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Atari PureVideo Encoder Module 2600VECr5.2

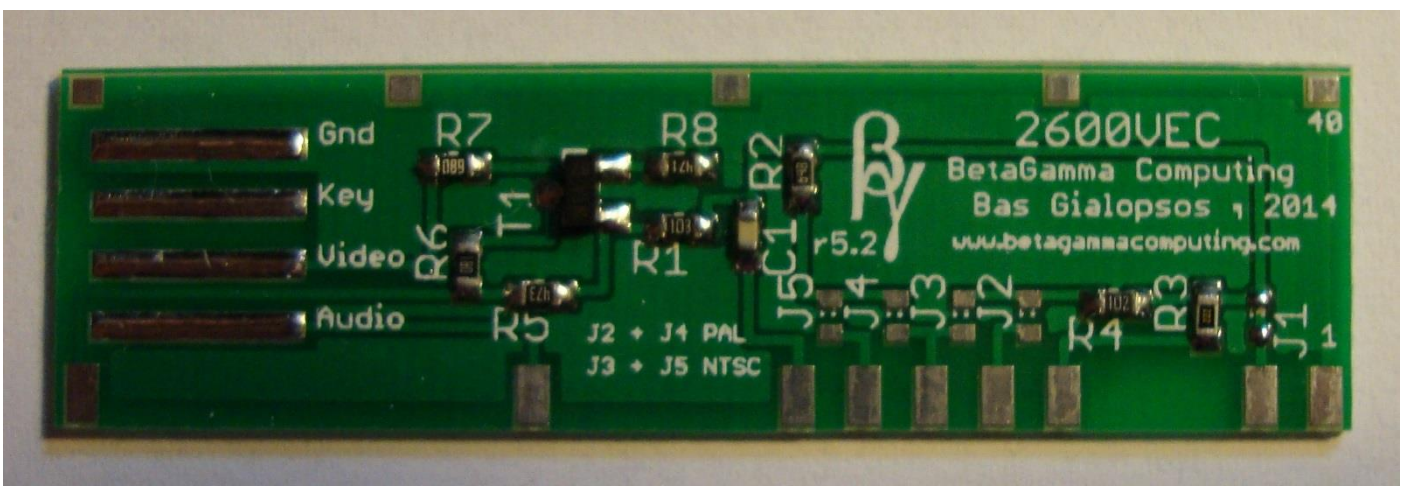


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Atari PureVideo Encoder Module 2600VECr5.2

Description

The BetaGamma Computing 2600VEC is an exciting new product aimed specifically for all model variants of the ATARI VCS2600 Gaming Console.

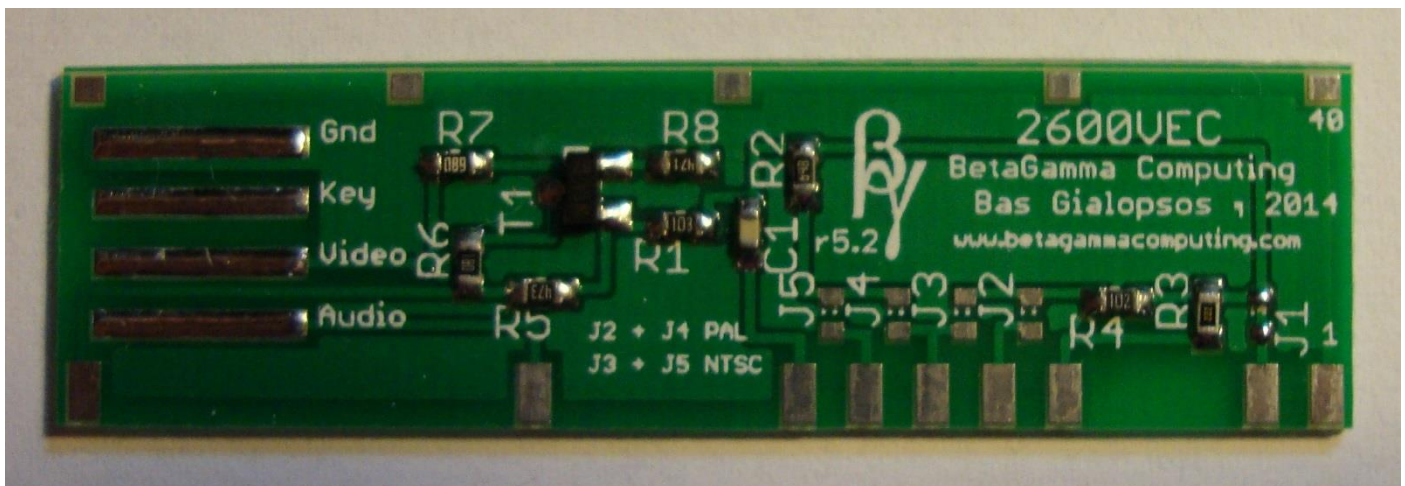
It Alleviates the Consoles one major failing in today's modern computing environment, RF system output only.

The Encoder module provides connectivity to modern standard TV and Video monitors by providing an industry standard specification PAL or NTSC Composite Video Output and Line level Audio Output which are present on a standard rear mounted 3.5MM Stereo jack socket.

This new socket allows cables terminating in SCART or RCA connectors to be easily hooked up to modern LCD or similar Television receivers.

The revision 5.2 version of the module is a miniature surface mount PCB which allows direct connection to the 2600's PCB with minimal footprint and visibility.

This revision will support both PAL and NTSC operation, SECAM operation is NOT supported.



The upgrade is available in kit form for self-installation or can be professionally installed by us at request for a small fee.

Installation of this module requires NO hard modification to the existing 2600 Electronics.

The Kit comprises of the following.

1x 2600VEC r5.2 Encoder module.

1x Composite AV cable 1.5m length with RCA connection.

1x 3.5mm Chassis mount low profile stereo socket

1x 11" length of quality 2 core screened cable for interconnection.

Disclaimer

This Product has been designed to provide loads to the TIA outputs in line with the Manufacturer's specifications so we can guarantee no harm will come to your 2600.

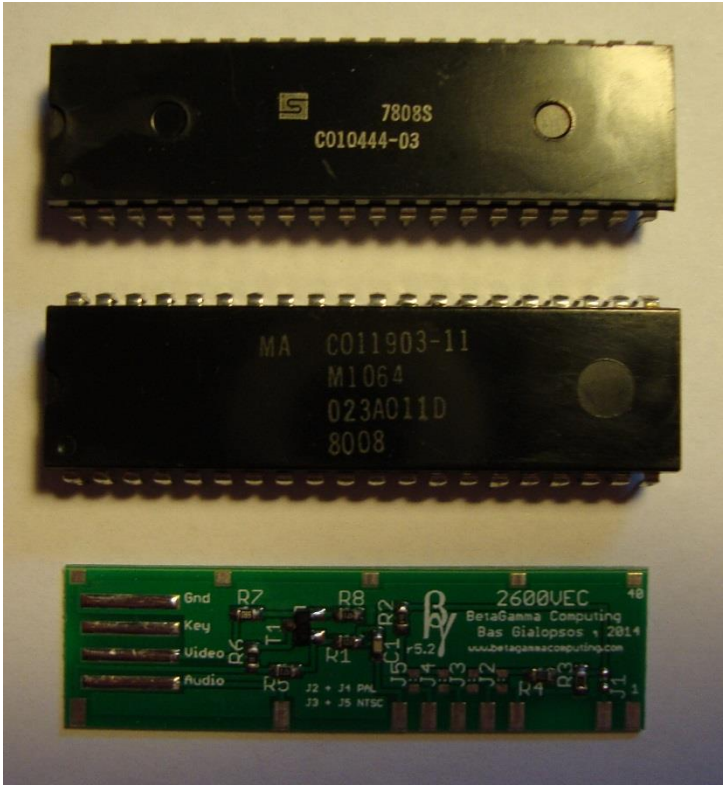
However we cannot be held liable for any damage caused due to poor installation of the module, if you have any doubts please contact us to install the module for you professionally.

Technical and Signal Identification

As Mentioned the Encoder module supports both PAL and NTSC variations of the 2600 system, the following picture depicts the two different TIA chips that are present in each system.

The Top chip C010444-0x is an NTSC TIA

The Bottom chip C011903-1x is a PAL TIA



The Encoder module has been designed to be installed between the TIA IC's dual in line pin spacing on the solder side of the board, so it is important for us to both correctly identify the TIA chip but also its pin 1 orientation.

From the Picture above note the pin indented in the plastic of the chip in the bottom left, this identifies pin 1 and the pin numbering continues around the chip in an anticlockwise manner, therefore the pin at the bottom right is 20, above top right is 21 and finally top left is pin 40.

You will also find a notch, semi-circular or square, indented into the top end of the plastic housing, this also identifies pin 1, if the indent is to your left then pin1 is directly below it.

On the Encoder module you will see 5 silver contacts running across the top edge and 9 larger contacts running along the bottom.

The smaller pads are just used for anchoring the Encoder module and serve no other function, the larger pads along the bottom are the actual signal pickup points from the TIA.

Note the 1 and 40 white labelling on the Encoder module, this identifies pin 1 etc, and as you can see from the picture above flipping the Encoder over and placing it under the actual TIA then pins 1 to 40 will correspond.

The Larger 4 pads on the left of the Encoder are used for Signal output pickup, this is where we will solder our interconnecting screened cable to harness the Encoder module's output.

The following table provides full technical details of the TIA pinouts and the Encoder module inputs and outputs.

Signal Name	TIA Pin Nr PAL	TIA Pin Nr NTSC	2600VEC Module	Signal Name	Cable Colour
VCC	20	20	Gnd	Signal Ground	Screen
GND	1	1	Key	--	--
Lum2	6	8	Video	Composite Video	Red
Lum1	5	5	Audio	Mono Audio	White
Lum0	7	7			
Sync	2	2			
Chroma	9	9			
Audio	13	13			

As you can see from the table above on PAL systems Pin 6 is used for the Lum2 signal and on NTSC systems Pin 8 is used for the Lum2 signal.

The Encoder module has the on-board flexibility to take this into account with full isolation.

But in General,

When fitting the Encoder module to a **PAL** system there is no need to connect **Pin 8**

When fitting the Encoder module to an **NTSC** system there is no need to connect **Pin 6**

The Encoder module does have isolation of these connections so if you do accidentally solder all the pins no damage or miss operation will occur.



Finally, as the Encoder module supports both PAL and NTSC systems, it must 'programmed' for its intended application, this is easily performed by the use of J2,J3,J4,J5 selection pads as seen in the picture above.

The selection pads can be easily closed by using a small amount of solder to bridge and make the connection, you will see examples during the installation chapters.

For **PAL** operation simply Close **J2** and **J4**

For **NTSC** operation simply Close **J3** and **J5**

These options are also printed on the Encoder module too.

If you have ordered a specific kit then you may find the pad configuration has already been carried out for you.

Illustrations and Examples of the above points can be seen in the various model step by step installation chapters that follow.

Installation Instructions.

The Encoder module will not resurrect faulty a TIA IC or non-working 2600 systems, Please ensure your 2600 system is fully functional prior to Installation.

The Encoder module has been designed to be installed between the TIA IC's dual in line pin spacing on the solder side of the board.

Double sided tape has been already applied to the rear of the Encoder module to facilitate board placement, alignment and fixing.

As previously mentioned, the Encoder module has pins 1 and 40 clearly highlighted and once correctly orientated should be mounted pushed up against the soldered legs of the TIA IC so that the signal pads can be soldered directly to the IC's protruding legs, please note, it does not matter if the TIA is originally socketed or directly soldered to the main PCB.

You will Need the following Tools

Phillips type medium to large screwdriver

Electric Drill fitted with a sharp 6MM general purpose bit.

Sharp Stanley Knife.

Small qty of General purpose Superglue.

25-40 Watt Soldering Iron with Medium tip.

Suitable Solder and liquid flux if required.

8CM length of uninsulated kynar wire between 26-30 awg

Small PCB angled wire cutters.

Large cutters

Long nose pliers

Isopropyl alcohol and some cotton buds

Multimeter set to continuity to test your solder connections.

Suitable PAL or NTSC Game Cartridge and AV Composite Video display.

CAUTION

It is imperative that Anti-Static precautions are followed and adhered to at ALL times, Static damage can shorten the working life of Integrated circuits.

Always Work on a clean bench with good light visibility and ensure you have adequate ventilation when soldering.

Always take your time and work slowly and carefully, read the Installation procedure for your Model 2600 as many times as you need until you are clear and confident to proceed.

Be Extra Careful when using the Electric drill and Stanley knife to prevent any damage to the 2600 and to prevent harming yourself.

If in any doubt please contact us for help and support.

Installation Tips

Always work in a tidy and clean environment, ensure you use Anti-Static precautions.

Apply liquid Flux if required.

Use a fine tipped soldering Iron not more than 40Watts and suitable flux.

Ensure you correctly identify **PIN 1** of *your* fitted **TIA IC**

If the TIA IC is socketed you may wish to remove it prior to fitting the Encoder module, but take care and ensure you refit with its correct orientation..

Prior to fitting the Encoder module, trim any protruding soldered component legs from the main board that may interfere with the Encoder modules' output connector.

For soldered TIA's avoid prolonged heat exposure, you can always return to rework a connection after it has cooled.

Prior to soldering, bend the tip of the IC's soldered pin towards the pad.

Use the method outlined below if difficulty is encountered soldering any pads.

Use a Multimeter and carry out continuity test to confirm pads have been correctly soldered before test and reassembly.

NB – To solder the anchor pads please carry out the following, this is due to variable distance that can occur between the PCB edge and the soldered IC pin.

Use a piece of uninsulated kynar wire between 26-30 awg, solder this wire directly to the existing solder pad of the TIA's pin straight up, add solder first if required.

Then cut this wire to size and bend it over to sit on the Encoder modules pad nice and flush.

Apply heat and solder to the Encoder modules pad to then flow onto the kynar wire, this method ensures the wire does not detach from the TIA IC pin.

Support and Contact

For all Sales or Installation Enquiries Contact Matthew Buxton - mattb@videogameperfection.com

For Technical Support - <https://www.videogameperfection.com/forums/forum/repairs-and-mods/>



videogameperfection.com

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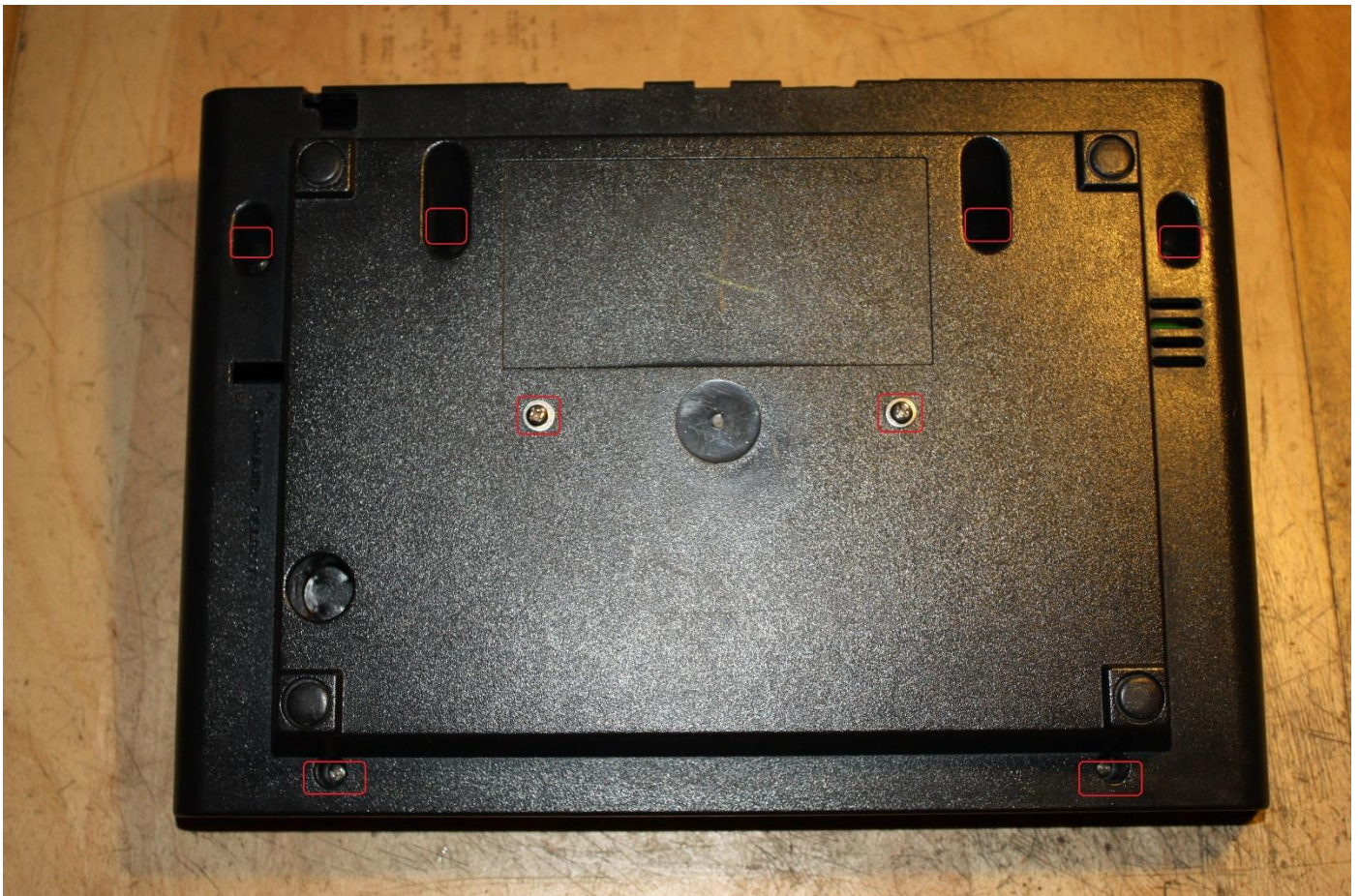
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2600 6 Switch Woody model PAL and NTSC



Place a soft towel between the bench and unit to cushion the switches when you turn the unit over.



Remove the 8 Screws highlighted above using the Philips Screwdriver.

Note the Four screws at the top are inserted and removed at 45 degree angles.

Now carefully turn the unit over and slowly remove the top of the casing paying attention to the switches as these can be a little fragile.



Your unit will have an Aerial cable connected to the RF Modulator socket as highlighted by the red square in the picture above.

Gently remove the plug from the socket and feed the cable out through the rear exit of the casing, this cable is now redundant.

Now Grip the Centre Metal Casing and carefully lift out the entire Electronics assembly, use a lift and withdraw motion.

Place the Electronics assembly safely to one side for now.

We will now need to carefully drill and mount the supplied 3.5mm Stereo jack socket to the bottom casing.

See the following picture for the recommended location.

Use the Drill with 6mm bit to carefully drill the hole, do not apply excessive pressure with the drill as you may crack the bottom casing.

Use the Stanley knife to carefully remove any burrs or plastic debris from inside to ensure a nice flat surface to mount the socket.

Apply a small quantity of Superglue to the front plastic face of the socket and then position and push it into place inside the case, ensuring you have good contact between the case and front housing of the socket.



You will need to maintain a good contact for about a minute until the glue has begun to set and the socket will then stay in place.

As you can see from the picture above, the end result is a very non obtrusive 'natural' socket added to the console.

We can now put the base aside to allow the glue to fully set whilst we continue with the Installation.

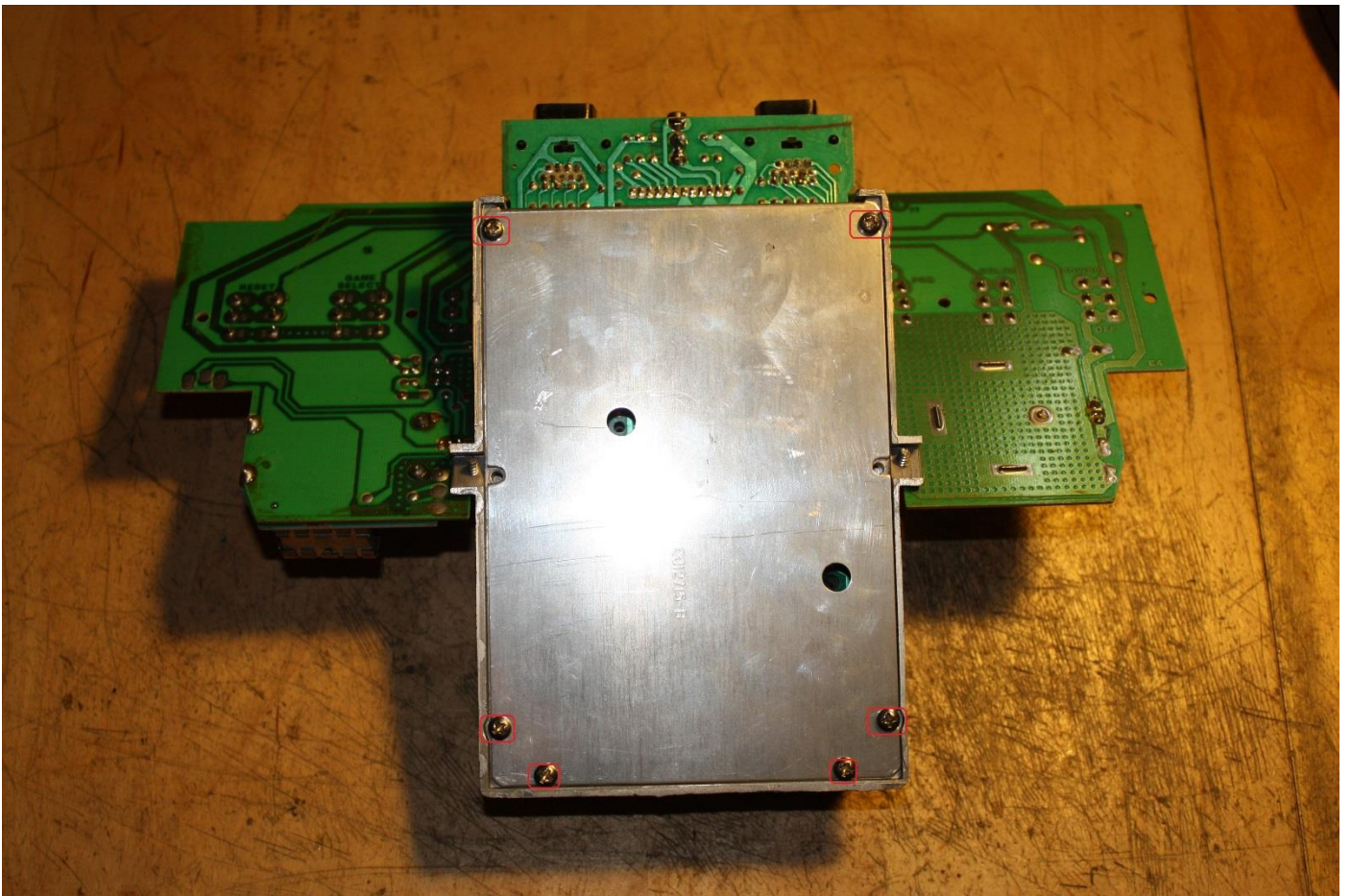
Pick up the Electronics assembly and carefully remove the 6 circular felt pads from the switches and put them to one side.

Place a soft towel on the bench lay the Electronics Assembly upside down on it to cushion the switches.

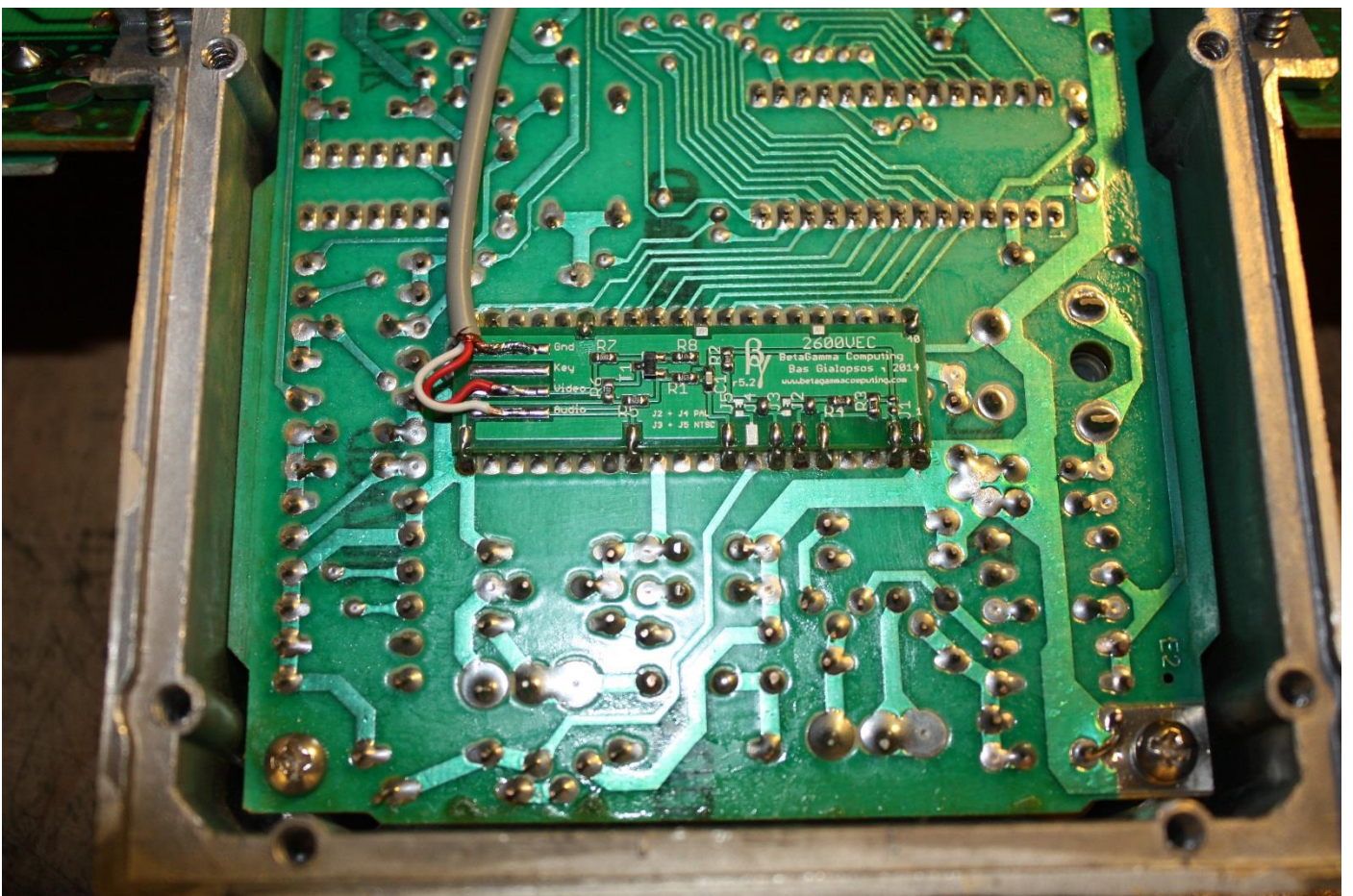
See the following Picture and carefully remove the 6 highlighted Screws using the Philips screwdriver.

Carefully remove the rear metal plate to expose the Main PCB solder side.

At this point you can if you wish remove the bottom 2 PCB screws to remove the entire PCB from the metal housing so you can identify the TIA and it's Pin orientation, OR simply follow the pictures which also depict the correct orientation for the Encoder module.



We can now fit the Encoder module to the PCB using the guidelines and tips previously described.



Clean any flux deposits using the alcohol and cotton buds.

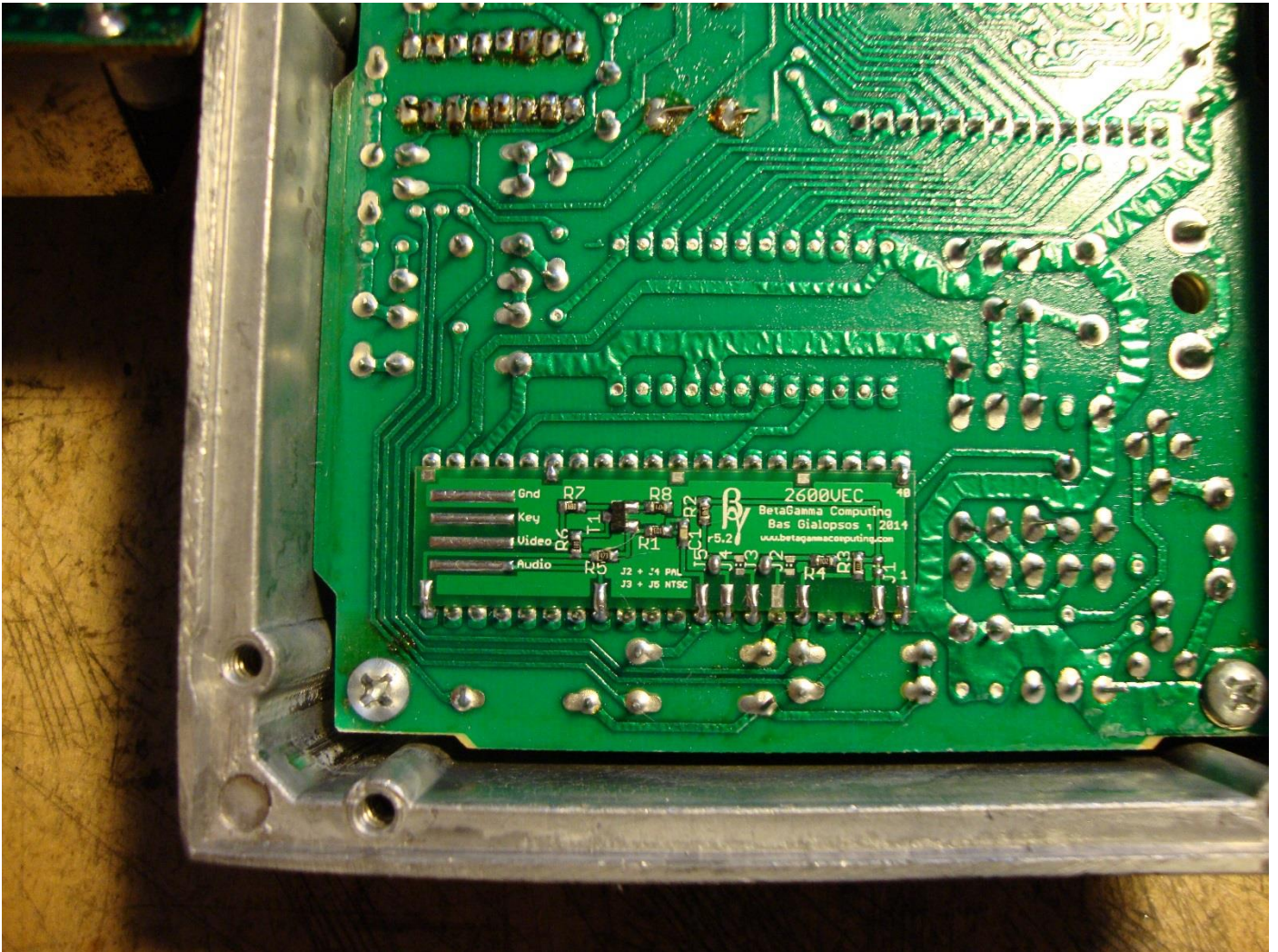
From the Picture above you can see the following.

JP2 and **JP4** are bridged for **PAL** operation and Pin 8 has not been soldered as it is not required for **PAL** operation (see pin out table).

Only 2 Anchor points have been used which is sufficient.

At this point the included screened cable has been carefully stripped at one end and soldered to the Encoder module outputs as also described in the pin out table.

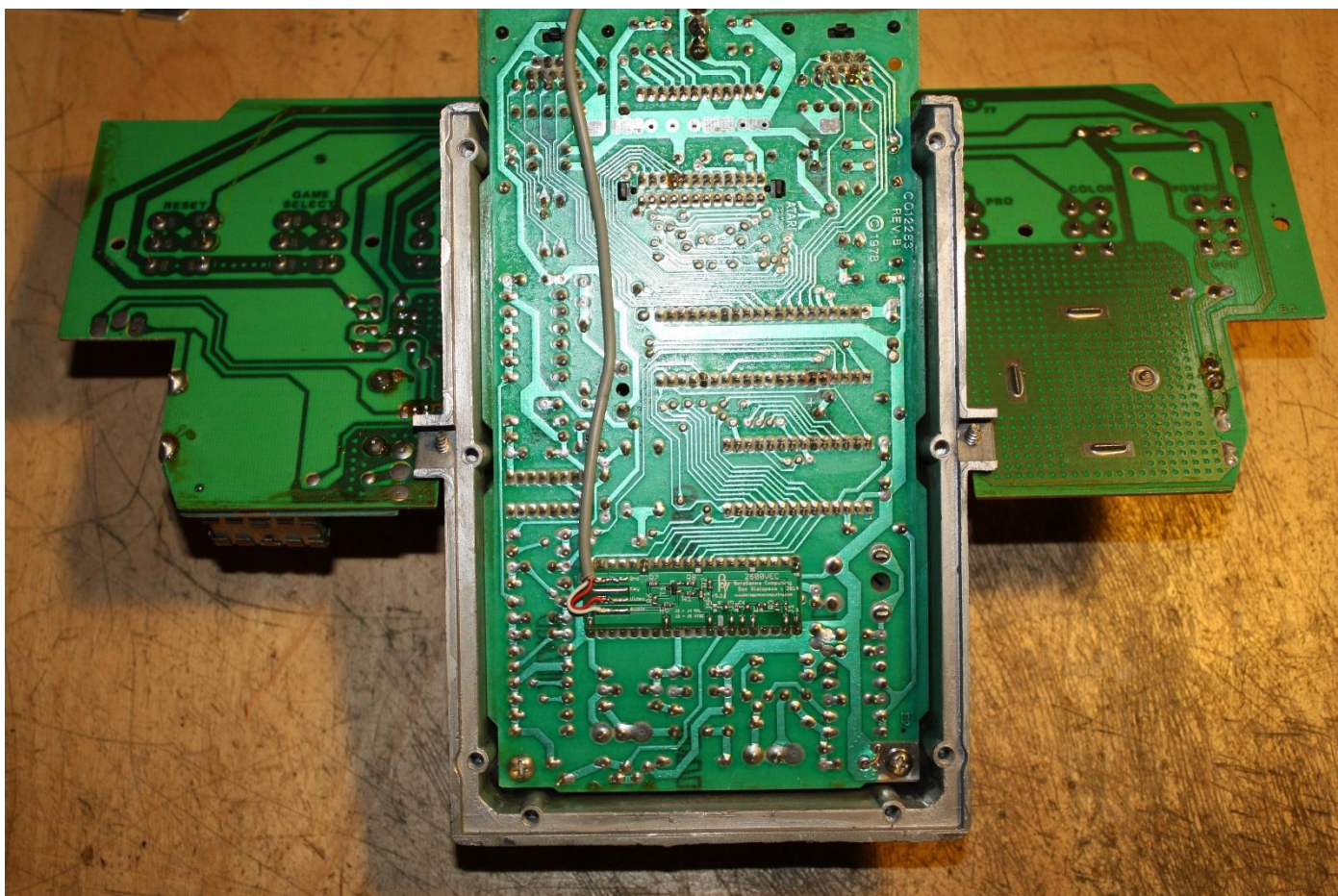
NTSC Version



The Picture above is from an **NTSC** model, you can clearly see the following.

JP3 and **JP5** are bridged for **NTSC** operation and Pin 6 has not been soldered as it is not required for **NTSC** operation (see pin out table).

Strip Down, Installation, rebuild and test is identical to the PAL version in all other respects.



At this point it is a good idea to ensure all solder connections are good by using a Multimeter set to continuity mode.

When you are happy with your test results then refit the rear cover plate as follows.

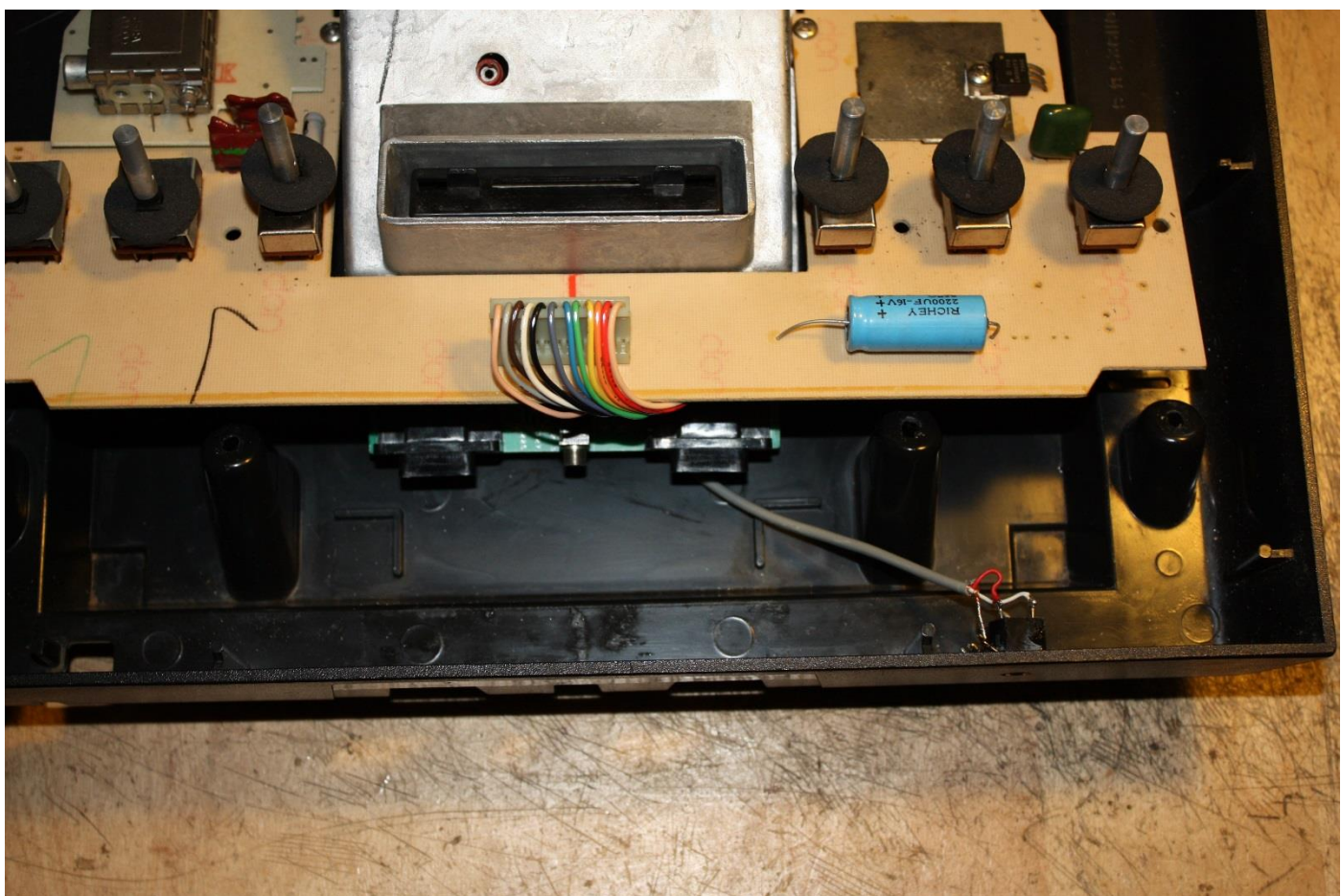
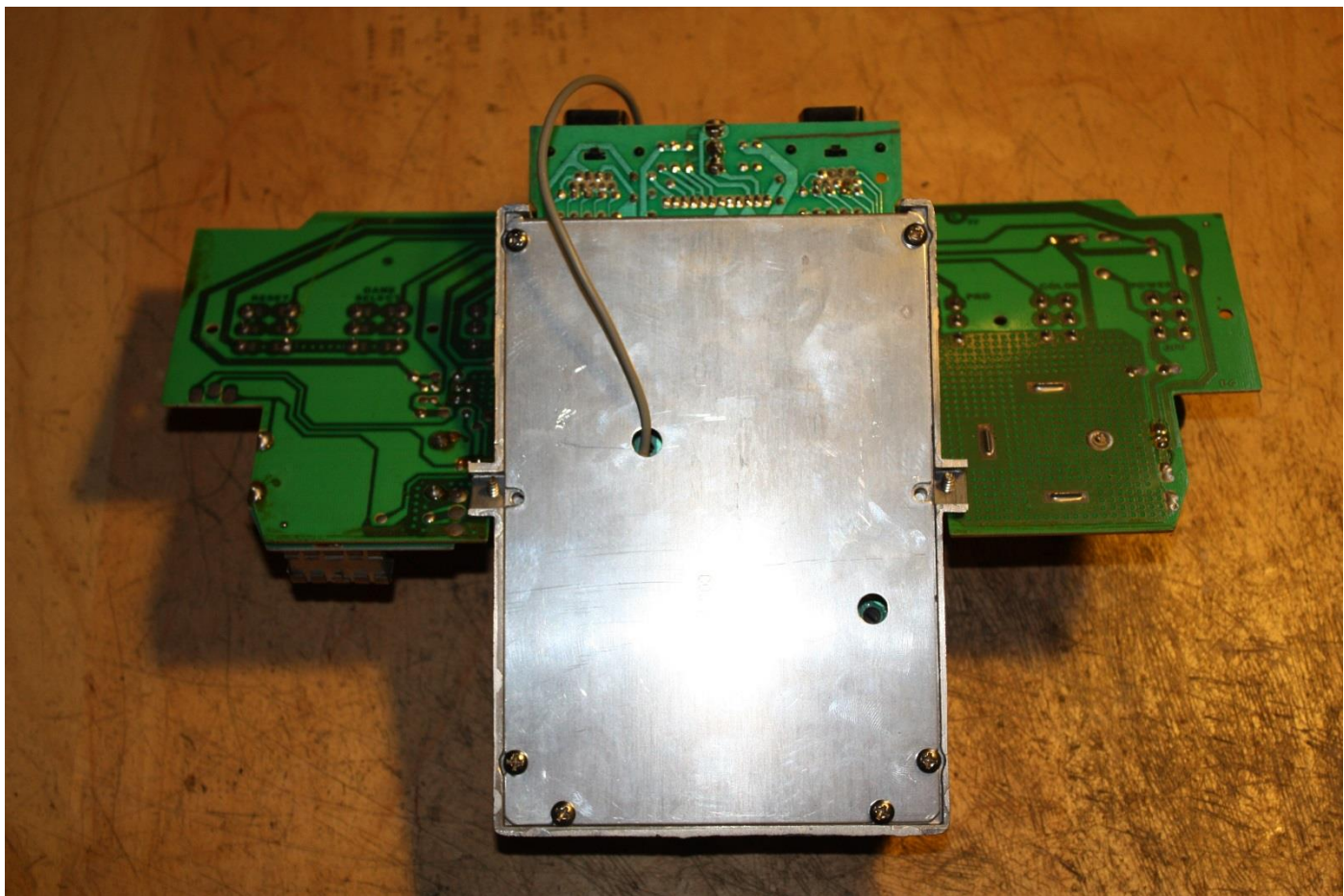
Feed the new cable through the plate hole as shown in the next picture.

Once the plate is in position refit the top two screws first.

Turn the assembly over and ensure you can fit a games cartridge into the console socket easily and correctly, if not you will have to remove the top two screws again and reposition the main PCB.

If all is good the turn the assembly over again and refit the remaining four screws.

Our next step now is to place the Electronics assembly back into the bottom casing.



Carefully place the assembly into the case as shown above, strip and prepare the cable end and solder the ends to the jack socket. Ensure you follow the pictured connections, The Red wire will be closer to the Screen.



Refit the rear socket card protector if it had been removed as shown above and place the cable into the case so it lays into the bottom edge as shown in the picture.

You can now fit the Electronics Assembly back into the bottom case by gripping the Metal Casing and holding it at a 45 degree angle line the sockets

at rear through the case and then gently laying it flat into the base.

Refit the 6 circular felt pads to the switches.

You can test the system safely at this point by connecting up the DC power supply to the console and connecting up the supplied AV cable to your video display.

The AV cable's RCA jacks are colour coded for RED to be Composite Video and the other jack, WHITE or BLACK to be Audio...

To refit the top cover, remove all cables and the cartridge and carefully place it over the top so the 6 switches go through the correct holes and the front edge fits in nicely to the case bottom.

Place a soft towel between the bench and unit to cushion the switches when you turn the unit over.

Refit the 8 screws as outlined in our previous picture, remembering that the 4 will need to be carefully refitted at a 45 degree angle.

Installation Completed.

2600 4 Switch Woody and Darth Vader model PAL and NTSC



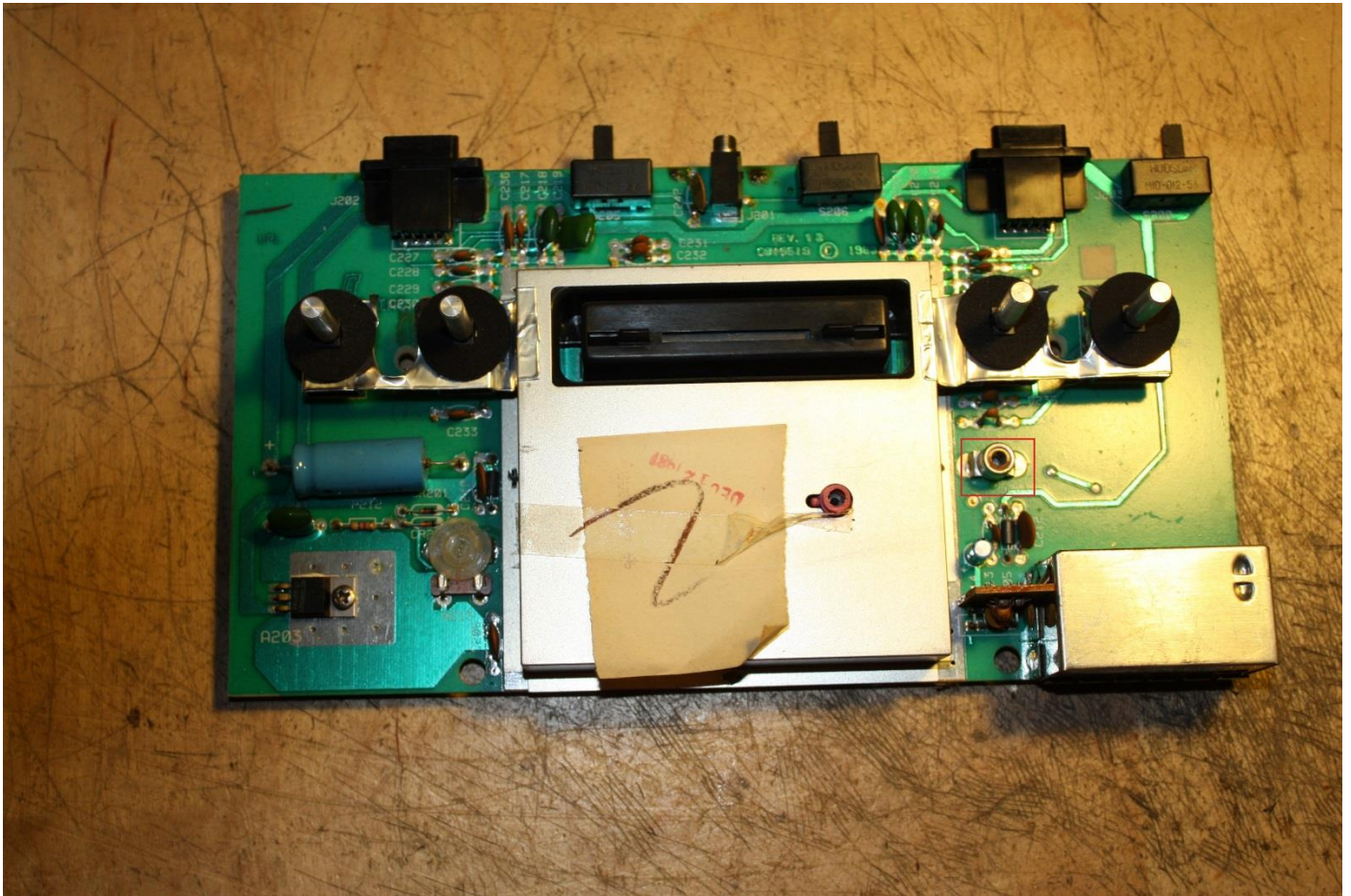
Place a soft towel between the bench and unit to cushion the switches when you turn the unit over.



Remove the 4 Screws highlighted above using the Philips Screwdriver.

Note the Two screws at the top are inserted and removed at 45 degree angles.

Now carefully turn the unit over and slowly remove the top of the casing, then remove the PCB assembly paying attention to the switches at the top and rear as these can be a little fragile.



Your unit will have an Aerial cable connected to the RF Modulator socket as highlighted by the red square in the picture above.

Gently remove the plug from the socket and feed the cable out through the rear exit of the casing, this cable is now redundant.

Place the Electronics assembly safely to one side for now.

We will now need to carefully drill and mount the supplied 3.5mm Stereo jack socket to the bottom casing.

See the following picture for the recommended location.

Use the Drill with 6mm bit to carefully drill the hole, do not apply excessive pressure with the drill as you may crack the bottom casing.

Use the Stanley knife to carefully remove any burrs or plastic debris from inside to ensure a nice flat surface to mount the socket.

Apply a small quantity of Superglue to the front plastic face of the socket and then position and push it into place inside the case, ensuring you have good contact between the case and front housing of the socket.



You will need to maintain a good contact for about a minute until the glue has begun to set and the socket will then stay in place.

As you can see from the picture above, the end result is a very non obtrusive 'natural' socket added to the console.

We can now put the base aside to allow the glue to fully set whilst we continue with the Installation.

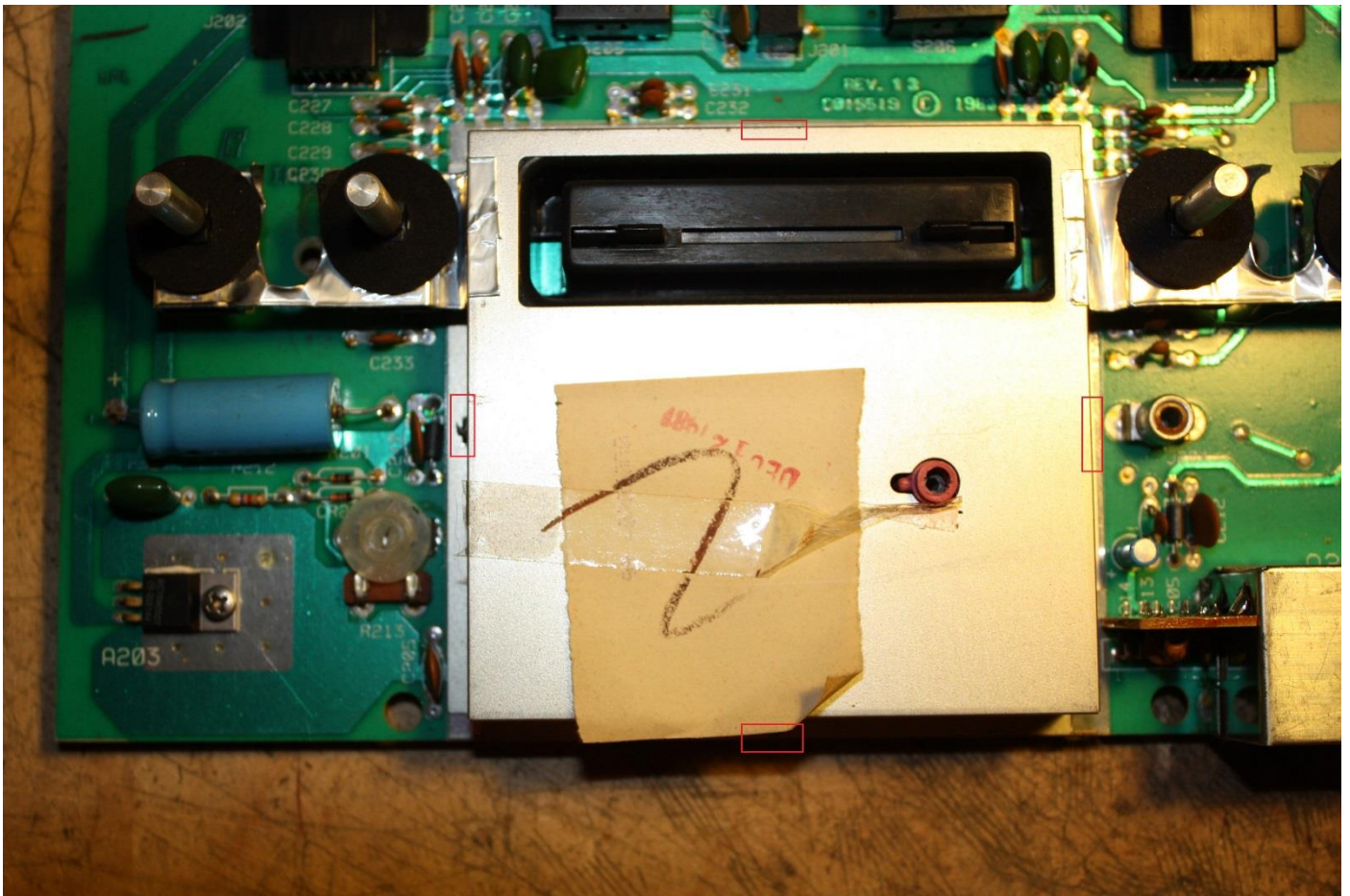
Pick up the Electronics assembly and carefully remove the 4 circular felt pads from the switches and put them to one side.

Using the Stanley knife cut the metal foil tape at each side of the screening can to isolate the switches.

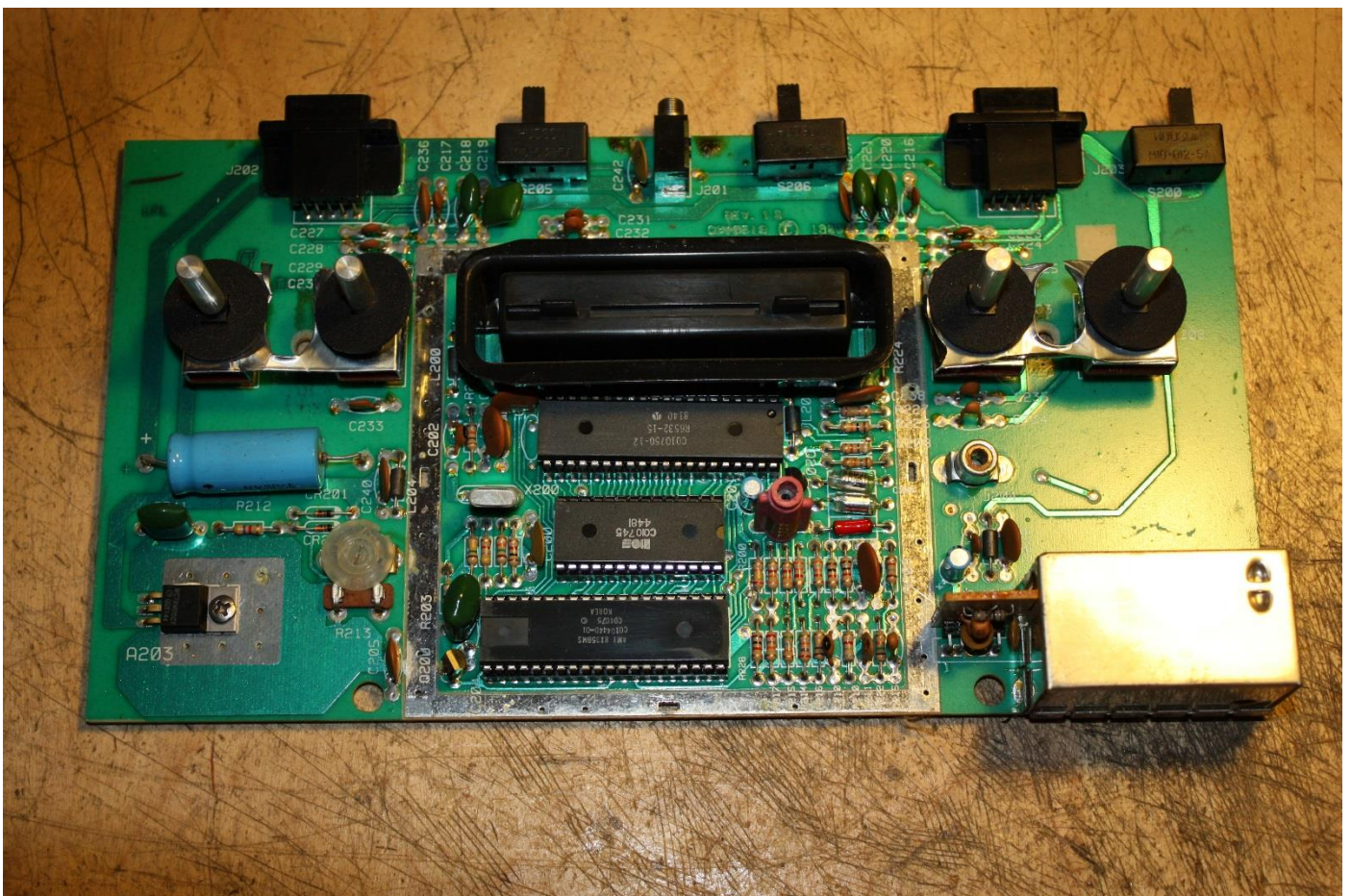
You will find 4 metal tabs that will need untwisting to separate the sheilding can from the PCB, these are highlighted in the following picture.

Carefully straighten the metal tabs and free the upper sheilding can,

Carefully remove the rear metal plate to expose the PCB solder side.

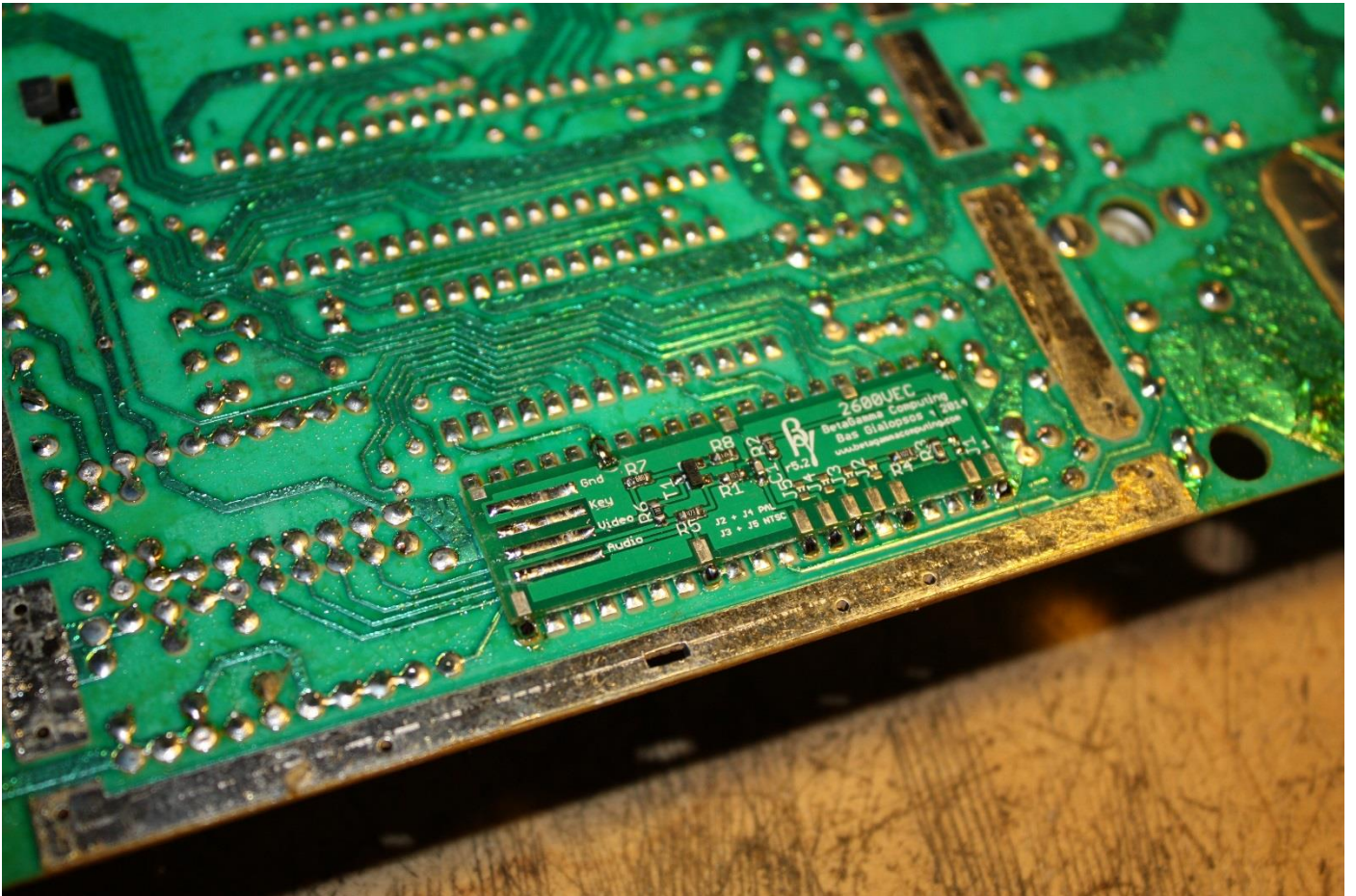


The Four metal tabs highlighted above

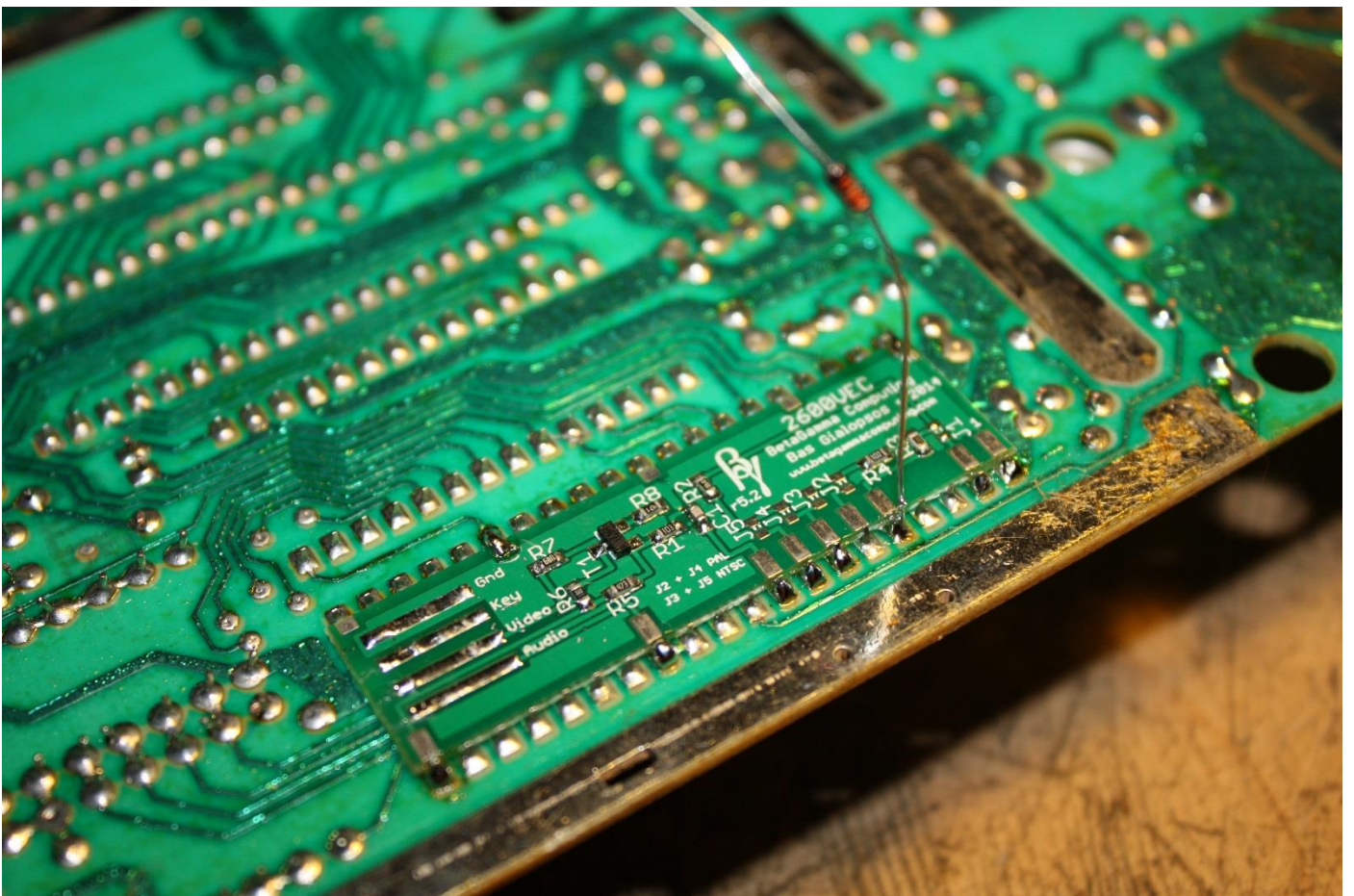


The PCB with top shield can removed.

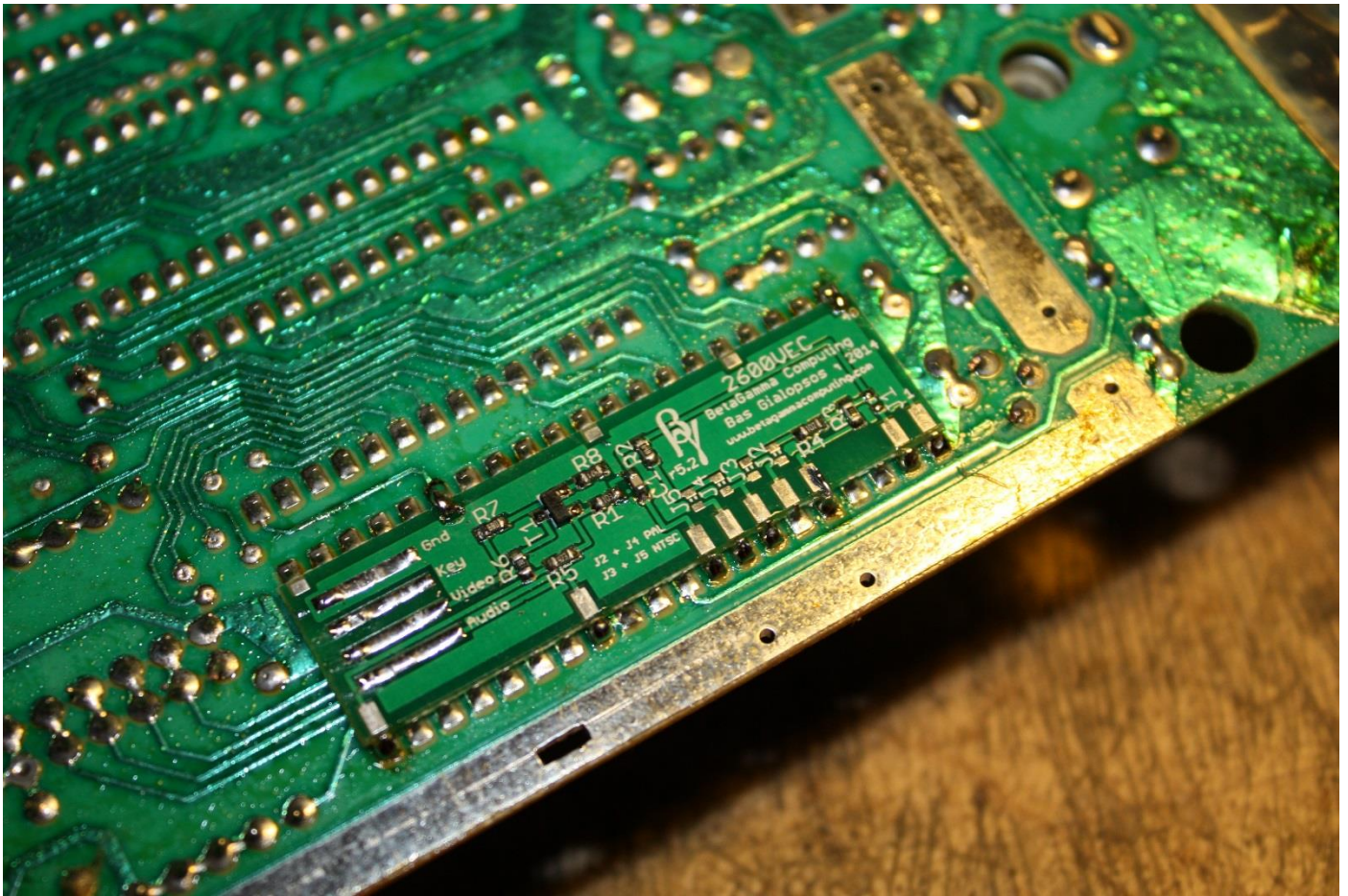
We can now fit the Encoder module to the PCB using the guidelines and tips previously described.



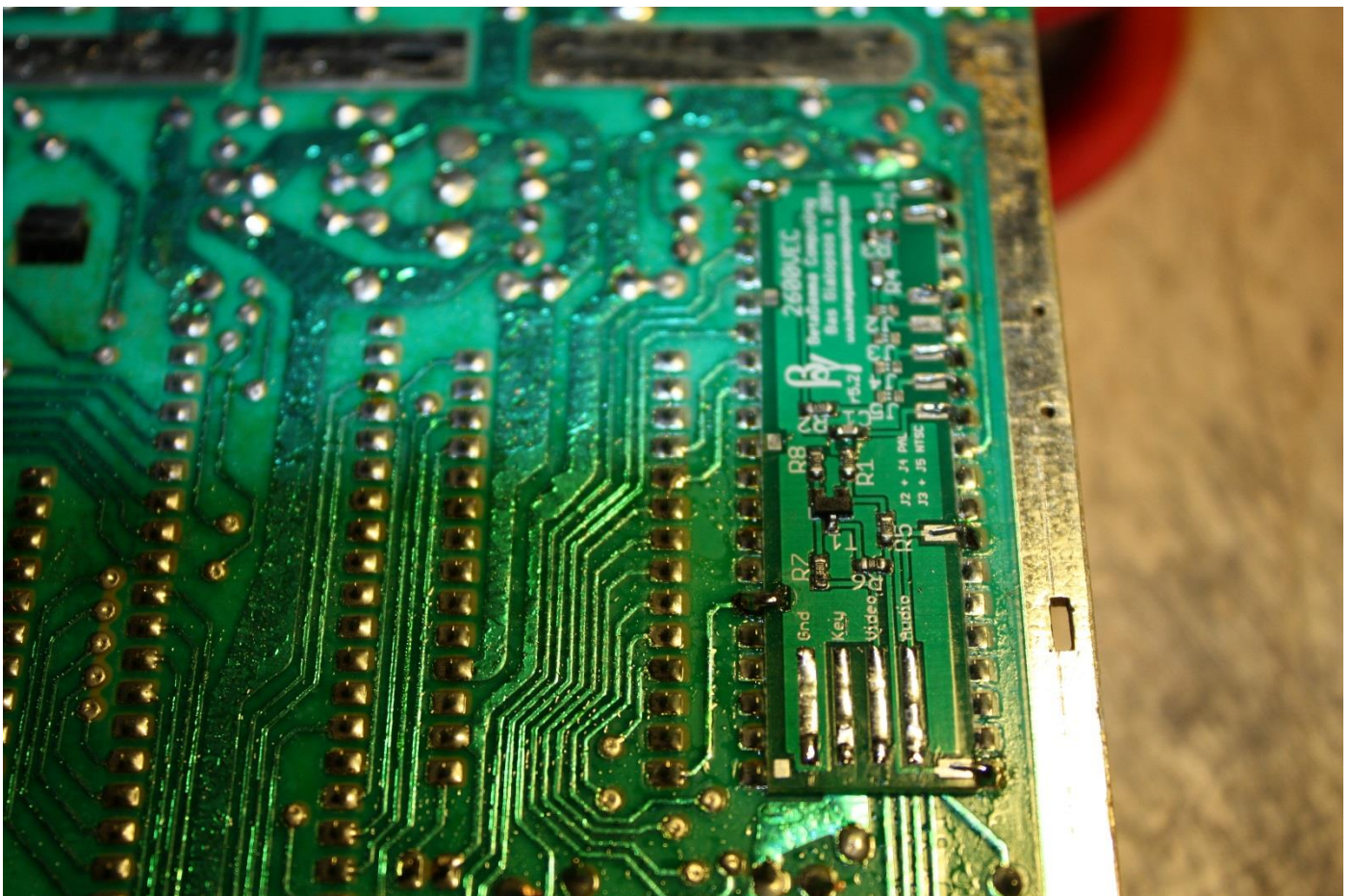
After identifying the TIA chip and pin 1 the Encoder module is placed in the correct position on the solder side. Note – Pin 1 orientation is the same PAL and NTSC models.



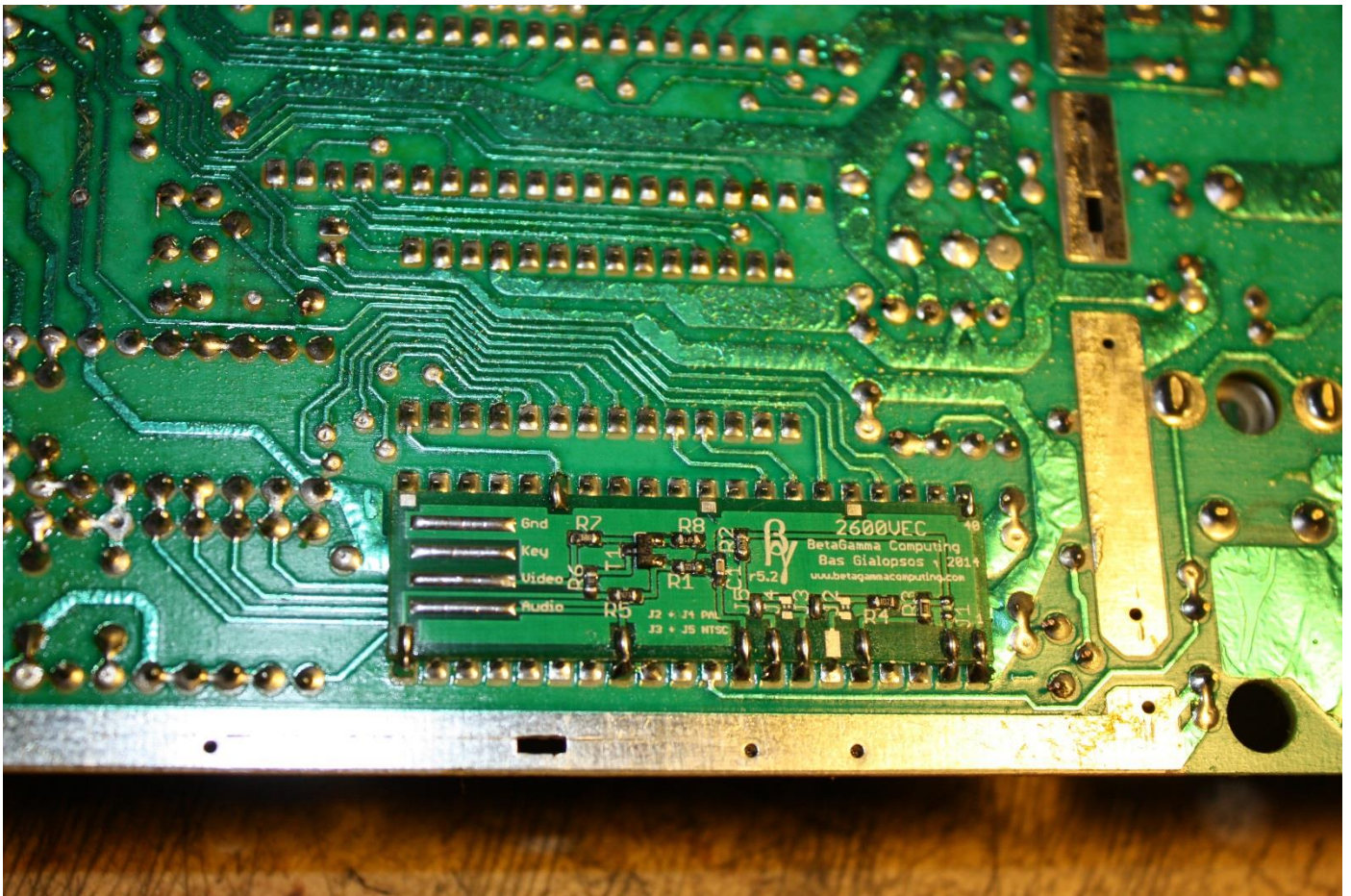
From the above picture you can see the beginning of the solder process, the 2 Anchor points soldered first. I am using a surplus diode for wiring but anything of similar wire gauge is suitable.



Soldered then trimmed and bent over to make contact with the pad on the Encoder module.



Process repeated until all the required pads are wired.



And finally soldered.

Clean any flux deposits using the alcohol and cotton buds.

From the Picture above you can see the following.

JP3 and **JP5** are bridged for **NTSC** operation and Pin 6 has not been soldered as it is not required for **NTSC** operation (see pin out table).

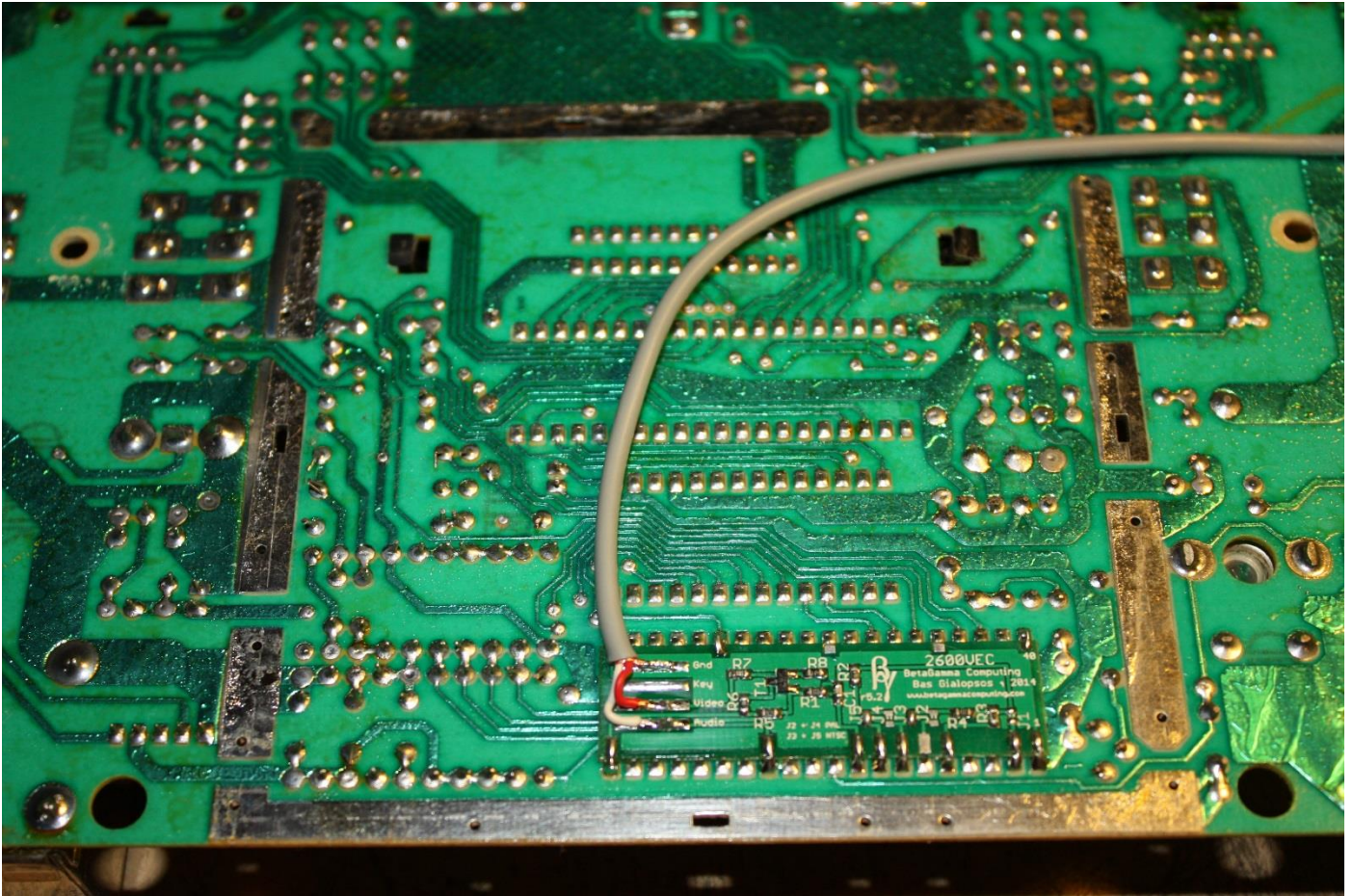
Only 2 Anchor points have been used which is sufficient.

At this point the included screened cable can be carefully stripped at one end and soldered to the Encoder module outputs as also described in the pin out table.

At this point it is a good idea to ensure all solder connections are good by using a Multimeter set to continuity mode.

When you are happy with your test results then place the new cable as shown in the next picture.

We will now need to make a minor modification to the bottom shield can so put the Electronics PCB safely to one side for now.



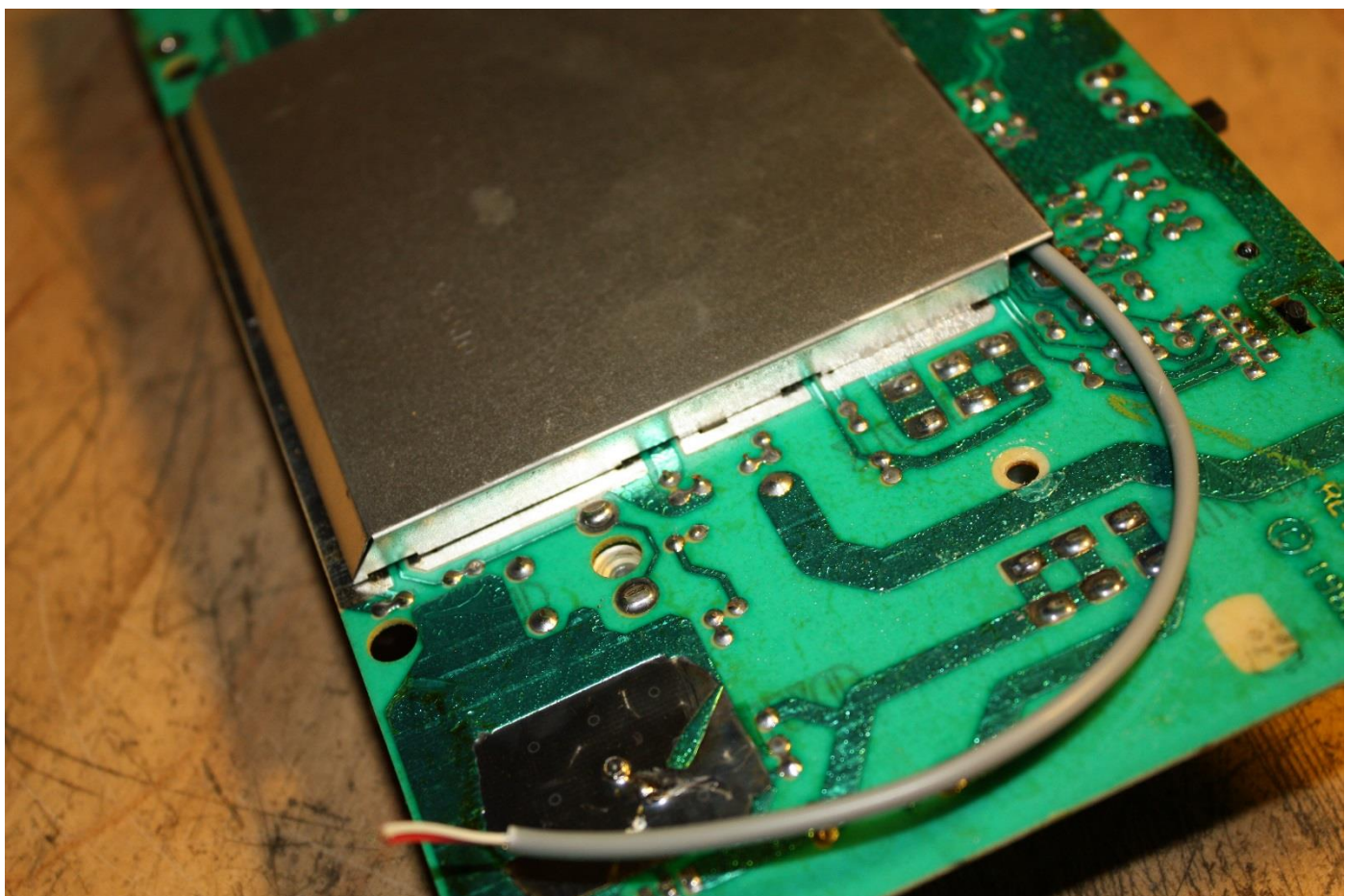
Using a pair of suitable cutters and long nose pliers, cutaway the edge of the bottom shield can as shown in the two pictures, you can see the cable exit point clearly in the above picture too.



When that has been done, carefully refit the bottom shield plate to the PCB being careful not to snag the new cable and ensure it exits cleanly.

Refit the top shield housing taking care to feed the four metal tabs poking the PCB through their appropriate slots.

Gently twist or bend these four tabs to secure the assembly.



Carefully place the PCB assembly into the case as shown above, strip and prepare the cable end and Solder the ends to the jack socket. Ensure you follow the pictured connections, The Red wire will be closer to the Screen.

Refit the 4 circular felt pads to the switches.



You can test the system safely at this point by connecting up the DC power supply to the console and connecting up the supplied AV cable to your video display.

The AV cable's RCA jacks are colour coded for RED to be Composite Video and the other jack, WHITE or BLACK to be Audio...

To reassemble the system, remove all cables and the cartridge and carefully place the top cover over the PCB assembly at an angle so you can feed the 4 top lever switches and rear 2 slide switches through the top case cut-outs.

Then carefully insert the top case and PCB assembly into the case bottom so the case edges all meet correctly.

Place a soft towel between the bench and unit to cushion the switches when you turn the unit over.

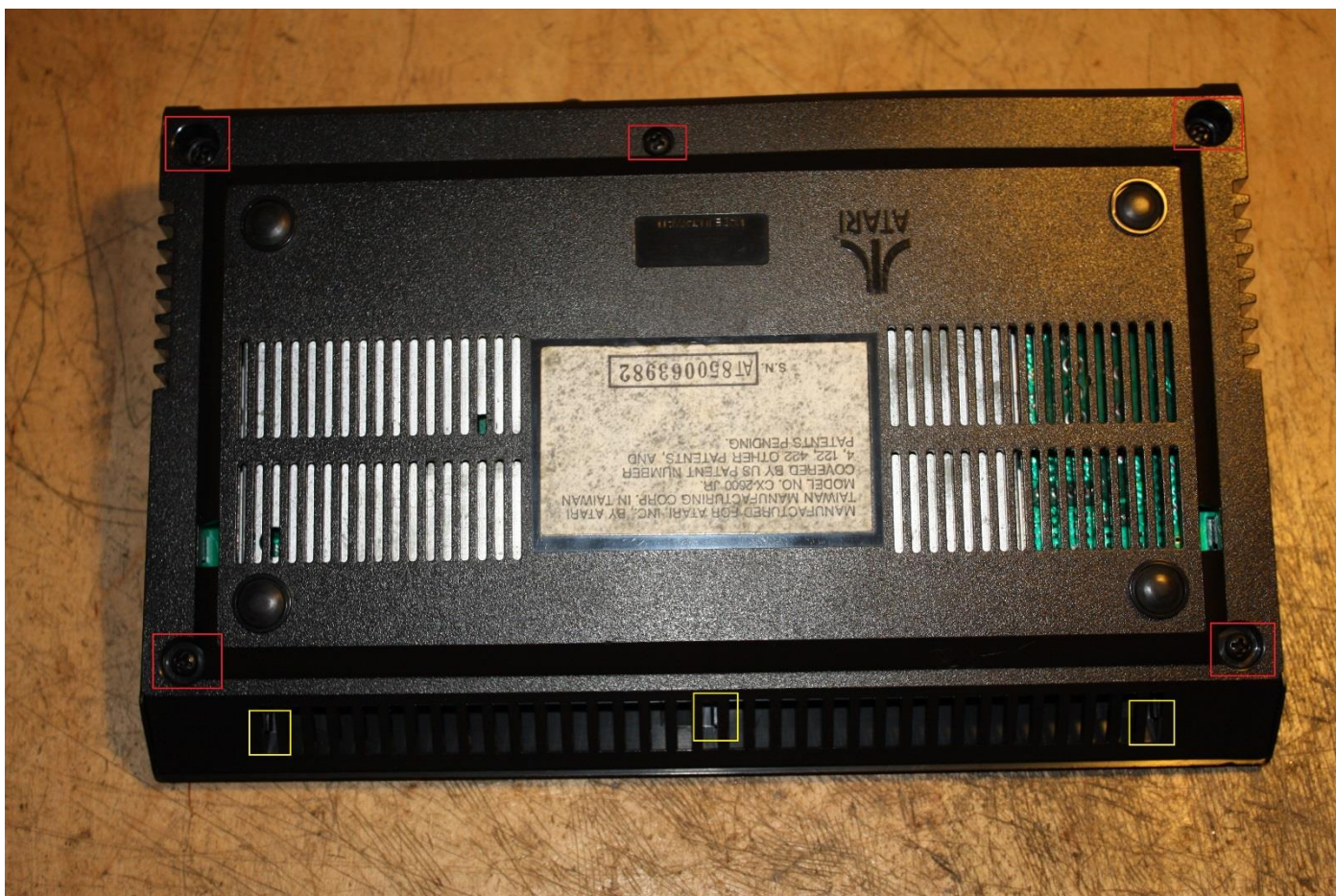
Refit the 4 screws as outlined in our previous picture, remembering that the 2 will need to be carefully refitted at a 45 degree angle.

Installation Completed.

2600 Junior model PAL and NTSC



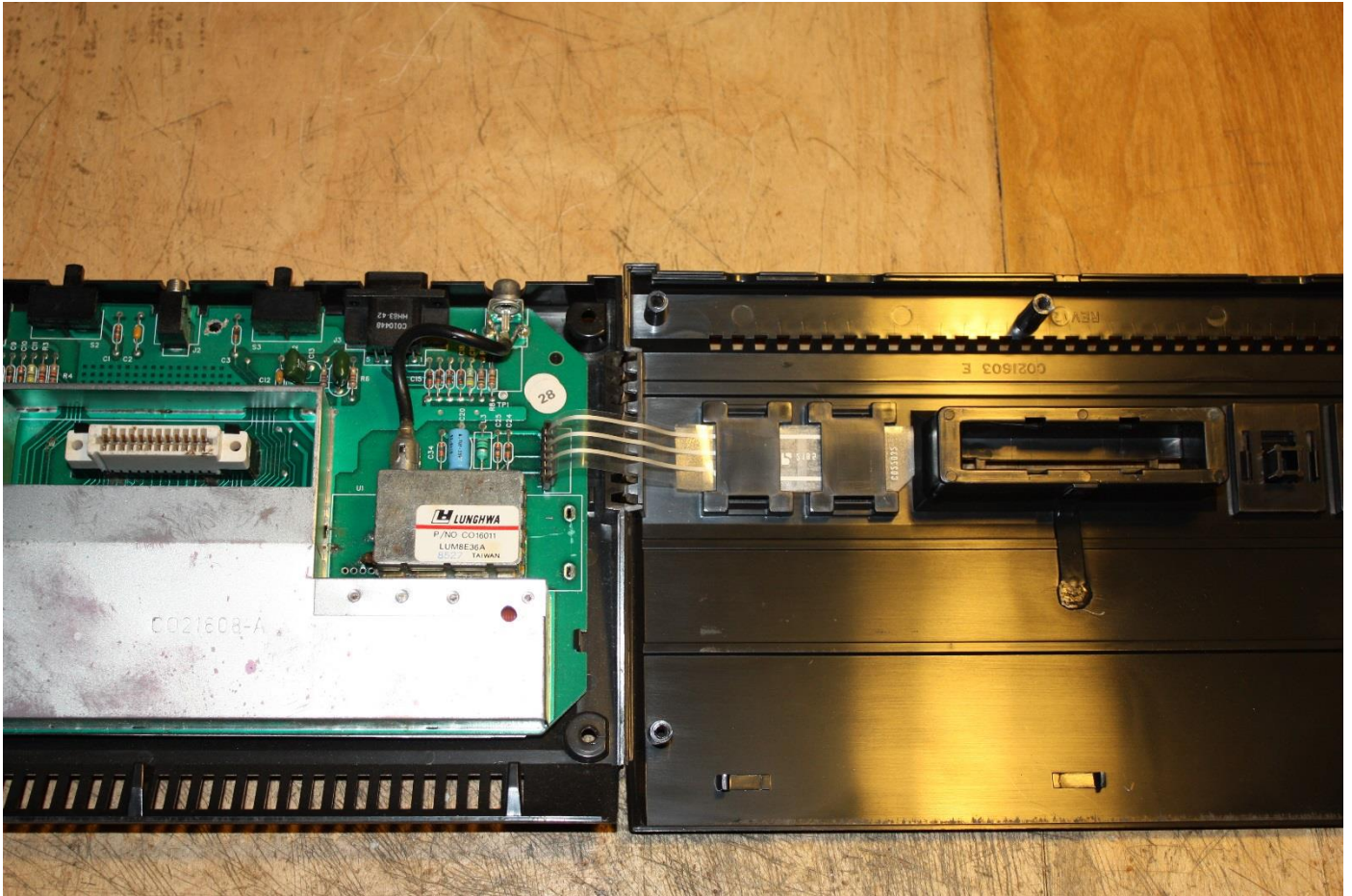
Turn the unit over.



Remove the 5 Screws highlighted in Red above using the Philips Screwdriver.

In order to free the top case from the bottom you will need a small flat screwdriver to carefully lever the three plastic clips highlighted in Yellow above.

Now carefully turn the unit over and slowly open the top of the casing as shown below, paying careful attention to the key switch membrane as these can be a little fragile.

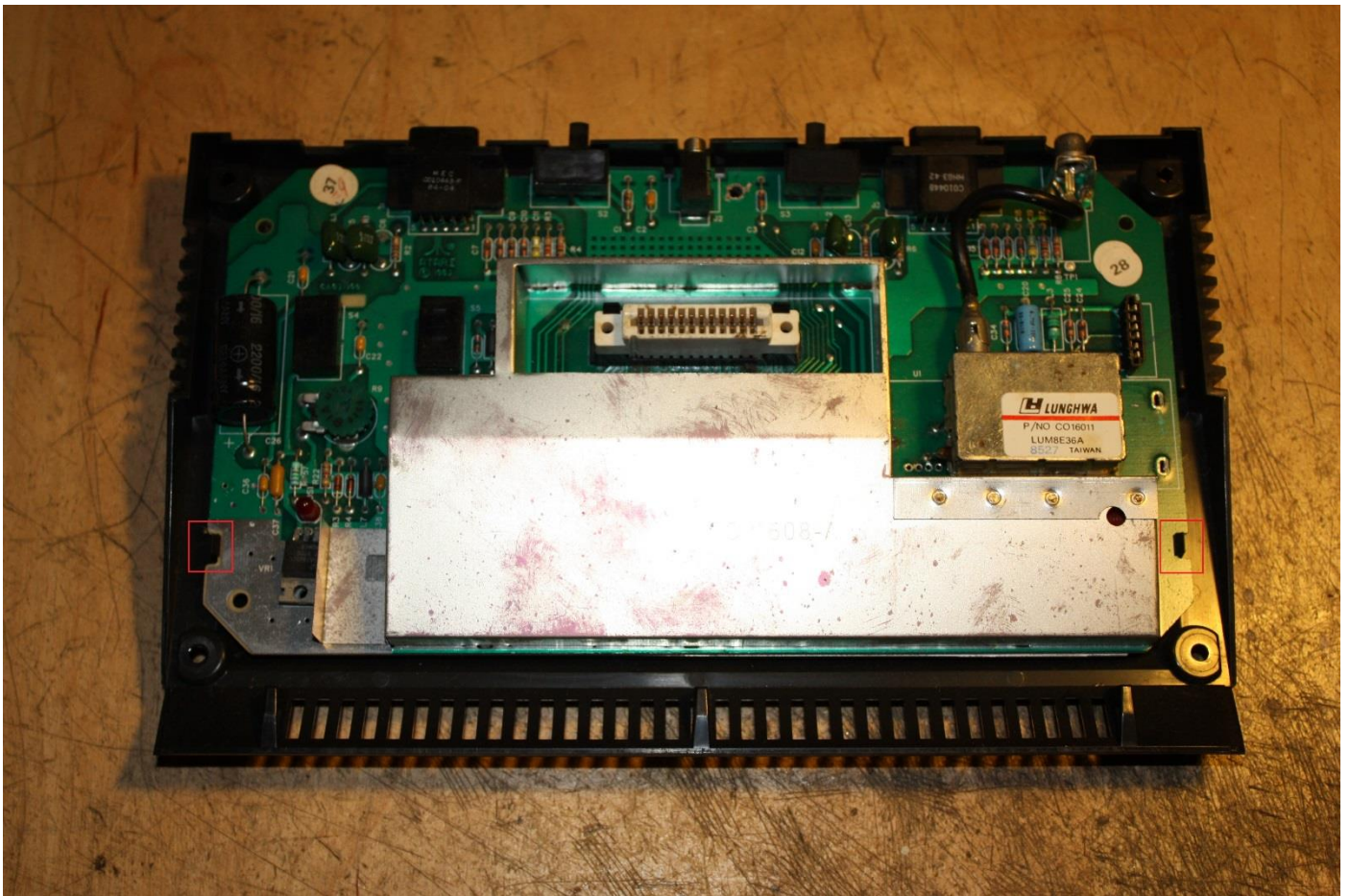


Gently remove the membrane from the PCB socket and put the cover to one side.

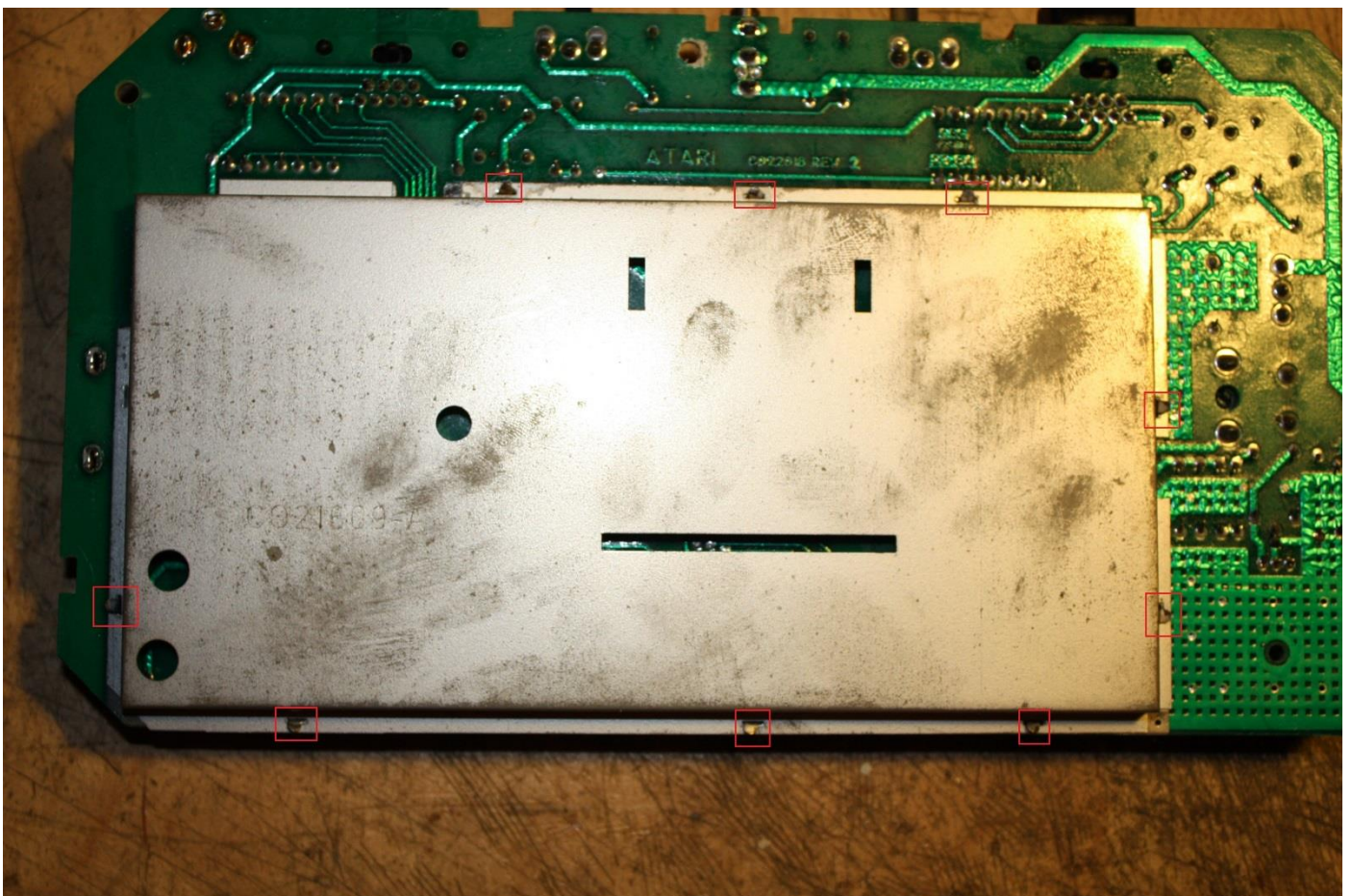
There are two plastic clips either side holding the PCB onto the case bottom, these are highlighted in the next picture.

Simply push them gently aside to free the PCB from each side then remove the PCB from the bottom case.

Place the bottom case to one side for now.



The Next task is to remove the Metal screening can, turn the PCB assembly over.



There are 9 bent or twisted tabs, as highlighted above that hold the upper shield can and lower plate together through slots in the PCB.

Carefully untwist or unbend all 9 until you are able to carefully remove the bottom plate away, you can also remove the upper shield can now if you wish to clarify the TIA location and pin 1.

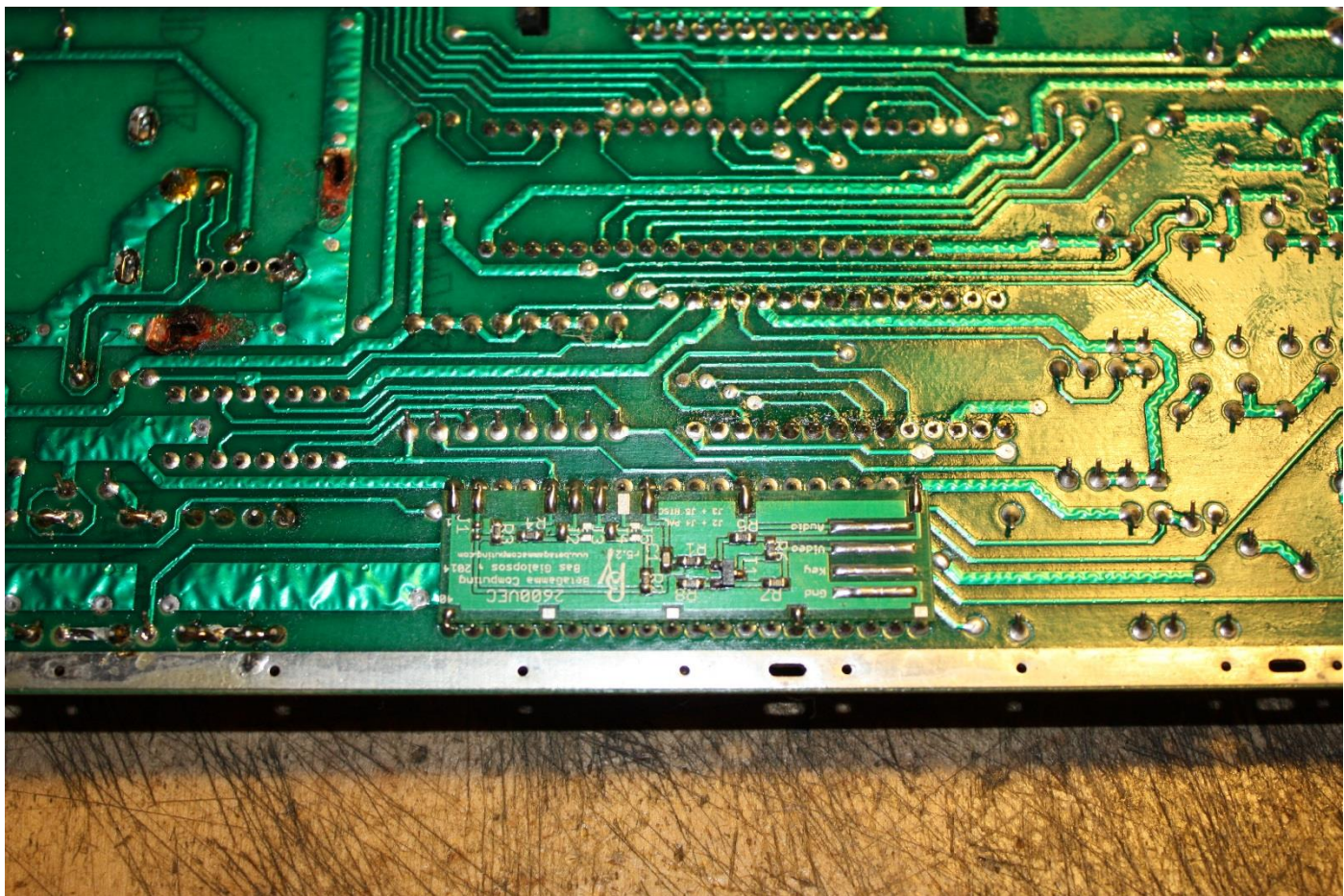


The above picture is of a PAL model junior.

NB - Interestingly the junior breaks tradition with the other variants in that the TIA is fitted upside down.

Carefully turn the PCB over.

We can now fit the Encoder module to the PCB using the guidelines and tips previously described.



Clean any flux deposits using the alcohol and cotton buds.

From the Picture above you can see the following.

JP2 and **JP4** are bridged for **PAL** operation and Pin 8 has not been soldered as it is not required for **PAL** operation (see pin out table).

Only 2 Anchor points have been used which is sufficient.

At this point the included screened cable can be carefully stripped at one end and soldered to the Encoder module outputs as also described in the pin out table.

At this point it is a good idea to ensure all solder connections are good by using a Multimeter set to continuity mode.

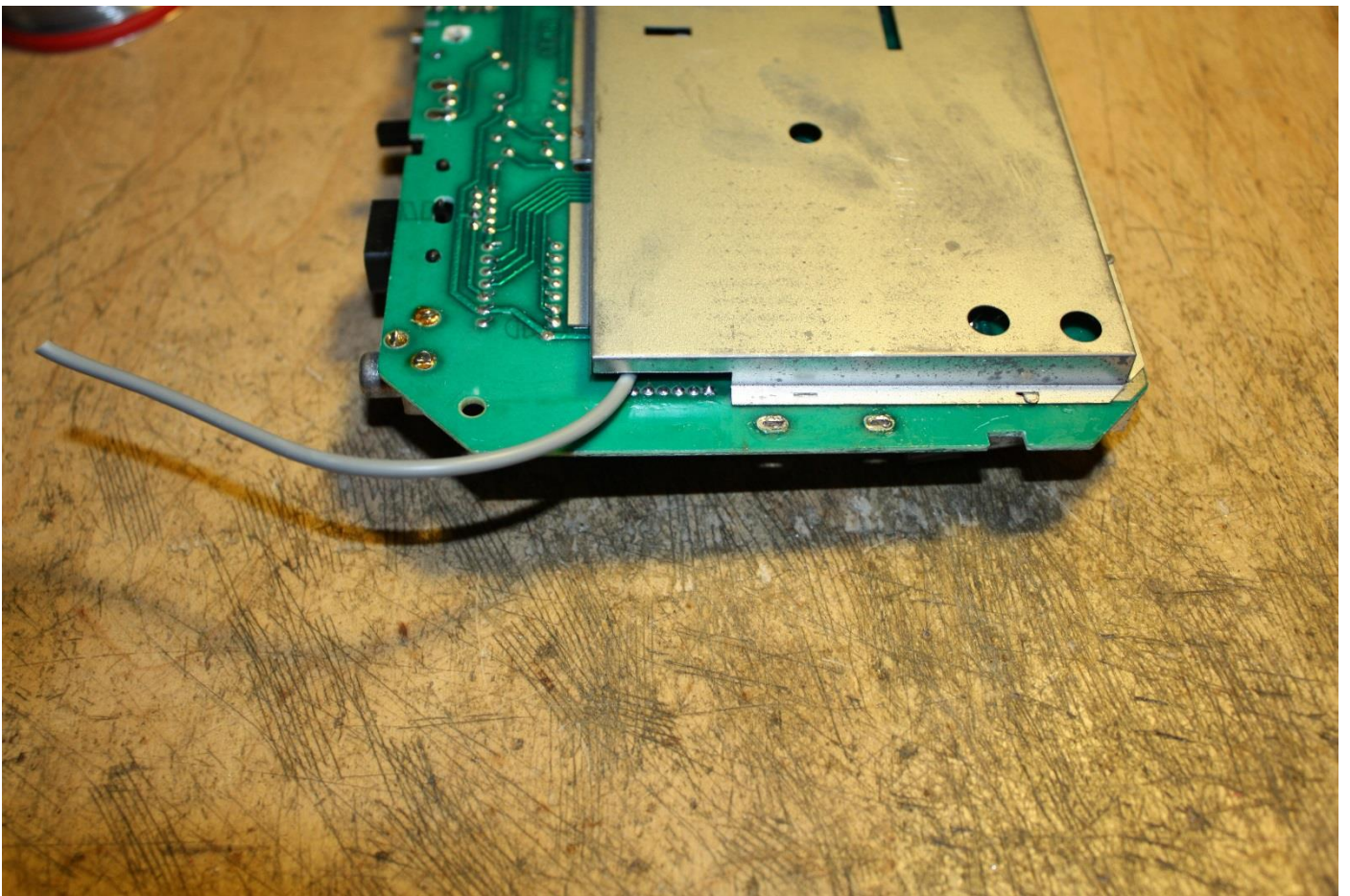
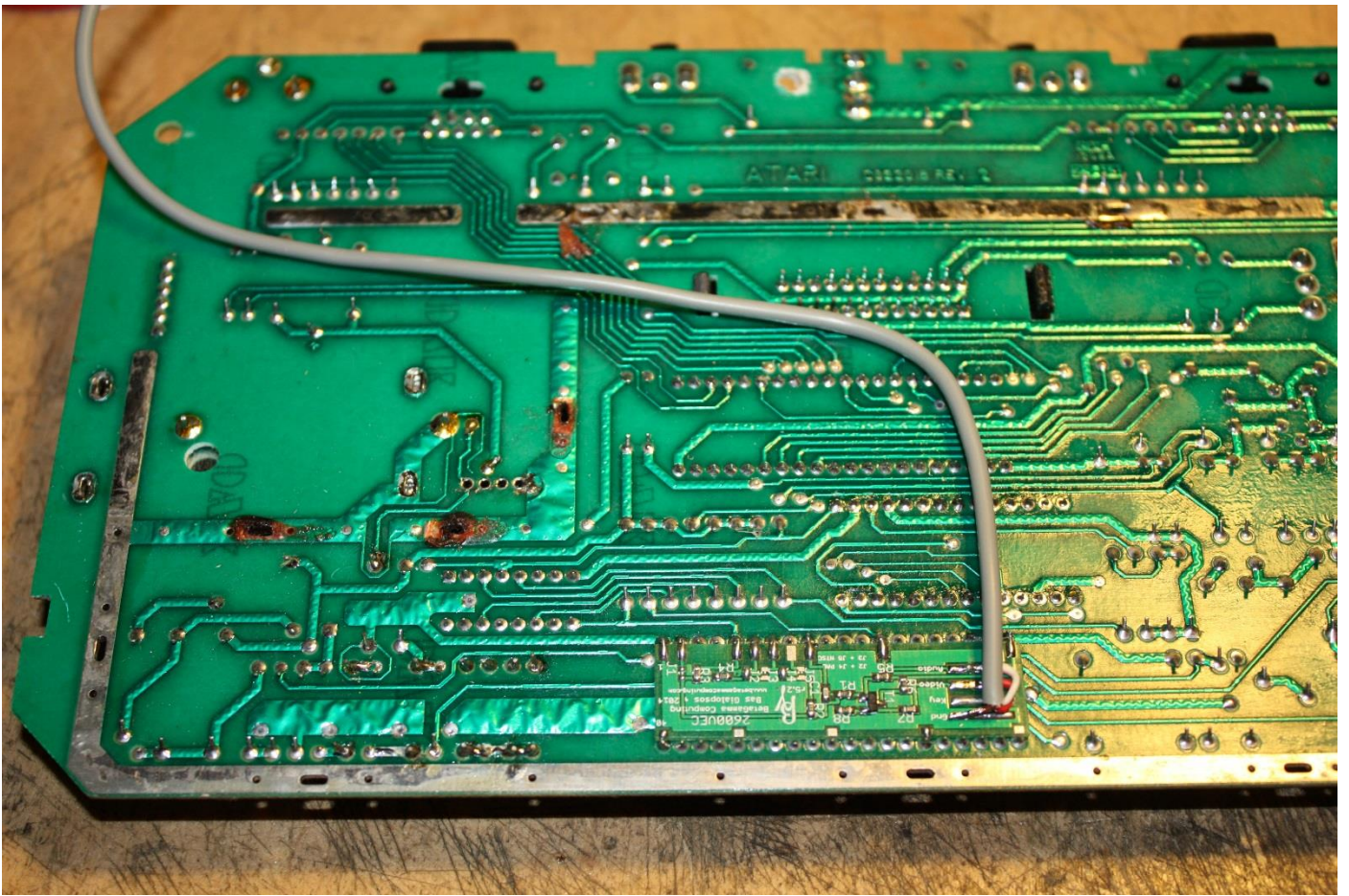
When you are happy with your test results then refit the shielding covers as follows.

Refit the top shield housing taking care to feed the 9 metal tabs poking the PCB through their appropriate slots.

Route the new cable from underneath as shown in the next picture.

Carefully refit the bottom shield plate to the PCB being careful not to snag the new cable and ensure it exits cleanly, a suitable exit point for the cable already exists.

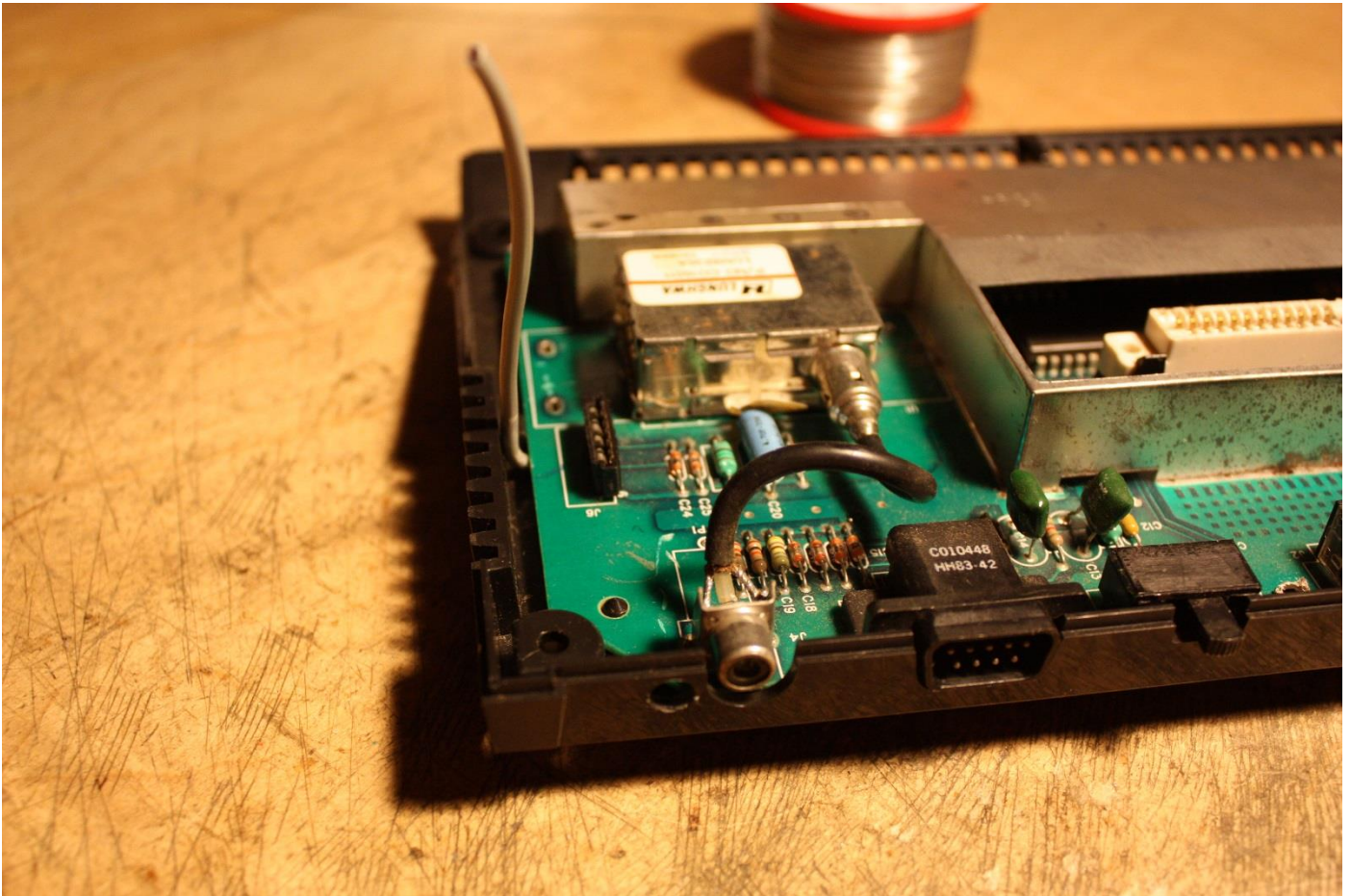
Gently twist or bend the 9 metal tabs to secure the assembly.



Feeding the new cable through the existing exit point.

Carefully place the assembly into the case as shown below, the cable can be sat between gaps in the bottom case struts to allow a flush PCB fitting.

Ensure the two PCB clamps are located in place.



We will now need to carefully drill and mount the supplied 3.5mm Stereo jack socket to the bottom casing.

See the above picture for the recommended location.

Use the Drill with 6mm bit to carefully drill the hole, do not apply excessive pressure with the drill as you may crack the bottom casing.

Use the Stanley knife to carefully remove any burrs or plastic debris from inside to ensure a nice flat surface to mount the socket.

Apply a small quantity of Superglue to the front plastic face of the socket and then position and push it into place inside the case, ensuring you have good contact between the case and front housing of the socket.

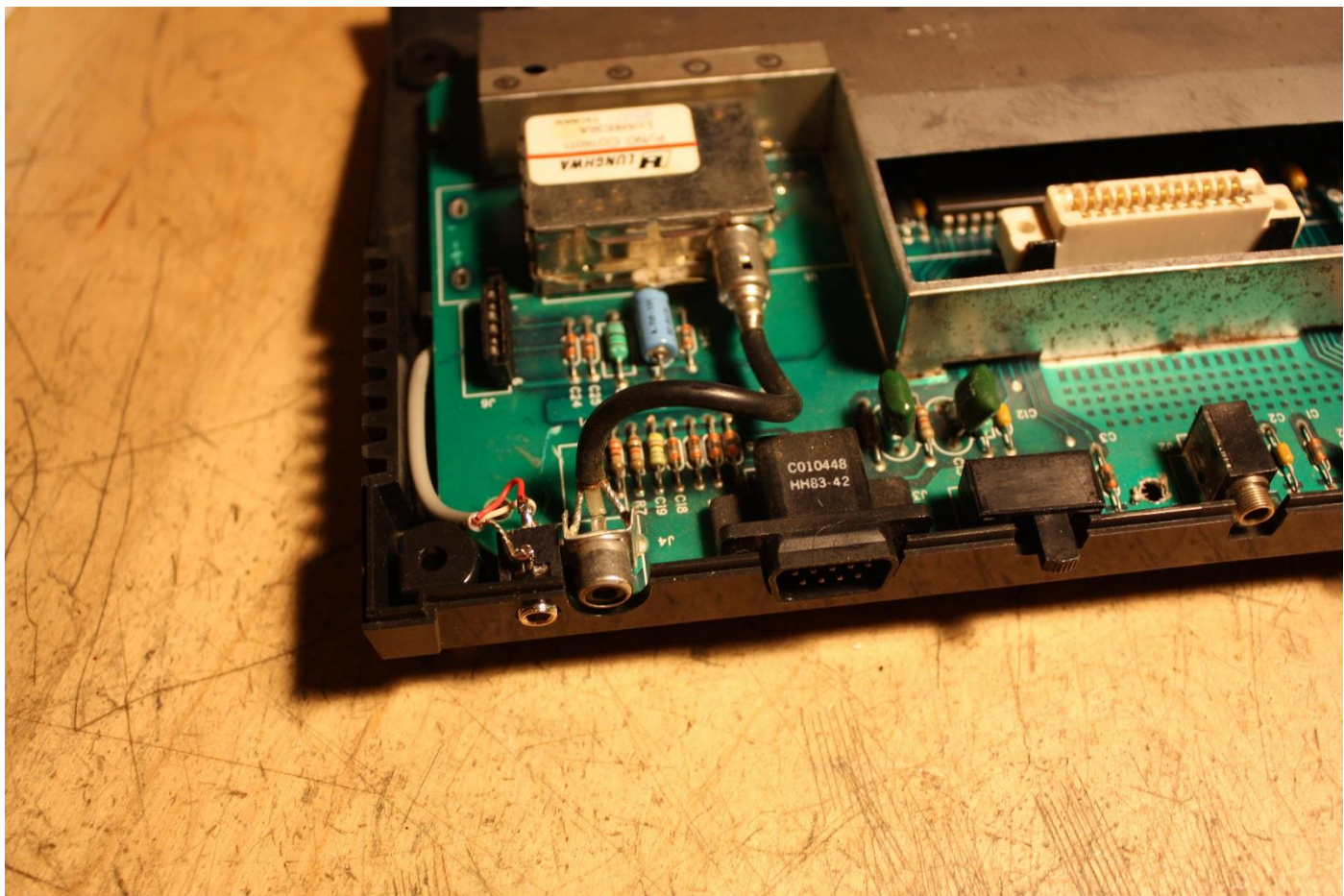
You will need to maintain a good contact for about a minute until the glue has begun to set and the socket will then stay in place.

As you can see from the picture below, the end result is a very non obtrusive 'natural' socket added to the console.

We can now put the base aside to allow the glue to fully set.

Once the glue has set, strip and prepare the cable end and Solder the ends to the jock socket.

Ensure you follow the pictured connections, the Red wire will be closer to the Screen.



You can test the system safely at this point by connecting up the DC power supply to the console and connecting up the supplied AV cable to your video display.

The AV cable's RCA jacks are colour coded for RED to be Composite Video and the other jack, WHITE or BLACK to be Audio...

To refit the top cover, remove all cables and the cartridge, place the top cover upside down to the right of the unit and carefully re-insert the key switch membrane.

Set the Power and Colour switches to down and ensure the switch housings in the cover are also down and refit the top cover until it clicks into place.

Ensure the Switches have located and work.

Refit the 5 screws as outlined in our previous picture.

Installation Completed.

Troubleshooting

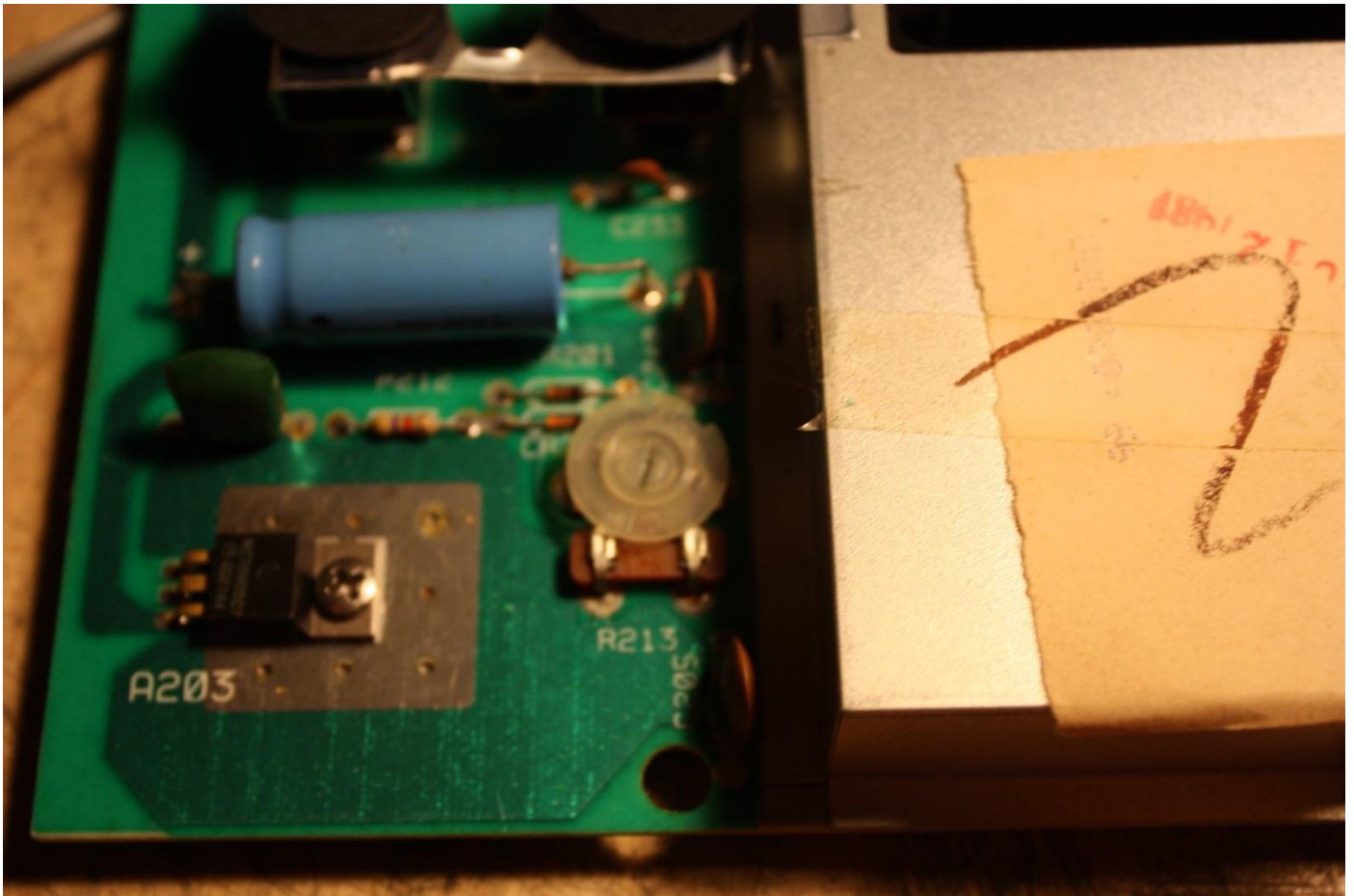
If for some reason your installation has not been successful then please check the following points.

- 1 RCA Jacks inserted correctly to monitor, Red = Video, Black = Audio.
- 2 The 2600 was functioning correctly prior to installation.
- 3 Cartridge inserted correctly.
- 4 No short circuits in the new cable assembly.
- 5 No open circuits in the new cable assembly.
- 6 Check +5V at Pin 20(+) and Pin 1(-) of TIA.
- 7 Previous continuity tests passed OK.
- 8 No short circuits between TIA Pins and Encoder module pads.
- 9 No Colour or incorrect Colour on screen, check the following,
Is the cartridge being used for the correct region, ie, PAL or NTSC.
Check Colour / BW switch is operational and set correctly.
Carry out the Colour Phase Adjustment procedure.

Colour Phase Adjustment

The way the TIA in the 2600 generates colour is by manipulating the Phase of the Chroma signal. In order to achieve this then a reference setting must exist for the TIA work with.

This is controlled by a large Potentiometer on all 2600 Main PCB's and is usually factory set however this can drift over time, move in extreme transit or we can simply accidentally move it whilst installing the Encoder module.



Without Factory equipment to hand, we can however make fine adjustment to the Colour palette by using known games cartridges referenced against screen shots downloaded via the internet.

Carefully tweak the Potentiometer left and right until the correct colour balance is obtained on screen.

It is advisable to let the 2600 warm up for 15 minutes before adjustment and use a number of cartridges to ensure all hues are correct.

In some circumstances you may need to use contact cleaner to restore the Potentiometers range.

NB – Colour Phase adjustment is not a requirement of installing the Encoder module, as it has a transparent effect on the original circuit.

Only carry out the adjustment if, your unit has drifted OR you accidentally moved its position.