October 1989

XTRA-RAM

Installation Manual

Addendum Included ☐

Frontier Software

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Frontier Software

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remaining guarantee on that ST. You should not attempt the fitting on an untested ST. You will require about one hour to complete the fitting of the XTRA-RAM upgrade - It is best to try to do this fitting in one session.

Don't Worry! If after reading these instructions, you feel faint, Frontier Software offers a fitting service for £40 - This includes VAT, collection, fitting of the XTRA-RAM, testing and return of your ST to you. This will normally take two working days. Contact Frontier for more details.

If you have any problems during the fitting of the XTRA-RAM, please contact Frontier Monday to Friday 8:30am to 5:30pm on (0423) 567140 or 530577 for assistance. Our Fax number is England (0423) 522874.

- **Buying RAM Chips**

If you have purchased the XTRA-RAM upgrade without RAM chips (unpopulated) then you must now purchase the required chips.

To upgrade your ST to 1MB you will need **16 (sixteen)** of the following:

256K bit DRAM DIL chip - Part Number 41256 (or possibly 4256) . 150ns or faster.

To upgrade your ST to 2.5MB you will need 16 **(sixteen)** of the following:

1 Megabit DRAM DIL chip - Part Number 511000P. 120ns or faster.

Don't worry if you do not understand the above descriptions. If you read it to any supplier of memory chips then they will know exactly what you require.

These chips are usually supplied in a plastic tube or pressed into an anti-static pad. If your chips have been supplied to you pressed into white polystyrene (as used in ceiling tiles) you must return them and demand a refund. Polystyrene is not anti-static and chips pressed into it may be damaged or may fail after only a short time. There is a special anti-static polystyrene which is pink. This type will not cause any problems.

You must not fit fewer than the required 16 (sixteen) RAM chips into your XTRA-RAM upgrade. Each chip holds one bit of a number and therefore the ST being a 16 bit computer, requires 16 chips.

• **Installation**

There are five major steps to installing the Frontier XTRA-RAM upgrade into your Atari ST:

1 - Disassemble the ST
2 - Identify your ST type
3 - Fit the XTRA-RAM upgrade
4 - Reassemble the ST
5 - Test the ST to confirm correct fitting

• **Step 1** - Disassembly of the ST.

Although the principles used in the assembly of both ST keyboard models, STM and STFM are similar, there are some differences. As we go through the installation of the XTRA-RAM board we will point these out to you.

We will use a step-by-step description of each stage of the disassembly and will split these steps where the two main keyboard ST models differ. The ST/STM is just a basic keyboard while the STFM has a built-in power supply and floppy disk drive.

Note that where we mention an STM we are referring to both STs and STMs and where we mention an STFM we are referring to 520STFMs, 1040STFs and 1040STFMs.

Steps:

(1) You will need an area of table top approximately equal to two widths and two lengths of your ST's keyboard. You must not try do the installation of the XTRA-RAM in the usual space that your ST sits in. You will need a large area on which to spread everything out.

(2) You will require the following tools:

Small/medium Phillips screwdriver
Small flat blade screwdriver
Small long nosed pliers

Despite the obvious benefits you must <u>not</u> use an electric screwdriver when disassembling or reassembling your ST. This can damage your ST's case.

(3) When you have completely disassembled your ST, there will be many screws all of different sizes and shapes. There are two good methods for keeping these in order. One is to use separate envelopes for each type of screw. You can then write on the envelope the location and use of the screws. The second method is to use mugs or glasses into which you place the screws. You can then use small pieces of paper placed in the mugs or glasses to mark the location and use of the screws. This is important because you can damage your ST's case by using the wrong screws in the wrong locations.

(4) Turn your ST upside down so that the keyboard is face down on the work top in front of you.

(5) Unscrew all of the screws on the base of the ST (these are in square and round holes) using the Phillips screwdriver and place them in a mug or envelope. You may find that one of the screws is hidden under a small white label. There are 10 screws on an STFM and 6 on an STM. Keep the golden floppy disk screws separate (if this is an STFM). Also keep the screws from the front of the ST (which are usually slightly shorter) separate from the screws from the rear.

(6) Holding the two halves of your ST together, slowly turn the ST over and place it on your work top. Now remove the top and place it to one side as shown in figure 1.

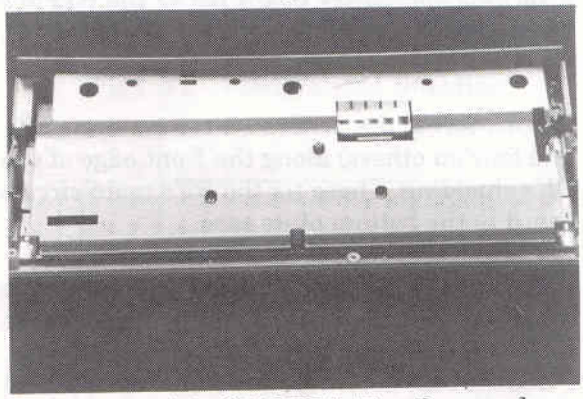


Figure 1(a) - STM With Top Removed

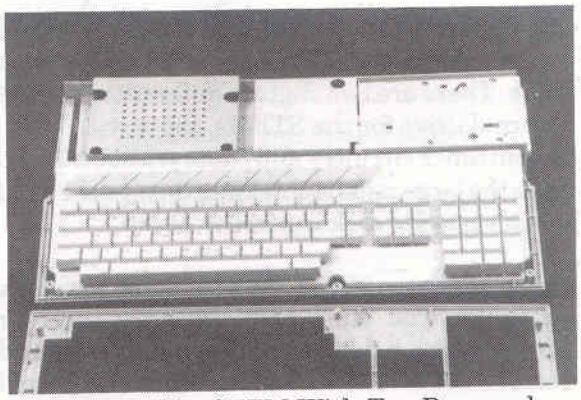


Figure 1(b) - STFM With Top Removed

Continues...

(7) Lift up the keyboard from the left hand side and you will notice that it is attached to the ST's main circuit board through a hole in the shielding by a connector on the right hand side of the ST. Lay the keyboard to one side as shown in figure 2 and, using the pliers, unplug the connector from the ST. Lift the detached keyboard up and place it to one side.

Skip to step 14 if you are disassembling an ST or STM.

(8) The STF and STFM computers have a built-in power supply. This is housed in the small shielded box at the left hand rear of the STFM. You must now remove this shielding. Undo the screws and straighten the twists shown in figure 3. Now remove the shielding and place it to one side. You will now see the power supply circuit board. You must not touch the components on this board. You might receive a small electric shock if you do! This is nothing to worry about - just be careful.

(9) At either side of the front of the power board inside the shielding you will see a screw attaching the power board leg to the STFM's main circuit board (as shown in figure 4). Unscrew both of these screws.

(10) Unscrew the screws (three on some STs and four on others) along the front edge of the ST's shielding. These fix the ST's main circuit board to the bottom of its case.

(11) Lift the top and bottom halves of the shielding slightly forward and up and remove them together from the bottom of the ST's case. Place the case bottom to one side. Put the main circuit board (contained within its shielding) on your work top.

(12) Before the top shielding can be removed you must disconnect the internal floppy disk drive. There are two slightly different models of internal drive for the STFMs, those with built-in controller circuitry and those without. If you have the large middle shielding then your STFM has a separate disk controller board.

(13a) If your STFM has a separate disk controller, you must now unscrew the four screws which hold the middle shielding on and remove the middle shielding. This will reveal the floppy controller board, which is linked to the main STFM's circuit board and the floppy disk drive by way of a ribbon cable. You must disconnect this cable and also unscrew the small earthing wire from the drive which is attached next to the ribbon cables. You must also disconnect the small four way power plug from the disk drive. You can now remove the

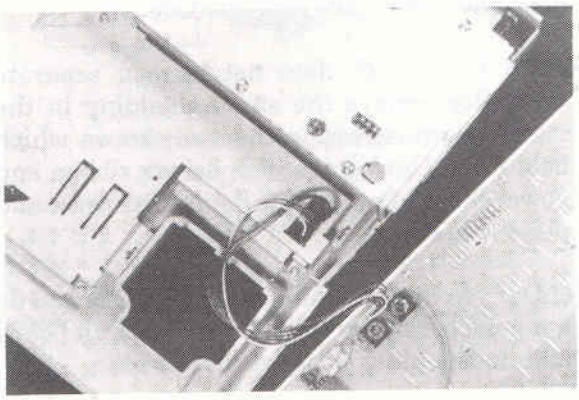


Figure 2 - Keyboard to one side

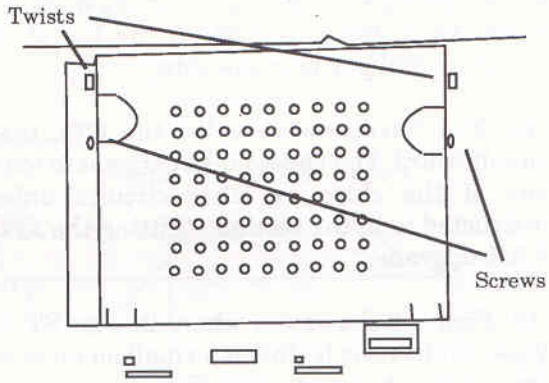


Figure 3 - Power Board shielding

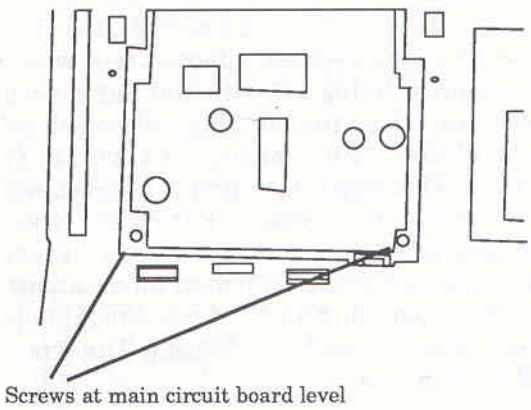


Figure 4 - Power Board screws

disk drive and place it to one side.

(13b) If your ST does not have a separate controller remove the small shielding in the middle by unscrewing the two screws which hold it on. Unplug the disk drive's ribbon and power cables. Remove the floppy disk drive and place it to one side.

(14) If you disassembling an ST or STM you do not need to remove the ST's main circuit board and its shielding from the plastic base.

(15) You must now disconnect the top of the main shielding from its base. You can do this by straightening all of the twists in the metal top at shown in figure 5. Lift off the top of the shielding and put it to one side.

(16) You have now revealed the ST's main circuit board. You should take care not to touch any of the chips or other circuits unless instructed to in the section - 'Fitting the Xtra-RAM upgrade.'

(17) Figure 6 shows you where in your ST the Video Shifter box is (this is a small metal shiny box). If this box has a lid (don't worry if your ST's Video Shifter box does not have a lid), you must untwist the two small twists at the front of the box (some STs have these twists soldered down. If this causes you any problems - contact Frontier). If your ST is an ST or STM, then the shifter lid might well be a different type which just requires prying off with the flat bladed screwdriver. Open the lid. This will reveal the Video Shifter chip labelled CO25914 or CO70713. This chip is mounted in a socket and will be used in the section - Fitting the Xtra-RAM upgrade (If your Video Shifter is not socketed contact Frontier for more information). If you are upgrading an STM you should now proceed with the section - 'Fitting The Xtra-RAM RAM Board.'

• **Step 2** - Identifying Your ST Type

There are four main types of circuit boards in STFMs (whether 520STFM, 1040STF or 1040STFM). You must now identify which of these types matches your STFM. We will call these types Type I, Type II, Type III and Type IV throughout the remaining text of these

Straighten each twist with the long nosed pliers

Figure 5

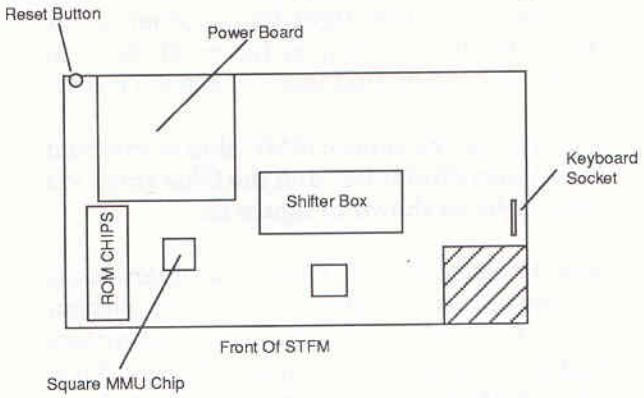


Figure 6a - STFM Type I

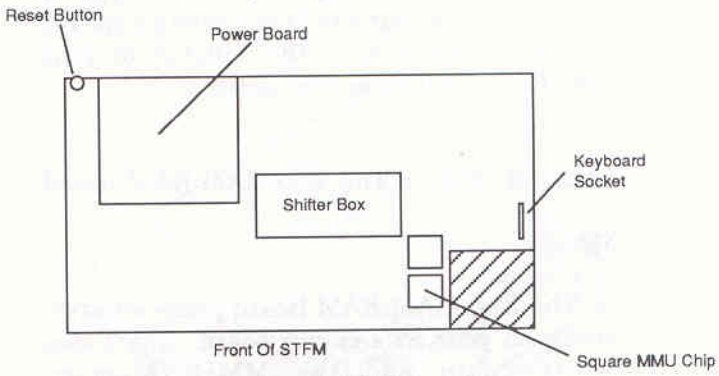


Figure 6b - STFM Type II

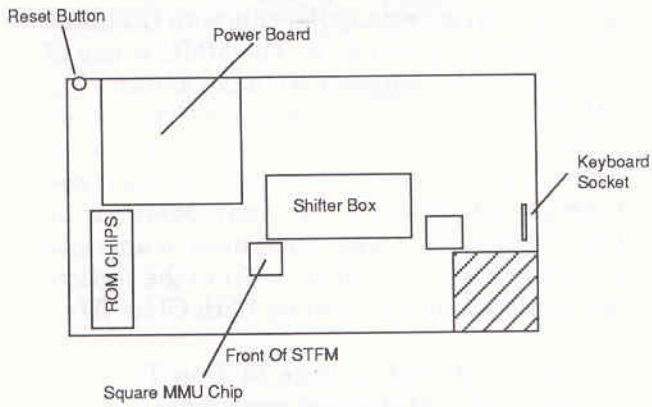


Figure 6c - STFM Type III

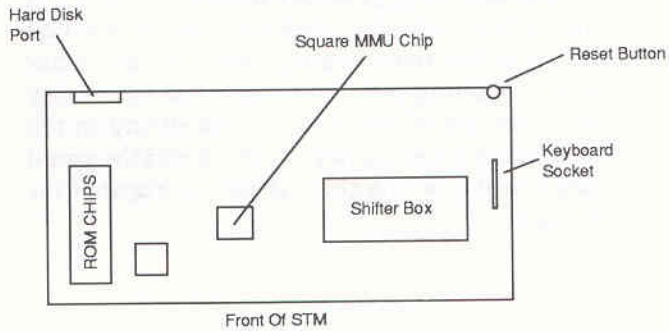


Figure 6d - STM

instructions.

Type I has one square chip to the left hand side and one to the right hand side as shown in figure 6a. Look at figure 7 to confirm that your ST is not Type IV.

Type II has the two square MMU and Glue chips in the bottom right hand corner of the circuit board as shown in figure 6b Look at figure 7 to confirm that your ST is not Type IV.

Type III has the square MMU chip to the front of the Video Shifter box and the Glue chip over to the right as shown in figure 6c.

Type IV Some STFMs have both square chips soldered directly to the circuit board without the need for sockets by a method called surface mounting. Figure 7 shows one of these sockets. If your STFM's square chips <u>are</u> socketed like this, then you have a Type I, Type II or Type III circuit board. If your STFM is indeed a Type IV, then you must contact the supplier of your Xtra-RAM for further instructions.

• **Step 3** - Fitting The Xtra-RAM RAM Board

Steps:

(1) The Xtra-RAM RAM Board plugs into two places on your ST's circuit board - the Video Shifter chip and the MMU (Memory Management Unit) chip. The Video Shifter is the large 40 pin rectangular chip with CO25914 or CO70713 written on it. The MMU is one of the two (or three if your ST has a blitter chip fitted) large square chips and has CO25912 or C100109 written onto it. These chips will have some other numbers on them after a dash (For example CO25912-38). If your MMU is a CIO25912-20, then you might need to upgrade or modify your ST slightly - refer to the section starting on page 30, 'Dealing With Older STs.'

(2) Refer to the box on page 14 'How To Avoid Static.' Having taken static precautions, remove the Video Shifter chip (from the open Video Shifter box) by <u>very</u> gently prising one end of it upwards with the flat bladed screwdriver. When this end has risen slightly, work on the other end - swapping ends often, until the entire chip has risen out of the socket and is sitting on top of it. Make a mental note of which end the small notch or dot on the chip (shown in Figure 8) is located.

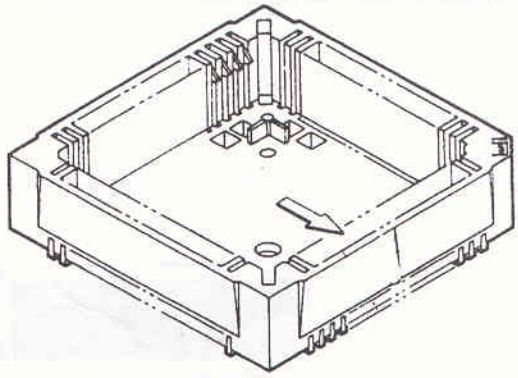


Figure 7 - An MMU socket

(3) Being very careful about static, pick the chip up (trying not to touch its legs) and place it into the socket of the XTRA-RAM's Video Shifter board, being very careful not to bend its legs and also being careful that all the legs are inserted correctly. Be sure to place the chip in the socket with the notches and cutouts as shown in figure 9.

(4) Place the XTRA-RAM's Video Shifter board into the now empty Video Shifter socket (so that the chip is the same way around as it originally was) on the main ST's circuit board being careful not to bend any of its legs in the process. Make sure that all of the legs are inserted correctly. Press the Video Shifter board down firmly. Bend the left hand twist down so that it is parallel with the main circuit board. Take the ribbon cable out of the box as shown in figure 10 and close the box lid by fastening the right hand twist with the pliers.

(4a) If you are upgrading an ST with 1MB then you should now read the section 'Using The Jumper Wires', on page 25.

How To Avoid Static

Static electricity which is generated by certain floor coverings and clothing can be potentially destructive to most electronic chips such as the ST's MMU and Video Shifter chips. Following these simple steps you can avoid static problems:

- Every time you move your feet, stand up or sit down during the fitting of the XTRA-RAM touch something metallic such as a table leg, metal lamp. This will dissipate the static.
- Wherever possible **do not** touch the legs of any chips.
- **Never** touch any components that you are not expressly told to touch in these instructions.
- Do not unpack any part of the XTRA-RAM until you are told to do so.

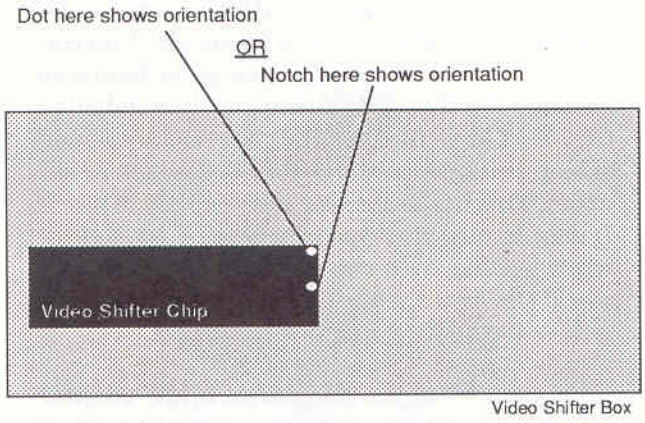


Figure 8 - Video Shifter orientation

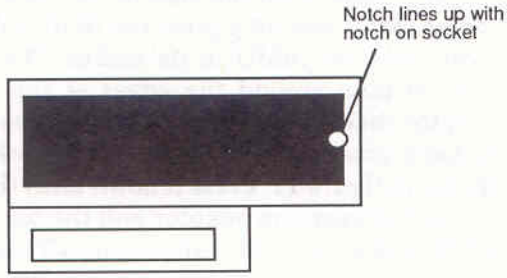


Figure 9 - Video Shifter on adaptor board

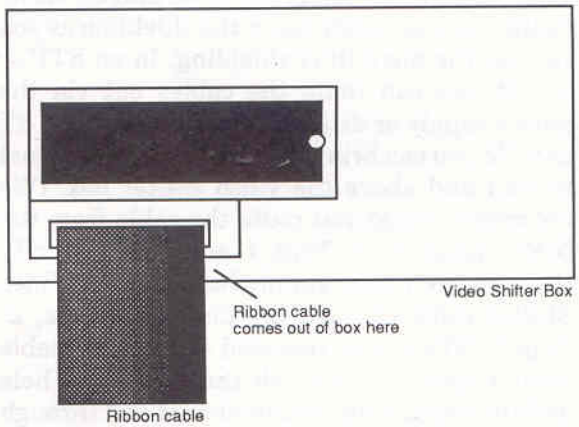


Figure 10 - Ribbon cable out of Video Shifter Box

(5) Now you must seat the MMU adaptor onto the top of the MMU chip in its socket. You can locate the MMU chip by following the diagrams on page 11. The MMU chip itself is labelled CO25912 or C100109 and is square. Along one side of the square MMU chip there is a small notch. This notch shows you which pin is pin 1. It should also correspond with a '1' written in white on the ST's circuit board. If there is a metal clip over the top of your MMU, remove it now with the flat bladed screwdriver.

(6) If you look at the XTRA-RAM MMU adaptor you will see a large one written next to one of the pins on the top side of the adaptor. This lines up with the notch on the MMU chip. Lining up the '1' on the adaptor and the notch on the MMU carefully push the MMU adaptor down onto the MMU in its socket. The three rows of pins around the edges of the MMU adaptor should press into the gaps between the socket's pins and the sides of the socket as shown in figure 11. Press it down until there is no gap between the adaptor and the top of the MMU socket. If you are upgrading a Type II ST then you will need to place a piece of thin card or thick paper over the top of the MMU adaptor to stop the top shielding shorting aginst it.

(7) Take the MMU adaptor's ribbon cable and the Video Shifter adaptor's cable and carefully route them out of the top of the shielding as you replace the top half of shielding. In an STF or STFM you can route the cables out via the power supply or disk drive holes and on an ST or STM you can bring them out via the hole just behind and above the video shifter box. (We recommend that you route the cable from the MMU adaptor in Type I and Type III STs through the power supply hole and the Video Shifter cable through the disk drive hole, in Type II STs this is reversed - the MMU cable should come out through the disk drive hole and the Video Shifter cable should exit through the power supply hole).

(8) Close up the top and bottom halves of shielding and refasten all of the twists. If you have an STF or STFM place the two halves back into the bottom case.

(9) Screw down the front edge of the shielding. If you are upgrading an STFM you can now screw down the front two screws into the power board's legs and replace the power board shielding top with the two small screws and two twists.

(10) Now you are ready to place the circuit board that contains the actual RAM chips inside your ST. You *must* follow the anti-static

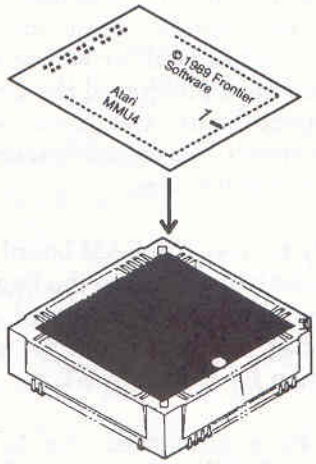


Figure 11 - MMU Orientation

precautions as discussed in the box - 'How To Avoid Static' on page 14. The chips that are fitted into the RAM board (or will be fitted by yourself, if you have purchased the XTRA-RAM upgrade unpopulated) are static sensitive devices. You must be especially careful not to touch any of the chips' legs.

(11) Carefully remove the RAM board from its protective static bag and place the bag on your worktop. Now place the RAM board onto the empty static bag. This will protect it while you locate a position for it in your ST.

(12) If you have purchased the XTRA-RAM upgrade unpopulated, you must now insert the RAM chips which you have purchased separately, as discussed in the box 'Inserting RAM Chips'. If you intend to go straightaway to 2.5MB, you need to upgrade the XTRA-RAM RAM board using the technique described on page 23.

(13) Figure 12 shows you the position that we recommend you place the RAM board for the STM and STFM. Connect the ribbon cable from the MMU and Shifter boards to the main XTRA-RAM RAM board (these should only be connected as shown in figure 14) at the places shown in figure 15 (each position is clearly labelled on the RAM board itself) and then place the RAM board in the position shown for your particular ST type.

(14) If you upgrading an STM (placing the RAM board in the position shown in figure 13), you will now need to cut the middle rear pillar of the top case so that it does on go through the RAM board. This can be done using a knife or hacksaw. You should cut the pillar as close as possible to its end.

(15) Attach the earthing wire (which comes out of the RAM board at a location labelled as 'GND3') under the power board shielding top if you are upgrading an STFM or to a twist in the shielding of you are upgrading an STM.

(16) Plug in the keyboard and fold the two ribbon cables that are now attached to the XTRA-RAM so that the keyboard can be placed back into its original position with the minimum of effort. This might take some time, but don't worry, the ribbon cables can be bent and folded without damaging them.

(17) You are now ready to reassemble your ST so that you can test your installation. See the section 'Reassembling Your ST.'

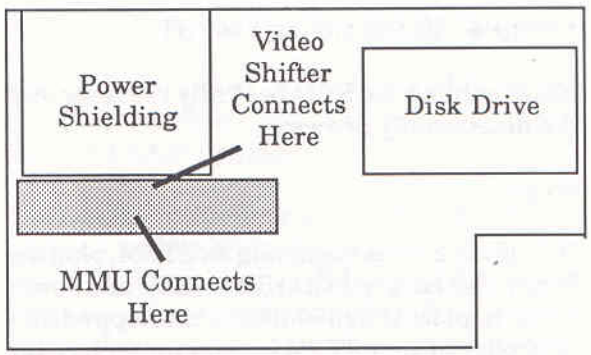


Figure 12 - The position of the RAM board in an STF/STFM. Place it up against the Power shileding on top of the main shielding.

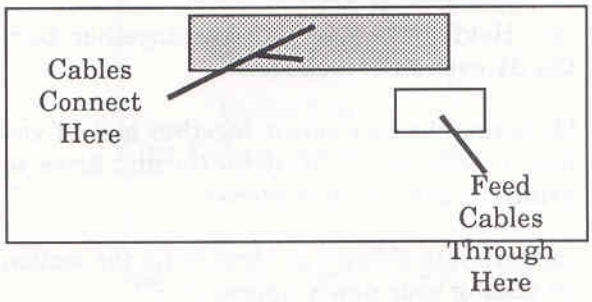


Figure 13 - The position of the RAM board in an ST/STM. Place it up against the back in the middle.

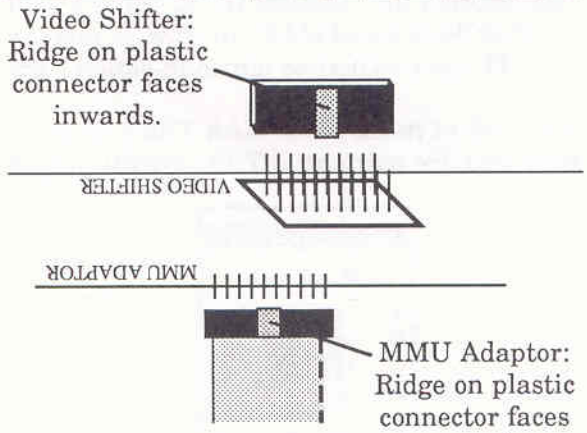


Figure 14 - How to plug in the connectors.

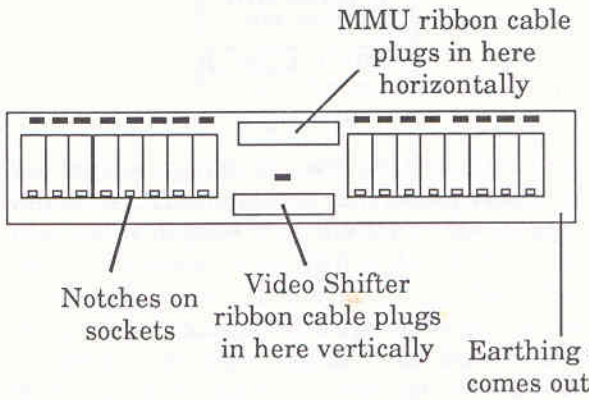


Figure 15 - Places for ribbon cables to plug in

• **Step 4** - Reassembling Your ST

Reassembling the ST is basically the reverse of the disassembly process.

Steps:

(1) If you are reassembling an STFM, plug the floppy disk back in to its ribbon cable and power cords. Replace the shielding on the floppy disk's controller (if your STFM has one) or replace the small middle shielding. Twist all of the tabs back to their original positions.

(2) Place the top of the ST back on.

(3) Holding the two ST halves together, turn the ST over on to its back.

(4) Screw the two halves together and (if you have an STF or STFM) screw the disk drive in using the three golden screws.

(5) Turn your ST over and proceed to the section on testing your newly upgraded ST.

• **Step 5** - Testing The XTRA-RAM Upgrade

The program called 'XTRA-RAM.PRG' on the XTRA-RAM utilities disk will test your newly installed RAM upgrade.

Double click on the program's icon on the desktop and you will be presented with the display in figure 15. Click on the OK box and the testing program will tell you how much RAM the MMU's internal test routines found when you turned on your ST. If this amount is not 1024K (for an

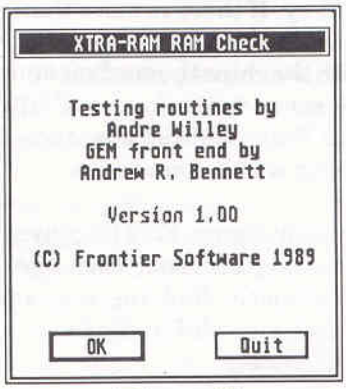


Figure 15

upgrade to 1MB) or 2560K (for an upgrade to 2.5MB) or 4096 (for a Mega 2ST upgrade to 4MB) then there is possibly a problem with the fitting of the MMU adaptor, the Video Shifter adaptor or with the RAM board itself (refer to the Trouble-Shooting section on page 31).

Click on TEST RAM to be taken to the main display (figure 16). The program will now start

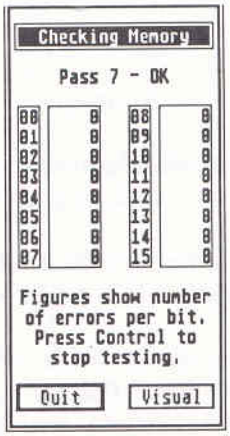


Figure 16

testing the upgrade and will tell you if there are any errors. The number of runs through memory (passes) is displayed at the top of the display with the number of errors found in each bit (an eighth of a byte) displayed below this. You should leave this part of the program to test the memory for at least half an hour. Don't worry that at the end of each pass through the memory the screen sparkles slightly - this is perfectly normal. When you return to your ST the display

will tell you if there have been any errors. If there are no errors shown then the installation has been succesful. Note that because your ST now has more memory, it will take slightly longer to boot when you turn it on.

Press the Control key once to stop the testing cycle. If there have been any bit errors you will now have the chance to click on the Visual button which will take you to a display which will show the XTRA-RAM. The RAM chips which have been found to be faulty will flash until you press any key. If there is more than a couple of chips flashing then there is probably nothing wrong with the chips themselves and you should check the connections from and fittings of the MMU and Video Shifter adaptors. Also check the earthing wire's connection.

If the dialog in figure 17 is displayed when you run the testing program then the MMU has failed to properly find the upgrade and you should check the MMU, Shifter and earthing wire connections.

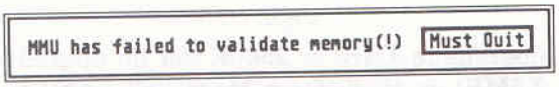


Figure 17

• Fitting the XTRA-RAM into Mega STs

These instructions apply to fitting the XTRA-RAM to Mega 1ST and Mega 2ST computers. You should read the instructions for a normal ST before you start the upgrade, taking especial note of the Anti-Ststic precautions listed on page 14.

(1) Using the Philips screwdriver, remove all fourteen screws from the bottom of the Mega ST.

(2) Turn the Mega ST over and remove the plastic top carefully. As you do this, unplug the small plastic connector just under the clock battery compartment.

(3) In the top shielding you will see four holes towards the top right hand corner as you look at the Mega from the front. Looking through the two front holes, you will see two screws which hold the power supply board to the bottom of the case (see figure 18). Using the Philips screwdriver, reach into these holes and undo the two screws.

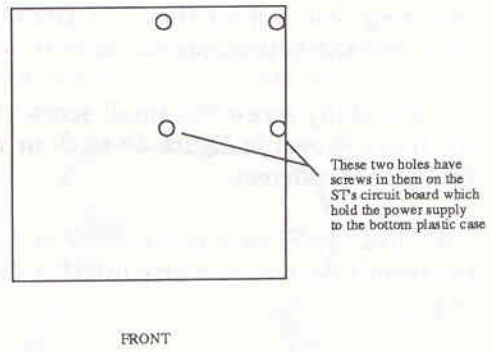


Figure 18

(4) Remove the bottom plastic part of the case from the shielding and place it to one side.

(5) Using the pliers, straighten all of the small tabs around the edges of the shielding.

(6) Squeeze the sides of the small plastic connector in the top left hand side of the top shielding (this was plugged into the clock compartment) and push it inside the case.

(7) Remove the top shileding.

(8) The MMU chip is located in its socket at the front edge of the main circuit board and the Video Shifter chip is located just to the left of the power supply board (as shown in figure 19).

(9) Plug in the MMU and Video Shifter adaptors as described on pages 14-16. Note that the Video Shifter is the other way around than

Continues...

on a normal ST.

(10) With the adaptors plugged in correctly, the ribbon cable should come out to the right from the MMU adaptor and towards the rear of the Mega ST from the Video Shifter adaptor.

(11) Using double sided adhesive pads, stick the main XTRA-RAM RAM board to a convenient place on the ST's circuit board (we recommend the top of the ROM chips) or stick it to the top shileding as you replace it, if you have other circuit boards mounted in your Mega ST.

(12) If you are installing the XTRA-RAM in a Mega 1ST you will also need to fit the two jumper wires as described on page 25.

(13) Replace the two power supply screws into their holes on the power supply legs so that you can refasten them when you have replaced the top shielding. Replace the top shielding, carefully plugging in the small plastic connector which you disconnected in step 6. Tighten up the all of the twist tabs.

(14) Place the top and bottom halves of the shielding (containing the ST's circuit board) back into the bottom plastic case.

(15) Carefully screw the small screws through the holes shown in figure 18 back in with the Philips screwdriver.

(16) Turn the ST over and replace and screw in the three long screws which hold the disk drive in place.

(17) Turn the ST back over and replace the plastic top. As you do this, plug the clock cable back into its connector in the top left hand corner of the top shielding.

(18) Turn the ST over again and refasten all of the other screws.

(19) Test the Xtra-RAM installation as described on page 21.

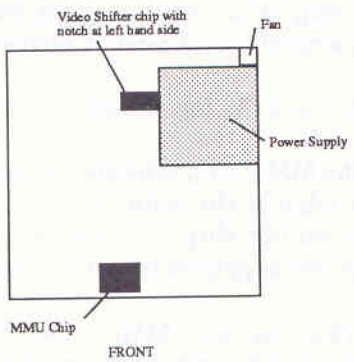


Figure 19

• Using The Two Jumper Wires

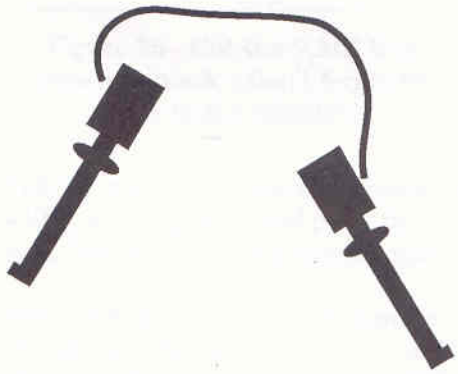
In the XTRA-RAM box you wil have found two red wires with a small jumper clip on each end. These should only be used in the fashion described below and if your ST is one of the following:

A 1040STF/1040STFM
A 520STFM already unpgraded to 1MB not using the XTRA-RAM
A 520ST/STM already upgraded to 1MB not using the XTRA-RAM
A Mega 1ST

These STs use both banks of memory in the computer. You will be replacing one of these banks with the XTRA-RAM. The bank of memory in the computer must be turned off and be sent into a 'sleep' state so that it does not consume a large amount of power. To do this:

(1) With the ST completely open, locate a large blue capacitor (a good one to use is one next to either the ROM or RAM chips over to the left of the ST's circuit board). This is a metal cylinder with legs coming out of each end.

(2) Along the length of the capacitor will run arrows each containing a small minus sign.



(3) Connect one end of each of both jumper wires to the leg of the capacitor which the arrows do **not** point to. ie the positive leg of the capacitor.

(4) Locate the MMU chip as described in step 5 on page 16. Near to this chip will be a row of small resistors (very small metal multi-coloured tubes). On an ST or Type I these are labelled R70-73, on a Type II they are labelled R90-94, on a Type III they are labelled R71-73, on an ST/M they are labelled R136 and R137 and on a Mega 1ST, they are labelled R72-R74.

Continues...

(5) Cut the end of **only** the **two** resisitors mentioned below at the end nearest to the MMU chip and bend the resistors upwards slightly.

ST Type I	R71 and R72
ST Type II	R93 and R94
ST Type III	R71 and R72
ST/STM	R136 and R137
Mega 1ST	R148 and R149

(Bend the resistors in an ST/M upwards from the right).

(6) Connect the other end of each jumper to one of the bent up resistors.

(7) Place the jumpers as flat as possible against the ST's circuit board making sure that the cut resistors are not touching any other components or each other (we recommend using insulation tape for this).

(8) Proceed with step 5 on page 16.

• How To Upgrade The XTRA-RAM From $^1/_2$MB To 2MB

If your XTRA-RAM was supplied by Frontier with RAM chips to expand your ST to 2.5MB then it will already have been upgraded to take the larger memory chips and you do not therefore need to read this section.

The XTRA-RAM has the capability to take 256Kbit DRAM memory chips to expand any $^1/_2$MB ST to 1MB and 1 Megabit DRAM memory chips to expand to 2.5MB. To upgrade the XTRA-RAM so that it can take the larger 1 Megabit DRAMs:

(1) You do not need to touch the MMU or Video Shifter adators.

(2) Remove the top of your ST as described on pages 6 to 8.

(3) Cut all of the wire links on the XTRA-RAM RAM board shown in figure 20. Do not forget the link in the middle of the board between the two connectors.

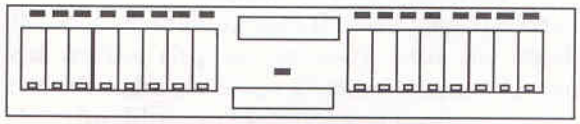


Figure 20 - Cut the $^1/_2$MB links shown in black (Don't forget the one in the middle!)

(4) Taking static precautions remove the 16 41256 memory chips and place them to one side. You will not need these again.

(5) Put the supplied seventeen jumpers over the vertical prongs marked L1 to L17 as shown in figure 21 If you have lost these jumpers, you can get a new set by sending a cheque for £2.00 to Frontier.

(6) The resistor network chip is plugged into positions 2 and 4 as shown in figure 22 (on page 28) for the $^1/_2$MB version. Move it to positions 1 and 3.

(7) Taking static precautions, follow the instructions on page 29 on how to insert the 1 Megabit memory chips as shown in figure 22 leaving one pin free next to the notch of each socket.

(8) Reassemble your ST. You have now upgraded your ST to 2.5MB.

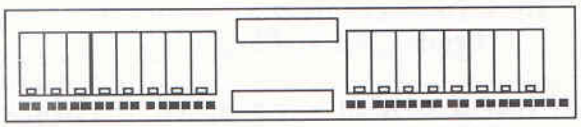
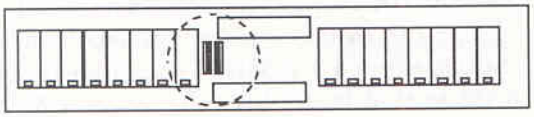


Figure 21 - Links for 2MB shown in black. Make these links with the small jumpers supplied



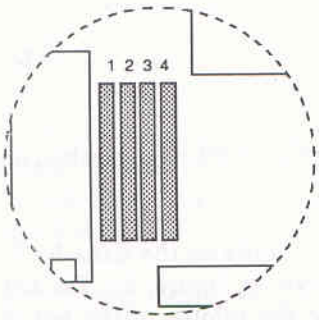


Figure 22 - The resistor network chip. Move it to the other pair of sockets.

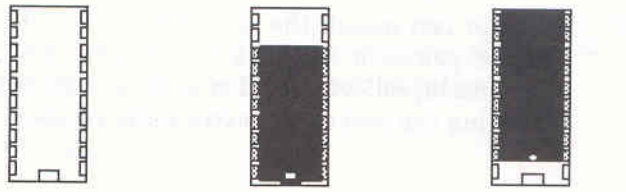
• Inserting RAM Chips

If you purchased your XTRA-RAM upgrade without any RAM chips (unpopulated) then you will need to install the chips described in the section 'Buying RAM Chips' into the XTRA-RAM RAM board. You should also read this section if you are upgrading the XTRA-RAM from 1MB to 2.5MB.

These chips are usually supplied in a plastic tube or pressed in an anti-static pad. If your chips have been supplied to you pressed into white polystyrene (as used in ceiling tiles) you must return them and demand a refund. Polystyrene is not anti-static and chips pressed into it may be damaged or may fail after only a short time. There is a special anti-static polystyrene which is pink. This type will not cause any problems.

Take the Static precautions described on page 14. Do not remove more than one chip at once from the tube or pad. Very carefully bend each set of legs of the chip against your desk so that the legs are straight rather than slightly curved.

Now place the chip in a socket on the XTRA-RAM RAM board making sure that the small notch or dot on the chip corresponds with the small notch on the socket as shown in figure 23 and that the chips are in the correct position for the chip type that you are using.



Empty Socket

Chip Position For Upgrade To 1MB

Chip Position For Upgrade To 2.5MB

Figure 23 - RAM chip orientation

Press the chip well into the socket. Repeat the process until all sixteen chips are in place.

You must not fit fewer than the required 16 (sixteen) RAM chips into your XTRA-RAM upgrade. Each chip holds one bit of a number and therefore the ST being a 16 bit computer, requires 16 chips.

Check that all of the empty sockets are filled and that all the chips are the correct way round.

• Dealing With Old STs

For the purposes of this manual an 'old ST' is one which was manufactured during 1985 or the first couple of months of 1986. If your ST has an MMU chip with the number CO25912-20 on it then it can also be described as an 'old ST'.

There are a couple of small problems which might arise if you try to install the XTRA-RAM upgrade into an old ST, but it is impossible to tell if these will occur unless you install the XTRA-RAM. We therefore recommend that you install the XTRA-RAM (which will in no way damage your ST or the XTRA-RAM if there is a problem) and see whether there are any memory errors when you run the testing software.

The two main areas which cause the memory error problems are the older version of the MMU and the need for better earthing to the RAM chips. The uncertainty is caused by the fact that some older MMU chips can control more than 0.5MB of memory and some cannot - There is no way of telling without first trying to install more than 0.5MB of memory.

If you do have a problem when you have installed the XTRA-RAM into your old ST first try making a better earth connection between the RAM board and the ST's main circuit board (phone Frontier for advice) and then you should try replacing the MMU chip with the latest version which is available direct from Frontier (at a cost of around £33+VAT).

Frontier can install the XTRA-RAM into older STs for you at a cost of £40 including VAT, installation, collection and return delivery but excluding the cost of any extra parts needed.

• Trouble Shooting - Dealing With Problems

As soon as you have installed XTRA-RAM into your ST and have switched on you will know whether the XTRA-RAM is operating properly or not.

The most obvious problems that will arise are:

Your ST fails to boot

This means that when you turn your ST on, very little happens and you will probably get a strange pattern or nothing on the screen. You must check:

- All ribbon connections from the Video Shifter and MMU adaptors to the XTRA-RAM RAM board.

- That the MMU and Video Shifter adaptors are properly seated in their respective sockets and that the MMU and Video Shifter chips are properly seated in the sockets on the adaptor boards with no legs bent.

- That you have installed the MMU and Video Shifter adaptor boards in the correct sockets.

- That the XTRA-RAM RAM board is not touching against the shielding and causing a short.

- The earthing wire is tightly fitted.

Your ST boots, but there are strange streaks across the desktop display

Check:

- The earthing wire is tightly fitted.

- All ribbon connections - check for any small nicks in the cables.

- That the Video Shifter adaptor is firmly seated.

- Run the test software. If it runs it will tell you if there is a faulty RAM chip (see the section 'Testing The XTRA-RAM'). If there are more than a couple of faulty chips, then the connections between the boards and fitting of the adaptor boards is probably to blame. If the

Continues...

streaks on the screen are fairly stable then a single faulty RAM chip could be to blame.

Your ST boots, seems OK, but crashes after some use

This is caused by a loose connection which is disturbed when you type on the keyboard. Check:

- All ribbon cable connections.
- The seating of the adaptor boards.
- The seating of the RAM chips.
- The fitting of the earth wire.
- The shielding is not touching the RAM board and causing a short.

If all else fails

Try disconnecting the Xtra-RAM RAM board from the two adaptor boards and then re-booting your ST. If the ST still doesn't operate properly then then problem is with one of the adaptor board connections. Try removing them both and reseating them tightly.

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Disclaimer

Frontier Software does not assume any liability for any consequential damage caused by the use of the XTRA-RAM upgrade or included software. Frontier Software also does not assume any liability for any damages caused during or as a result of installing the XTRA-RAM upgrade or resulting from parts not supplied by Frontier Software.

Ten Day Money Back Guarantee

The Frontier XTRA-RAM upgrade is covered by a ten day money back guarantee. This means that if the XTRA-RAM upgrade (including all circuit boards, software, disk, box, manual and other items supplied with the XTRA-RAM upgrade) are returned to the supplier in their original saleable condition then the supplier will offer a complete refund on the purchase price. In no way will Frontier accept the return of items for a ten day money back guarantee if they are not in their original condition (this includes *all* items supplied in the outer packaging and the outer packaging itself). Any soldering or other electronic changes made to any circuit board will immediately void the ten day money back guarantee and will also immediately void the normal twelve month guarantee. There will be *no* exceptions to this.

Guarantee

Frontier Software guarantee the XTRA-RAM Atari ST upgrade to be free from defects in materials and workmanship for a period of twelve months from the date of purchase by the user. If any parts or equipment becomes defective during this period Frontier Software will repair or replace them without any charge. If it is deemed by Frontier Software that the part(s) are defective through misuse, neglect or accident, then the repair or replacement will be undertaken at normal repair charges for materials and labour.

• What Is Included

In the XTRA-RAM box you should have found:

This manual
The XTRA-RAM main RAM board in an anti-static bag
The XTRA-RAM MMU adaptor board with ribbon cable attached
The XTRA-RAM Video Shifter board with ribbon cable attached
A disk containing memory testing and useful Public Domain software
Seventeen small black jumpers
Two jumper wires with clips (not required with $^1/_2$MB upgrade)
Addendum to this manual (only included if there is a tick mark on the back cover of this manual)

Do not unpack any of these until you are instructed to do so.

• Introduction

Congratulations on buying the XTRA-RAM upgrade for your Atari ST.

Once installed the XTRA-RAM will upgrade your $^1/_2$MB ST (520ST, STM or STFM) to 1MB or your 1MB ST (upgraded 520, 1040STF, 1040STFM) to 2.5MB. With the XTRA-RAM, you do not need to stop with 1MB, you can upgrade the XTRA-RAM later to give you 2.5MB, simply by changing RAM chips. If you intend to use the XTRA-RAM to upgrade your ST to 2.5MB straightaway, you must upgrade the XTRA-RAM using the method described on page 27.

Your ST and any peripherals that you might have will operate in exactly the same way as they have before, but you will have the added benefit of extra memory for your business programs, word processors, DTP packages, print spoolers, RAM disks and other programs.

This manual might look very complicated as you start the installation process, but don't worry because the instructions have been made purposefully long so that they include every detail that you will need to install the XTRA-RAM successfully.

You should read the instructions at least once before you start this project. This project requires no soldering and should therefore be suitable for a beginner providing that the instructions contained in the following pages are followed *very* carefully. Be warned, however, that fitting the XTRA-RAM into an ST will void any

• How To Upgrade The XTRA-RAM From ½MB To 2MB

If your XTRA-RAM was supplied by Frontier with RAM chips to expand your ST to 2.5MB then it will already have been upgraded to take the larger memory chips and you do not therefore need to read this section.

The XTRA-RAM has the capability to take 256Kbit DRAM memory chips to expand any ½MB ST to 1MB and 1 Megabit DRAM memory chips to expand to 2.5MB. To upgrade the XTRA-RAM so that it can take the larger 1 Megabit DRAMs:

(1) You do not need to touch the MMU or Video Shifter adators.

(2) Remove the top of your ST as described on pages 6 to 8.

(3) Cut all of the wire links on the XTRA-RAM RAM board shown in figure 20. Do not forget the link in the middle of the board between the two connectors.

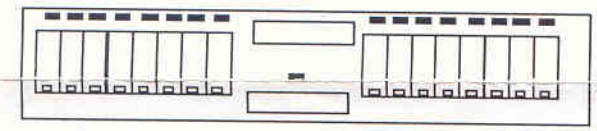


Figure 20 - Cut the ½MB links shown in black (Don't forget the one in the middle!)

(4) Taking static precautions remove the 16 41256 memory chips and place them to one side. You will not need these again.

(5) Put the supplied seventeen jumpers over the vertical prongs marked L1 to L17 as shown in figure 21 If you have lost these jumpers, you can get a new set by sending a cheque for £2.00 to Frontier.

(6) The resistor network chip is plugged into positions 2 and 4 as shown in figure 22 (on page 28) for the ½MB version. Move it to positions 1 and 3.

(7) Taking static precautions, follow the instructions on page 29 on how to insert the 1 Megabit memory chips as shown in figure 22 leaving one pin free next to the notch of each socket.

(8) Reassemble your ST. You have now upgraded your ST to 2.5MB.

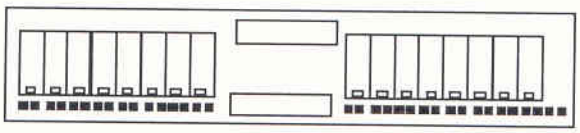
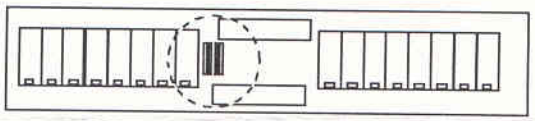


Figure 21 - Links for 2MB shown in black. Make these links with the small jumpers supplied



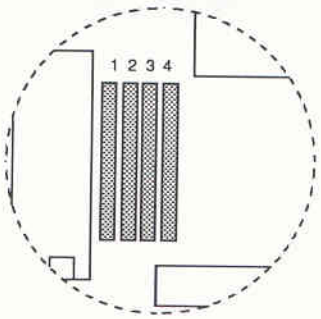


Figure 22 - The resistor network chip. Move it to the other pair of sockets.