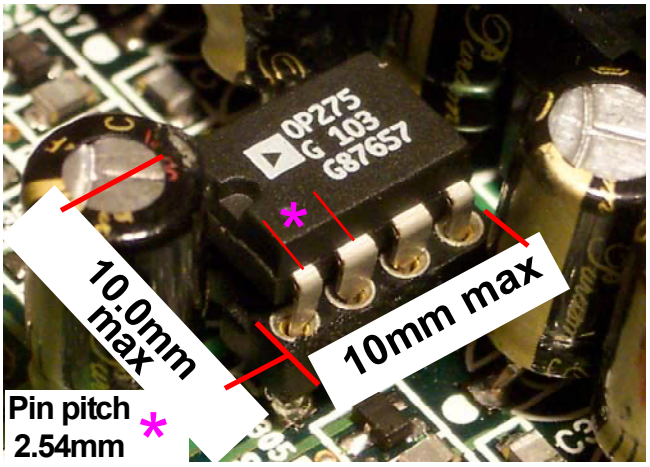
Bill Bax...*"good looks have always been my downfall".*

Roland VS-1880 op-amp swap

There has been much talk at the VS-PLANET forum about the Roland VS op-amp swap modification, not to mention considerable discussion concerning mic preamps and front-end input interfacing. This step-by-step guide aims to set out the benefits of modifying your Roland VS, and hopefully lay to rest some of the myths surrounding the quest for the 'Holy Grail' in front-end inputs. You won't be hearing any 'rock n' roll' buzzwords like how to how '*warm*' a particular op-amp is, or the dreaded, '*the bass sounds tighter*'.

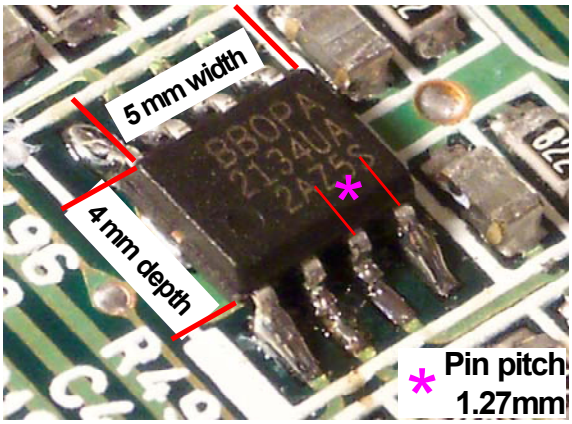
PART ONE highlights the practical difficulties, minimum tools needed, soldering and desoldering techniques etc. In PART TWO you will see how easy it is to remove a SMD (surface mount device) with the right tools. PART THREE will help you to evaluate various detailed test results with nine op-amps, including the highly rated DBX386 vacuum tube preamplifier. PART FOUR shows two PCB (Printed circuit board) projects using the much acclaimed AD825 and the new dual op-amp successor; AD8066. Finally, at http://www.separate-strings.co.uk you will be able to download 3 uncompressed 16-bit AVI's and critically listen to each op-amp.



PART ONE

STANDARD 8 pin DIL (Dual-in-Line) Even working in normal scale, removing through-board components can be difficult. 10mm X 10mm socket size (Actual size).

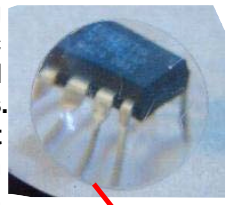
SMD (Surface mount device) Removing SMDs requires precision tools and practise. It's not that difficult extracting an SMD from a board... The hardest part is putting one back in!



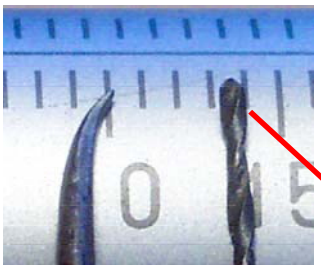
Tools Needed

Your first port of call in the UK will probably be Maplin Electronics (www.maplin.co.uk). You can also try Farnell, but they're not in your local High Street and what's worse, their range is not so well suited to the hobbyist. With Maplin at least you're guaranteed to get the essential tools in one-shot.

MAGNIFYING GLASS. I used this one and attached it to a mic stand. Took out the holding screw in the mic adaptor, and slotted in the glass. Saved £40. At least 5X magnification needed.

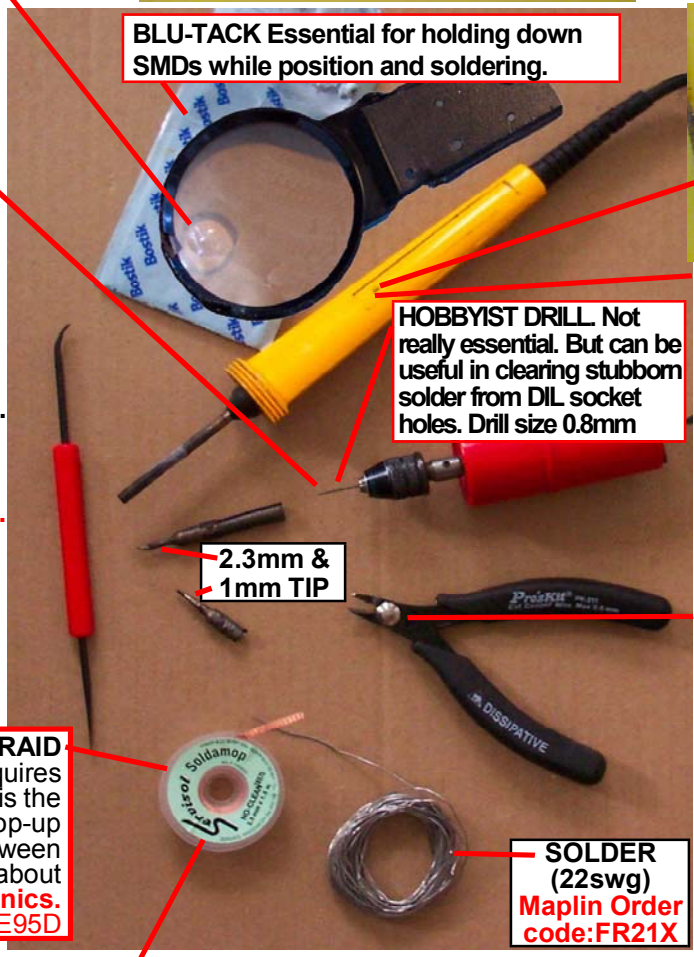


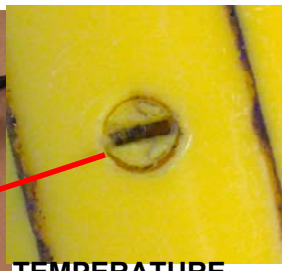
MULTIMETER WITH TEMPERATURE FUNCTION. Fahrenheit setting is best. Maplin do an inexpensive meter at £14.99. Order code: UZ85G



CUSTOM PCB TOOL & 0.8mm drill. The tip has a maximum of 0.3mm and a slight bend. Maplin supply a 6 piece PCB aid set. Order code: N18AN Price £9.99.

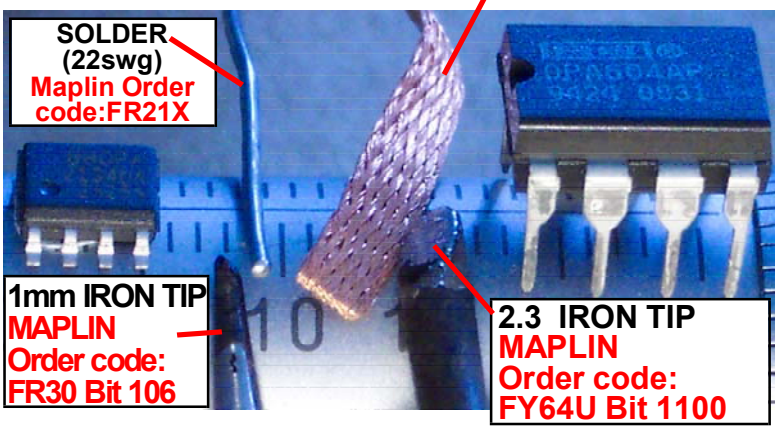
The 0.8mm drill bit unfortunately appears to be no longer available as a single item from Maplin.

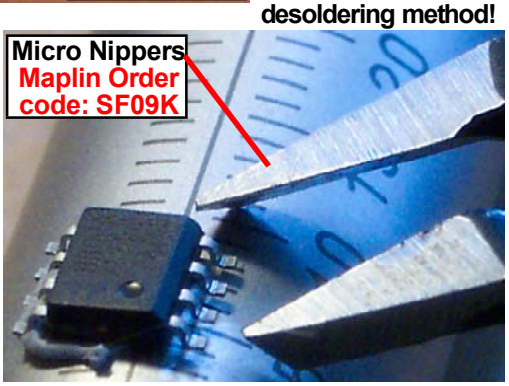




TEMPERATURE CONTROLLED SOLDERING IRON 50WATTS Setting the right temperature is very important. Available from Maplin electronics. Order code: XJ45Y. Price £39.99

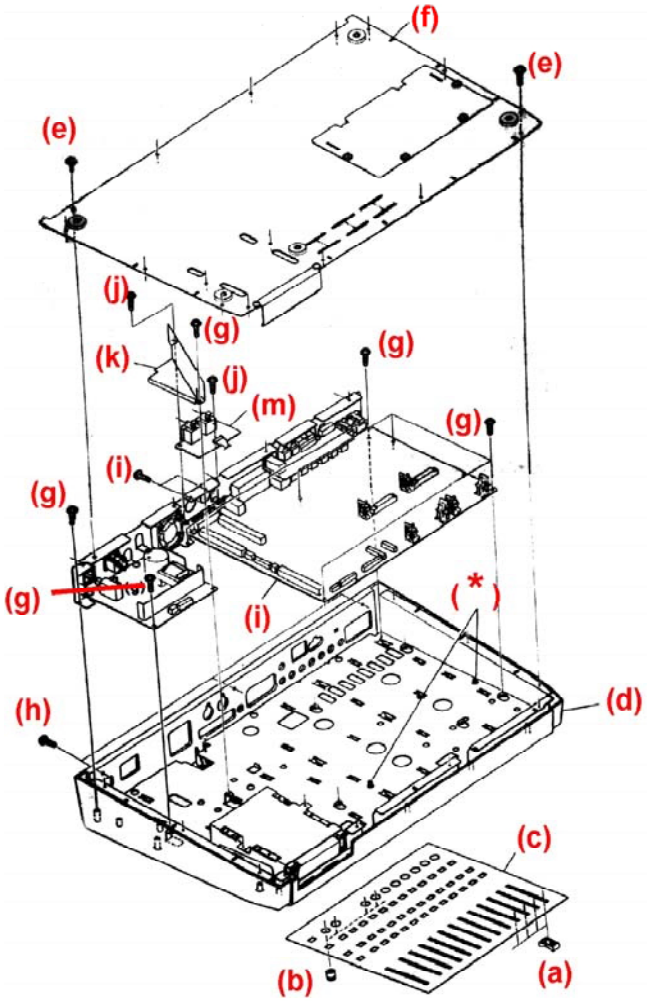
MICRO NIPPERS (Maplin. order code SF09K). It can take hours trying to safely remove NE5532 with a soldering iron and desolder braid. Using these handy pair of cutters will shave 50% off the time taken using the traditional desoldering method!

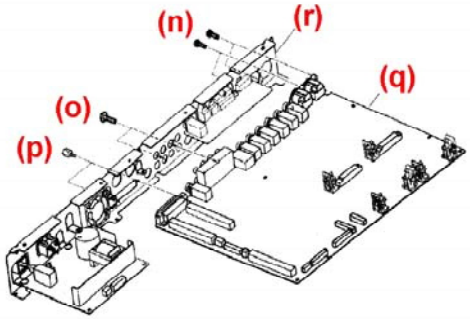




Removing the main board

1. Remove the knobs from the front panel: **(a)**, **(b)** (slider knobs and 10 round knobs). Remove the top panel **A(c)**: slide in a flat blade tool e.g. tip of a screwdriver below the top panel and then carefully lift the panel **(See next page).**
Notes*:* 1) Main board cannot be removed before the top panel **A(c)** is removed.
2. Once the panel is removed, keep adhesive surface away from dust.
3. Replacement top panel **A(c)** available from Roland service department.
4. Turn over the body **(d)** and remove the bottom cover **(f)** by removing 16 screws.
5. Remove **CN2** and **CN3** and MIDI board by removing corresponding 4 screws. Remove screws: 2 from main board. =, 6 from rear panel, 2 **(g and h)** from switching regulator. Remove the panel **(i)** together with the switching regulator, fan, main board, digital I/O board. To do this, slightly shift the main board to disengage it from notches (marked * in the figure).
6. Remove screws **(j)** and **(l)** and then the air guide **(k)** and MIDI board **(m)** from the rear panel.
7. Remove screws **(n)**, **(o)** and **(p)** and then main board **(q)** from the rear panel **(r)**.
8. Install the repaired or new main board by first engage it with notches **(*)**. Repeat steps 1 to 6 in the reverse order.
After attaching the top panel **A(c)**, evenly depress the surface using soft cloth for tight





Removing the sticky panel

This was the part I hated most. It made me feel as though I was doing something I shouldn't. A bit like going to the off-license two days in a row for a six-pack of beers.

Top left hand corner is a good place to start with a blunt blade

It's a very gradual affair

Easy does it. The sticky panel will squeak and pop as you slowly prize it away

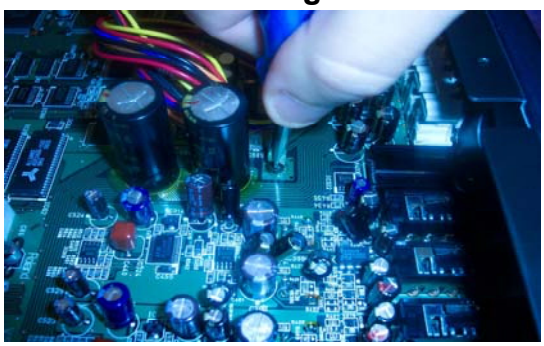
Almost done

Complete. The only thing to do now is to find a safe dust-free place to temporarily store the sticky panel.

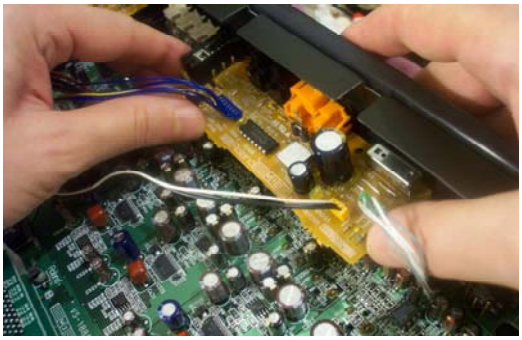
A haystack is probably a bad idea

Working with the main board

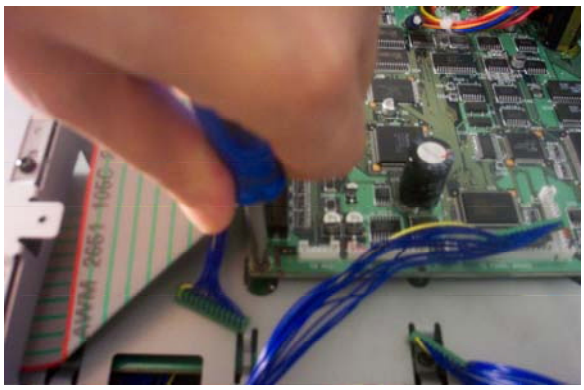
er.....Removing a screw



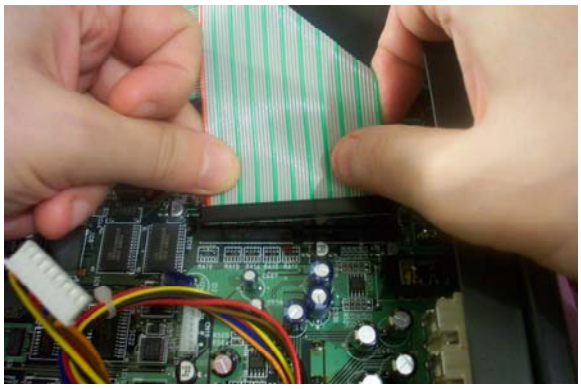
Digital board removal



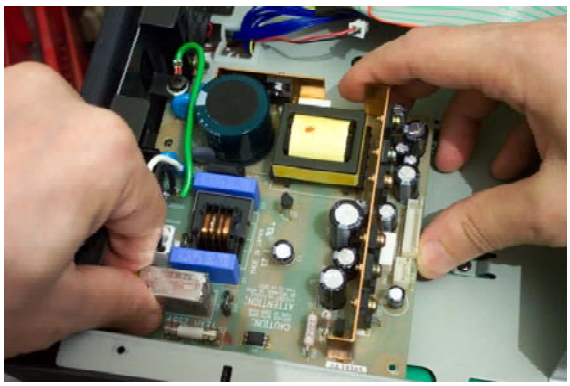
Another screw



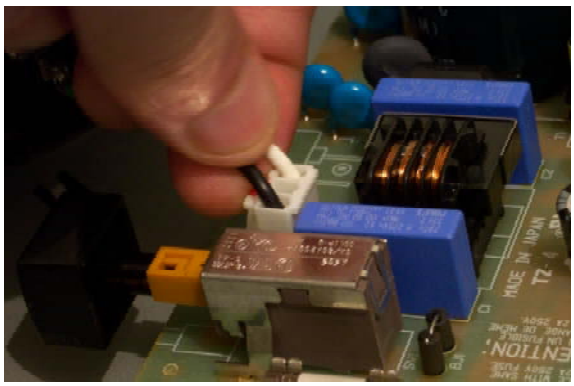
Removing the IDE cable



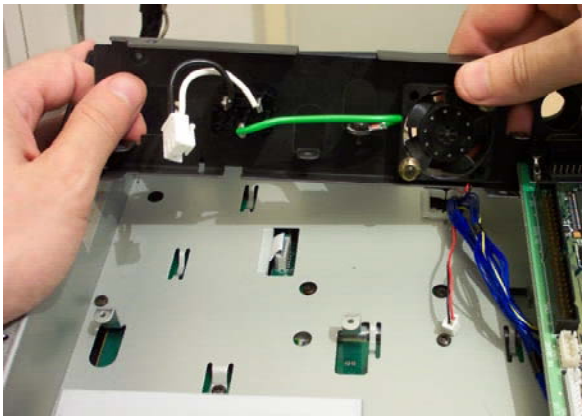
Power supply must come out



Power supply mains clip



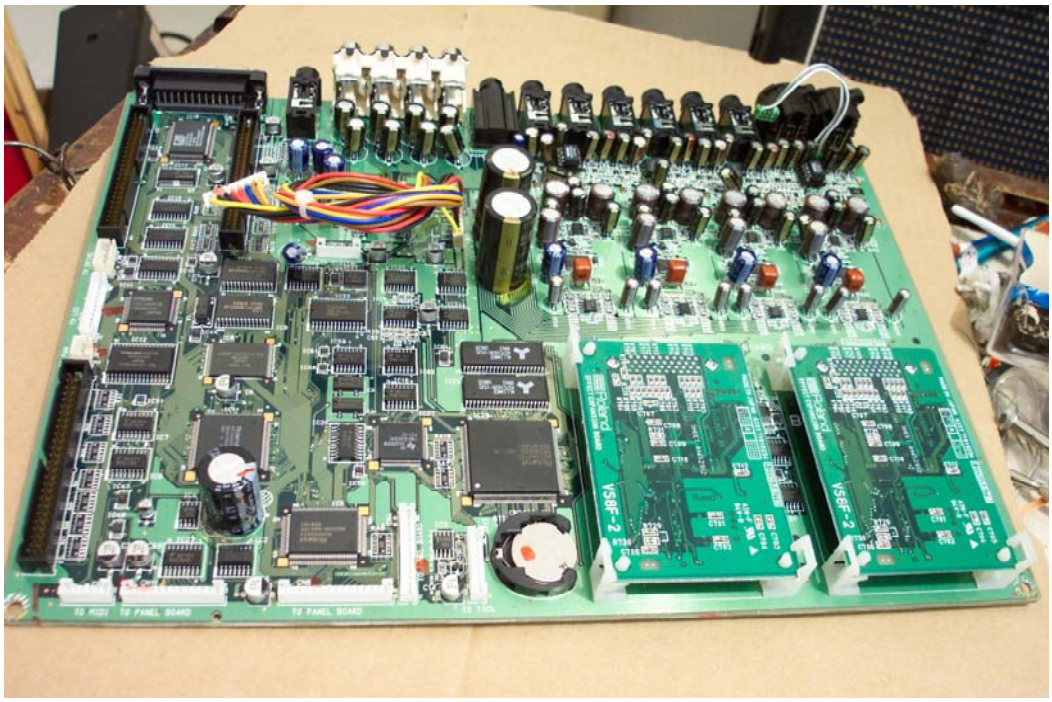
The metal bracket behind power supply has to be removed too. It's attached to the mainboard.



The main board

I cannot stress enough the importance and high degree of attention that you must employ removing the main board. It may appear that once you've removed all the relevant screws and auxiliary boards, that one is still having difficulty in separating the main board. Remember, the front/top sticky panel has to be removed first! I tried to remove the board without the removal of the sticky panel, and added at least an hour to my workload! Another point of some confusion was the removal of the power supply and mainboard bracket. These must also be removed, in order for the main board to easily slot out.

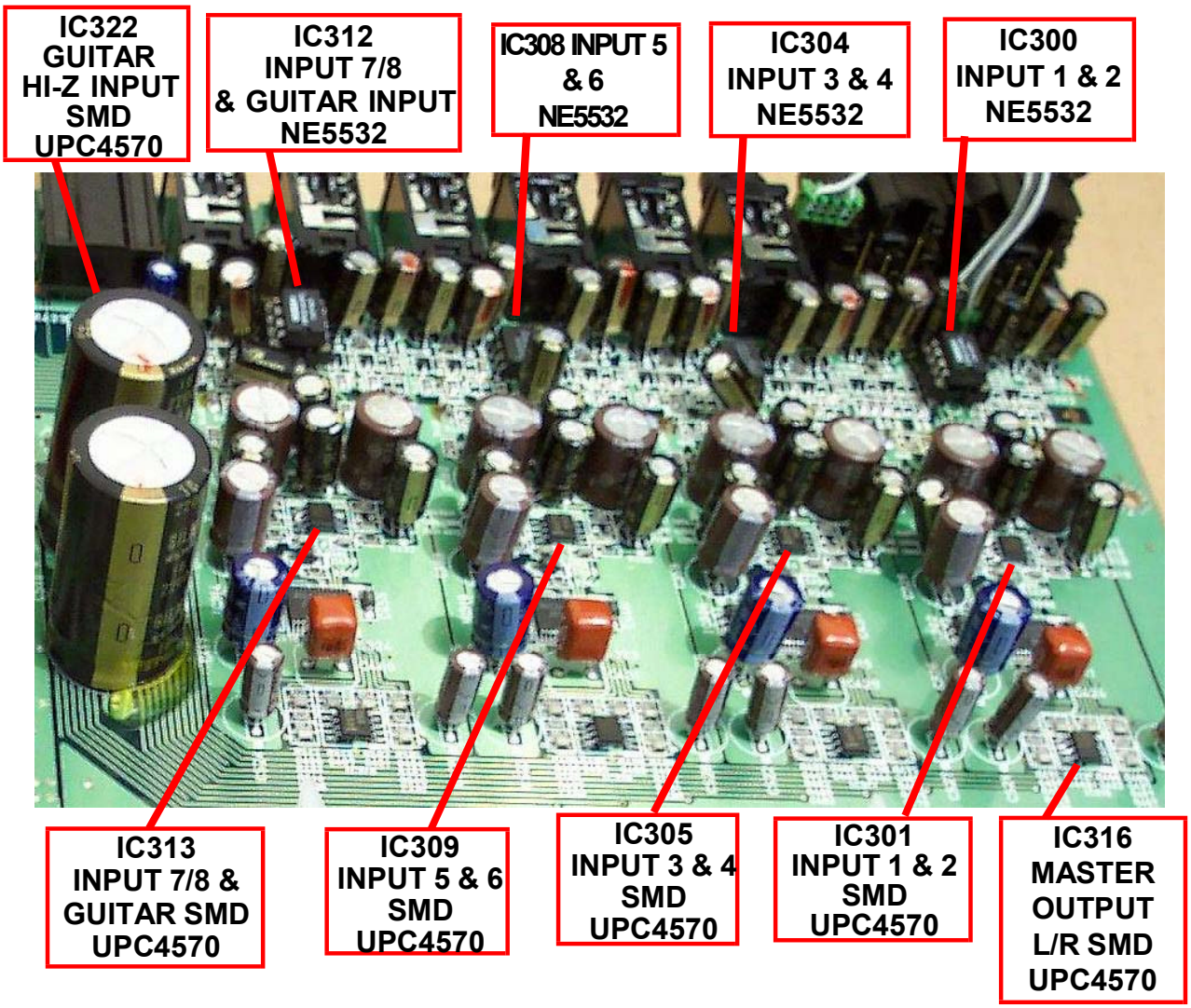
Place the main board on a very clean surface.
A piece of cardboard is a good idea



Candidates for eviction

There seems very little point in just replacing NE5532, as you will only be hearing a 50% improvement. The SMD UPC4570 was first introduced back in the early 80's, and is nearly as old as NE5532. Although 4570 is a good standard OP-AMP, it in no way compares to say, OPA2134 in an SMD package. To hear evidence of this, I suggest you to download OP-AMP REVIEW ONE.avi @http://uk.groups.yahoo.com/group/mod-your-roland-vs/ As the AVI progresses, you will hear a gradual increase in, what I would call an 'intimacy' or a sound engineer might describe it as 'presence'. The difference made by changing UPC4570 is obvious, so the removal of this op-amp is a wise move.

At a cinema near you...
Starring the DBX 386 valve preamp.
Co-starring OPA2134, OPA2604.
With worst supporting actor NE5532



Begin

I have experimented with several ways to remove the IC's from the main board. The obvious one, involved the standard method working with desoldering braid and a 2.3mm iron tip. **Fig 1.** At this point, I think it's important say that I had completed more than half way through the VS-1880 modification, before realising there is an easier way to remove all the IC's. Therefore, I'm not going to document the standard desoldering and removal method...a waste of time. See **Figure 2.** Instead, I think it would be better to show, what is a much more simpler technique, and thankfully, using this method removes the risk of serious heat damage to the precious components and tracks.

Standard through-board IC removal method working with soldering iron & braid

- ✗ Cumbersome working in small areas
- ✗ Increased heat-stress to delicate board tracks
- ✗ IC body restricts overall view and easy access to the iron points
- ✗ Risk of damage to board tracks when lifting IC
- ✗ Risk to adjacent surface mount components which are easily dislodged
- ✗ Time consuming. Typically 1.5 hours per IC.

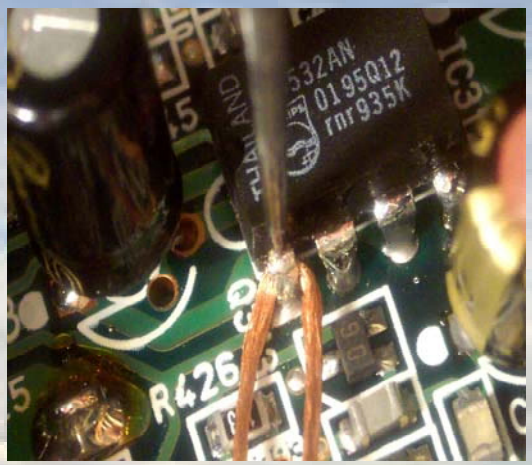
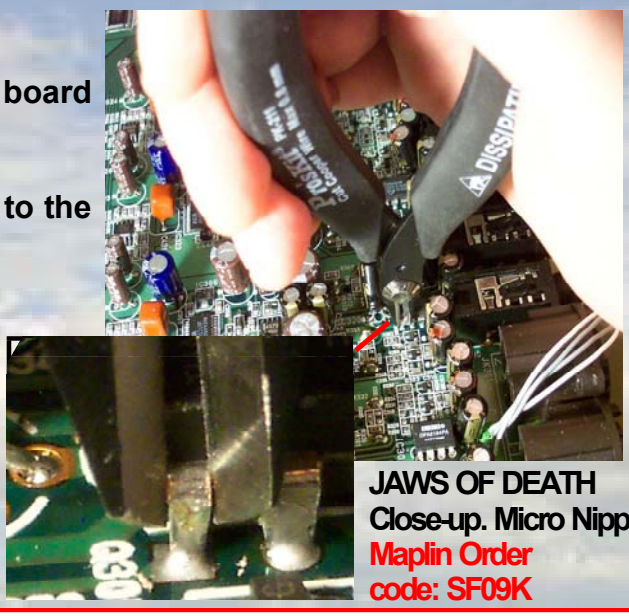


Figure 1

Working with Micro Nippers

Figure 2

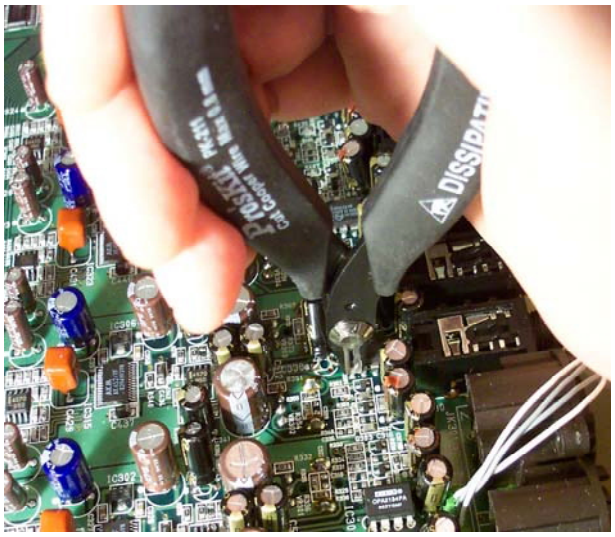
- ✓ Quick removal of IC main body
- ✓ Reduced heat-stress to delicate board tracks
- ✓ Increased view and easy access to the iron points
- ✓ Reduced risk of damage to surrounding components
- ✓ Removing NE5532 overall time-factor reduced by up to 50%. Cutting out NE5532 only takes about 7 minutes



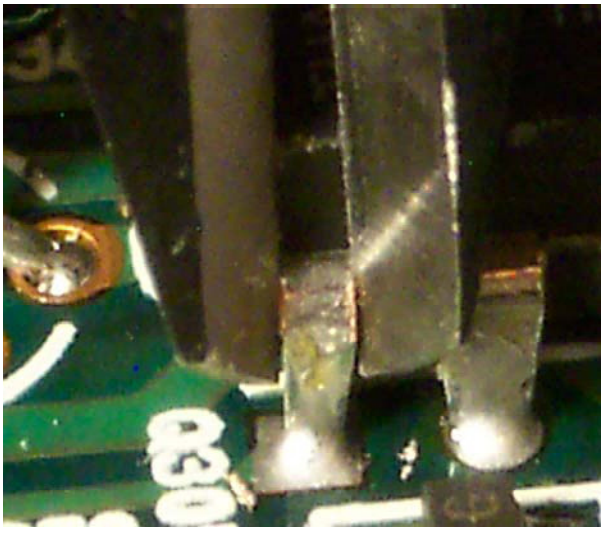
JAWS OF DEATH
Close-up. Micro Nippers
Maplin Order code: SF09K

Removing NE5532
Time taken: 7 minutes

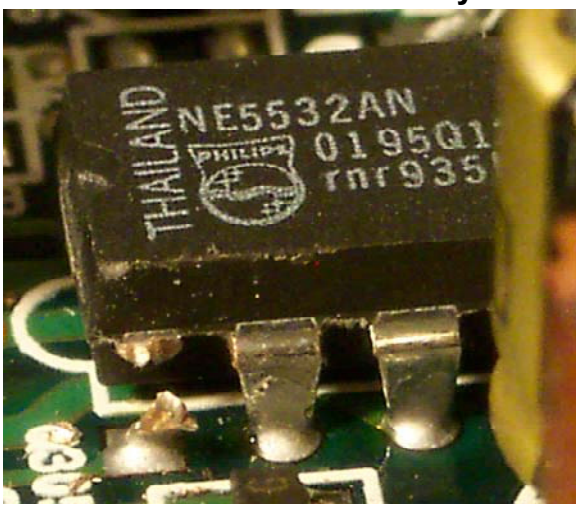
Micro Nippers 1st leg



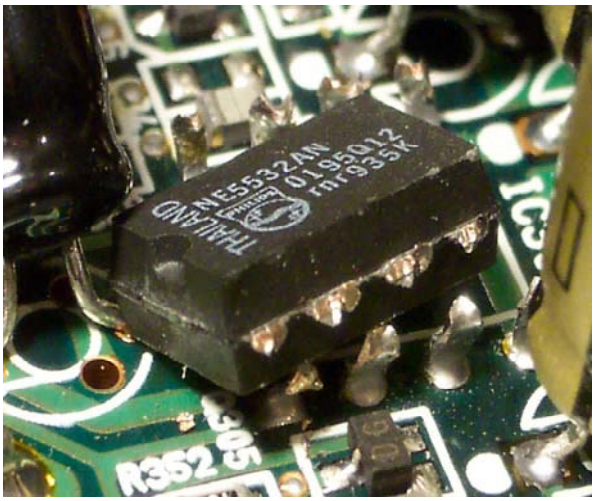
Up-close with the jaws of death



1st leg gone. Notice how close the cut is to the IC body

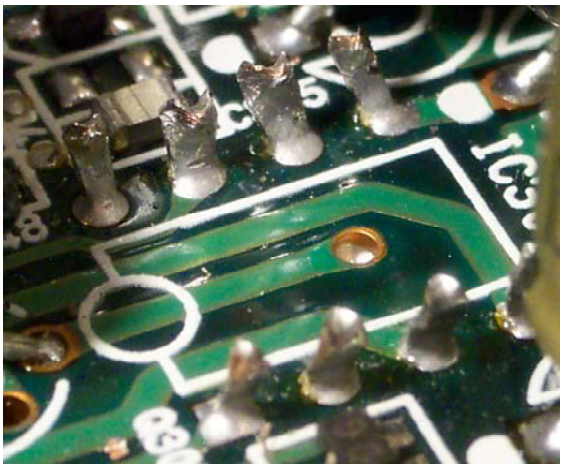


Complete

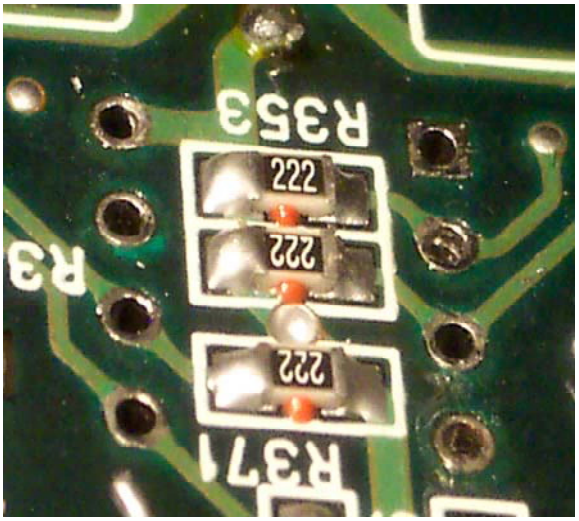


Cleaning up
Time taken: 1:04 hours

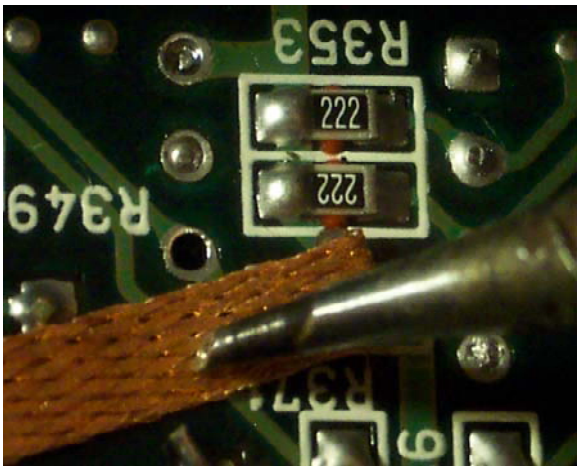
The benefits of using micro nippers are obvious. What remains of the IC legs will later provide a relatively easy method of cleaning up.



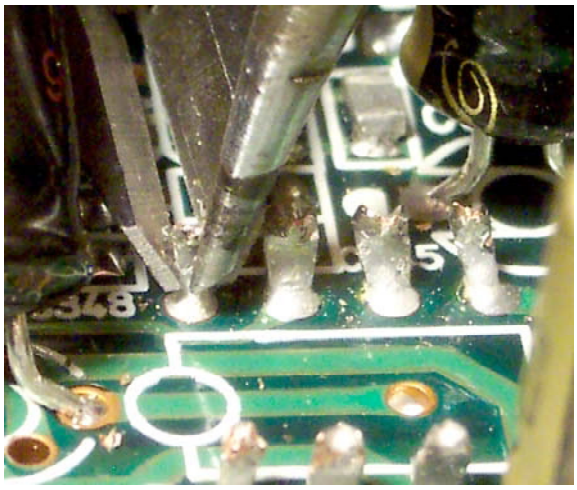
As clean as it's going to get



First thing to do is clean up the opposite side of the board with the desolder braid. Set iron temperature to about 420 Fahrenheit. The aim here is to remove as much solder as possible around the legs. You can experiment with the iron bit size. 2.3mm worked well for me (not shown in photo) but don't try more than 3 attempts on each leg, as you'll only end up damaging the tracks.



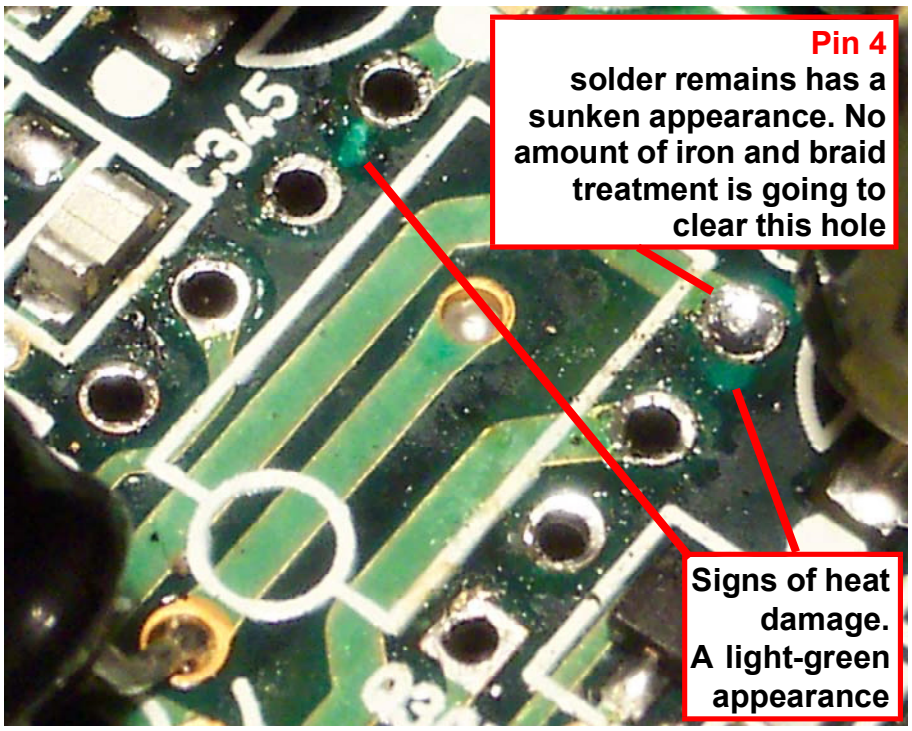
Using the iron & nippers together



Using the soldering iron and micro nipper together. The trick here is to grab hold of the remains of the IC leg with the nippers, and at the same time apply the iron to base of the leg. Ideal iron temperature for this removal job is about 440 Fahrenheit with a 2.5mm iron tip. Another good idea is to clean and tin the iron tip before contact, creating better heat transfer. Once the iron is applied, very gently rock the leg with the nippers and slowly pull upwards. You should find that the leg easily comes out of the board. One other way of assisting the leg removal, could be to use the desolder braid to reduce the amount of solder around the leg, and then use the nippers and iron technique to a greater effect. There are no fixed rules here, the only area of concern might be heat-stress to the tracks. Experiment with care.

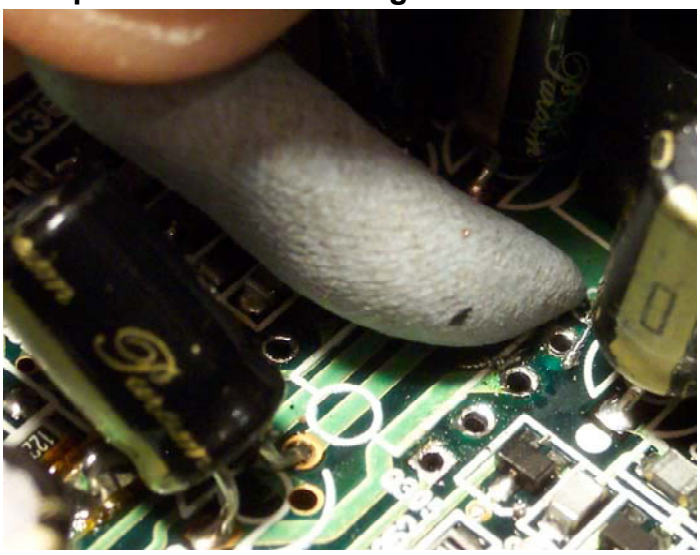
Cleaning up cont'd

Looking a bit like a battle zone, the cleanup is nearly complete. In the photo, **pin 4** still has a small amount of soldering left in the hole. The light-green appearance on the borders of the hole are tell-tale signs of heat damage. It would be unwise to have another go with the braid and the iron. All is not lost though, as a hand-cranked 0.8mm drill will carefully clear the hole.



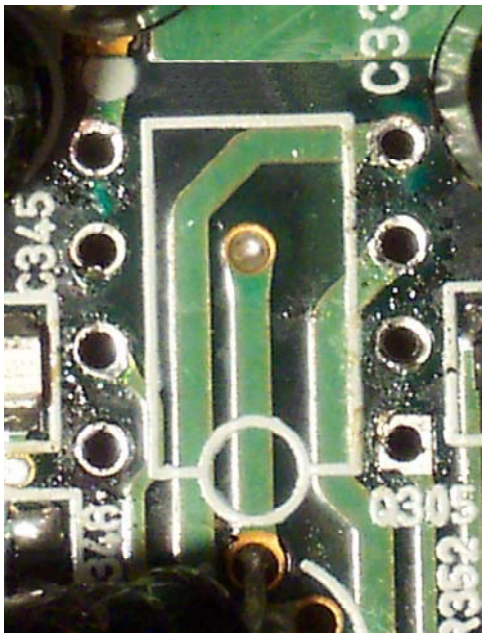
0.8mm hand-cranked drill

Cleaning away debris with Blu-Tack. Don't use a brush. You'll only be moving the debris to somewhere else on the board, possibly creating a nasty bridge between components or an IC's legs.

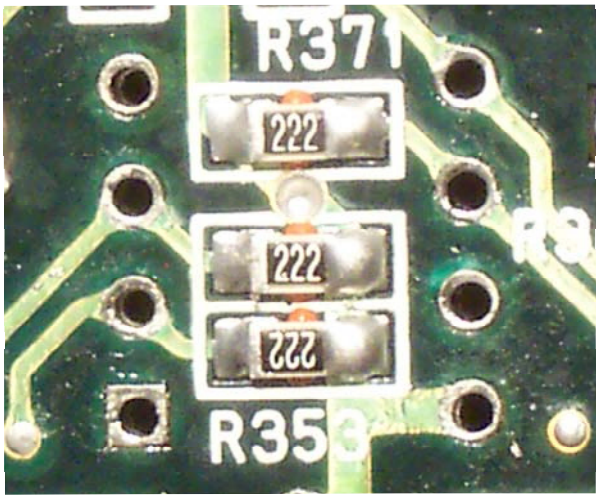


Cleaning up cont'd

IC component side complete, but looking a little bit fluxy. You could use a flux cleaner to give a more pleasing appearance, but there seems little point in doing so.

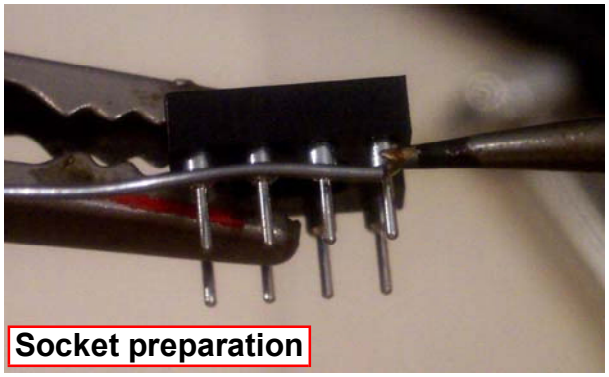


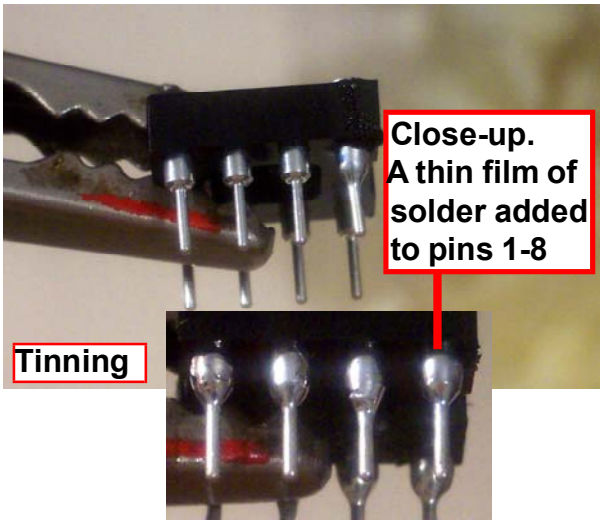
Opposite side complete with some further heat damage.



Preparing the socket
Time taken: 5 minutes

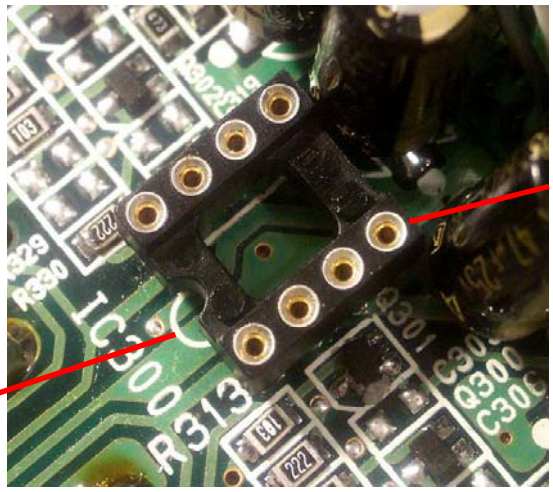
As the IC socket legs must continue through to the opposite side of the board, this can present a significant problem, in gaining access with the iron to the mating points between the socket and tinned tracks. Fortunately all is not lost, as solder thankfully posses the unique properties of capillary reaction. This means that if both the mating areas of the socket and the tracks are sufficiently tinned, when the iron and solder are applied from the opposite of the board, the solder will flow down through the holes, and assisted by gravity/capillary reaction will in turn lead to a good connection *(I need a breather).*


Socket preparation



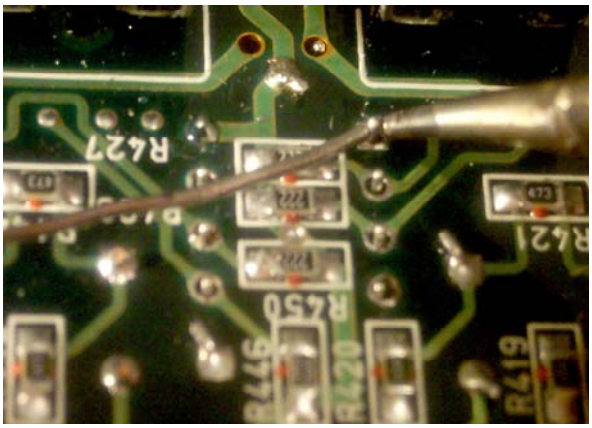
Soldering
Time taken: 10 minutes

Placing the socket. The little notch in the socket (X marks the spot) should face away from input sockets.

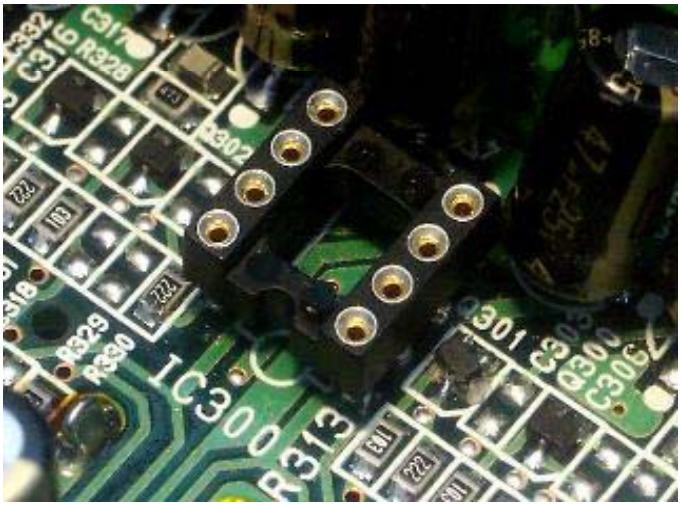


8 pin socket
Maplins
order code: FZ45Y

Soldering. From the opposite of the board, apply a fairly generous amount of solder, and allow the solder to drop down through the hole.



IC300 socket completed



Continuity Checks
Time taken: 15 minutes per IC

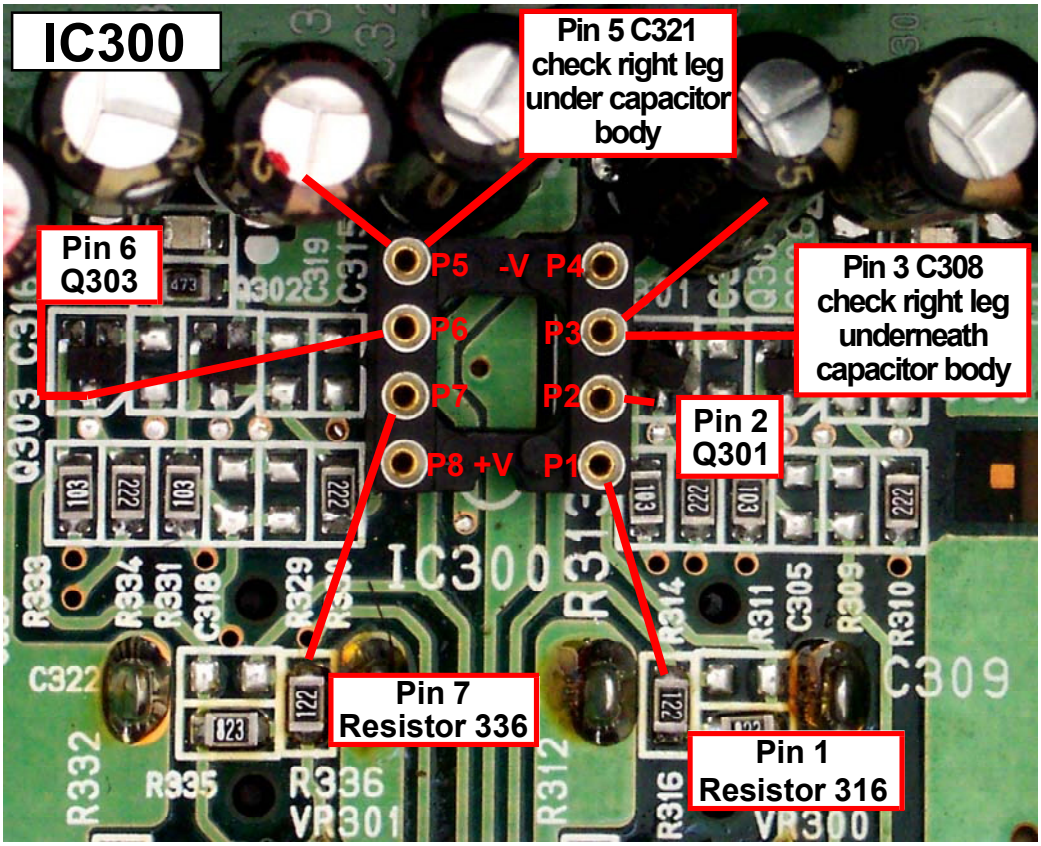
Once you have completed soldering, the only other task is to check the continuity from the socket pins to the tracks and components with a multimeter. If there isn't continuity, you'll have to inspect and if required, apply a little more solder to the pins from the opposite side of the board. Also here, it's a good idea to check for continuity between pins. Look out for solder bridges, and pay extra attention to pins **4 & 8 (-+ volts)**. See ***DID YOU KNOW?*** box below. Make double sure there is no continuity with any other pin. You can easily check pins 4 & 8 continuity with the same matching pin on IC's 300, 304, 308 and 312.

DID YOU KNOW?

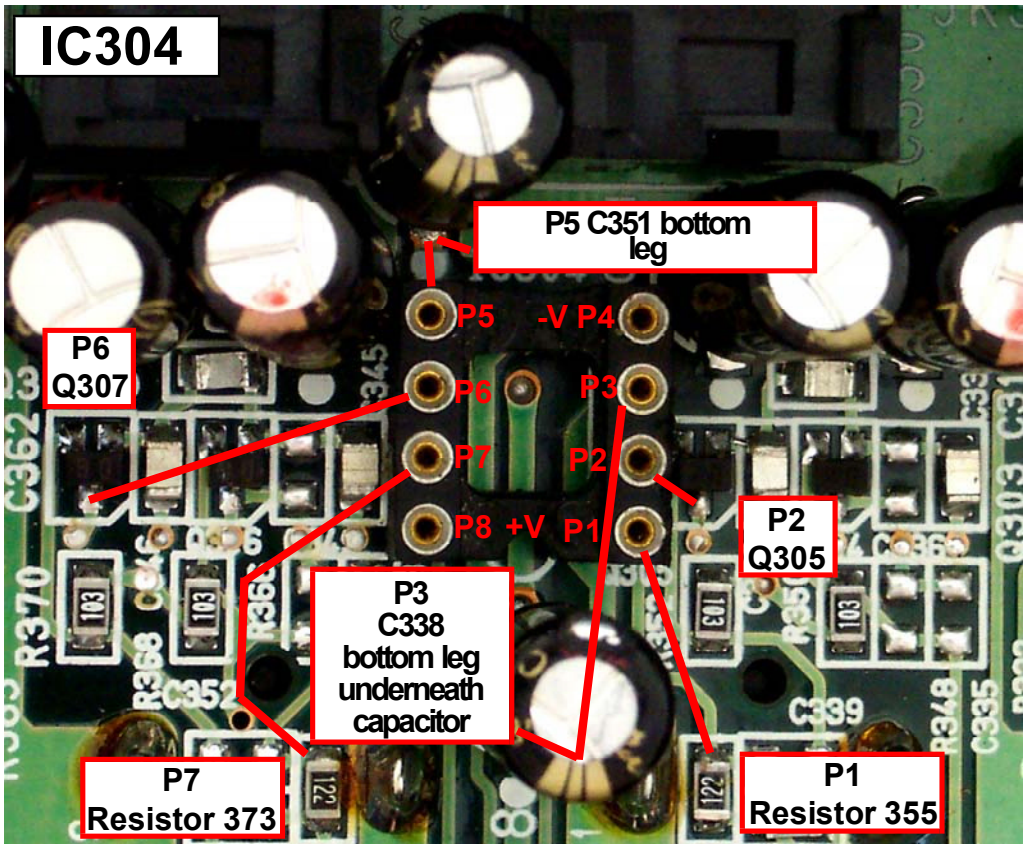
It is common to have brief continuity between pin 8 (+ volts) & pin 4 (-volts). Sometimes this can be a little confusing, as there often seems to be a connection when you first touch pin 4 & 8, and then, as if by magic, it quickly disappears.

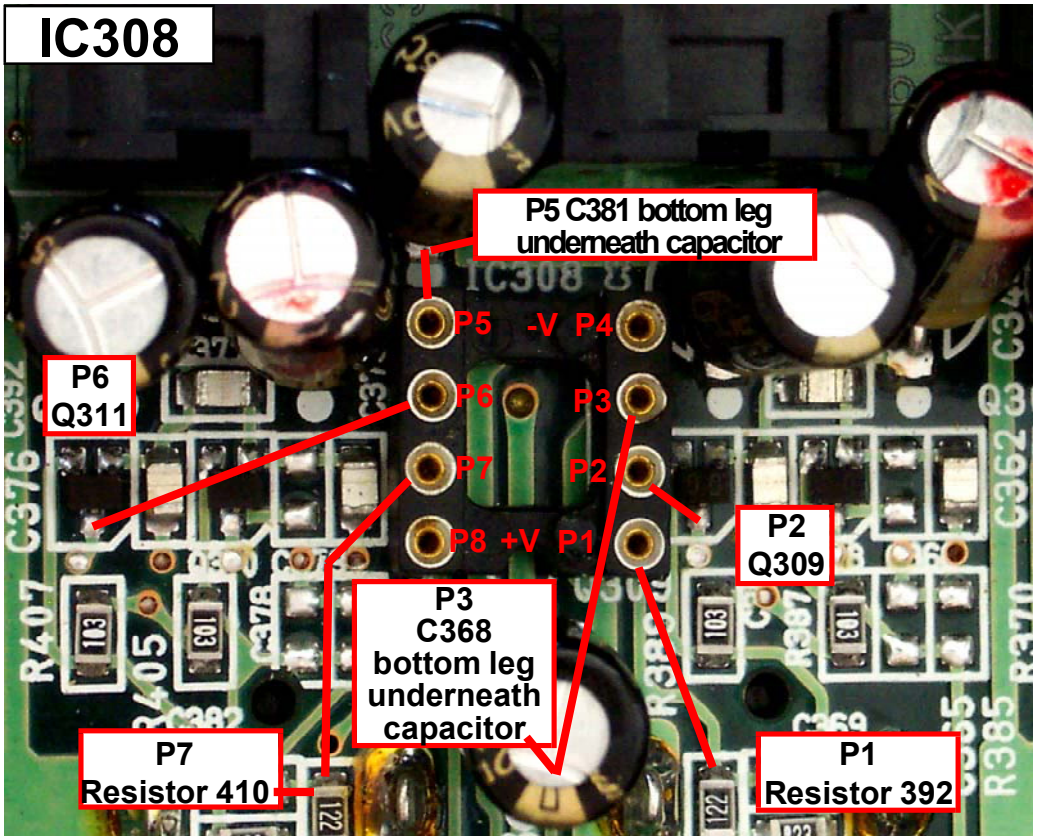
Answer....Brief continuity is caused by electrolytic capacitors charging up across the power supply rails. If the continuity is brief, all is well. If not, best check.

PIN TO NEAREST COMPONENT

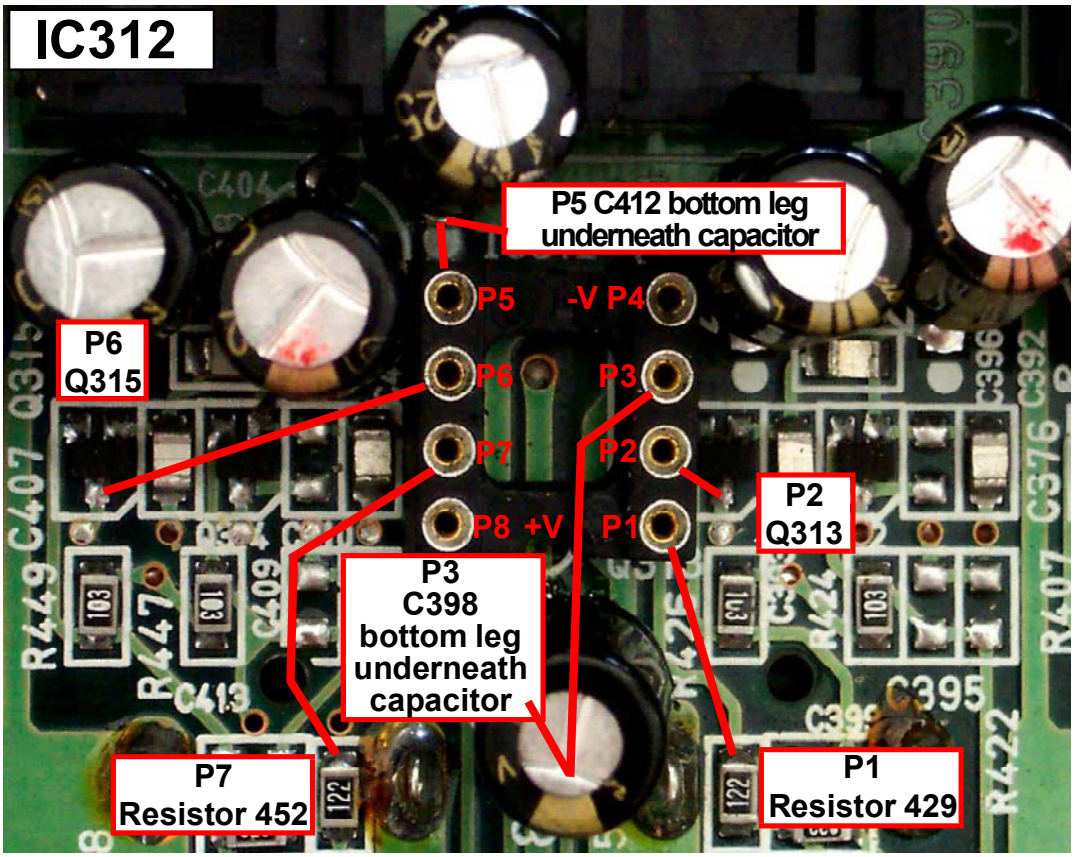


Continuity Checks P2

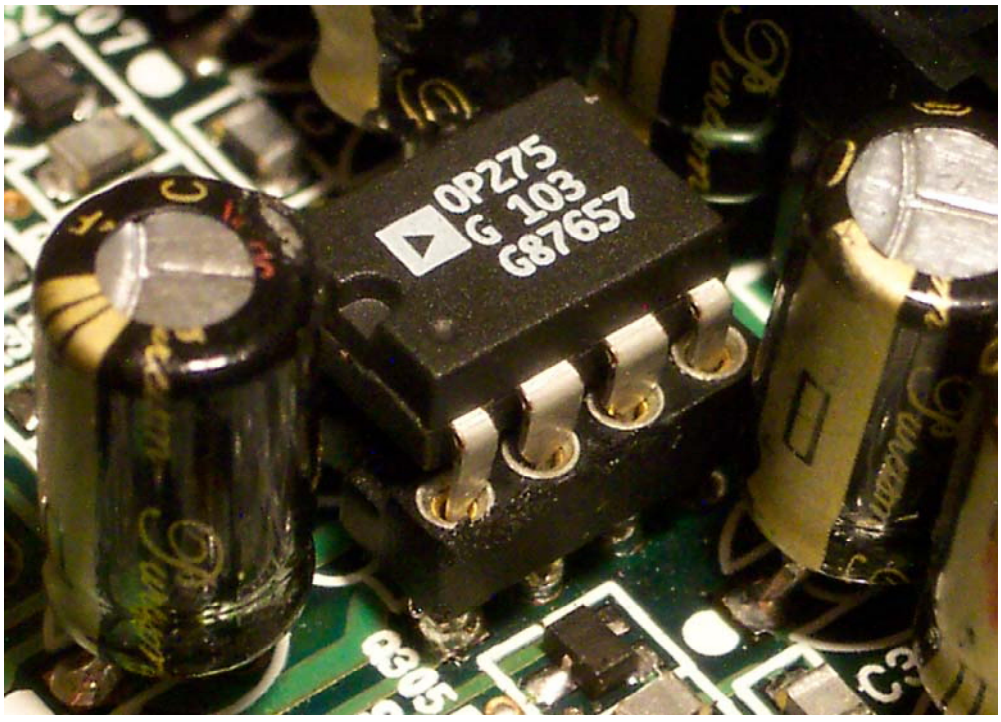




Continuity Checks P3

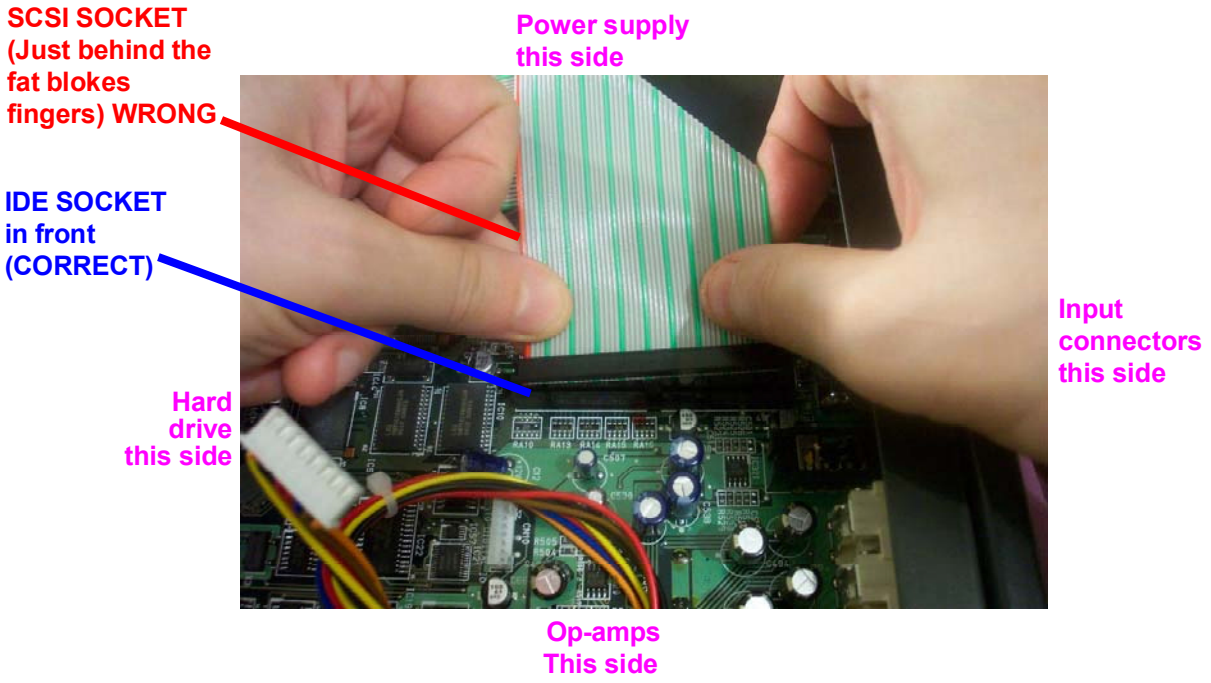


It's a pretty site!



Casing up

Now that the first stage of the op-amp upgrade modification has been completed, and all the continuity checks have been made, the only thing left is to put everything back together again. Go back to **Page 2** of this document, items 1-7 in reverse. Can't say anything more than that. The only potential problem I can foresee, is the reinstallation of the IDE cable. Although the board is clearly labelled SCSI and IDE, in an excited state of expectation, it's possible to become a little confused and make the wrong choice. If you happen to install the IDE cable from the hard drive to the SCSI socket, you'll be in for a nasty shock later. Untold damage will be done, not only to the hard drive, but also to the SCSI interface on the main board. This could end up expensive in many ways.



Reinstall the VS-1880 and test input channels

Nothing much to say at this point. You've done all the continuity checks, and positioned the IC's the right way around, then there should be nothing to worry about.