refit the board in the previously determined position, and temporarily fix it in place with small pieces of masking tape at the corners. Make very sure it is correctly aligned. See the photo below.



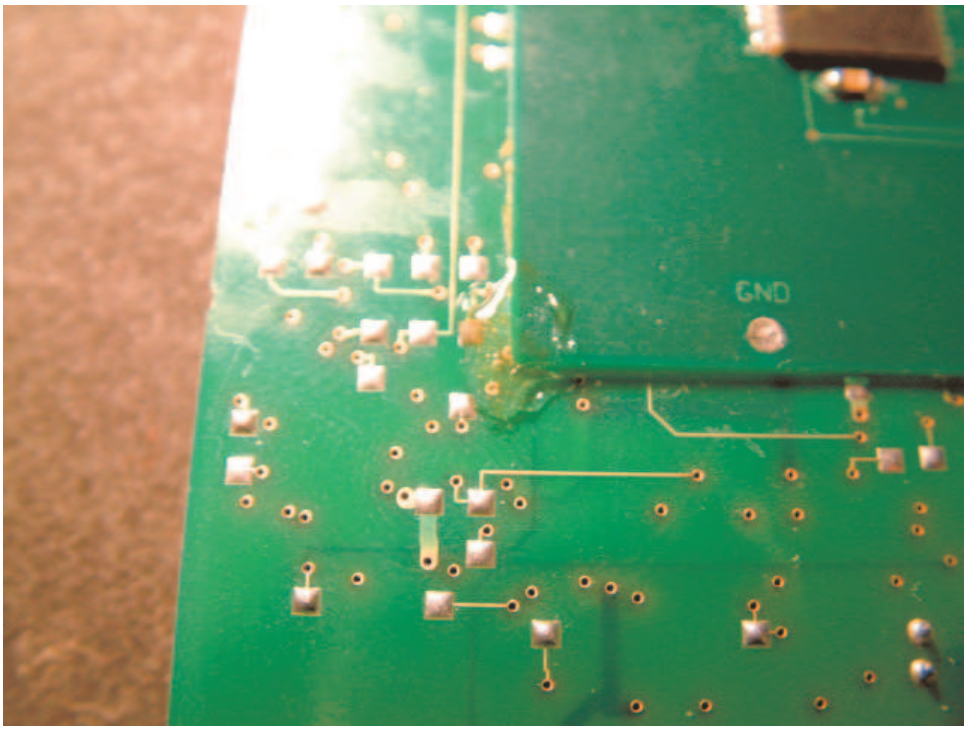
To attach the memory board to the motherboard, solder must be fed through each fixing hole so as to bond it to the underlying test pad. The procedure for achieving this is simple, but must be done carefully. The soldering iron tip must be of a size to allow it to fit through the fixing hole and touch the test pad, and allow the solder to be fed in past it. Tin the end of the iron and while making sure the board is pressed firmly against the motherboard, insert the iron tip into the hole. Add a little solder, so it flows around the tip and fills the hole. See the photo below.



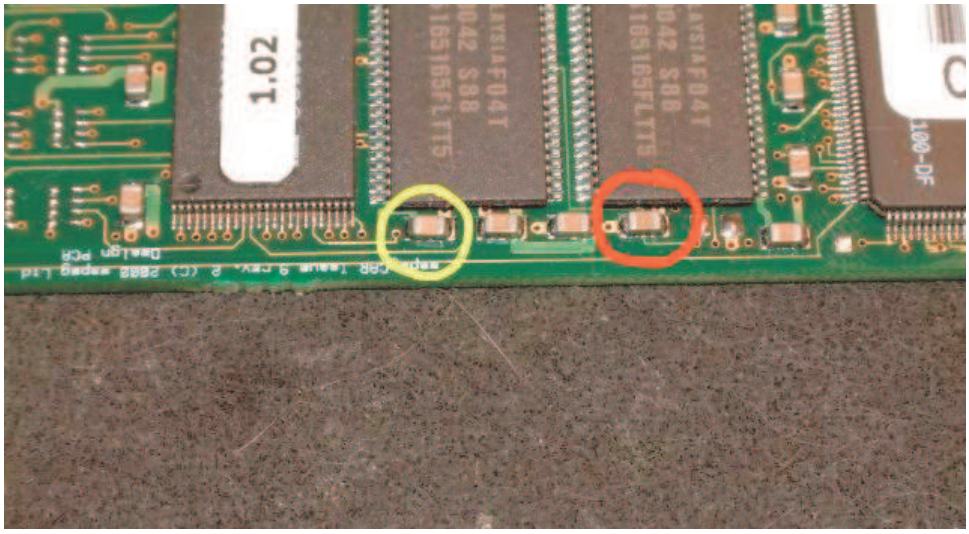
It is best to ‘stir’ the tip around a little, to make sure the solder evenly wets the entirety of the hole and pad. Don’t apply too much pressure or you may cause the pad to lift or move. This entire operation should take no more than a couple of seconds. Withdraw the iron and allow the solder to cool before releasing the board. Start with the VCC3 hole, then the top right hole. Once these are done, check carefully with a magnifying glass through each remaining hole that they are correctly aligned with their respective test pads. When you are sure that everything is correct, solder the remaining holes. The solder should form a concave meniscus in each hole. Remove the masking tape. Clean off the flux residue with the isopropyl alcohol and a clean rag. See the photo below.

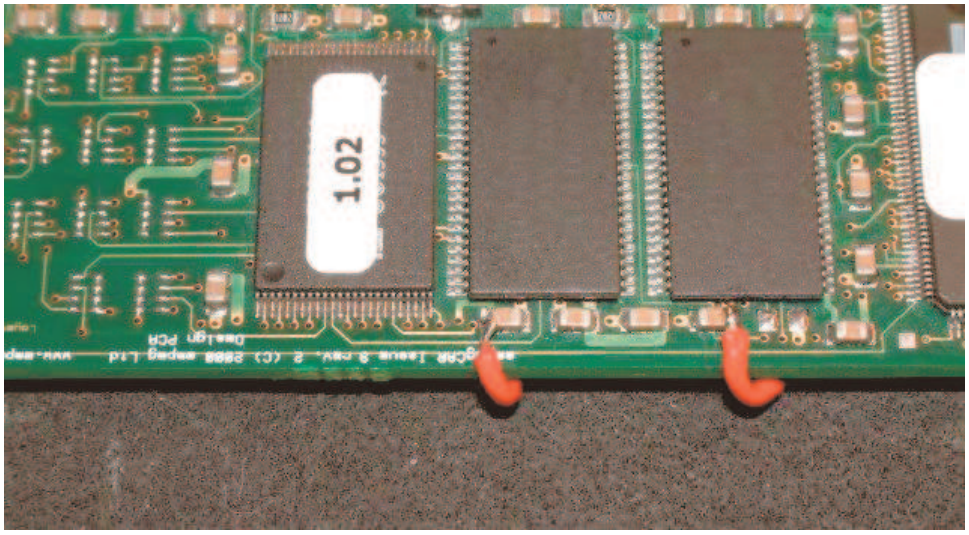


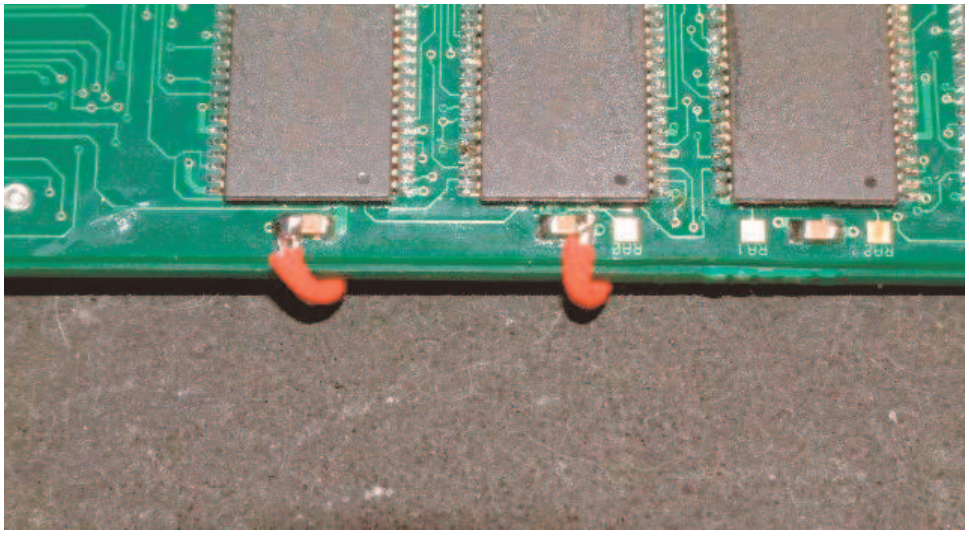
Very carefully inspect the whole memory board, including the pins of the chips, for any stray splatters or particles of solder than may be forming bridges, and remove any you find. Using the multimeter on the continuity setting, check that there is **NO** continuity between the VCC3 and GND holes on the board. Also check that there **IS** continuity between the GND hole and a convenient ground point (such as the shield of the serial port connector), and between the VCC3 hole and the +3V link in the power supply. This is the two pin jumper nearest the DC IN jack on the lower left hand side of the PCB as seen from the top when the connectors are towards you. Assuming everything checks out, apply a small amount of hot melt glue to the corners of the memory board to add strength. See the photo below.



Cut two pieces of the 1mm wire approximately 1cm long. Strip about 1mm of wire from each end of these pieces. Place the motherboard rightside up on the bench with the connectors facing away from you. Locate the rightmost capacitor in the block of four below the existing ram chips (circled in red in the photo below). Solder one piece of wire between the ***right*** end of this capacitor and the ***right*** end of the memory board capacitor beneath and to the right of it, folding the wire over the edge of the PCB as shown in the photo. Next, locate the leftmost capacitor in the block of four (circled in yellow in the top photo below). In a similar manner to the above procedure, connect the ***left*** end of this capacitor to the ***left*** end of the memory board capacitor immediately beneath it. Again, refer to the top photo. Be careful not to short out any vias in this process. When you have finished, you should have a result similar to the middle and bottom photos below. Now check that there is **NO** continuity between the VCC3 fixing hole on the memory board and the GND hole.

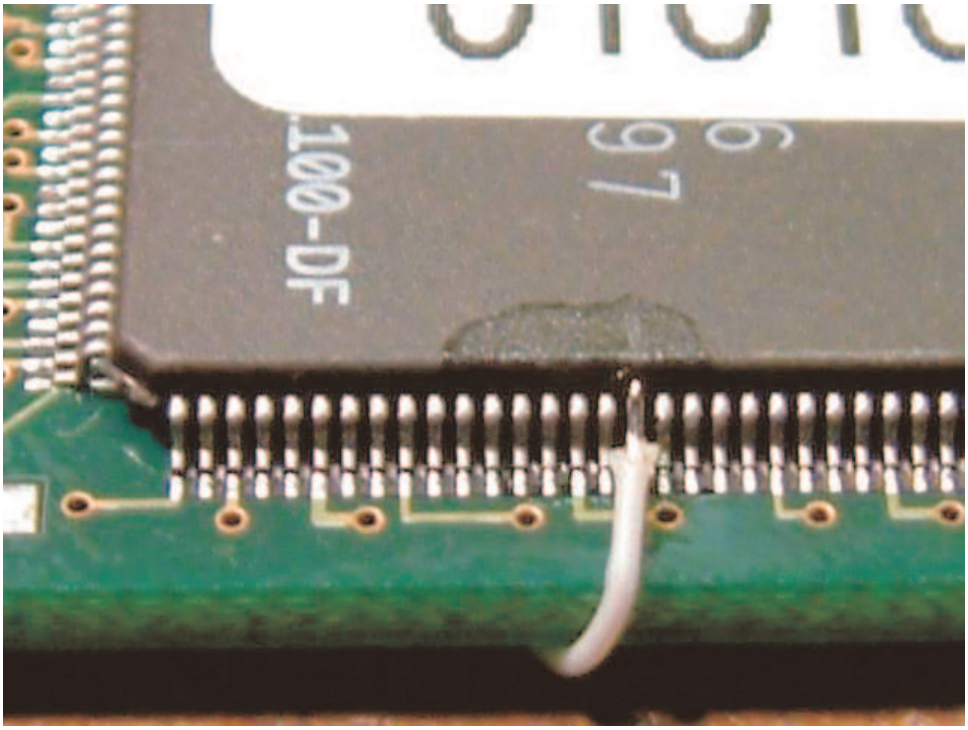




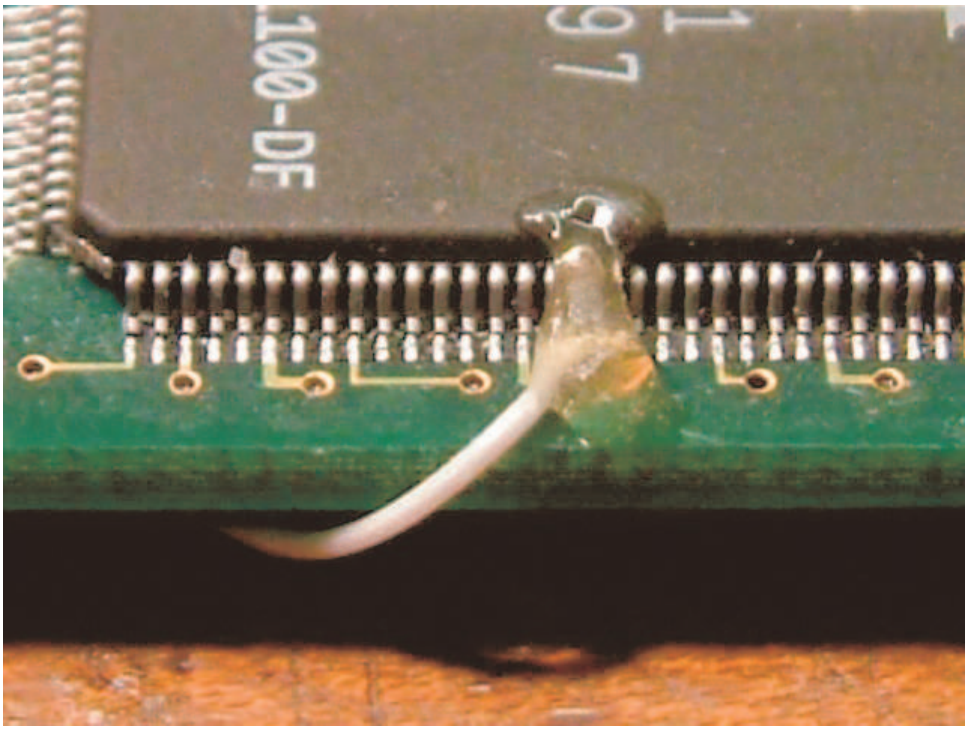


If you are content with 48MB of ram, you have finished the upgrade. If you want the full 64MB, one patch wire must be fitted, to connect the 4th bank select line (RA3) to the expansion board.

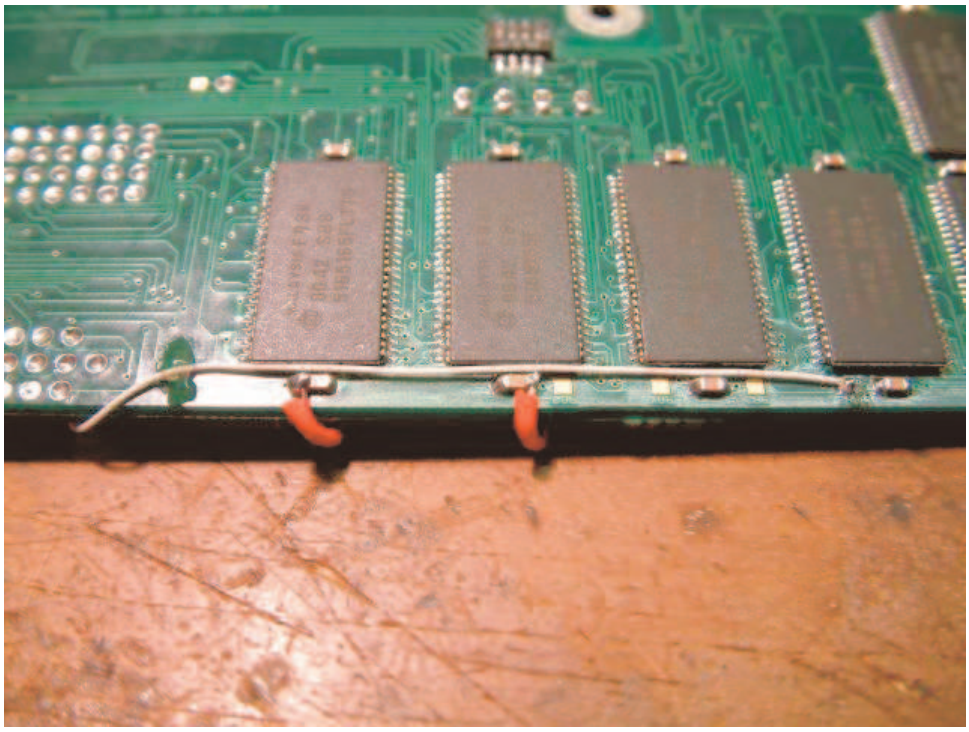
Place the motherboard rightside up on the bench with the connectors facing away from you. Count 17 pins from the left corner of the SA1100 strongarm chip. This is RA3. Mark it by sticking a small piece of masking tape to the top of the chip aligned with the bottom edge, and use a fine pen to indicate the correct pin. Count again and double check you have the right pin. Remove about 2mm of the insulation from the end of a piece of the fine wire. Tin the exposed end, and dip it in flux. Apply some flux to the pin of the SA1100 you have marked, and very carefully apply a small quantity of solder to it. This is best done by wiping the tip of the iron completely clean, then adding a very small amount of solder to the extreme tip. This can then be transferred to the pin. Apply more flux, and while holding the wire in the tweezers aligned with the pin, solder the two together. See the photo below.



Check very carefully with the magnifying glass under a bright light that you have not made any solder bridges. If you have, remove the wire, clean up the solder with the solder braid, and start again. Once you are absolutely sure that the wire is correctly soldered to the pin, apply a small amount of hot melt glue over the top of the pin and wire to fix it in place, and allow it to cool. See the photo below.



Bend the wire over the edge of the board and feed it along the memory board to the pad labelled RA3, which is on the top edge at the left side of center. Fit the wire between the capacitors and the top edge of the memory chips. Cut it to the correct length and remove 2mm of insulation. Tin the pad, and solder the free end of the wire to it. Use a little hot melt glue to fix the wire down. See the photo below.



Remove the kapton tape covering the switch. Set switch 1 (the one farthest from the center fixing hole) to off. If you have gone for a 48MB upgrade, do the same to switch 4 (nearest the center fixing hole). The remaining switches should all be on. Perform a final check for shorts between VCC3 and GND. Connect the motherboard to a PC running a serial terminal program set to 115200, 8, n, 1, with the correct cable, and apply power to the unit. You should get an output similar to the following:

```
empeg-car bootstrap v1.02 20001106 (hugo@empeg.com)
If there is anyone present who wants to upgrade the flash, let them speak now,
or forever hold their peace...it seems not. Let fly the Penguins of Linux!

e000 v1.04
Copying kernel...
Calling linux kernel...
Uncompressing Linux..................................... done, booting the kernel.
Linux version 2.2.17-rmk5-np17-empeg52-hijack-v417 (hijack@rtr.ca) (gcc version 2.95.3 20010315
(release)) #2 Sat Jan 15 19:12:21 EST 2005
Processor: Intel StrongARM-1100 revision 11
Checking for extra DRAM:
c1000000: passed.
c1100000: passed.
c1200000: passed.
c1300000: passed.
c1400000: passed.
c1500000: passed.
c1600000: passed.
c1700000: passed.
c1800000: passed.
c1900000: passed.
c1a00000: passed.
c1b00000: passed.
c1c00000: passed.
c1d00000: passed.
c1e00000: passed.
c1f00000: passed.
c2000000: passed.
c2100000: passed.
c2200000: passed.
c2300000: passed.
c2400000: passed.
c2500000: passed.
c2600000: passed.
c2700000: passed.
c2800000: passed.
c2900000: passed.
c2a00000: passed.
```

```
c2b00000: passed.
c2c00000: passed.
c2d00000: passed.
c2e00000: passed.
c2f00000: passed.
c3000000: passed.
c3100000: passed.
c3200000: passed.
c3300000: passed.
c3400000: passed.
c3500000: passed.
c3600000: passed.
c3700000: passed.
c3800000: passed.
c3900000: passed.
c3a00000: passed.
c3b00000: passed.
c3c00000: passed.
c3d00000: passed.
c3e00000: passed.
c3f00000: passed.
NetWinder Floating Point Emulator V0.94.1 (c) 1998 Corel Computer Corp.
empeg-car player (hardware revision 9, serial number 10101539) 64MB DRAM
```

For a 48MB upgrade, of course, the last line will report 48MB DRAM rather than 64MB.

For added strength, it is now recommended that you use cyanoacrylate glue to permanently attach the memory board to the motherboard. Using a cotton bud soaked in isopropyl alcohol, thoroughly clean the edges of the memory board and the motherboard under it. Once the alcohol has evaporated, apply a drop of the glue every couple of centimeters all the way around the edge of the memory board, avoiding the area around the center fixing hole. Do your best to refrain from glueing yourself to the furniture, as cyano can be devious that way. Leave the glue for a few hours to harden. Check that there is no part of the upgrade that protrudes past the dip switch, the lowest part of the board, or you may have difficulty refitting the motherboard into the case.

At this point you can reassemble the player, which is the reverse of disassembly as described in the preparation section. Be especially careful to fit the display and hard drive cables in the correct orientation, not one pin out either side. You have finished. Congratulate yourself.

Procedure for upgrading a MK2 player

After ensuring that the player is functioning normally after applying the software upgrades (if necessary) as detailed in the preparation section, you must reflash the bootloader with an issue 9 version to replace the issue 7 version that will be currently present. This is not difficult, **but must NOT be interrupted,** as a failed upgrade will render the player unable to boot. The only way of recovering from such a situation is to remove the flash chip from the motherboard and reflash it externally.

You will require a copy of the bootloader binary file, which should have been packaged in the same zip file as this manual, and a copy of Tony Fabris' LogoEdit program, available from **http://www.riocar.org/download.php?op=getit&lid=10** at the time of writing. To reflash the bootloader, first bridge with solder or a small piece of wire the two pads labelled 'Prot' found to the upper right of the flash chip. This unlocks the protected boot page of the flash. Connect the empeg to the PC with the correct serial cable. Copy the boot9.rom file to the same directory as the LogoEdit program. Start a command prompt, change directory to the location you have just copied the file to, and issue the command 'upload boot9.rom 0000 1' (the last number being whatever com port your serial cable is connected to, of course). Apply power to the player motherboard when prompted, and wait for the program to complete. Upon successful completion, close the command prompt and disconnect the motherboard. Remove the solder bridge on the Prot link.

Next, the existing ram chips must be removed from the motherboard. This is not something that I would recommend is attempted by a soldering neophyte, as the potential for damage to the motherboard is considerable.

There are two straightforward methods for removing the chips. One is simply to use a very sharp scalpel to carefully cut the legs from the body of the chips, remove the body part, and desolder the remaining legs from the pads on the board. With practice this method is very fast, but if you slip with the blade…

It is best, when using this method, to lightly run the tip of the scalpel blade along the one side of the chip over the tops of the pins several times. Eventually the pins will begin to separate, and a little more force on the last pass should cut cleanly through the pins. It is essential to not press too hard, or it's likely that the blade will contact the motherboard and possible cut one or more tracks. When one side has been completely cut through, you can score the pins on the other side, bend the chip body up carefully, wiggle it back and forth a couple of times, and the pins should break along the score mark. DO NOT force it! If you do, you may lift some PCB pads, which can be problematic. Once all the chips have been removed, use the

soldering iron with a well-wetted tip to wipe the remaining wire from the pads towards the center of the space once occupied by the chip.

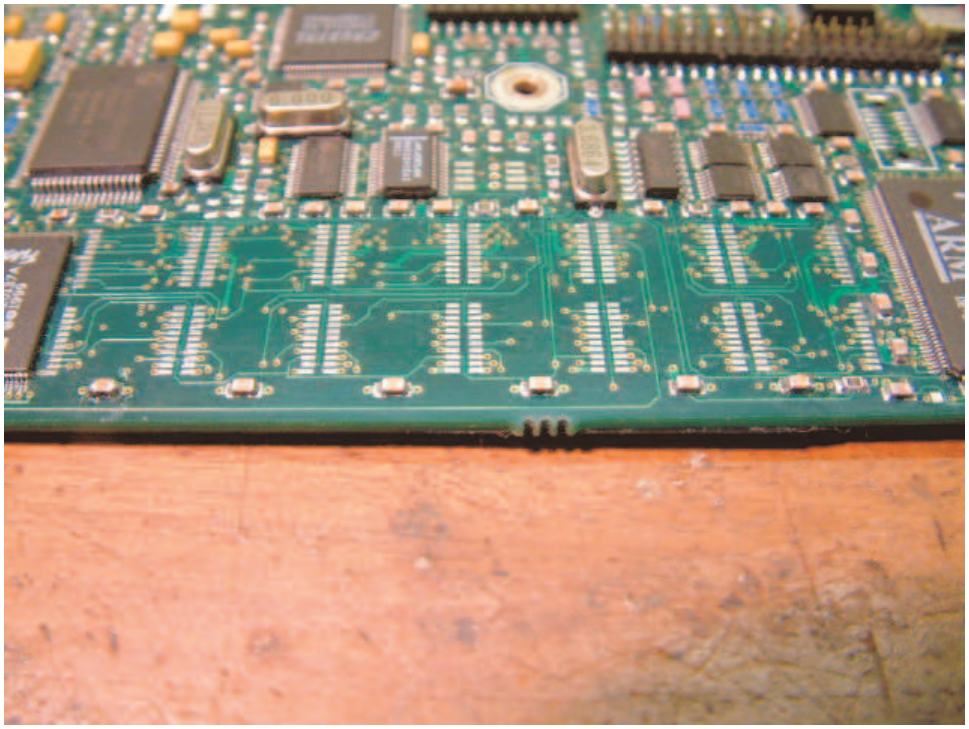
The other method, which is more time-consuming but easier, is to use a product called ChipQuik. This is an alloy of several metals, mainly bismuth, lead, and tin. It has a very low melting point of around 150 degrees C, and solder is soluble in it at this temperature. A SMD removal kit with sufficient materials for the removal of a couple of dozen ram chips is available in the US from Digikey: **http://www.digikey.com/scripts/DkSearch/dksus.dll?Detail?Ref=16323&Row=488641&Site=US** , and in the UK from CPC: **http://cpc.farnell.com/jsp/endecaSearch/partDetail.jsp?SKU=SD00632&N=411**

Instructions are supplied with the kits, but briefly the procedure for use is:

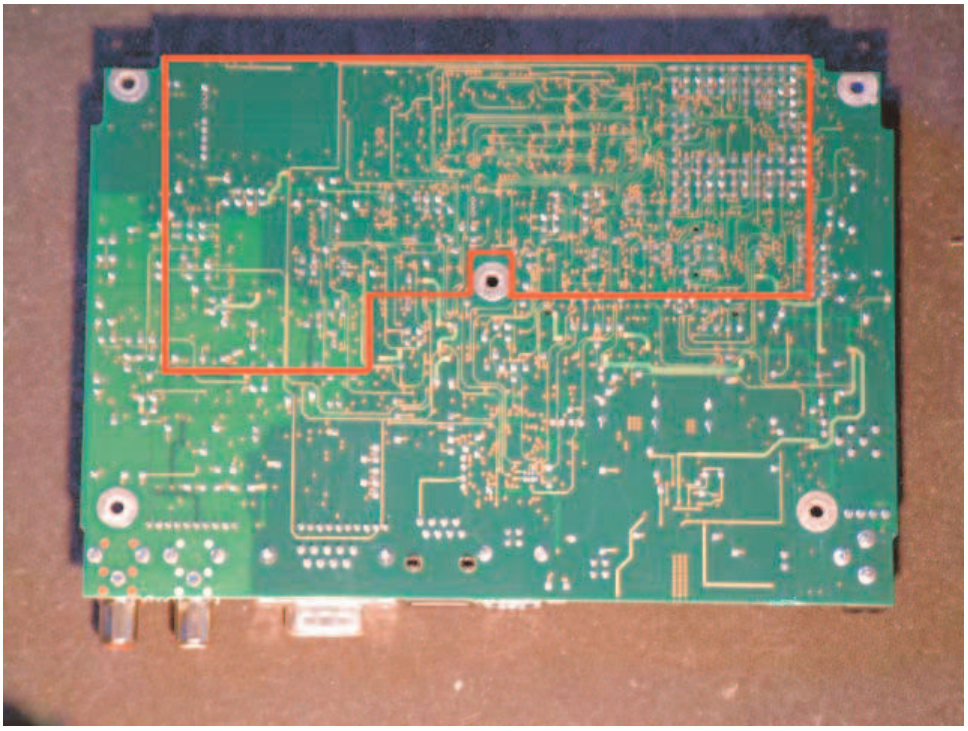
- Add flux from the kit to the joints of the chip to be removed.
- Apply the chipquik (which looks like a very brittle solder wire) to the pins of the chip, using enough to bridge all the pins together.
- Run the soldering iron down both sides of the chip to reflow the chipquick (it will stay liquid for 10-15 seconds).
- Using tweezers, lift the chip quickly away from the PCB.
- Clean the remaining chipquick from the pads with solder braid.

This method has the advantage that the chips removed are normally completely functional, once the chipquik linking the pins is removed. It is also unlikely to damage the PCB if done carefully.

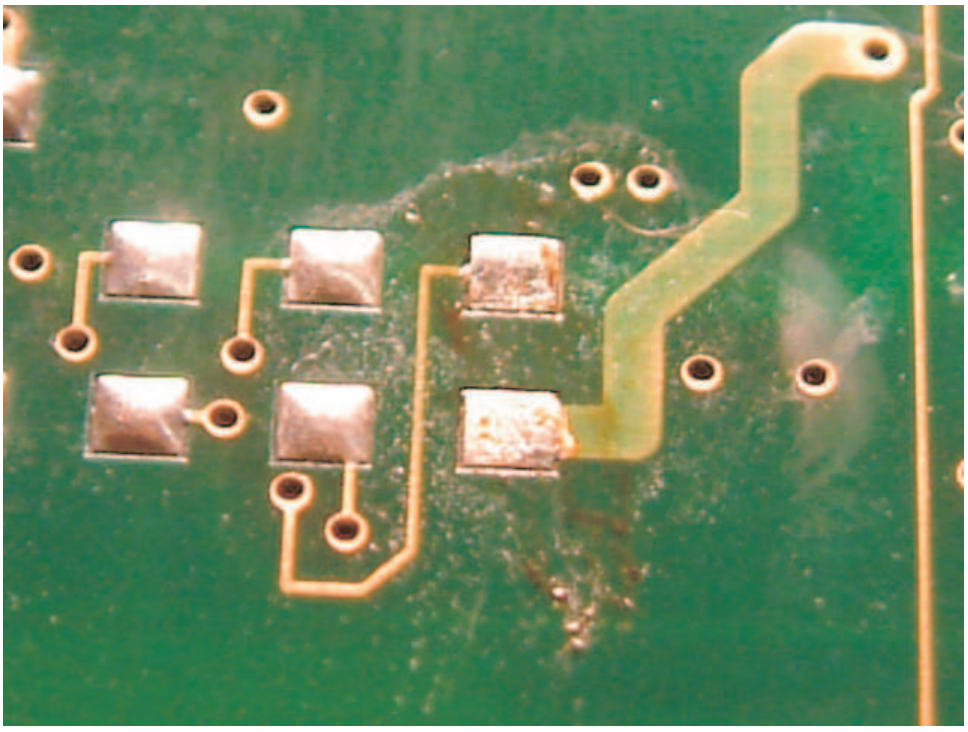
Check for shorts or solder bridges with a magnifying glass, then clean the pads with a cotton bud soaked in isopropyl alcohol. See the photo below.



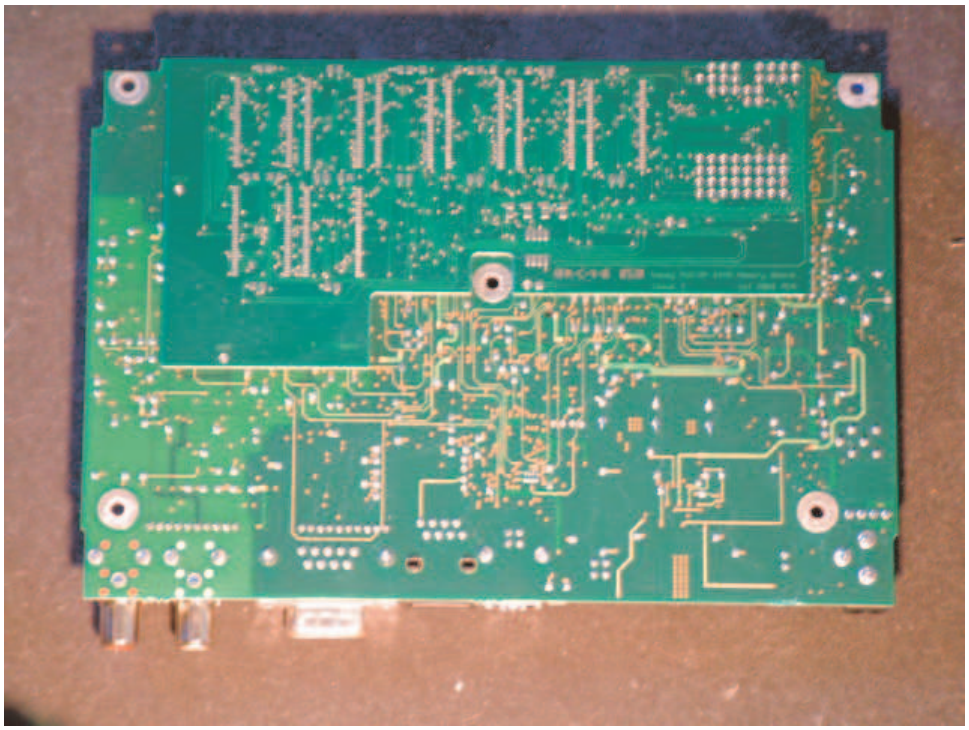
The memory board occupies the space on the bottom of the main board outlined in red below.



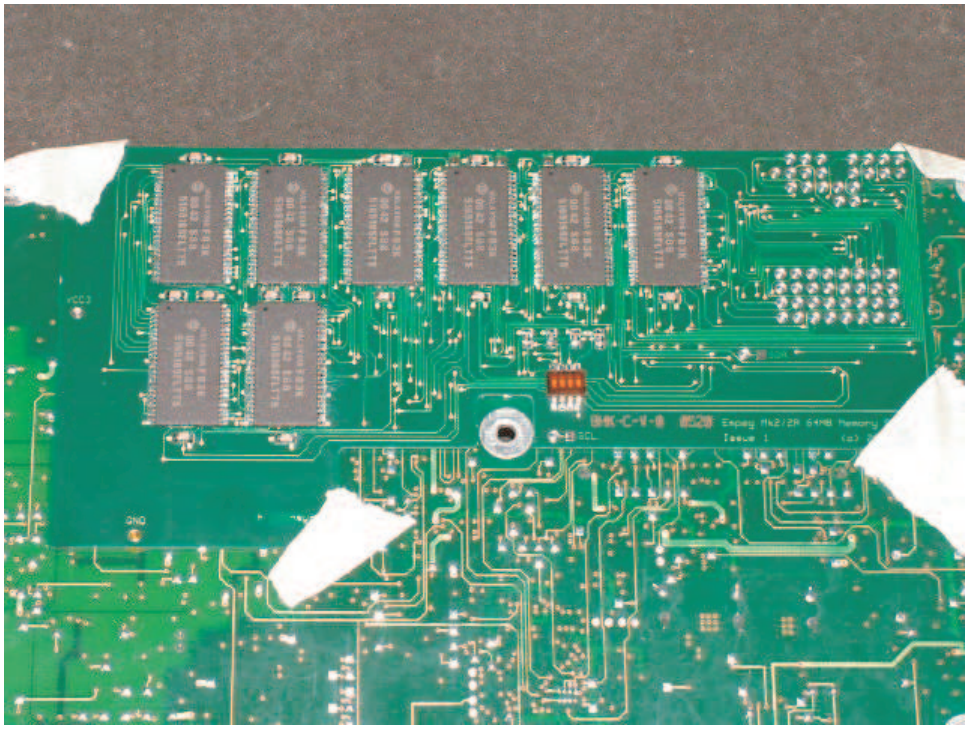
Using the solder braid, remove any excess solder that may be present on the square test point pads that lie within this region. Be careful not to overheat the pads, as the glue holding them to the board can soften and allow them to shift or tear loose. It is advisable to paint some flux onto the pads before applying the solder braid and soldering iron. Don’t apply too much pressure and keep the heating time to no more than a second or two. The desired end result is pads that are flat and smooth, rather than rounded or protruding, as shown in the photo below.



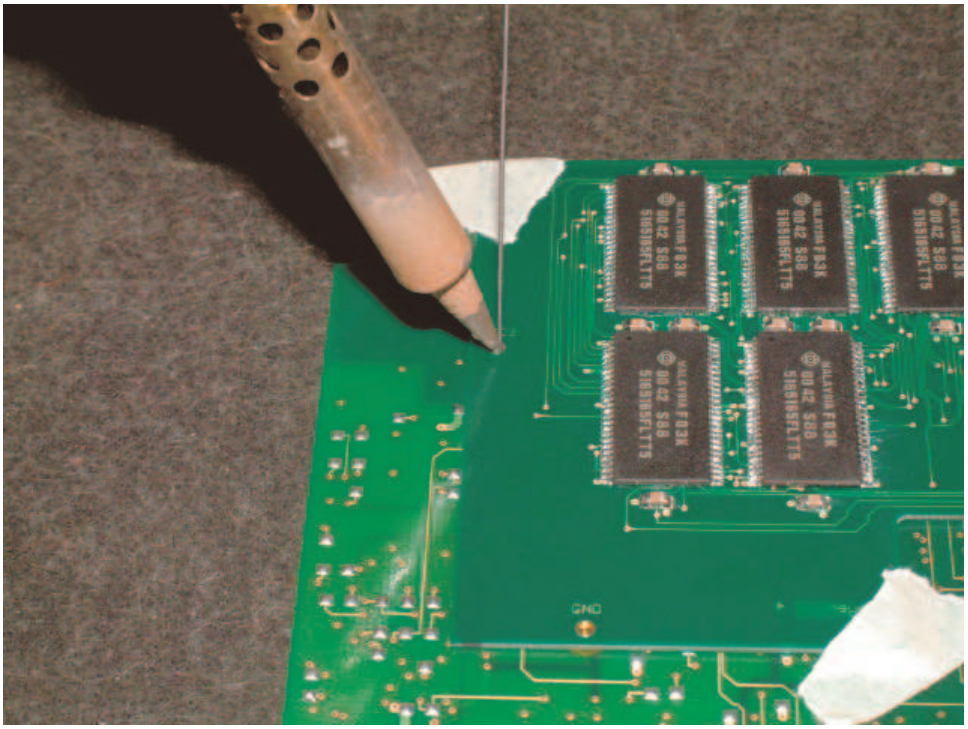
Test-fit the board as shown in the photo below. You should be able to see a test pad through each hole on the memory board. Pay especial attention to the VCC3, GND, SCL, and SDA holes, and the topmost hole on the right side. If these are correct the board is located properly. The top edge of the memory board should run parallel with, and almost in line with, the front edge of the motherboard.



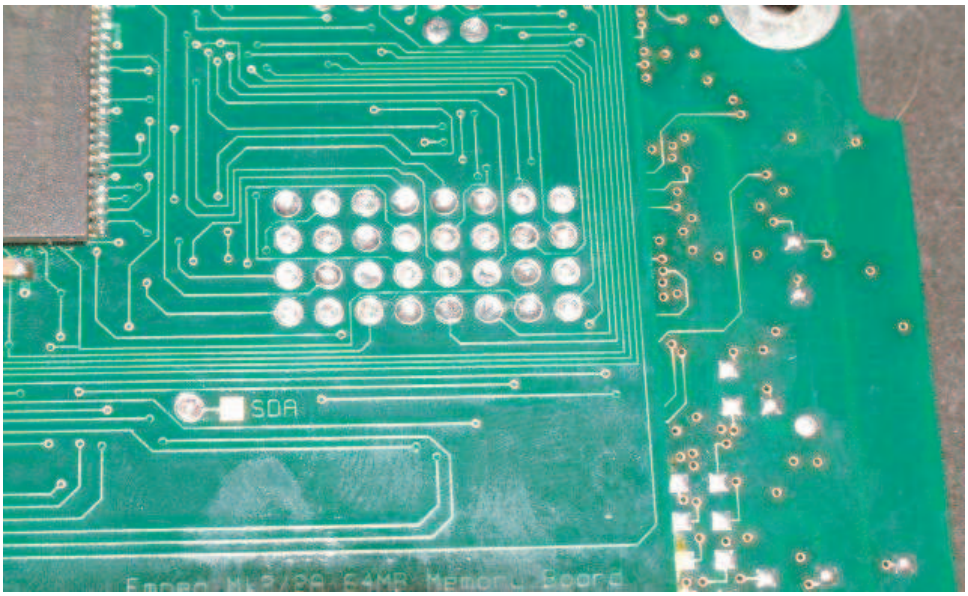
Remove the board, and apply flux to both the test pads on the motherboard and the holes in the memory board. Refit the board in the previously determined position, and temporarily fix it in place with small pieces of masking tape at the corners. Make very sure it is correctly aligned. See the photo below.



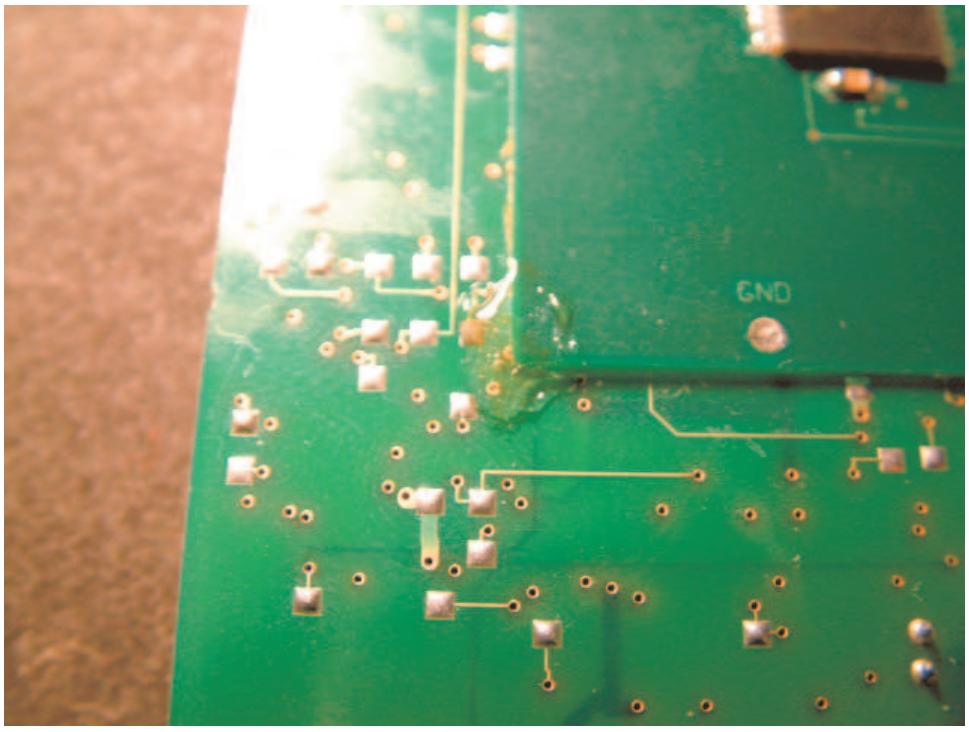
To attach the memory board to the motherboard, solder must be fed through each fixing hole so as to bond it to the underlying test pad. The procedure for achieving this is simple, but must be done carefully. The soldering iron tip must be of a size to allow it to fit through the fixing hole and touch the test pad, and allow the solder to be fed in past it. Tin the end of the iron and while making sure the board is pressed firmly against the motherboard, insert the iron tip into the hole. Add a little solder, so it flows around the tip and fills the hole. See the photo below.



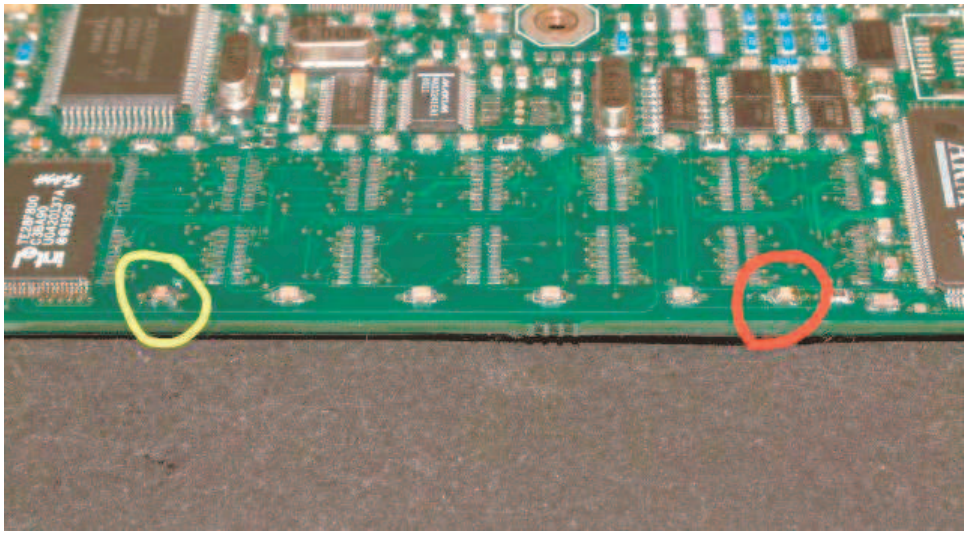
It is best to ‘stir’ the tip around a little, to make sure the solder evenly wets the entirety of the hole and pad. Don’t apply too much pressure or you may cause the pad to lift or move. This entire operation should take no more than a couple of seconds. Withdraw the iron and allow the solder to cool before releasing the board. Start with the VCC3 hole, then the top right hole. Once these are done, check carefully with a magnifying glass through each remaining hole that they are correctly aligned with their respective test pads. When you are sure that everything is correct, solder the remaining holes, noting that there is no connection to the GND hole. The solder should form a concave meniscus in each hole. Remove the masking tape. Clean off the flux residue with the isopropyl alcohol and a clean rag. See the photo below.

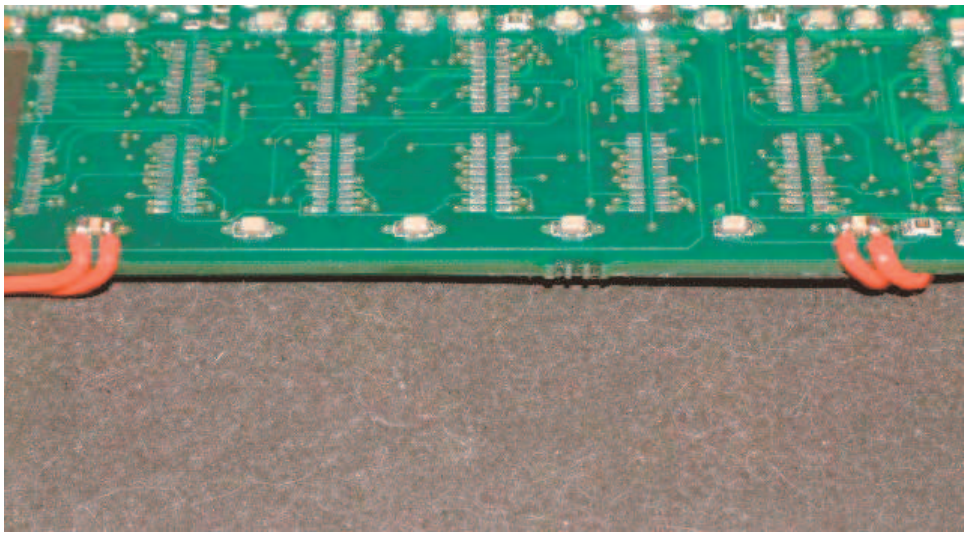


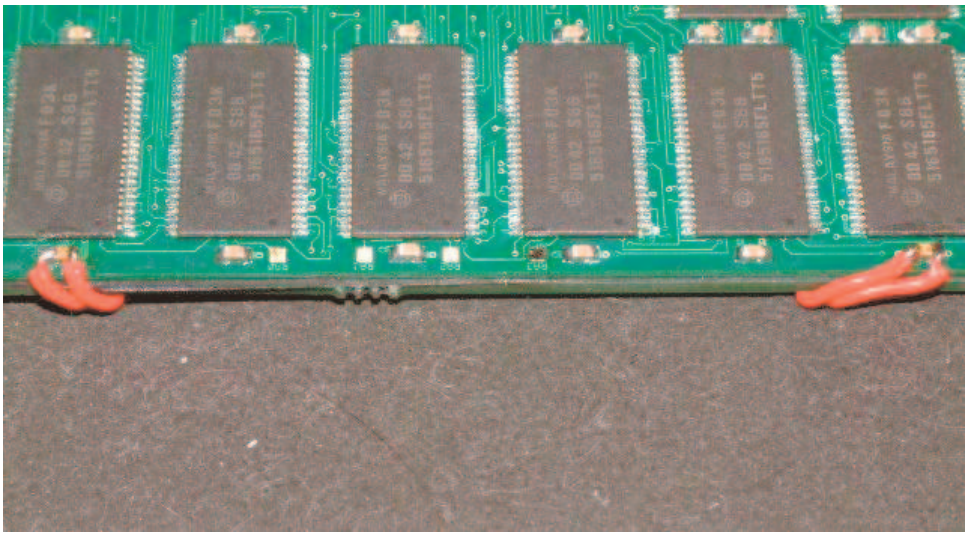
Very carefully inspect the whole memory board, including the pins of the chips, for any stray splatters or particles of solder than may be forming bridges, and remove any you find. Using the multimeter on the continuity setting, check that there is **NO** continuity between the VCC3 and GND holes on the board. Also check that there **IS** continuity between the GND hole and a convenient ground point (such as the shield of the serial port connector), and between the VCC3 hole and the +3V link in the power supply. This is the two pin jumper nearest the DC IN jack on the lower left hand side of the PCB as seen from the top when the connectors are towards you. Assuming everything checks out, apply a small amount of hot melt glue to the corners of the memory board to add strength. See the photo below.



Cut four pieces of the 1mm wire approximately 1cm long. Strip about 1mm of wire from each end of these pieces. Place the motherboard rightside up on the bench with the connectors facing away from you. Immediately to the left of the SA1100 processor, near the edge of the PCB facing you, is a surface mount capacitor. To the left of this is a surface mount resistor, and to the left of *that* is another capacitor (circled in red in the top photo below). Solder one piece of wire between the left end of that capacitor and the left end of the memory board capacitor beneath and to the right of it, folding the wire over the edge of the PCB as shown in the photo. In a similar manner, connect the other end of both capacitors with another piece of wire. Next, locate the capacitor near the bottom edge of the space for the ram chip nearest the flash chip (circled in yellow in the top photo below). Using the two remaining pieces of wire, connect the ends of this capacitor to the equivalent ends of the memory board capacitor beneath and to the left of it. Again, refer to the top photo. Be careful not to short out any vias in this process. When you have finished, you should have a result similar to the middle and bottom photos below. Now check that there is **NO** continuity between the VCC3 fixing hole on the memory board and the GND hole

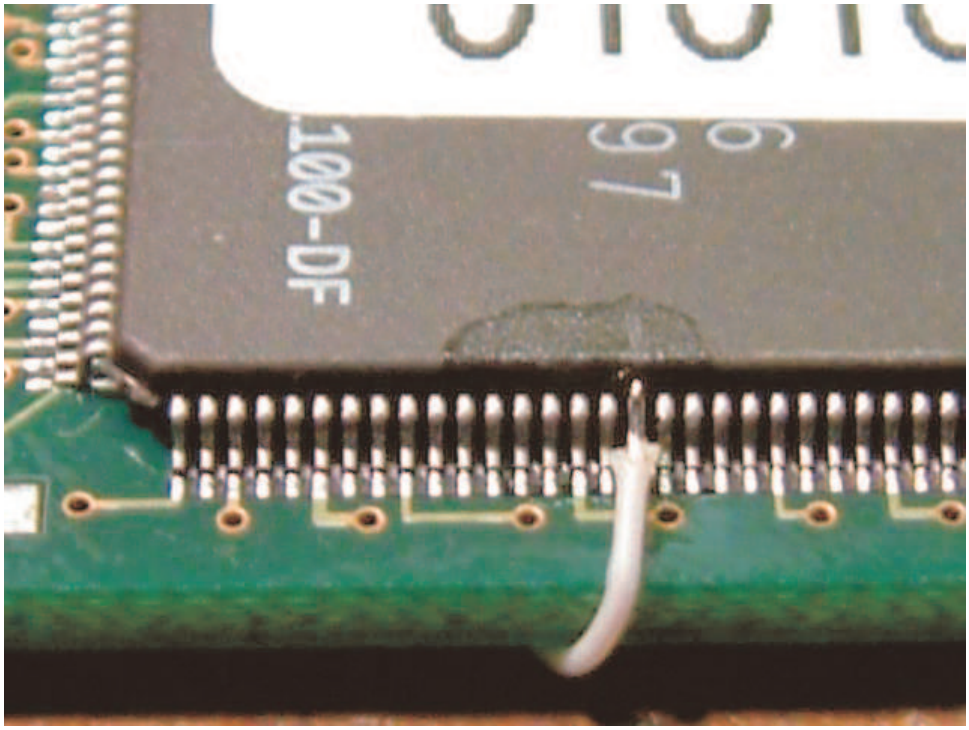




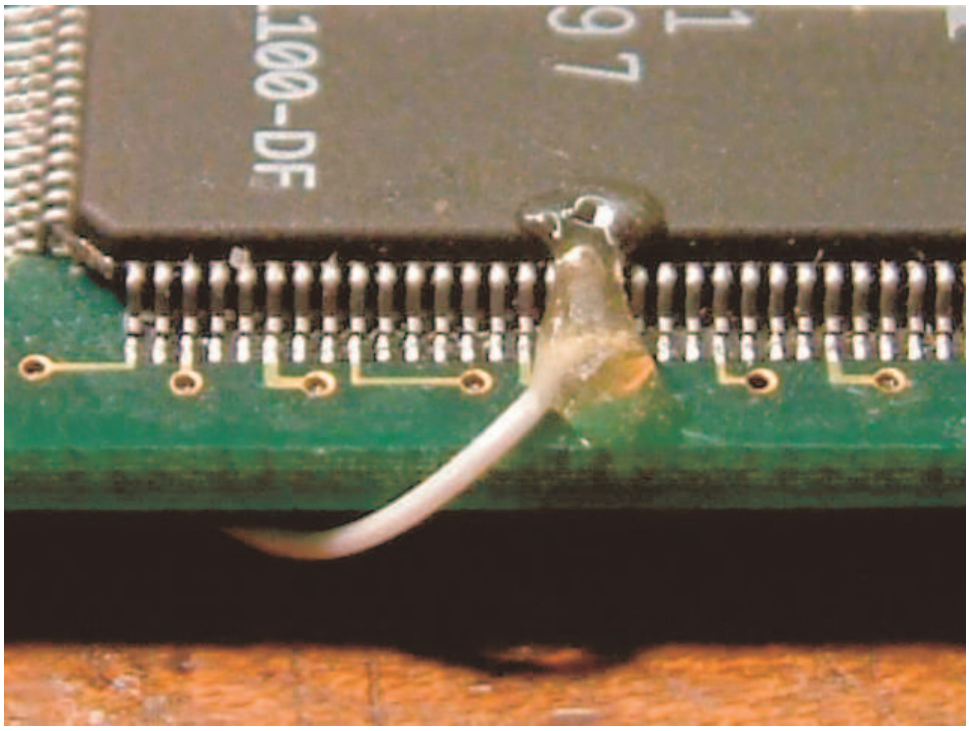


If you are content with 48MB of ram, you have finished the upgrade. If you want the full 64MB, one patch wire must be fitted, to connect the 4th bank select line (RA3) to the expansion board.

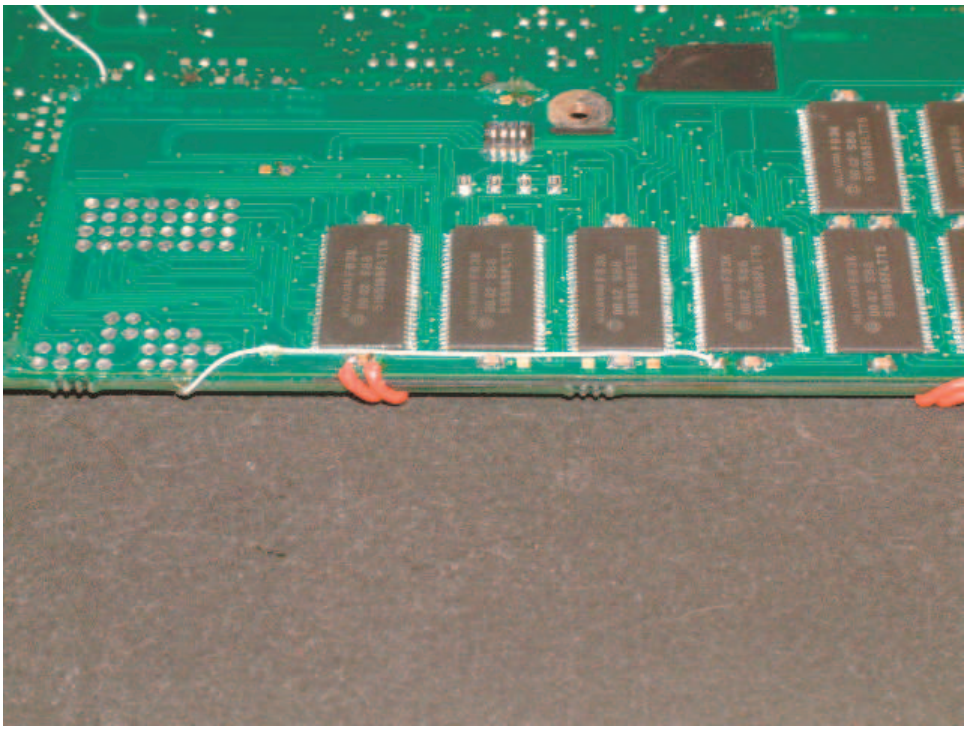
Place the motherboard rightside up on the bench with the connectors facing away from you. Count 17 pins from the left corner of the SA1100 strongarm chip. This is RA3. Mark it by sticking a small piece of masking tape to the top of the chip aligned with the bottom edge, and use a fine pen to indicate the correct pin. Count again and double check you have the right pin. Remove about 2mm of the insulation from the end of a piece of the fine wire. Tin the exposed end, and dip it in flux. Apply some flux to the pin of the SA1100 you have marked, and very carefully apply a small quantity of solder to it. This is best done by wiping the tip of the iron completely clean, then adding a very small amount of solder to the extreme tip. This can then be transferred to the pin. Apply more flux, and while holding the wire in the tweezers aligned with the pin, solder the two together. See the photo below.



Check very carefully with the magnifying glass under a bright light that you have not made any solder bridges. If you have, remove the wire, clean up the solder with the solder braid, and start again. Once you are absolutely sure that the wire is correctly soldered to the pin, apply a small amount of hot melt glue over the top of the pin and wire to fix it in place, and allow it to cool. See the photo below.



Bend the wire over the edge of the board and feed it along the memory board to the pad labelled RA3, which is on the top edge at the left side of center. Fit the wire between the capacitors and the top edge of the memory chips. Cut it to the correct length and remove 2mm of insulation. Tin the pad, and solder the free end of the wire to it. Use a little hot melt glue to fix the wire down. See the photo below.



Remove the kapton tape covering the switch. If you have gone for a 48MB upgrade, set switch 4 (nearest the center fixing hole) to off. The remaining switches should all be on. Perform a final check for shorts between VCC3 and GND. Connect the motherboard to a PC running a serial terminal program set to 115200, 8, n, 1, with the correct cable, and apply power to the unit. You should get an output similar to the following:

```
empeg-car bootstrap v1.02 20001106 (hugo@empeg.com)
If there is anyone present who wants to upgrade the flash, let them speak now,
or forever hold their peace...it seems not. Let fly the Penguins of Linux!

e000 v1.04
Copying kernel...
Calling linux kernel...
Uncompressing Linux..................................... done, booting the kernel.
Linux version 2.2.17-rmk5-np17-empeg52-hijack-v417 (hijack@rtr.ca) (gcc version 2.95.3 20010315
(release)) #2 Sat Jan 15 19:12:21 EST 2005
Processor: Intel StrongARM-1100 revision 11
Checking for extra DRAM:
c1000000: passed.
c1100000: passed.
c1200000: passed.
c1300000: passed.
c1400000: passed.
c1500000: passed.
c1600000: passed.
c1700000: passed.
c1800000: passed.
c1900000: passed.
c1a00000: passed.
c1b00000: passed.
c1c00000: passed.
c1d00000: passed.
c1e00000: passed.
c1f00000: passed.
c2000000: passed.
c2100000: passed.
c2200000: passed.
c2300000: passed.
c2400000: passed.
c2500000: passed.
c2600000: passed.
c2700000: passed.
c2800000: passed.
c2900000: passed.
c2a00000: passed.
c2b00000: passed.
```

```
c2c00000: passed.
c2d00000: passed.
c2e00000: passed.
c2f00000: passed.
c3000000: passed.
c3100000: passed.
c3200000: passed.
c3300000: passed.
c3400000: passed.
c3500000: passed.
c3600000: passed.
c3700000: passed.
c3800000: passed.
c3900000: passed.
c3a00000: passed.
c3b00000: passed.
c3c00000: passed.
c3d00000: passed.
c3e00000: passed.
c3f00000: passed.
NetWinder Floating Point Emulator V0.94.1 (c) 1998 Corel Computer Corp.
empeg-car player (hardware revision 9, serial number 10101539) 64MB DRAM
```

For a 48MB upgrade, of course, the last line will report 48MB DRAM rather than 64MB.

For added strength, it is now recommended that you use cyanoacrylate glue to permanently attach the memory board to the motherboard. Using a cotton bud soaked in isopropyl alcohol, thoroughly clean the edges of the memory board and the motherboard under it. Once the alcohol has evaporated, apply a drop of the glue every couple of centimeters all the way around the edge of the memory board, avoiding the area around the center fixing hole. Do your best to refrain from glueing yourself to the furniture, as cyano can be devious that way. Leave the glue for a few hours to harden. Check that there is no part of the upgrade that protrudes past the dip switch, the lowest part of the board, or you may have difficulty refitting the motherboard into the case.

At this point you can reassemble the player, which is the reverse of disassembly as described in the preparation section. Be especially careful to fit the display and hard drive cables in the correct orientation, not one pin out either side. You have finished. Congratulate yourself.