

# Retro-Kit

Ultra VIDC Enhancer board

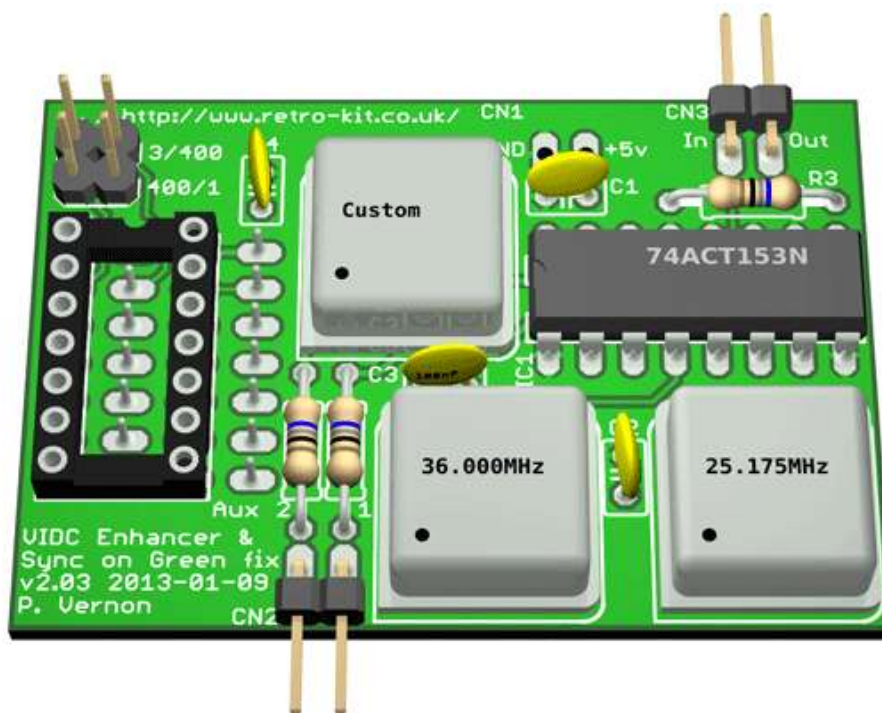
and

Sync on Green fix for

Acorn Archimedes series'

A300, A400, A400/1 and A3000

## Hardware Installation and Reference Manual



Improving monitor compatibility and delivering higher screen resolutions  
for the Acorn Archimedes range of computers

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## Copyright notice

The Ultra VIDC Enhancer Manual, schematic and PCB layout is copyright Paul Vernon (Retro-Kit) 2013.

The software used to control the Ultra VIDC Enhancer is based upon the work of Andreas Barth. Andreas' original work can be downloaded from the Retro-Kit website at the following address:

<http://www.retro-kit.co.uk/user/custom/Acorn/3rdParty/RetroKit/VIDCEnhancer/software/autovidc.spk>

Andreas' work was placed in the public domain and the copyright remains with him.

Retro-Kit was granted special permission to distribute a modified version of his work to support any Retro-Kit VIDC Enhancer projects.

Whilst copyright is retained by Retro-Kit, this manual, the schematic and PCB layout are placed in the public domain where unlimited use and distribution is permitted on a non-profit basis as long as all original Retro-Kit project files are included WITHOUT CHANGE.

## Disclaimer

This manual contains instructions that include stripping down your Archimedes and depending on the model, potentially performing track cuts and soldering new parts to the motherboard.

The Ultra VIDC Enhancer board also has the provision for the end user to over-clock the VIDC chip in their Acorn Archimedes computer.

All of the instructions in this manual have been written whilst working on a machine from the series at hand and if followed carefully, with a little common sense should take an hour or two to complete successfully.

If you undertake any over-clocking activities or carry out the work described in this manual on your computer, you do so at your own risk and you undertake that you will not hold Retro-Kit responsible for any damage that you may cause.

**If in doubt, find someone with the necessary skills or contact Retro-Kit to perform the work for you.**

Finally, this is a long document. Whilst I've made every effort to ensure the accuracy of the information within, there may be errors or omissions of which I'm unaware. The responsibility is upon the reader to double check the information within before carrying out any modifications to the hardware described.

## Introducing the Retro-Kit Ultra VIDC Enhancer board

The Retro-Kit Ultra VIDC Enhancer board is a hardware upgrade that allows early Acorn Archimedes computers to achieve screen resolutions and refresh rates that are only normally available in later Acorn computers such as the A540, A4000, A5000, A3010 and A3020.

The board also features a way to remove the Composite Sync signal that forms part of the Green signal in the A300, A400 and A400/1 series of Archimedes and is unique to the range of Retro-Kit VIDC Enhancers.

### How it works

The Ultra VIDC Enhancer board allows the Archimedes to achieve higher resolutions and refresh rates by providing increased clock speeds to the **VIDEo Controller (VIDC)** chip on the motherboard. Once fitted and suitable software is installed, its operation is transparent to the user and the board will automatically switch between the Archimedes' own 24MHz clock and one of the new clock speeds provided by the Ultra VIDC Enhancer board depending on the screen mode selected.

When installed, a basic Ultra VIDC Enhancer allows a RISC OS 3 based Archimedes to deliver the desktop environment at the SVGA resolution of 800x600 with a horizontal frequency of 35.156 kHz and vertical frequency of 56.250 Hz using the native screen mode, MODE 31. With RISC OS 2, MODEs 29 to 31 are unavailable however the VIDC Enhancer delivers improved refresh rates for VGA screen modes.

An expanded Ultra VIDC Enhancer fitted with an oscillator suitable for over-clocking can deliver the same screen mode with a higher refresh rate or depending on the oscillator fitted, custom screen modes with resolutions of up to 1024x768.

For the technical detail describing how the Ultra VIDC Enhancer switches between VIDC clock signals, please refer to [Appendix D](#).

### A note about monitors

In order to support as many Archimedes screen modes as possible, ideally a Multi-sync monitor capable of horizontal refresh rates ranging from 15-50kHz and vertical refresh rates of between 50-75Hz should be used.

Some SVGA monitors no longer sync down to the SVGA refresh rates that the 36MHz oscillator can provide. If you find that your monitor is in this group, switching out the 36MHz oscillator for a 40MHz oscillator will deliver SVGA refresh rates suitable for these monitors without any modification of the AutoVIDC software.

**NOTE:** When using a 40MHz oscillator, the VIDC chip is effectively being over-clocked and will require cooling to maintain stability and prolong its life. Please refer to [Appendix C](#) for details about over-clocking the VIDC chip and [Appendix H](#) for details of monitors that have been tested with an Ultra VIDC Enhancer.

## Differences between RISC OS 2 and RISC OS 3

When using your Archimedes with screen modes 12 - 15 and other modes that have a 15kHz horizontal refresh rate, the way in which RISC OS 2 and RISC OS 3 handles these modes is different when connected to a VGA or SVGA monitor.

In RISC OS 2, the modes are output exactly as if they were being output to a standard 15 kHz capable monitor or television which means they cannot be displayed on a VGA or SVGA monitor. To be able to view all of these modes and the VGA and SVGA mode when using RISC OS 2, a multi-sync monitor is required.

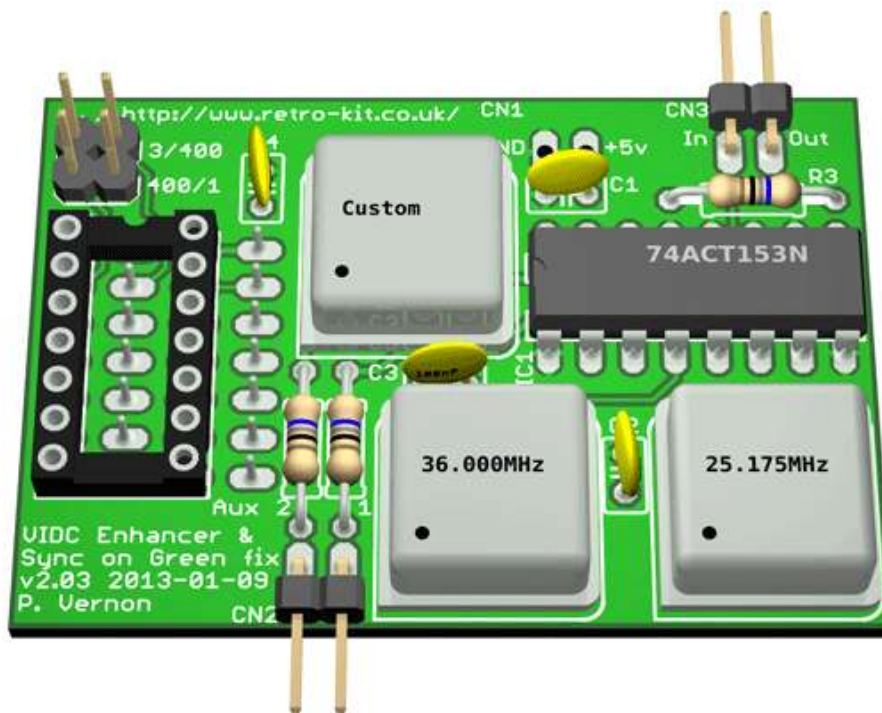
In RISC OS 3, the modes are re-mapped to a suitable screen size and refresh rate for display on a (S)VGA monitor. This means that all of the available screen modes can be displayed on a (S)VGA monitor. Due to the re-mapping process, the affected modes are displayed with a "letterbox" effect which is documented by Acorn and can be also found in [Appendix B](#) of this manual.

Further to the lower MODEs not being available in RISC OS 2, it also does not support the Super VGA or LCD monitor-types. Therefore MODEs 29-31 are unavailable even when an Ultra VIDC Enhancer is fitted.

Please refer to [Appendix A](#) to see all the Monitor Types supported by RISC OS and their values.

## Differences for each model of Archimedes

### Riser board configuration



When the Ultra VIDC Enhancer board is supplied in its riser board configuration, it draws its power from the socket on the motherboard to which it is plugged in and therefore requires no extra power connections.

The model of the Archimedes the Ultra VIDC Enhancer board is being fitted to dictates which integrated circuit on the motherboard needs to be replaced by a socket to apply the Sync on Green fix that the board features.

In the original A300 and A400 series, this will be the 74LS05 located in position IC4.

In the later A400/1 series, this is the SN7438 located in position IC9<sup>1</sup>.

Finally, although not recommended, in the A3000, this would be the 74HC04N located in position IC47.<sup>2</sup> To see the recommended A3000 configuration, skip to the section covering the non-riser configuration of the Ultra VIDC Enhancer board.

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<sup>1</sup> The SN7438N is sometimes replaced in the A400/1 with an equivalent part which has the code 733W00127.

<sup>2</sup> It is not recommended to fit the A3000 with a riser board configuration as this model does not have the "Sync on Green" issue and the space underneath the keyboard where the board fits is extremely limited.



The chip that is fitted to the socket IC2 on the Ultra VIDC Enhancer board should match the chip on the motherboard and is supplied with a suitable chip for the Archimedes you own. The riser board can be transferred to other models of Archimedes by changing the chip fitted to IC2 as required.

The bank of jumpers PL1 on the Ultra VIDC Enhancer board have different settings depending on which series of machine the Ultra VIDC Enhancer is fitted to.

### **A300 and A400**

In the A300 and A400, the jumper marked 3/400 controls the Sync on Green fix. The jumper should be OPEN to remove the Sync signal from the Green component of the RGB output.

### **A400/1**

In the A400/1 series, the jumper marked 400/1 controls the Sync on Green fix. The jumper should be OPEN to remove the Sync signal from the Green component of the RGB output.

### **A3000**

In the A3000, both jumpers should be closed at all times if the board is in the riser configuration.

### **All machines**

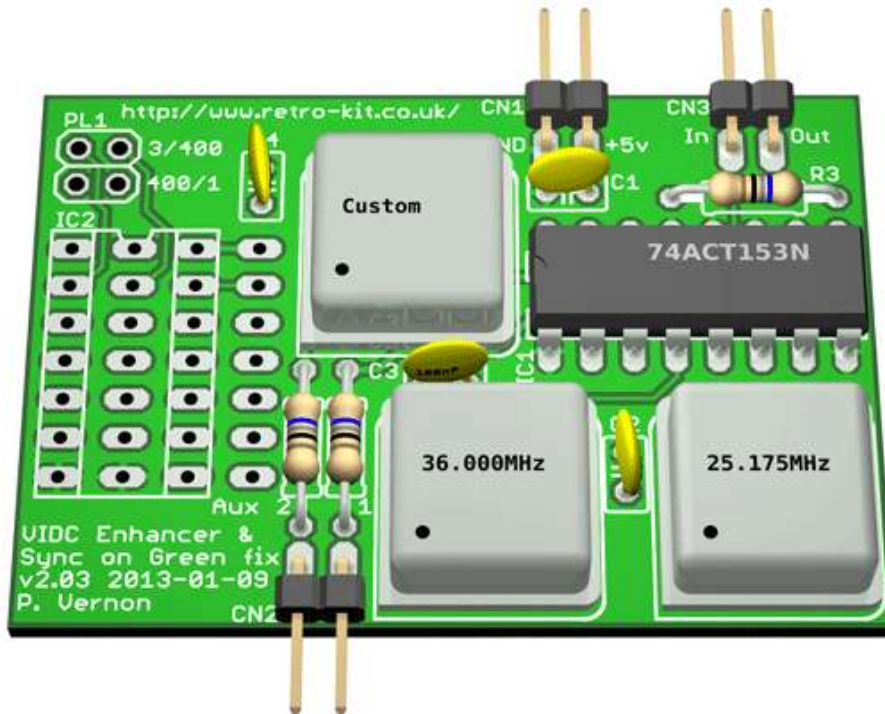
Where a monitor requires the Sync on Green signal, both jumpers should be CLOSED.

## **WARNING**

**Fitting a VIDC Enhancer board suitable for one of these series machines into a different series may harm your computer and it is recommended that you double check the series of computer you are fitting the board to in order that you confirm the integrated circuit on the motherboard you are replacing matches the integrated circuit in the socket of IC2 on the Ultra VIDC Enhancer.**

## Non-riser configuration

The non-riser configuration of the Ultra VIDC Enhancer board is best suited to the Acorn BBC A3000 Microcomputer but it can be fitted to any of the supported Archimedes computers.



When fitting the board to an A300, A400 or A400/1 series machine, several parts must still be fitted to the motherboard so whilst doing that work, it makes sense to fit the board in the riser configuration anyway.

## Preparing your Archimedes for the Ultra VIDC Enhancer

If you intend to change your monitor immediately after fitting your new VIDC Enhancer then there are a couple of CMOS configuration settings that must be changed. One of these settings is the MonitorType, the other is the SYNC setting which can both be set using the \*CONFIGURE command in RISC OS.

Both the MonitorType and Sync can be changed at the point of power on however when the Sync is altered in this way, many other CMOS settings are reset to factory defaults too.

In order to avoid resetting your CMOS settings, the Sync can be changed using the \*CONFIGURE command set just before you shut down your computer to install the Ultra VIDC Enhancer.

From the Desktop, press CTRL + SHIFT + f12 to shutdown.

At the restart requester, press CTRL + SHIFT + f12 to close the desktop and enter Supervisor mode.

At the Supervisor prompt, enter

```
*CONF. SYNC 0
```

This will set the sync type that the Archimedes outputs to the correct setting for a VGA or SVGA monitor.

Turn off your Archimedes.

## **Fitting the Retro-Kit Ultra VIDC Enhancer board**

The riser board configuration has a more involved installation process requiring some solder work to be carried out. If you are at all unsure about your ability to install the board, seek assistance from someone with the necessary skills or contact Retro-Kit for assistance.

### **All machines**

#### **Tools required**

Please use an anti-static wrist band when working on your computer and ensure you are earthed correctly before carrying out any work.

#### **A3000**

For the Acorn BBC A3000, you'll need the following tools.

A set of Philips and flat bladed screw drivers will be necessary to open the case of the A3000. Fitting the board to the A3000 requires no further tools however you can optionally choose to solder the Auxiliary control wires into place.

#### **A300, A400, A400/1**

For the A300, A400 and A400/1, the following tools are required.

A set of Philips screwdrivers is required to open the case and remove the motherboard.

A soldering iron will be needed to remove a single integrated circuit and add in some headers to the motherboard.

A sharp craft knife, scalpel or PCB track cutter is required for the A300 and A400 models to break a shorting link where one of the headers is fitted.

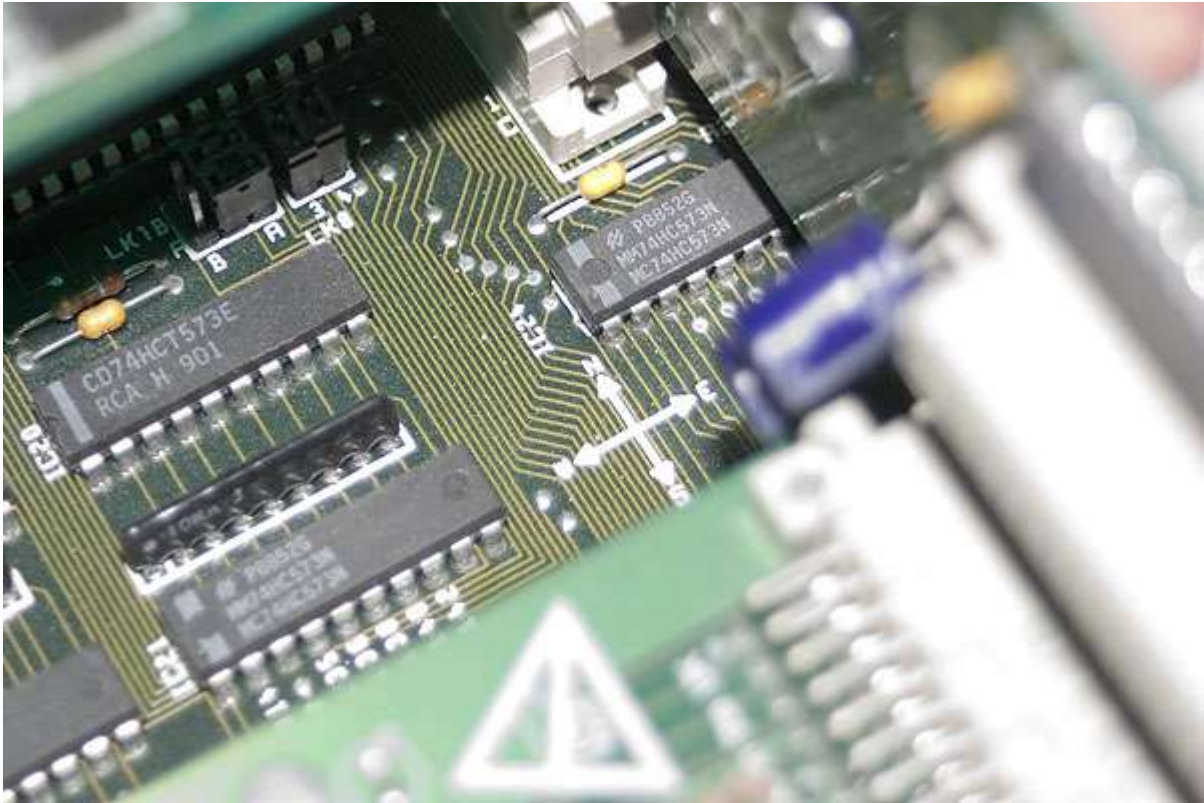
A pair of fine wire snippers.

A pair of fine point pliers.

A roll of solder wick to remove solder from existing joints on the motherboard.

## Orientation of the Archimedes motherboards

All the references to the orientation of the Archimedes motherboards are based on the compass points that are screen printed onto the board as pictured below. In the A300, A400 and A400/1, with the rear of the board oriented on the right hand side, the top of the board as viewed is NORTH, the front of the Archimedes motherboard is EAST, etc.



The orientation on the A3000 is different with the rear of the motherboard being regarded as NORTH and the front of the motherboard being SOUTH, etc.

## Fitting the Ultra VIDC Enhancer board to an Acorn BBC A3000

### Parts list

Please check the supplied kit to ensure that you have the following parts for fitting the Ultra VIDC Enhancer to your A3000.

- 1 x Retro-Kit Ultra VIDC Enhancer board
- 1 x Aux IO control cable
- 1 x VIDC clock signal connecting cable
- 1 x piggy back VIDC Enhancer power connector cable

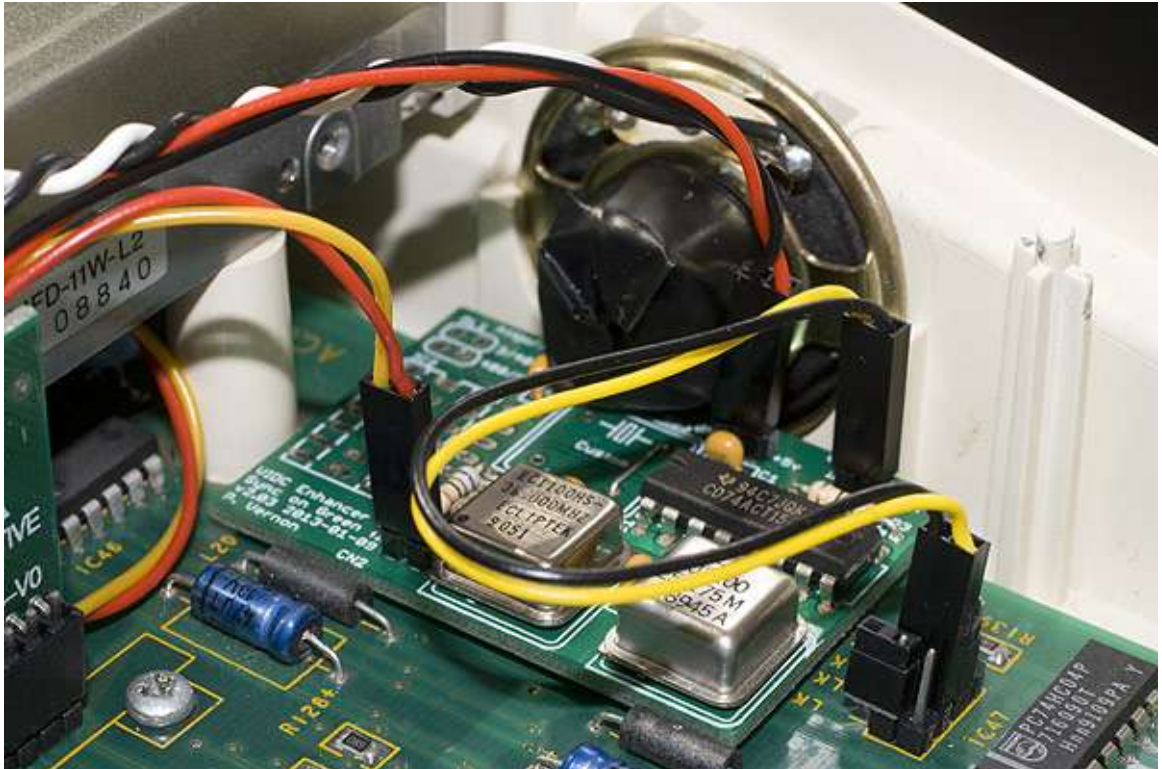
### Fitting

The Acorn BBC A3000 does not require the Sync on Green fix and as such, it is not necessary to fit the board in its riser configuration. There are also differences between early and later issue motherboards that make the riser board configuration unsuitable for the later motherboards.

The instructions below show how to fit the Ultra VIDC Enhancer board in the non-riser configuration and are applicable to all revisions of the A3000 motherboard.

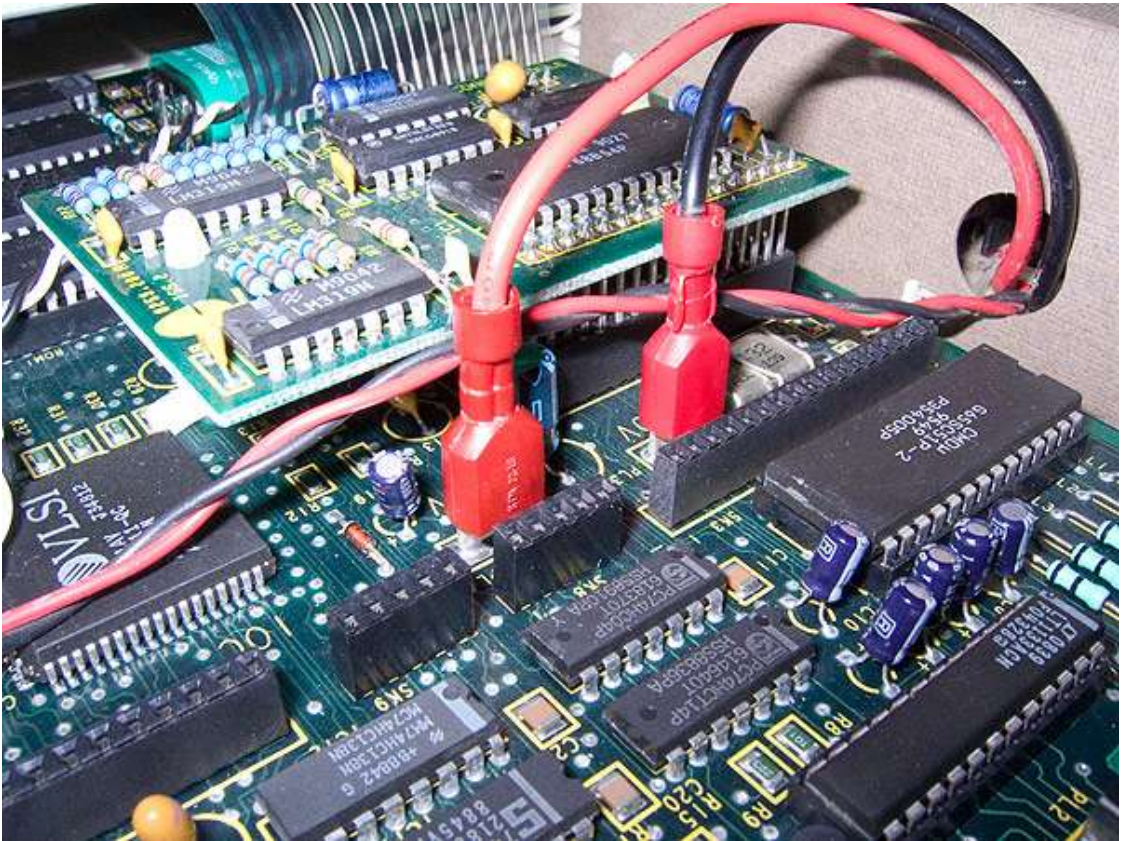
1. Remove the two rear case fixing screws and backing plates
2. Remove the centrally located case fixing screw from the underside of the A3000.
3. Gently lever the two rear case fixing clips out of position and lift the top half of the case free from the rear.
4. Using a large flat bladed screwdriver, gently lever the front case clips out of position freeing the top half of the case. Place the lid of the computer somewhere safe for re-assembly later.
5. Remove any mini-podule if fitted.
6. Gently remove the keyboard ribbon cables from the motherboard connector and lift the keyboard clear.
7. Remove the floppy drive fixing screws, disconnect the floppy power and data cables and then remove the floppy drive from the Archimedes.

8. Locate a suitable space to place the Ultra VIDC Enhancer board close to LK 28. You may wish to use a small piece of insulation tape to insulate the speaker housing from the VIDC Enhancer PCB

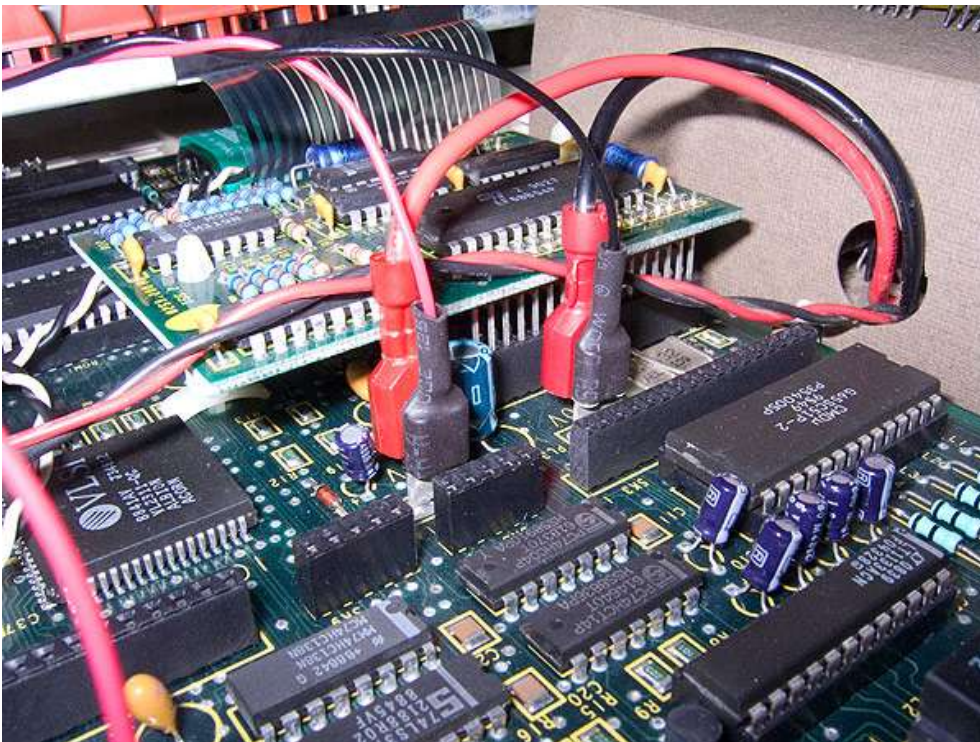


9. Remove the jumper from LK28 and connect the supplied VIDC clock cable to it and link it to CN3 on the Ultra VIDC Enhancer board.

10. Remove the black and red power cables from the motherboard that connect to the PSU.



11. Connect the supplied power cables to the motherboard and then the PSU power cables to the piggy back connectors ensuring that they are all tightly connected.

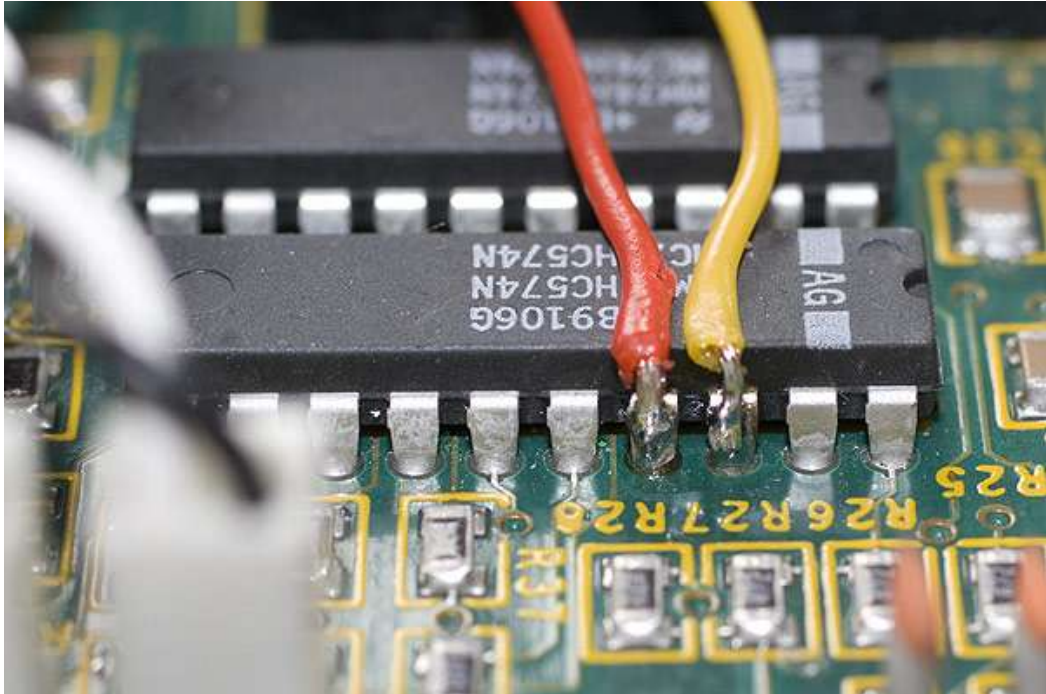


12. Connect the supplied VIDC Enhancer power cable to the Ultra VIDC Enhancer power connector observing correct polarity.



13. Locate IC18.

- a. Connect the two Aux I/O control wires to pins 17 and 18 for Aux 1 and Aux 2 respectively. This can be done by soldering the wires in place (as pictured) or using clip probes.
- b. Connect the other end of control wires to CN2 marked Aux 1 and 2.



#### **To configure the A3000 with VIDC Enhancer for a VGA monitor**

1. Locate the links LK24, LK25, LK26 and LK27
2. LK 24 should be set to the NORTH position.
3. LK 25 should be set to CLOSED.
4. LK 26 & LK 27 should be OPEN.

Fitting of the Ultra VIDC Enhancer board and configuring the output for a (S)VGA monitor is now complete.

Re-assemble the computer, fitting the floppy disc drive and case in the reverse order of the method used above.

Before powering your A3000 up, please refer to the [Powering on your Archimedes after fitting the Ultra VIDC Enhancer](#) section later in this manual.

## Fitting the Ultra VIDC Enhancer board to an Acorn Archimedes A300 or A400

Fitting the Ultra VIDC Enhancer to the A300 and A400 series Archimedes requires the addition of several headers and the replacement of a chip with a socket on the motherboard. This requires that the motherboard is extracted from the Archimedes case.

### Parts list

Please check the supplied kit to ensure that you have the following parts for fitting the Ultra VIDC Enhancer to your A300 or A400 series Archimedes.

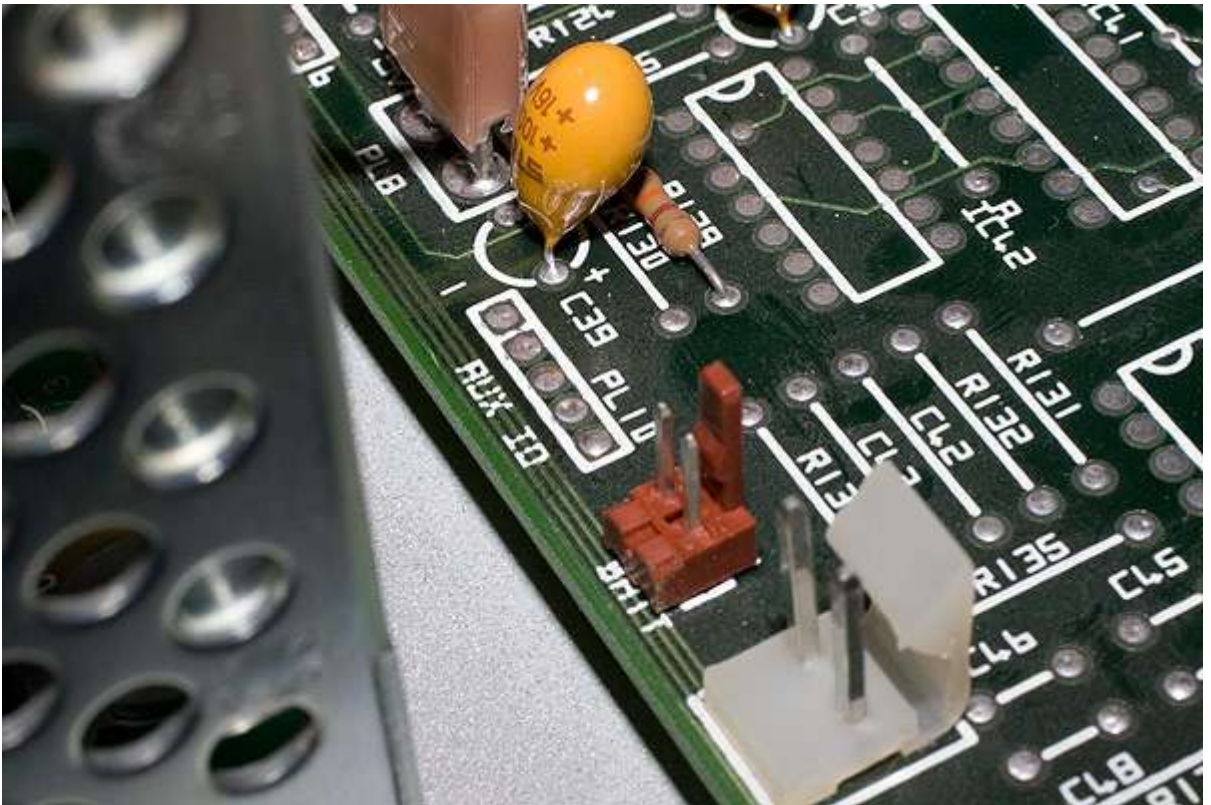
- 1 x Retro-Kit Ultra VIDC Enhancer board
- 1 x Aux IO control cable
- 1 x VIDC clock signal connecting cable
- 1 x 5-way header
- 2 x 3-way jumper headers

### To strip down the Archimedes

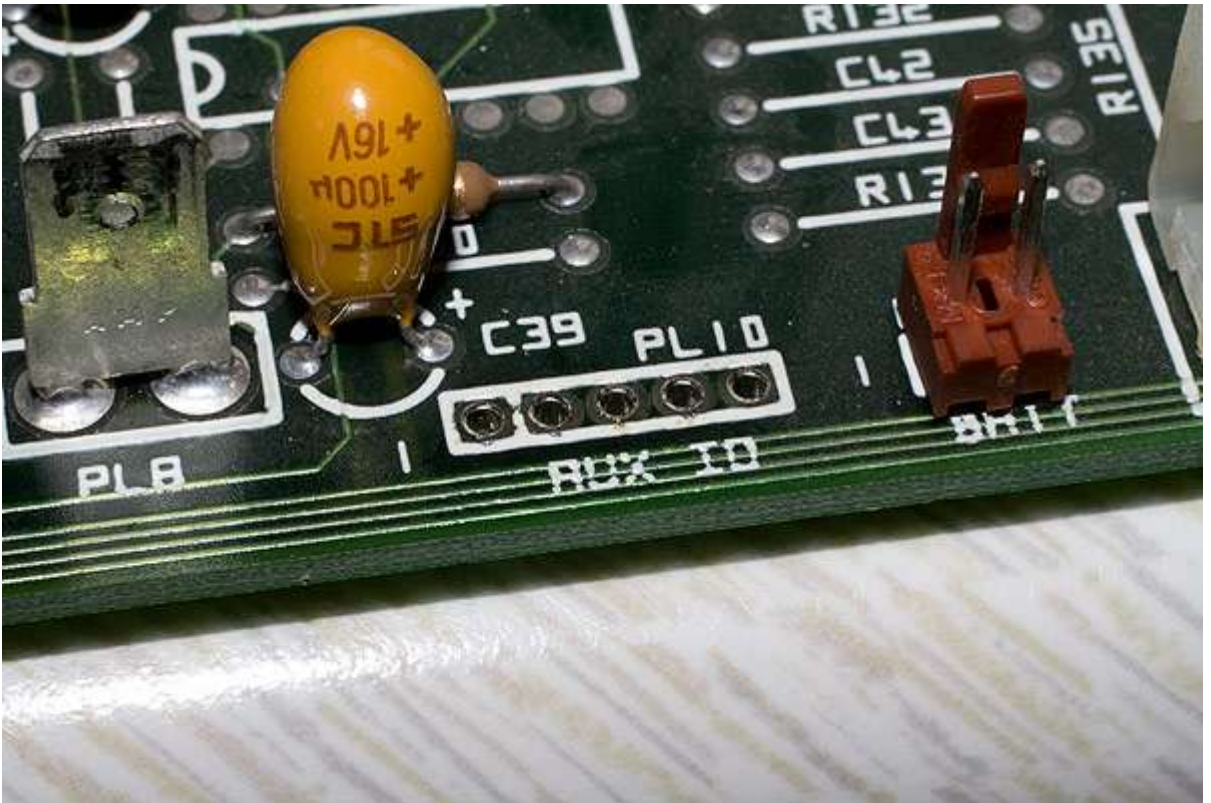
1. Remove the five case screws from the Archimedes (3 at the rear and 1 on each side) and remove the case lid.
2. Remove any podules fitted to the backplane by removing their fixing screws and sliding out the podules from the rear of the Archimedes.
3. Remove the five screws holding the front fascia in place and disconnect the cables from the motherboard (3 screws underneath, 1 on either side).
4. Remove the connecting power cable from the backplane noting their locations.
5. Unscrew the two fixing screws holding the backplane in place and gently extract the backplane by lifting it vertically clear.
6. Remove the floppy drive and hard drive (if fitted).
7. Disconnect the power connectors from the motherboard.
8. Disconnect the battery back from the motherboard.
9. Remove the two fixing screws from the underside of the Archimedes at the rear.
10. Remove the two motherboard fixing screws on the back plate and freeing the mounting posts before gently sliding the motherboard out from its case in a rearwards direction.

**To fit the additional parts to the A300 and A400 motherboards**

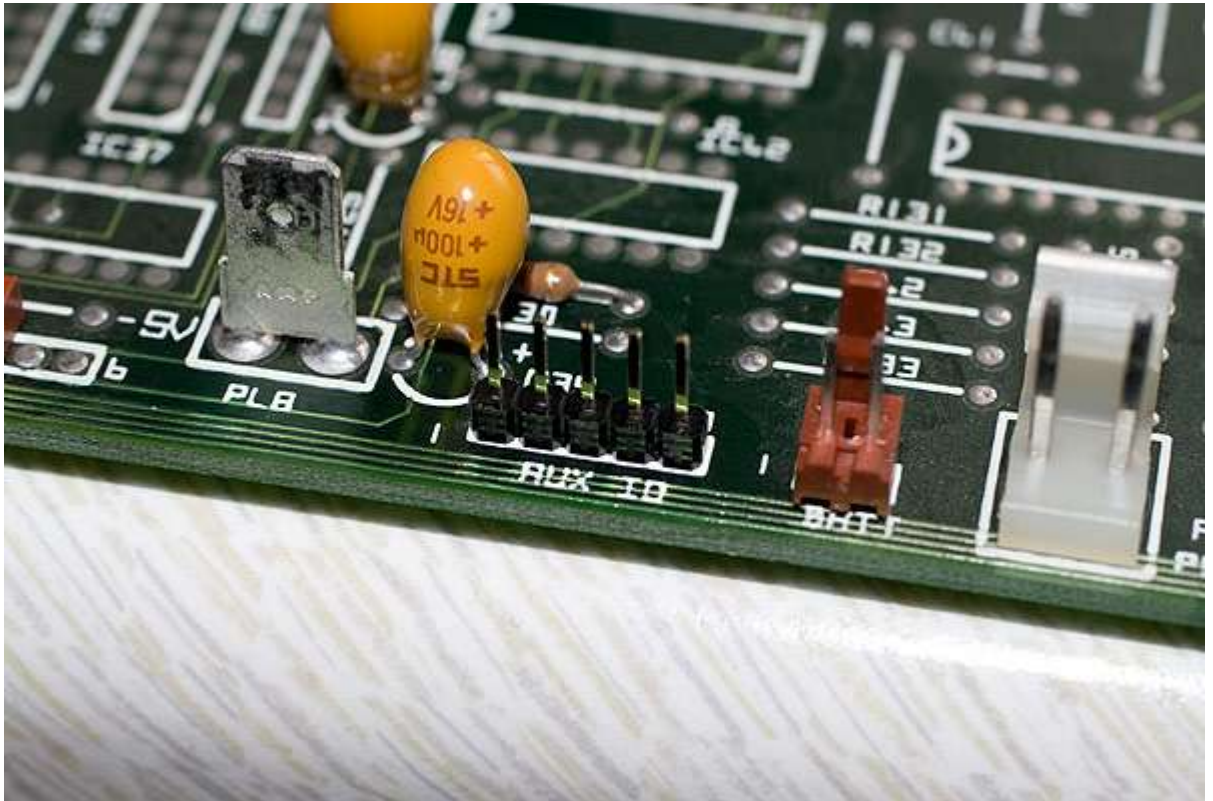
1. Locate the Aux I/O header location on the motherboard marked as PL10.



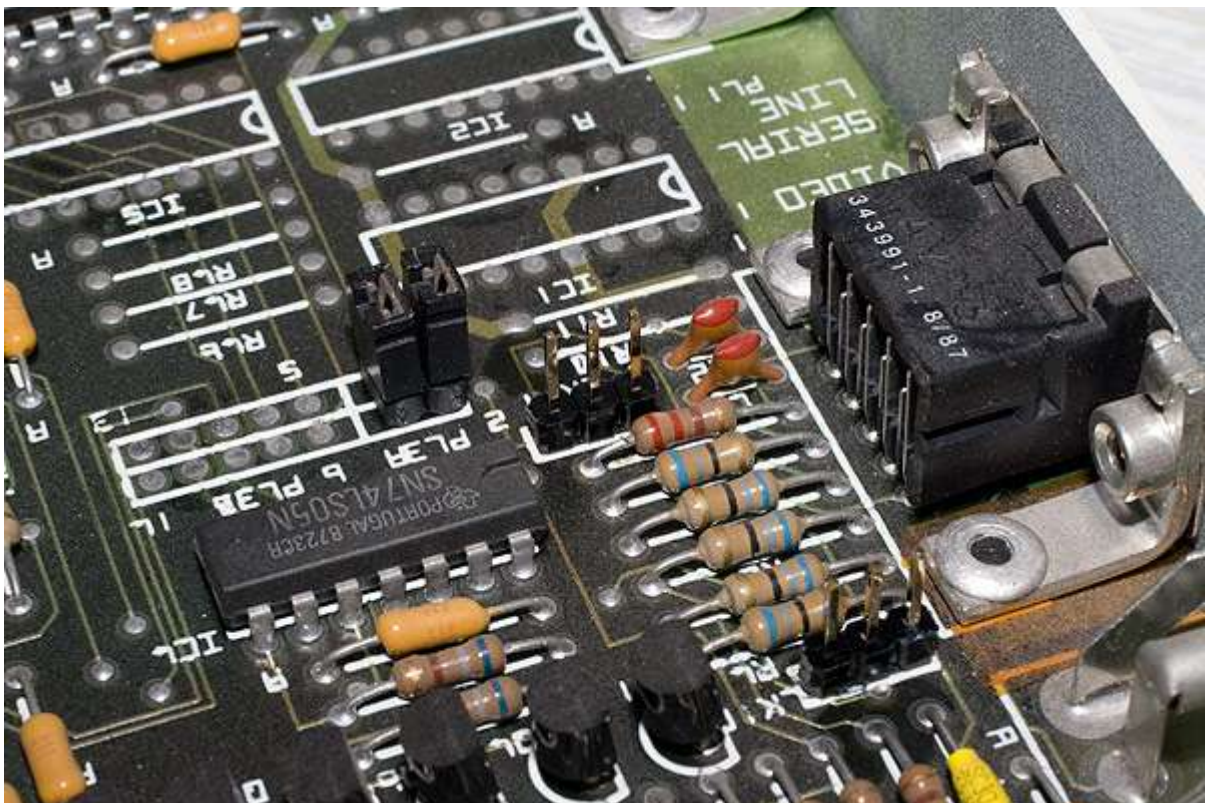
2. If no header is fitted, use some solder wick to remove the solder from the through hole mounting holes.



3. Solder in the supplied 5-way header.

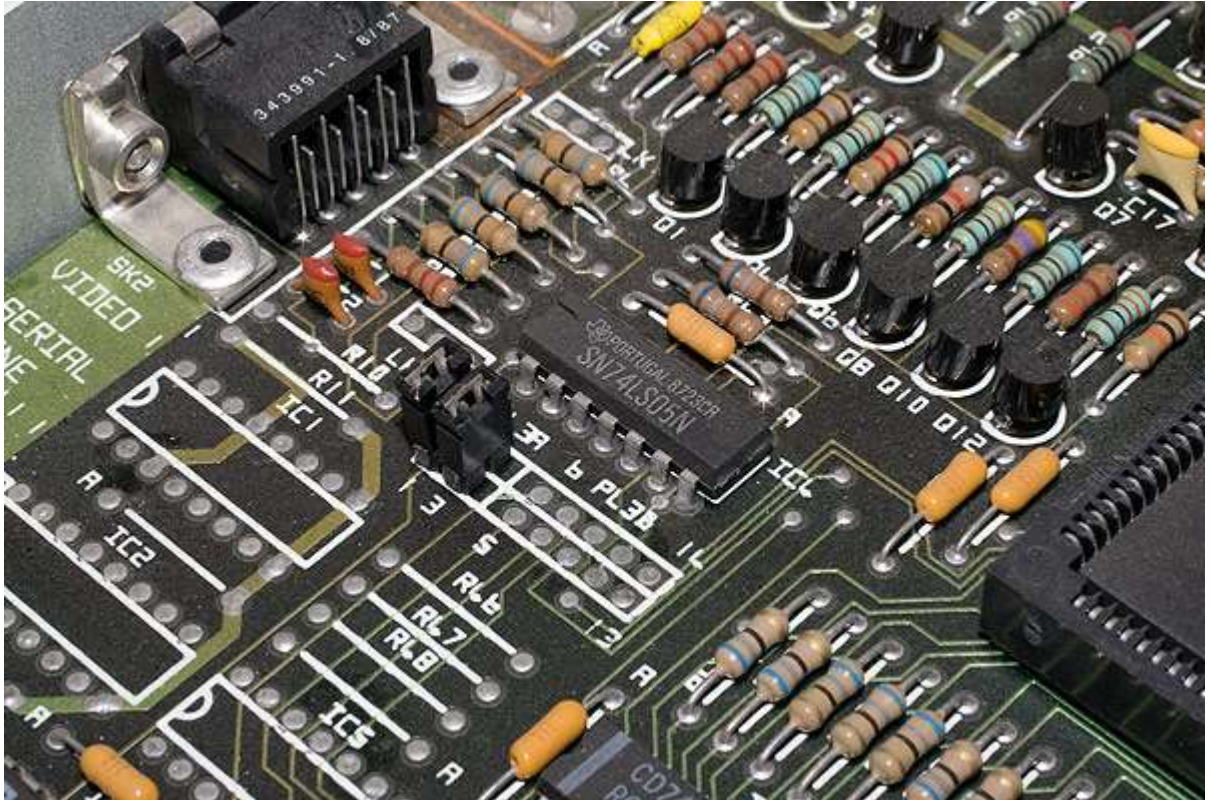


4. Locate the jumper location LK10. Carefully cut the track connecting the inner pin to the outer pin on the underside of the motherboard.
5. Remove the solder from the through hole mounting holes for LK10 and LK11 and fit the two 3-way jumper headers to the motherboard.

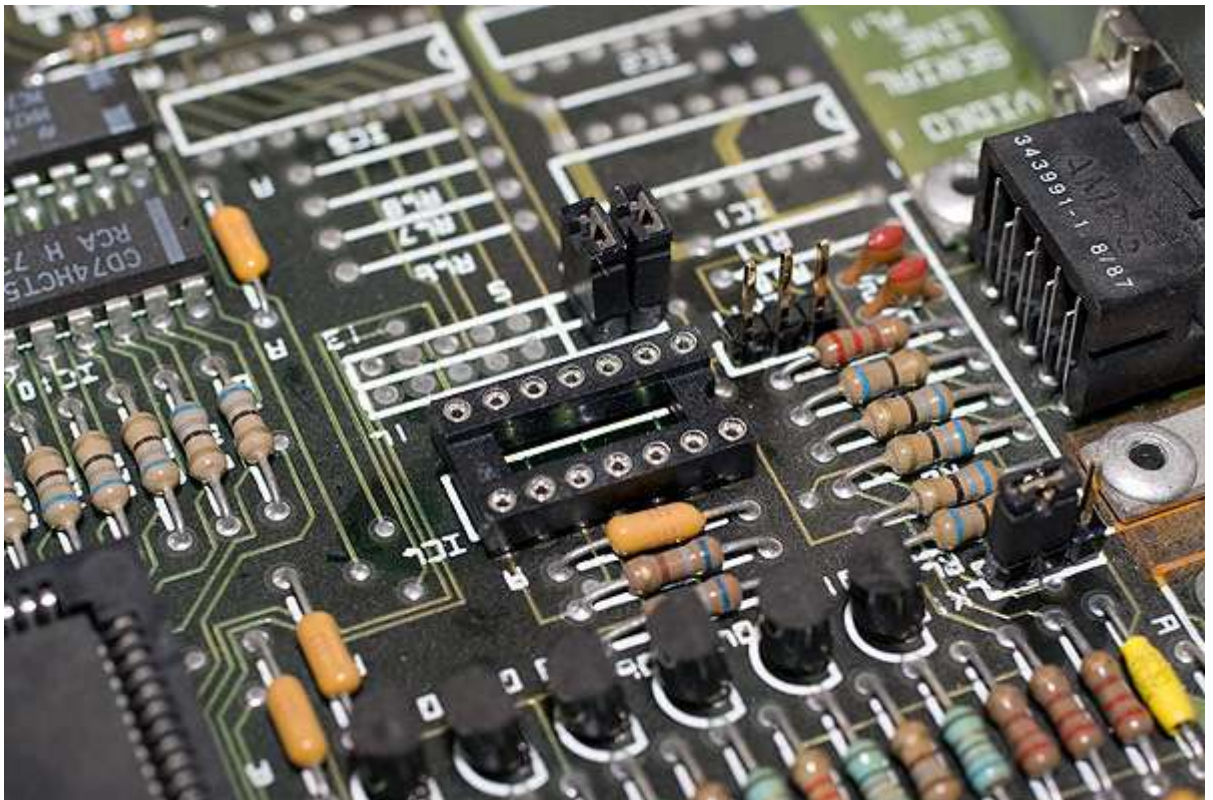




6. Locate the chip in position IC4 and remove it. TIP: The easiest way to remove a chip like this is to cut each leg to remove the body of the chip and then de-solder the remnants of each leg one by one using some solder wick. A new replacement chip is supplied on the Ultra VIDC Enhancer.



7. Fit the supplied 14-way socket in the position of IC4.



This completes the fitting of the additional parts to the A300 and A400 motherboard and it can be re-fitted to the Archimedes case. Follow the steps in the strip down instructions carrying out points 10 to 3 to reassemble the Archimedes, leaving the podule and lid fitting until after the Ultra VIDC Enhancer has been fitted.

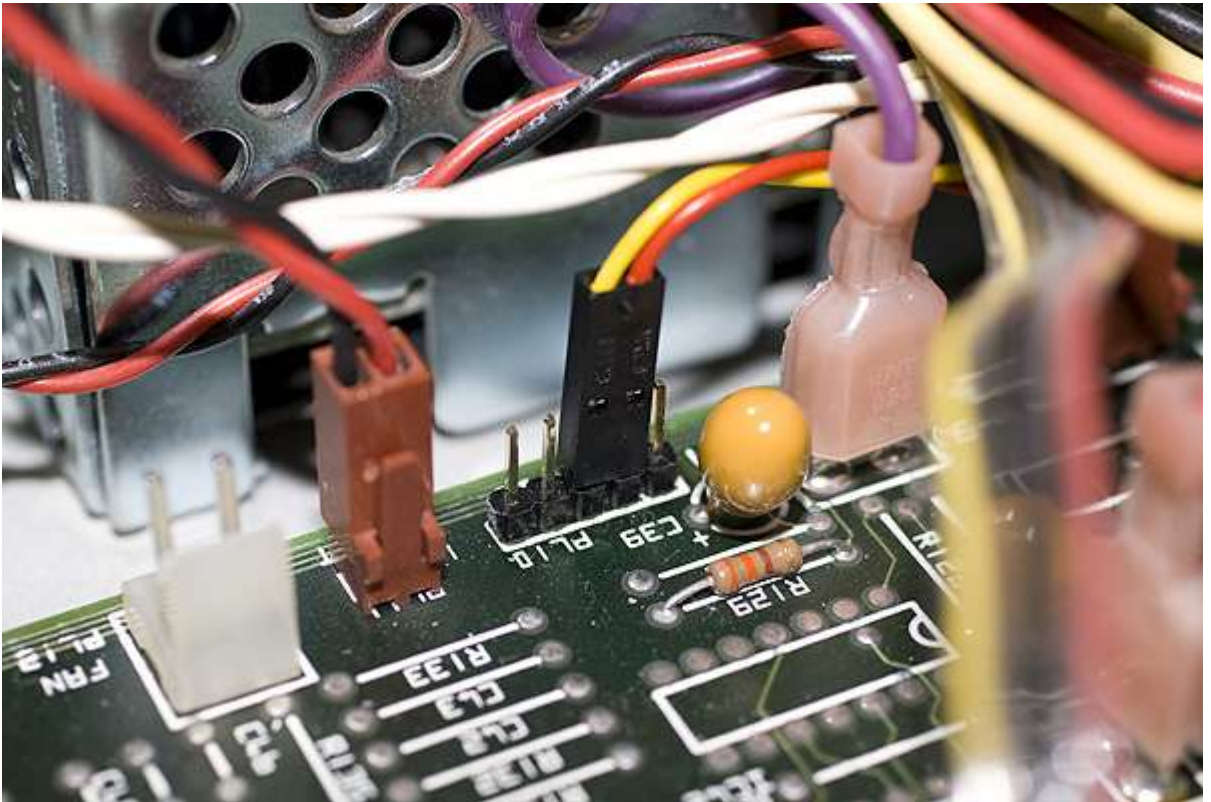
### To fit the Retro-Kit Ultra VIDC Enhancer

Once the Archimedes is ready to accept the Ultra VIDC Enhancer, the following steps should be carried out to complete the installation.

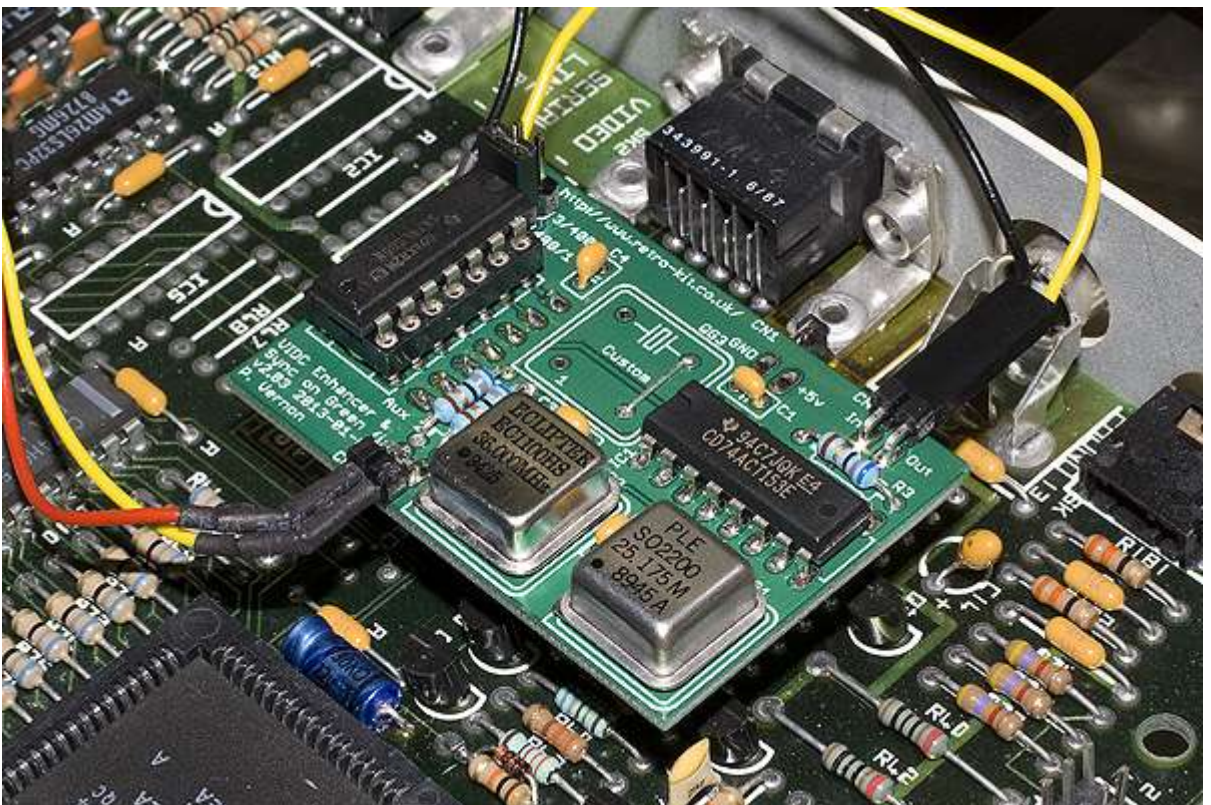
1. Plug the Ultra VIDC Enhancer into the newly socketed IC4.
2. Locate the headers on the motherboard marked PL3, remove the jumper from the link marked 1-2 and connect the Ultra VIDC clock connecting cable as shown in the photo below.



3. Locate the Aux I/O header marked as PL10 and connect the Aux I/O connecting cable to pins 2 and 3.



4. Connect the Aux I/O signal wire to the pin marked Aux on CN2 on the Ultra VIDC Enhancer board. Taking note of the markings, pin 2 of PL10 must be connected to Aux 2 on CN2. Pin 3 of PL10 must be connected to Aux 1 on CN2.



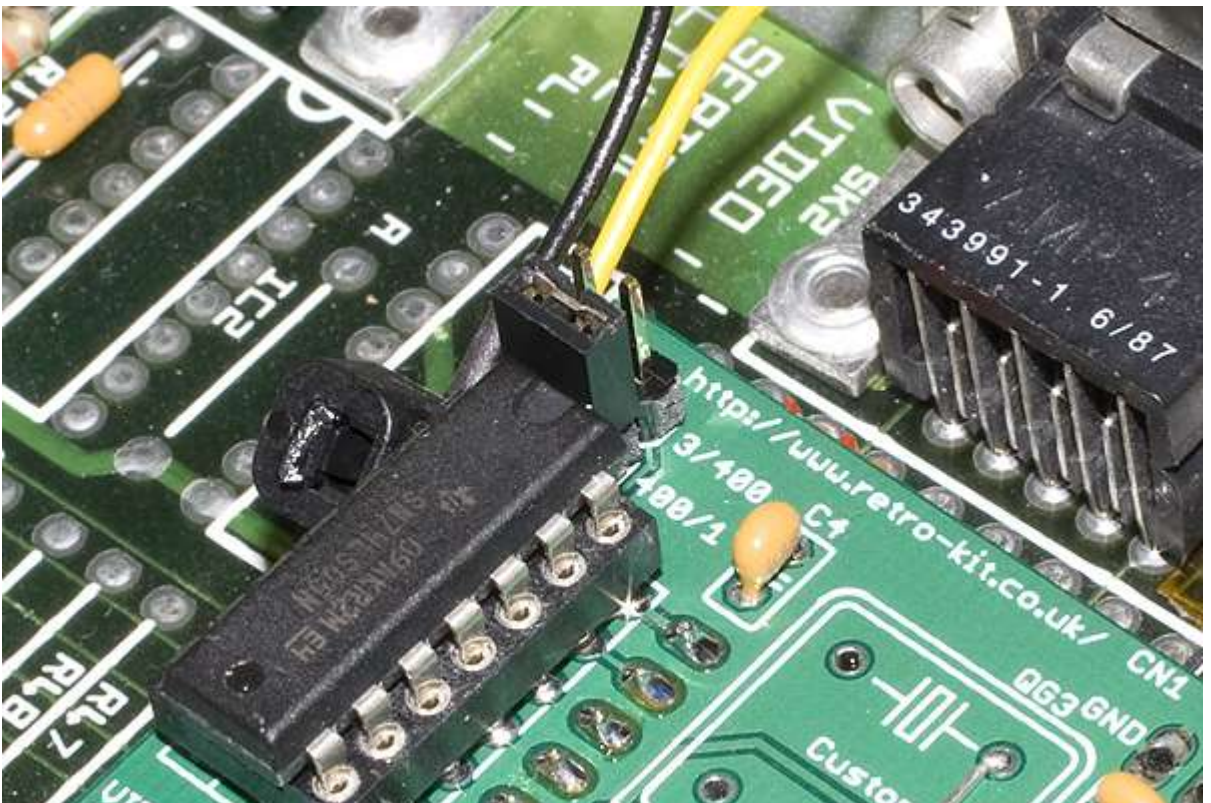


### To configure the A300 and A400 with VIDC Enhancer for a VGA monitor

1. Locate the newly fitted jumpers marked LK10 and LK11 on the motherboard.



2. Set the position of LK10 to the WEST position.
3. Set the position of LK11 to the WEST position.
4. Remove the jumper marked 3/400 on PL1 on the Ultra VIDC Enhancer.



This completes the fitting and configuration of the Ultra VIDC Enhancer. Follow steps 2 and 1 of the strip down guide to complete the re-assembly of your Archimedes.

Before powering your A300 or A400 series Archimedes up, please refer to the [\*Powering on your Archimedes after fitting the Ultra VIDC Enhancer\*](#) section later in this manual.

## Fitting the Ultra VIDC Enhancer board to an Acorn Archimedes A400/1

Fitting the Ultra VIDC Enhancer to the A400/1 series Archimedes requires the addition of a header and the replacement of a chip with a socket on the motherboard. This requires that the motherboard is extracted from the Archimedes case.

### Parts list

Please check the supplied kit to ensure that you have the following parts for fitting the Ultra VIDC Enhancer to your A400/1 series Archimedes.

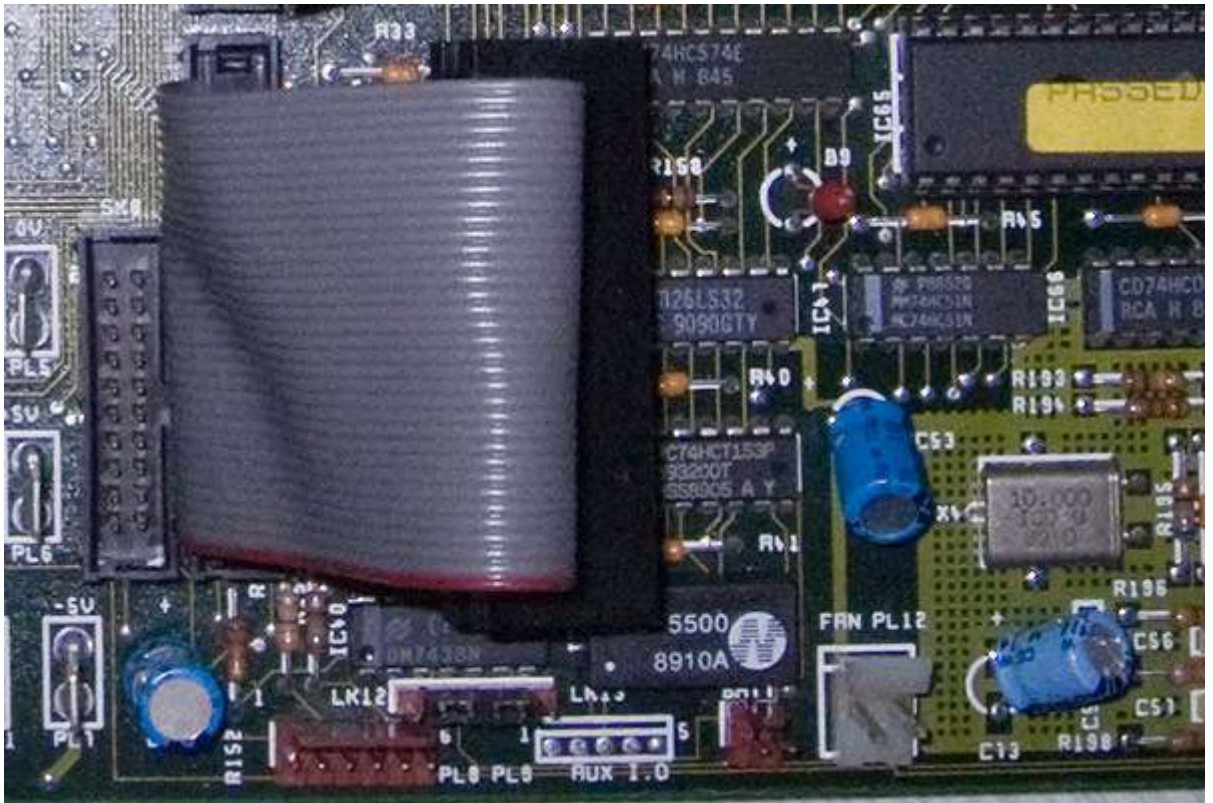
- 1 x Retro-Kit Ultra VIDC Enhancer board
- 1 x Aux IO control cable
- 1 x VIDC clock signal connecting cable
- 1 x 5-way header

### To strip down the Archimedes

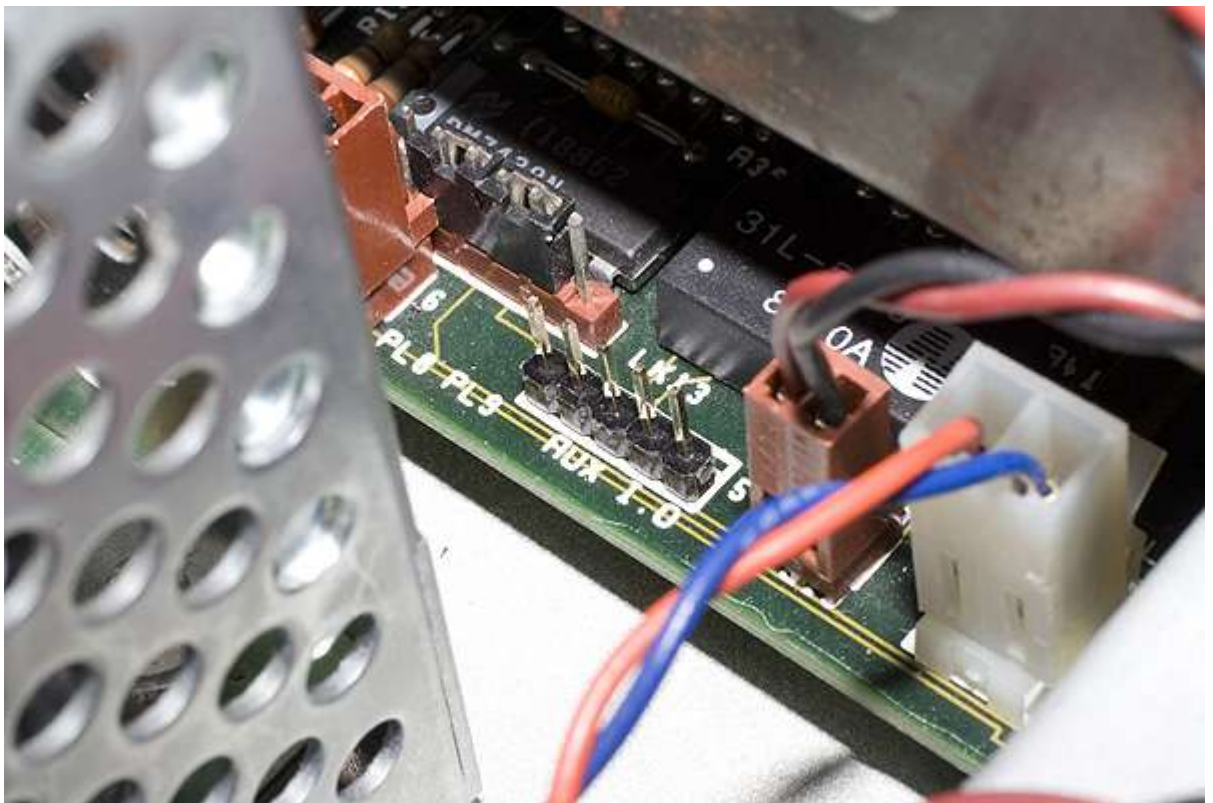
1. Remove the five case screws from the Archimedes (3 at the rear and 1 on each side) and remove the case lid sliding it rearwards.
2. Remove any podules fitted to the backplane by removing their fixing screws and sliding out the podules from the rear of the Archimedes.
3. Remove the five screws holding the front fascia in place and disconnect the cables from the motherboard (3 underneath, 1 on either side).
4. Remove the connecting power cable from the backplane noting their locations.
5. Unscrew the two fixing screws holding the backplane in place and gently extract the backplane by lifting vertically.
6. Remove the floppy drive and hard drive (if fitted).
7. Disconnect the power connectors from the motherboard.
8. Disconnect the battery back from the motherboard.
9. Remove the two fixing screws from the underside of the Archimedes at the rear.
10. Disconnect the earth strap from the front of the Archimedes connecting the motherboard to the chassis.
11. Remove the two motherboard fixing screws on the back plate and gently slide the motherboard out from its case in a rearwards direction.

### To fit the additional parts to the A400/1 motherboard

1. Locate the Aux I/O header location on the motherboard marked as PL9.



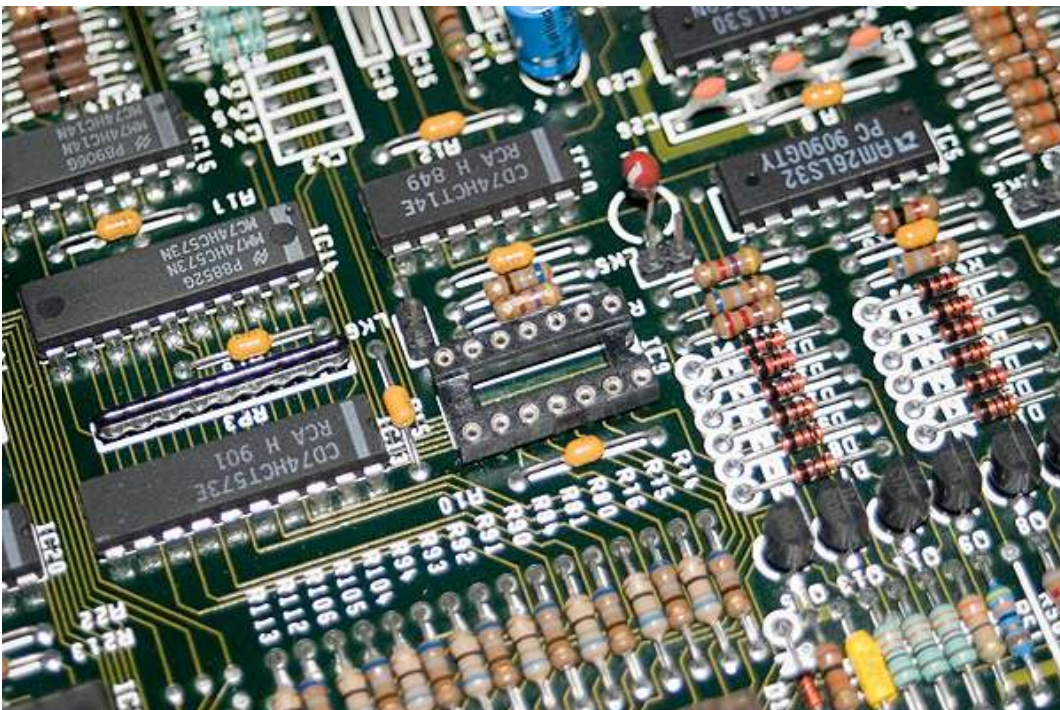
2. If no header is fitted, use some solder wick to remove the solder from the through hole mounting holes.
3. Solder in the supplied 5-way header.



4. Locate the chip in position IC9 and remove it. TIP: The easiest way to remove a chip like this is to cut each leg to remove the body of the chip and then de-solder the remnants of each leg one by one using some solder wick. A new chip is supplied on the Ultra VIDC Enhancer.



5. Fit the supplied 14-way socket in the position of IC9 noting the orientation of the socket when placing it on the motherboard.



This completes the fitting of the additional parts to the A400/1 motherboard and it can be re-fitted to the Archimedes case. Follow the steps in strip down instructions carrying out points 11 to 3 to reassemble the Archimedes, leaving the podule and lid fitting until after the Ultra VIDC Enhancer has been fitted.

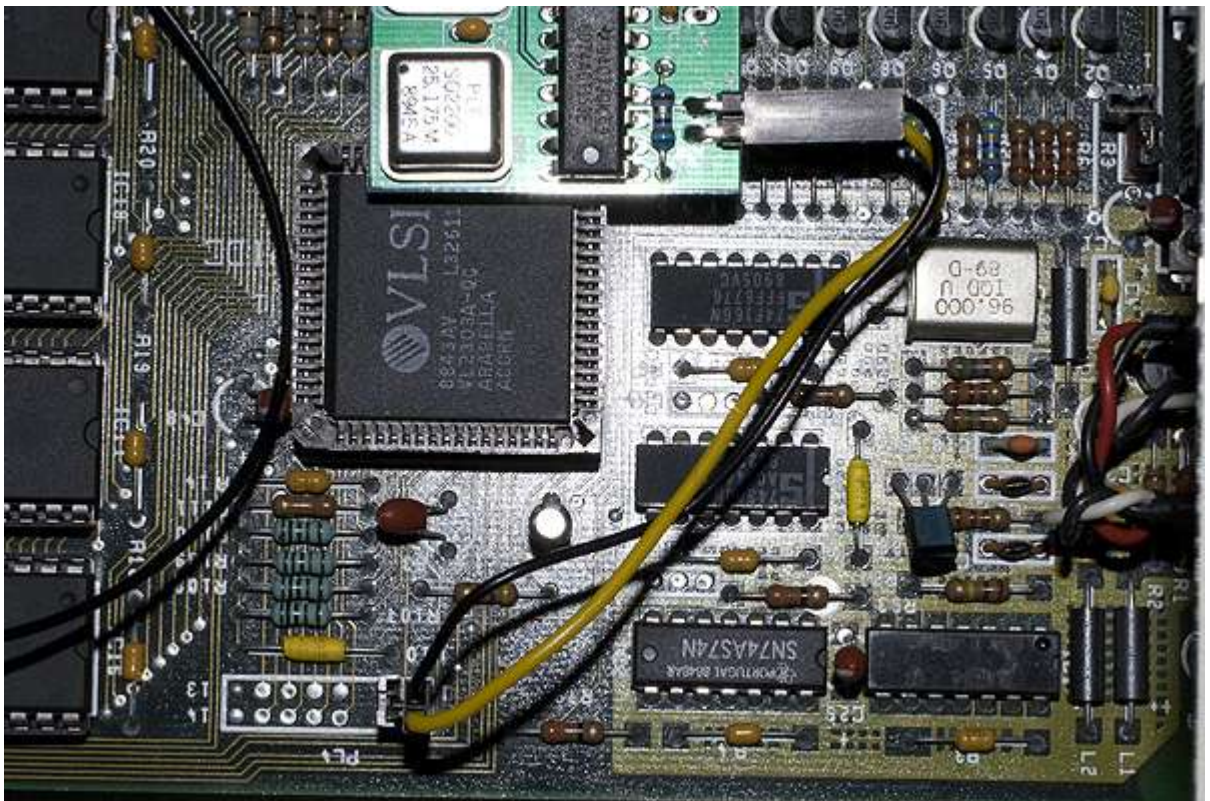
### To fit the Retro-Kit Ultra VIDC Enhancer

Once the Archimedes is ready to accept the Ultra VIDC Enhancer, the following steps should be carried out to complete the installation.

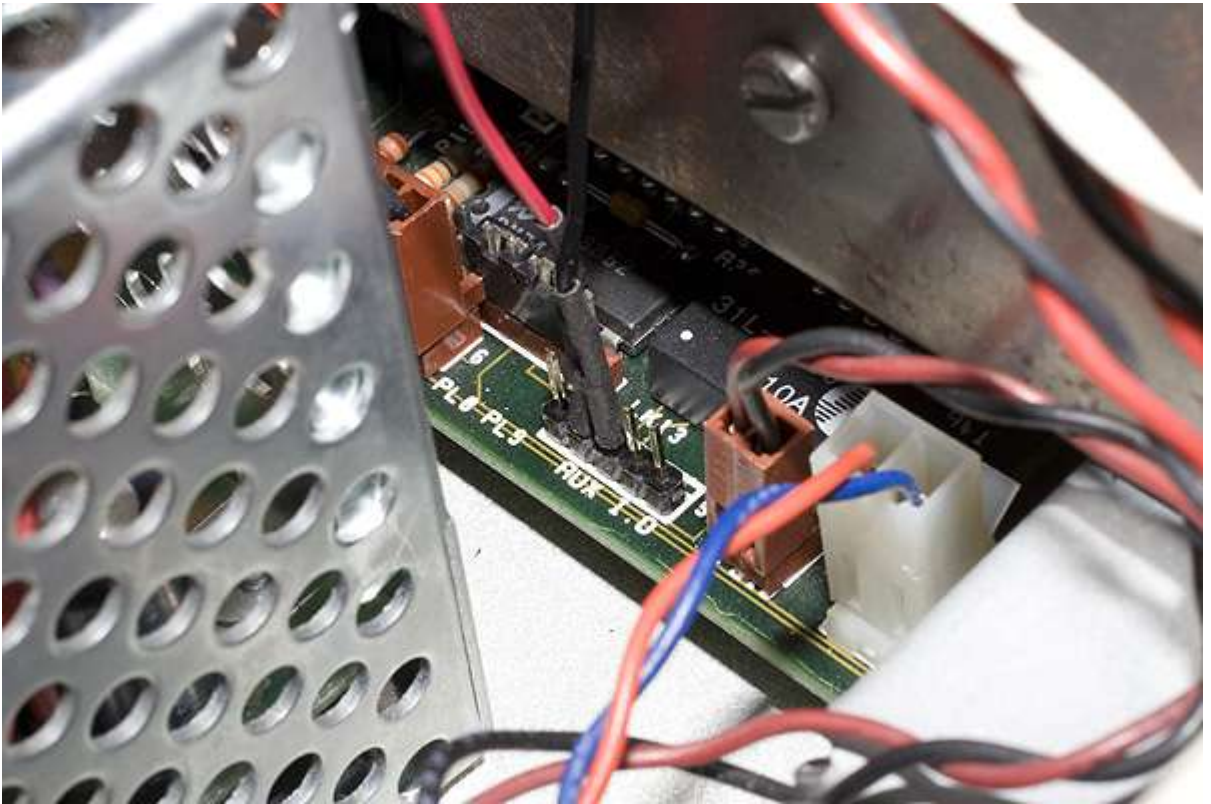
1. Plug the Ultra VIDC Enhancer into the newly socketed IC9.



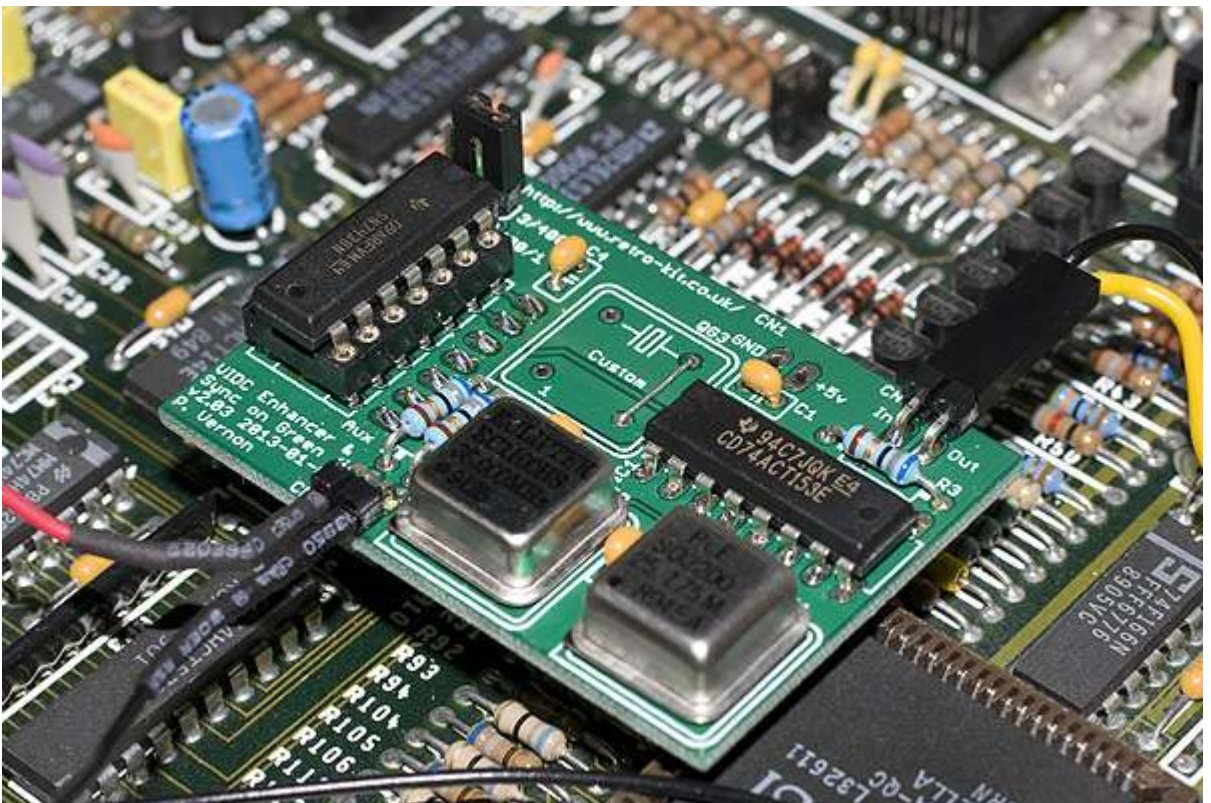
2. Locate the headers on the motherboard marked PL4, remove the jumper from the link marked 1-2 and connect the Ultra VIDC clock connecting cable as shown in the photo below.



3. Locate the Aux I/O header marked as PL9 and connect the Aux I/O connecting cable to pins 2 and 3.



4. Connect the Aux I/O signal wires to Aux I/O connector CN2 on the Ultra VIDC Enhancer board.



### **To configure the A400/1 with VIDC Enhancer for a VGA monitor**

1. Locate the jumpers marked LK1 and LK2 on the motherboard.
2. Set the position of LK1 to the NORTH position.
3. Set LK2 to be CLOSED.
4. Remove the jumper marked 400/1 on JP1 on the Ultra VIDC Enhancer.

This completes the fitting and configuration of the Ultra VIDC Enhancer. Follow steps 2 and 1 of the strip down guide to complete the re-assembly of your Archimedes.

Before powering your A400/1 series Archimedes up, please refer to the [Powering on your Archimedes after fitting the Ultra VIDC Enhancer](#) section later in this manual.



## Powering on your Archimedes after fitting the Ultra VIDC Enhancer

**NOTE: Before you power on your Archimedes, please double check your work to ensure the polarity of your connections are correct.**

When you power on the Archimedes for the first time after fitting a VIDC Enhancer, the settings in the CMOS will most likely be incorrect and need resetting and configuring if you have not used a (S)VGA or multi-sync monitor before. Thankfully, these details can be re-configured without the need to see what is on the screen.

### To set your Archimedes' monitor type

If you followed the instructions to prepare your Archimedes before fitting the Ultra VIDC Enhancer, all you should need to do now is tell RISC OS what monitor type it is connected to. Refer to [Appendix A](#) to see all the Monitor Types supported by RISC OS.

With a suitable (S)VGA monitor connected, press and hold the number 3 (VGA) or 4 (SVGA) on the keypad and power on (Only 3 (VGA) is supported under RISC OS 2).

With a suitable multi-sync monitor connected, press and hold the number 1 on the keypad and power on.

Keep the key pressed down until you hear the POST beep. If your sync setting is correct, you should see a picture shortly after the beep and a notification indicating the monitor type has been changed.

If you see no picture and your monitor reports that the refresh rate is "out of range" or "not supported" then the computers Sync setting probably needs to be changed.

### Using ConfigMon to configure your monitor

As an alternative to manually setting the monitor and sync settings above, as of AutoVIDC 2.11, if you boot your computer with the supplied disc, a tool called ConfigMon will be started.

ConfigMon will ask you which MonitorType you wish to use allowing for a response between 0 and 4 or 9. If you respond with 9, no changes will be made. To see which MonitorType you need to select, please refer to [Appendix A](#).

After selecting a MonitorType and pressing "Enter", you will be asked to confirm the changes by choosing 'Y' or 'N' and again pressing "Enter".

When you've confirmed the changes, ConfigMon sets sensible default values for the MonitorType chosen setting the MonitorType, Sync, Mode and WimpMode CMOS settings automatically.

## To change your Archimedes' Sync output by resetting the CMOS

If you followed the instructions to prepare the Archimedes before shutting down your computer and see no picture after setting the correct monitor type using the instructions above, with your Archimedes powered down, press and hold the 'R' key on your keyboard whilst powering on to reset the CMOS.

If you did not follow the instructions to prepare the Archimedes, then with your Archimedes powered down, press and hold the 'T' key on your keyboard whilst powering on to reset the CMOS with the alternate Sync setting.

Resetting the CMOS in this way will also reset the 'MonitorType' setting so it's likely that no picture will appear. Once you hear the POST beep, wait for any hard drive disc activity to stop before powering down again.

Once powered down, set the monitor type according to the instructions above and you should then see an image and notification of change of Monitor Type on your screen.

Once you can see a picture on your screen, you'll need to restore any other custom CMOS settings that may have been changed by the reset process.

## **Installing the software for your Ultra VIDC Enhancer**

The Retro-Kit Ultra VIDC Enhancer requires that AutoVIDC v2.00 is installed into your system for maximum compatibility however AutoVIDC v1.05 should be able to control the use of the 24MHz, 25.175MHz and 36MHz clock speeds. AutoVIDC v2.00 and above can control the Ultra VIDC Enhancer in full allowing complete control over four independent VIDC clock speeds. Please refer to the AutoVIDC manual for more information.

## **Support for other VIDC Enhancers**

AutoVIDC v2.00 should be able to control any VIDC Enhancer hardware that is controlled using the Aux I/O connections as it expects a 36MHz oscillator to be controlled by Aux I/O 1 (Aux I/O header pin 3) and a 25.175MHz oscillator to be controlled by Aux I/O 2 (Aux I/O header pin 2).

## **Other software**

Other software that can control VIDC Enhancers is partially supported by the Ultra VIDC Enhancer in so far as it can usually control either 1 or 2 additional oscillators along with the original 24MHz signal.

!CustomVDU allows the user to create custom screen modes which when used automatically control the state of the Ultra VIDC Enhancer using either the Aux1 or Aux2 pin. The Ultra VIDC Enhancer therefore can deliver clock speeds of 24MHz, 25.175MHz and 36MHz using the mode modules that !CustomVDU produces.

AutoVIDC v1.00, Atomwide and Beebug VIDC Enhancer software only support the control of the 24MHz and 36MHz clock speeds due to them only being able to switch Aux I/O 1 (Aux I/O header pin 3) and as such, an Ultra VIDC Enhancer controlled by these pieces of software will only deliver 24MHz and 36MHz VIDC clock speeds.

## **Incompatible software and hardware**

The Ultra VIDC Enhancer hardware cannot be controlled by the Watford Electronics Super VIDC Enhancer software as it uses the I2C bus to control the Watford Electronics Super VIDC Enhancer.

Likewise, AutoVIDC cannot control the Watford Electronics Super VIDC Enhancer hardware.

## Resetting the Archimedes for a Composite Sync monitor

If you wish to return to a traditional 15 kHz monitor like the AKF11 and AKF12 or Phillips 8833 MkII, you do not need to disconnect the Ultra VIDC Enhancer. Typically though, these monitors require a Composite Sync signal provided on the Green component of the RGB so you will need to set some jumpers accordingly.

### All Archimedes

Power on your computer with your current monitor and reset the SYNC setting by typing:

```
*CONFIGURE SYNC 1
```

Shutdown your Archimedes and open the case before resetting the jumpers according to the model of Archimedes you own.

### A3000

In the A3000, the jumpers marked LK24 and LK25 must be reset.

LK24 should be changed from the NORTH to the SOUTH position.

LK25 should be changed from the CLOSED to the OPEN setting.

### A300 and A400

In the A300 and A400 series Archimedes, the CSYNC settings and Sync on Green setting must be reset.

LK10 should be set to the EAST position.

LK11 should be set to the EAST position.

Both jumpers at position JP1 on the Ultra VIDC Enhancer should be CLOSED.

### A400/1

In the A400/1 series Archimedes, the CSYNC settings and Sync on Green setting must be reset.

LK1 should be set to the SOUTH position.

LK2 should be set to OPEN.

Both jumpers at position PL1 on the Ultra VIDC Enhancer should be CLOSED.

## Troubleshooting

### Archimedes fails its POST

The Ultra VIDC Enhancer is fully software controlled and the Archimedes should always start up using the system based 24MHz VIDC clock signal so the Archimedes should never fail its POST due to the Ultra VIDC Enhancer being fitted.

In the event that the POST does fail and the error code signifies a problem with the VIDC chip, read through the following information.

#### Fails POST but still boots

If you do see this type of error code before the machine completes its boot sequence and the machine otherwise operates perfectly and you have RISC OS 3.10 or above, you can alter the CMOS to toggle the POST tests using the small BASIC program below.

To toggle the VIDC POST test, you can use the AutoVIDC v2.00 '\*' command **\*AutoVIDCTogglePost** or you could enter the following BASIC program.

```
REM Toggle state of power on self test bit in CMOS
REM Read byte
SYS "OS_Byte",161,&BC TO ,,byte%
REM EOR byte with mask for bit 1
byte% = byte% EOR %10000000
REM Write byte back again
SYS "OS_Byte",162,&BC,byte%
END
```

This code toggles bit 7 of byte 188 (&BC) in the CMOS memory to control the long tests in the RISC OS POST. Running the program a second time resets the bit to 0.

- 0 - Enable long tests in POST
- 1 - Disable long tests in POST

**NOTE: In RISC OS 3.00, the VIDC timing tests are not disabled with this code. You can refer to Acorn App Note 225 for more information.**

<http://www.retro-kit.co.uk/user/custom/Acorn/32bit/documentation/RISCOS-POST-AppNote225.pdf>

#### Fails to boot at all

If the Archimedes fails to start at all and reports a VIDC Virq and a VIDC Sirq timing error, it's likely that the VIDC clock connecting wires have been connected to the Archimedes VIDC clock header back to front and the VIDC chip is not receiving a VIDC clock signal at all. Check the polarity and reverse the connection if required.

## Screen repeatedly goes blank when accessing floppy discs

This is not actually a VIDC Enhancer issue per-se; rather it is a limit of the Archimedes hardware when using high bandwidth screen MODEs such as MODE 28 or MODE 15 when it is being re-mapped for a VGA monitor.

When using high bandwidth screen MODEs, the Archimedes is unable to service the floppy drive controller in a timely manner which generates overrun errors. In order to recover from this situation, RISC OS disables the screen momentarily and re-tries the disk operation. This causes a characteristic blanking effect where the screen is repeatedly disabled and enabled whilst the floppy drive is being accessed.

There is no real way to resolve the issue apart from reducing the screen bandwidth requirements. This can be achieved by dropping from a 256 colour screen MODE to a 16 colour MODE with the same resolution. For example, switching from MODE 28 to MODE 27 or from MODE 15 to MODE 12 will resolve the issue by reducing the colour depth and bandwidth requirements of the display.

Roger Wilson of Acorn posted to the newsgroup [comp.sys.acorn](http://comp.sys.acorn) in 1991 explaining the origins of the problem and his post included below.

*OK, several people have asked for the Acorn view on this, in spite of the correct answer being posted a number of times.*

*Yes, it is all down to interrupt latency, though the driving force for the interrupt latency was the Econet rather than the floppy disc since there's no other way to run it. Though (as we shall see) the floppy disc ends up being the guy who turns the screen off.*

*Anyway, back in 1979 when Econet was designed to work on an Acorn Atom (1MHz 6502), the NMI latency of the 6502 was an enormous simplifier for the design, being only 7 cycles (plus 7 cycles for the longest instruction and 6 cycles for the return with most absolute data instructions taking 4 cycles). So we happily ran 250KBits through the network, interrupting every two bytes: loads of time. [note to 6809 fans interrupt might start in SWI3 instruction (20), NMI takes 21, return takes 15 and most of the instructions one needs to use take 5 or 6 cycles (direct page is a scarce resource). Acorn did in fact build a 6809 cpu card for its "System" range of computers and Econet and double speed floppy discs would not work!] [Mind you the NS32016 is MUCH MUCH worse!]*

*The same system was used for floppy discs: 125KBits, one byte interrupt.*

*The architecture was copied directly for the BBC machine (no time to change it, no money to spend on DMA controllers...). There the CPU got twice the bandwidth of the 6502 in the Atom due to the better memory system which paved the way for faster Econets and the ADFS double density floppy disc using the 1770 controllers. So floppies became the worst case (since a 500KBit Econet is physically too small to be truly interesting).*

*So when the ARM chip set was designed (1983, but who's counting?) we (I...) copied this requirement again. A doddle for ARM's overall design. Note that the MEMC system, instead of allocating fixed amounts of memory bandwidth (2MB, 2MB) to CPU and Video system, allocates it flexibly out of a 25.6MByte "pool". This lets the CPU get a much larger %age.*

*Trundle, trundle, fabricate, fabricate.*

*Write Arthur OS.*

*Oh dear, if you chuck enormous bandwidths down the screen ("mode 21") you haven't always got enough left to run the disc. OK: remove such modes from the OS.*

*Release 310 and Arthur (June 1987).*

*People write demo programs for mode 21.....*

*Pressure for next OS to include it! How can the OS cope with the NMI latency for running the floppy disc? Well, ADFS can observe itself running out of throughput - the controller says "late DMA" to it. In which case it can turn off the screen refresh and retry the operation. Which (with a bit of hysteresis in turning it back on) is what it does. Note that byte level versus sector level interrupt makes no difference: the critical operation (getting the NMI) has still got the same worst case characteristic.*

*Start ARM3.*

*Release RISC OS.*

*ARM3 worst case processing is actually worse than an ARM2 (though it happens less frequently). Heave sigh of relief that OS will behave sensibly: whenever the machine is running out of real throughput (as opposed to info from cache) it will get some more memory bandwidth and try again. Also, with everyone designing their own modes, the ability to starve the CPU is not restricted to modes 21 and 28...*

*The non-existence of Econets beyond 250KBits stops this being a problem at all: even at 24MBytes per second down the screen, the sound going as well, an ARM2 can cope with Econet. Anyway the guy at the other end will retransmit if all is failing!*

*Everyone happy now?*

*--Roger Wilson ("he was THAT MAN")*

### **A3000 screen appears to have serious corruption and speakers “click”**

This problem appears to be the result of poor power connections to the motherboard. This is likely to be due to the piggy back spade connectors not being tightly fitted to the A3000's main power cables.

To remedy this situation, remove the power connectors from the motherboard and remove the piggy back connectors from the A3000's power cables. Using a pair of pliers, gently apply pressure to the A3000 power connectors to “tighten” them up and then re-fit to the piggy back spade connections. You should feel that the connections are harder to put together and are solidly in place.

Refit the power connections to the main motherboard spade connectors and re-test your A3000. All signs of screen and audio corruption should be gone.

### **My A300 or A400 has no picture and fails to boot**

This problem can occur if the connectors on the clock wire become loose on the motherboard header. To rectify this, there are two things you can try.

Method 1: Remove the clock cable connectors from the motherboard and using a set of fine nosed pliers gently squeeze the connectors so that when you re-fit them, they create a tight connection.

Method 2: Remove the clock cable connectors from the motherboard and pre-tin the header pins with a small amount of solder. Remove the heat shrink from the connectors and re-fit them. Apply a small amount of heat from the soldering iron so that the connectors are fixed into place on the header pins.



## Appendices

## Appendix A – RISC OS monitor type definitions

The Archimedes range of computers can support several different types of monitor as standard. Each is assigned a number and the correct monitor type must be selected when a new monitor is connected to the Archimedes.

This is usually carried out by pressing and holding the relevant key on the keypad whilst powering the Archimedes on.

Monitor Type	Description
0	50Hz TV standard colour or monochrome monitor
1	Multi-sync monitor
2	64Hz high-resolution monochrome monitor
3	60Hz VGA type monitor
4	Super VGA type monitor *
5	LCD *

Monitor types marked with a '\*' denote types only available in RISC OS 3.

## Appendix B – Screen modes and refresh rates

Below is a reproduction of the mode definition table that can be found on page 575 in volume 1 of the RISC OS 3 Programmers Reference Manual published by Acorn Computers Ltd.

Mode	Text Resolution	Pixel Resolution	OS units resolution	Logical colours	Mem used	Refresh rate	Band-width (M/s)	Monitor types	Notes
0	80 x 32	640 x 256	1280 x 1024	2	20K	50Hz	1	0,1,3,4,5	3
1	40 x 32	320 x 256	1280 x 1024	4	20K	50Hz	1	0,1,3,4,5	3
2	20 x 32	160 x 256	1280 x 1024	16	40K	50Hz	2	0,1,3,4,5	3
3	80 x 25	Text only	Text only	2	40K	50Hz	2	0,1,3,4,5	3, 5, 7
4	40 x 32	320 x 256	1280 x 1024	2	20K	50Hz	1	0,1,3,4,5	3
5	20 x 32	160 x 256	1280 x 1024	4	20K	50Hz	1	0,1,3,4,5	3
6	40 x 25	Text only	Text only	2	20K	50Hz	1	0,1,3,4,5	3, 5, 7
7	40 x 25	Teletext	Teletext	16	80K	50Hz	4	0,1,3,4,5	3, 5
8	80 x 32	640 x 256	1280 x 1024	4	40K	50Hz	2	0,1,3,4,5	3
9	40 x 32	320 x 256	1280 x 1024	16	40K	50Hz	2	0,1,3,4,5	3
10	20 x 32	160 x 256	1280 x 1024	256	80K	50Hz	4	0,1,3,4,5	3
11	80 x 25	640 x 250	1280 x 1000	4	40K	50Hz	2	0,1,3,4,5	3, 8
12	80 x 32	640 x 256	1280 x 1024	16	80K	50Hz	4	0,1,3,4,5	3
13	40 x 32	320 x 256	1280 x 1024	256	80K	50Hz	4	0,1,3,4,5	3
14	80 x 25	640 x 250	1280 x 1000	16	80K	50Hz	3.9	0,1,3,4,5	3, 8
15	80 x 32	640 x 256	1280 x 1024	256	160K	50Hz	8	0,1,3,4,5	3
16	132 x 32	1056 x 256	2112 x 1024	16	132K	50Hz	6.6	0,1	6
17	132 x 25	1056 x 250	2112 x 1024	16	132K	50Hz	6.5	0,1	6, 8
18	80 x 64	640 x 512	1280 x 1024	2	40K	50Hz	2	1	
19	80 x 64	640 x 512	1280 x 1024	4	80K	50Hz	4	1	
20	80 x 64	640 x 512	1280 x 1024	16	160K	50Hz	8	1	
21	80 x 64	640 x 512	1280 x 1024	256	320K	50Hz	16	1	
22	96 x 36	768 x 288	768 x 576	16	108K	50Hz	5.4	0,1	1, 9
23	144 x 56	1152x896	2304 x 1792	2	126K	64Hz	8.1	2	
24	132 x 32	1056 x 256	2112 x 1024	256	264K	60Hz	13.2	0,1	6
25	80 x 60	640 x 480	1280 x 960	2	37.5K	60Hz	2.3	1,3,4,5	
26	80 x 60	640 x 480	1280 x 960	4	75K	60Hz	4.5	1,3,4,5	
27	80 x 60	640 x 480	1280 x 960	16	150K	60Hz	9	1,3,4,5	
28	80 x 60	640 x 480	1280 x 960	256	300K	56Hz	18	1,3,4,5	
29	100 x 75	800 x 600	1600 x 1200	2	58.6K	56Hz	3.3	1,4	1, 2
30	100 x 75	800 x 600	1600 x 1200	4	117.2K	56Hz	6.6	1,4	1, 2
31	100 x 75	800 x 600	1600 x 1200	16	234.4K	56Hz	13.2	1,4	1, 2
33	96 x 36	768 x 288	1536 x 1152	2	27K	50Hz	1.4	0,1	1
34	96 x 36	768 x 288	1536 x 1152	4	54K	50Hz	2.7	0,1	1
35	96 x 36	768 x 288	1536 x 1152	16	108K	50Hz	5.4	0,1	1
36	96 x 36	768 x 288	1536 x 1152	256	216K	50Hz	10.8	0,1	1
37	112 x 44	896 x 352	1792 x 1408	2	38.5K	60Hz	2.3	1	1
38	112 x 44	896 x 352	1792 x 1408	4	77K	60Hz	4.6	1	1
39	112 x 44	896 x 352	1792 x 1408	16	174K	60Hz	9.2	1	1
40	112 x 44	896 x 352	1792 x 1408	256	308K	60Hz	18.5	1	1
41	80 x 44	640 x 352	1280 x 1408	2	27.5K	60Hz	1.7	1,3,4,5	1, 3, 4
42	80 x 44	640 x 352	1280 x 1408	4	55K	60Hz	3.3	1,3,4,5	1, 3, 4
43	80 x 44	640 x 352	1280 x 1408	16	110K	60Hz	6.6	1,3,4,5	1, 3, 4
44	80 x 25	640 x 200	1280 x 800	2	15.7K	60Hz	0.9	1,3,4,5	1, 3
45	80 x 25	640 x 200	1280 x 800	4	31.3K	60Hz	1.9	1,3,4,5	1, 3
46	80 x 25	640 x 200	1280 x 800	16	62.5K	60Hz	3.8	1,3,4,5	1, 3

## Notes on display modes

1. These modes are not available in RISC OS 2.00, nor (except for mode 31) are they available in RISC OS 2.01
2. These modes are not available on early models of RISC OS computers (i.e. the Archimedes 300, 400 and 400/1 series and the A3000), because they are unable to clock VIDC at the necessary rate.
3. These modes are handled differently with a VGA or Super VGA type monitor. **If you are using such a monitor:**
  - RISC OS 2.00 does not implement these modes.
  - These modes are all displayed on a screen having 352 raster lines. Where a mode has fewer than 352 vertical pixels, it is centred on the screen with blank rasters at the top and bottom. Because of their appearance, these modes are known as *letterbox modes*.
  - The refresh rate is 70Hz.
  - The bandwidths shown in the table for these modes are lower than these monitor types consume, because no allowance has been made for the blank rasters.
  - Early models of RISC OS computers (i.e. the Archimedes 300, 400 and 400/1 series and the A3000) scan these modes some 4.7% slow. Again, this is because they are unable to clock VIDC at the necessary rate. Most VGA and Super VGA type monitors can still successfully lock onto this signal, but some may not. Furthermore, these models do not provide a *Sync Polarity* signal. This makes the effect of letterbox modes (see above) more severe.
4. Early models of RISC OS computers (i.e. the Archimedes 300, 400 and 400/1 series, and the A3000) also scan these modes some 4.7% slow with multi-frequency monitors. Again this is because they are unable to clock VIDC at the necessary rate.
5. These modes do not display graphics, and are provided for compatibility with BBC/Master series computers.
6. In these modes, circles, arcs, sectors and segments do not look circular. This is because the aspect ratio of the pixels is not in a 1:2, 1:1 or 2:1 ratio.
7. These are *gap modes*, where the colour of the gaps is not necessarily the same as the text background.
8. These modes are not a multiple of eight pixels high. By default, in these modes the bottom of the screen corresponds to the bottom line of ECF patterns, but the top line will not correspond to the top line of ECF patterns.
9. This mode is not available in RISC OS 3 (version 3.00). It provides a double-sized display suitable for use by visually impaired people. Unfortunately some applications may not provide correct displays when used in this mode.

## Other notes

Mode 32 has not been defined.

If an attempt is made to select a mode which is not appropriate to the current monitor type (or OS version), a suitable mode for that monitor is used. For example, an attempt to select mode 23 on a type 0 monitor will result in mode 0 being used.

In 256 colour modes, there are some restrictions on the control of colours. Only 64 base colours may be selected; 4 levels of tinting turn the base colours into 256 shades. Also, the selection from the colour palette of 4096 shades is only possible in groups of 16.

#### **Ultra VIDC Enhancer notes**

Where an Ultra VIDC Enhancer is used, Note 2 does not apply and the refresh rates referenced in Note 3 and 4 run at full speed without the 4.7% loss in performance described.

## Appendix C – Over-clocking the VIDC chip

### WARNING

**Any over-clocking of the VIDC chip is done at your own risk and Retro-Kit does not advise that it is done unless you know exactly what you are doing.**

**Any form of over-clocking of the VIDC chip will require a suitable custom cooling solution to be fitted to your Archimedes.**

The Acorn VIDC chip that controls the video display circuitry is rated to a maximum 36MHz clock speed without extra cooling and the Retro-Kit Ultra VIDC Enhancer board is supplied with a maximum speed 36MHz clock signal. A higher frequency oscillator can be fitted into the available space to allow the Archimedes to provide higher screen resolutions and refresh rates without losing the benefit of the additional 25.175MHz and 36MHz oscillators for VGA and SVGA resolutions.

In the past, others have over-clocked the VIDC chip successfully up to speeds of 60MHz with extensive cooling being applied which allows the Archimedes to output to displays supporting higher screen resolutions and refresh rates.

Technically, it is possible to replace the 36MHz oscillator with a 40MHz version to drive the SVGA modes 29-31 at slightly higher refresh rates and deliver full compatibility with monitors that require a minimum 60Hz vertical refresh rate without any other configuration changes to the software.

Adding a 42, 49.5, 50 or 60MHz oscillator into the available custom oscillator space on the Ultra VIDC Enhancer would allow you to drive custom screen modes with resolutions of up to 1024x768 or drive MODSs 29-31 at an even higher vertical refresh rate of 75Hz.

#### Adding an oscillator

To add an oscillator to the Ultra VIDC Enhancer:

1. Remove the tinned copper wire link connecting the output pin of the oscillator to the ground pin of the oscillator on the VIDC Enhancer PCB.
2. Fit the new oscillator in place, taking care to orient the oscillator correctly according to the layout on the PCB board.
3. Finally, re-fit the Ultra VIDC Enhancer to your computer ready for use.

Once fitted, to use the extra oscillator, please refer to the AutoVIDC User and Programmers Reference Manual which covers the available commands to enable the over-clocking features.

### RISC OS screen modes and dot clock information

The following table provides example screen modes and their respective refresh rates when different dot clocks (oscillators) are fitted to the Ultra VIDC Enhancer.

Resolution	RISC OS screen mode	Horizontal Frequency	Vertical Frequency	Dot Clock
640x256	8, 12 and 15	15kHz	50Hz	24.000MHz *
	8, 12 and 15	30kHz	66.8Hz	24.000MHz *** +
	8, 12 and 15	31.469kHz	70Hz	25.175MHz ** +
640x480	25-28	30.000kHz	57.1Hz	24.000MHz *
	25-28	31.469kHz	59.940Hz	25.175MHz **
	25-28	37.500kHz	75.000Hz	31.500MHz
	25-28	37.861kHz	72.809Hz	31.500MHz
	25-28	45.000kHz	85.650Hz	36.000MHz **
800x600	29-31	23.437kHz	37.500Hz	24.000MHz *
	29-31	35.156kHz	56.250Hz	36.000MHz **
	29-31	37.879kHz	60.137Hz	40.000MHz
	29-31	46.875kHz	75.000Hz	49.500MHz
	29-31	48.077kHz	72.188Hz	50.000MHz

\* - Acorn Archimedes native frequencies

\*\* - Additional dot clock frequencies available with the standard Ultra VIDC Enhancer

\*\*\* - Refresh rates of VGA modes on the original Archimedes

+ denotes the mapped modes as delivered by RISC OS 3 when connected to a (S)VGA monitor

## Appendix D - Theory of operation

The Retro-Kit Ultra VIDC Enhancer is based on a 74ACT153 Dual 4 line to 1 line data selector/multiplexer which allows the VIDC Enhancer to control up to four independent VIDC Clock frequencies using the 2-bit Auxiliary I/O facility provided by the Archimedes range of computers. The Auxiliary I/O facility is controlled by the AutoVIDC software making the presence of the Ultra VIDC Enhancer transparent to the user.

The VIDC clocks are provided by the Archimedes' own 24MHz system clock together with up to three further oscillators which are used to deliver VGA and SVGA resolutions and refresh rates.

### 74ACT153N connections

Only side A of the 74ACT153 is used to provide a single 4 line to 1 line data selector and is connected as show in the table below.

ACT153 pin assignment	Description	Connected to
1	Side A Enable Input ( $\overline{E_a}$ )	GND
2	Select 1 ( $S_1$ )	Aux I/O 2 (pin 2) via CN2 - Aux 2
3	VIDCClk $I_3$ (over-clocking)	QG3 clock output or GND
4	VIDCClk $I_2$ (36.000MHz)	QG2 clock output
5	VIDCClk $I_1$ (25.175MHz)	QG1 clock output
6	VIDCClk $I_0$ (24.000MHz)	Archimedes 24MHz system clock (via CN3 In)
7	VIDCClk output ( $Z_a$ )	VIDCClk In VIDC pin 19 (via CN3 Out)
8	GND	GND
9	Side B output	N/C
10	Side B input	GND
11	Side B input	GND
12	Side B input	GND
13	Side B input	GND
14	Select 0 ( $S_0$ )	Aux I/O 1 (pin 3) via CN2 - Aux 1
15	Side B Enable Input ( $\overline{E_b}$ )	$V_{cc}$
16	$V_{cc}$	$V_{cc}$

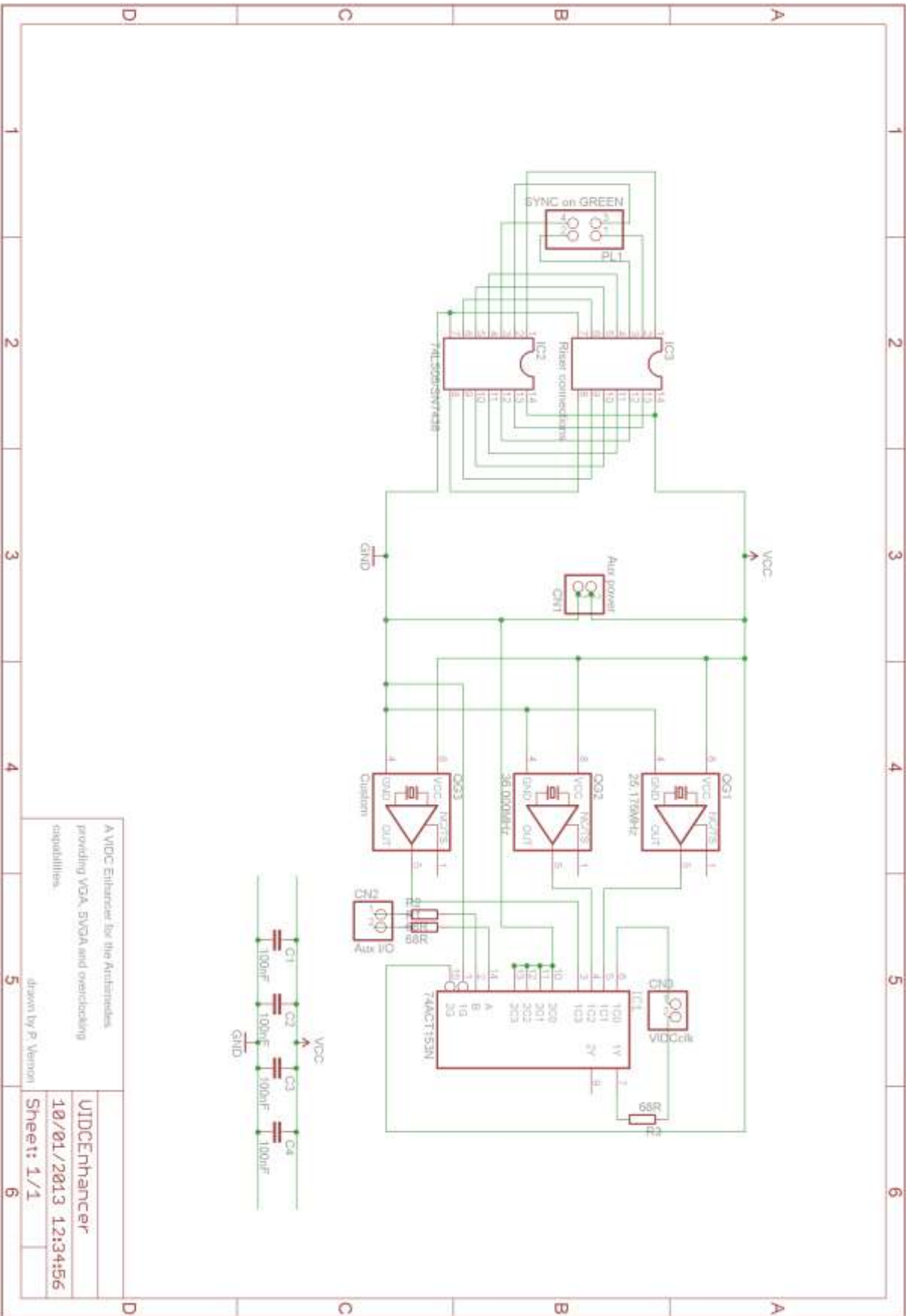
### Condensed truth table for the Ultra VIDC Enhancer

Select Inputs		Inputs (Side A)					Output (Side A)
$S_0$	$S_1$	$\overline{E_a}$	$I_0$	$I_1$	$I_2$	$I_3$	$Z_a$
L	L	L	SysClk	X	X	X	24.000MHz
H	L	L	X	QG1	X	X	25.175MHz
L	H	L	X	X	QG2	X	36.000MHz
H	H	L	X	X	X	QG3	Over-clocked*

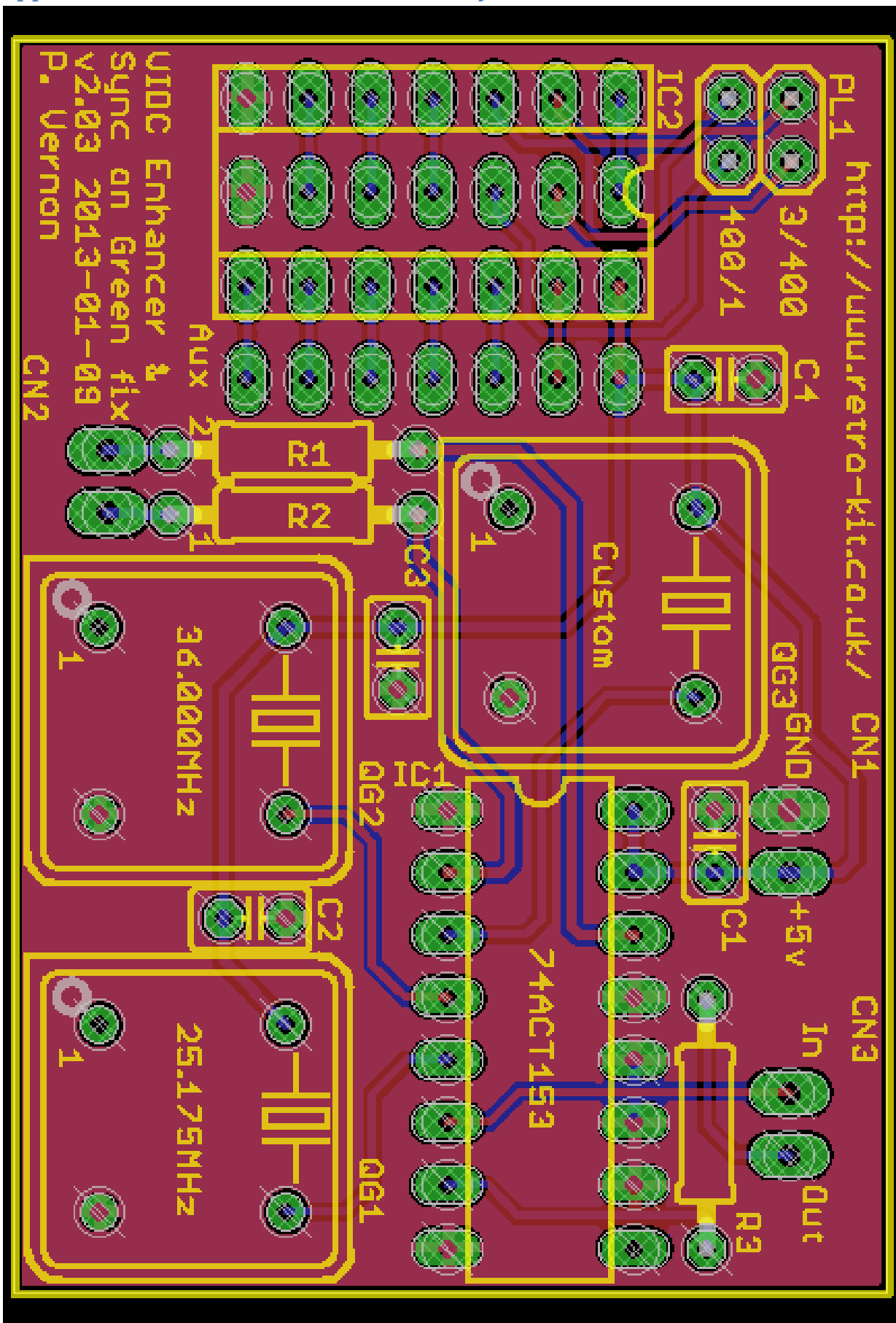
\* The over-clocked frequency is only output where QG3 is fitted. If QG3 is not fitted, the input  $I_3$  should be tied to GND which will cause the output to go LOW when selected.



**Appendix E – Ultra VIDC Enhancer schematic**



## Appendix F - Ultra VIDC Enhancer PCB Layout



## Appendix G – Parts list

IC1 - 74ACT153N

IC2 - SN7438 (A400/1, IC9) or 74LS05 (A300 and A400 series, IC4). (Not required for A3000)

C1-4 - 100nF ceramic capacitors

R1-R3 - 68R 0.25W resistors

QG1 - 25.175MHz (VGA) oscillator (half-can through hole)

QG2 - 36.000MHz (SVGA) oscillator (half-can through hole)

QG3 - Reserved for over-clocking (half-can through hole oscillator) \*

\* Pin 5 of QG3 on the PCB should be connected to pin 4 (GND) when an oscillator is not fitted.

CN1 - PCB mount 2-way header (A3000 only)

CN2 - CN3 - 90-deg 2-way headers (NOT 90-deg for the A3000)

PL 1 - 2x 2way header (not required for A3000)

### Sockets

1x 14-way DIL turned pin socket (not required for A3000)

1x 16-way DIL turned pin socket (optional)

2x 7-way round male header SIL pins (not required for A3000)

## Appendix H - (S)VGA and Multi-sync monitor support

The following displays have been tested using both a Dual VIDC Enhancer configuration and the latest Ultra VIDC Enhancer hardware with a 25.175MHz and 36.000MHz oscillator fitted. On Archimedes computers with RISC OS 3 fitted. The results are the same for both types of VIDC Enhancer.

Monitor	TV modes	VGA modes	SVGA modes**	Notes
Acorn AKF 50	OK	OK	OK	Full Multi-sync monitor. No letterboxing.
Iiyama ProLite E430S	OK TV MODEs are "letterboxed".	OK	OK	
Sony Bravia KDL 40V400 (TV using the VGA connection)	OK TV MODEs are "letterboxed".	OK	Display is visible but complains that it is "Out of range".	Requires a 40.000MHz oscillator to deliver SVGA @ 60Hz and remove the "Out of range" message.
Dell 1701 FP	OK TV MODEs are "letterboxed".	OK	OK	

### Previously tested with Dual and Single VIDC Enhancers

The following displays have ONLY been tested with Single and Dual VIDC Enhancers. The results indicate that an Ultra VIDC Enhancer would drive all of these monitors without problems.

Monitor	TV modes	VGA modes	SVGA modes **	Notes
Proview 780	TV MODEs are "letterboxed".	OK	OK	Dual VIDC Enhancer required for TV and VGA modes
Dell Ultrasharp 3008 WFP	OK TV MODEs are "letterboxed".	OK	OK	Dual VIDC Enhancer required for TV and VGA modes
Samsung 191T	OK TV MODEs are "letterboxed".	OK	OK	Dual VIDC Enhancer required for TV and VGA modes
LG Flatron Wide M208WA (TV using the VGA connection)	OK TV MODEs are "letterboxed".	OK	OK	Only requires a 36.000MHz VIDC Enhancer *

### Archimedes monitor support without a VIDC Enhancer

For comparison the support of the same monitors and screen modes by a stock Archimedes computer is shown below.

Monitor	TV modes	VGA modes	SVGA modes **
Acorn AKF 50	OK	OK	Unavailable
Iiyama ProLite E430S	OK TV MODEs are extensively "letterboxed".	OK	Display is visible but complains that it is "Out of Range"
Sony Bravia KDL 40V400 (TV using the VGA connection)	Refresh rates too slow		Unavailable
Dell 1701 FP	Refresh rates too slow		Unavailable
Proview 780	Refresh rates too slow		Unavailable
Dell Ultrasharp 3008 WFP	Refresh rates too slow		Unavailable
Samsung 191T	Refresh rates too slow		Unavailable
LG Flatron Wide M208WA (TV using the VGA connection)	OK TV MODEs are extensively "letterboxed".	OK	Unavailable

\* Monitors that only require a 36.000MHz VIDC Enhancer for display purposes benefit from the addition of the 25.175MHz oscillator due to the fact that the refresh rates provided by the 25.175MHz oscillator are slightly higher than those produced by the Archimedes natively which run 4.7% slower than they should. Adding the oscillator also has the benefit of reducing the impact of the letterboxing effect. See [Appendix B](#) for more details.

\*\* SVGA screen modes are only available with RISC OS 3 and a 36MHz VIDC Enhancer fitted.

## Appendix I – Acorn Field Change Order 2022

Acorn Field Change Order 2022 details the issue of the Sync on Green signal causing monitors to fail to display the Archimedes' video output correctly and a resolution for it.

As the Ultra VIDC Enhancer implements the FCO in a reversible fashion, it is simply included here for completeness.

FCO Number : 2022

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Date of Issue : October 1991

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Applicable Product : See Below

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Description of Problem

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The units listed under 'Types affected' will not work correctly the VGA or Multiscan monitors requiring separate horizontal and vertical sync signals

Types Affected

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A305 (AKB10)

A310 (AKB15)

A440 (AKB20)

A400/1 (AKB20, AKB42, AKB44)

A400/1 LC (AKB46)

R140 (UNX11)

See next page for serial number details

Description of Change

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The signal from the IC pin numbers detailed below must be disconnected. This may be done either by cutting the IC leg or the track connecting to it.

\*NB this modification is not easily reversible.

A400/1 series : IC9 pin 3

All others : IC4 pin 2

Claim Procedure

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N/A

Rework Doc. Reference

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FCO 2022

FCO Credit Rate

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N/A (Optional at Customer Request)

Special Instructions

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None

Machines affected.

All units of the following types are affected:

A305 (AKB10)  
A310 (AKB15)  
A440 (AKB20)  
R140 (UNX11)

For the 400/1 series units with the serial numbers up to and including the following are affected.

410/1	:	27	AKB40	up to	1010000
420/1	:	27	AKB42	up to	1002700
	:	25	AKB42	up to	1000380
	:	25	AKB45	up to	1000017
440/1	:	27	AKB44	up to	1002300
440/1 LC	:	25	AKB46	up to	1001600