

Vox Brian May AC30 (2006) Conversion Procedure To The Dave Peterson AC30 Specification



DANGER
This document is for use by qualified and experienced amplifier technicians. The voltages in a Vox AC30 can kill even after the power has been switched off.

THIS DOCUMENT IS NOT INTENDED FOR USE BY AMATEURS.



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DISCLAIMER

The information in this document serves as a general guide for an amplifier modification. To use this information safely and correctly the technician must be fully conversant with all of the necessary safety procedures required to work with high voltage amplifier circuits.

Do not attempt to do this work if you are inexperienced or unqualified.

By building, modifying or operating this amplifier, you acknowledge that you understand the dangers improper operation or safety procedures can pose and you accept all risks associated with the building and the operation of the amplifier.

You also acknowledge that the authors and contributors to this document are not, nor will be responsible, for any death or injury caused by the procedures and/or instructions set out in this document or the subsequent results of applying these procedures and/or instructions whatsoever and that you assume all risk by the modification and use of this amplifier.

This document, information, procedures or instructions are not affiliated in anyway to Brian May or Queen nor any of their associated companies. Neither is this information sanctioned by Vox Amplifiers, 'Vox R & D' or Korg UK. Carrying out these suggested modifications will void any warranties.

FORWARD BY GREG FRYER

The objective of Mike Ryde and myself in developing this information has been to provide as many people as possible with high quality ways to alter or improve the sound of their amplifier. As we stress many times, this is NOT work to be carried out at home by inexperienced people and should ONLY be done by qualified amp technicians because of its capacity to kill or injure you. Please take this information to an experienced amp tech.

These modifications began as being a simple solution to overcoming the troublesome undertones of the BM AC30, but as time went on they turned into addressing a full scale rebuild to the specs of the handmade Dave Petersen BM amp.

The modifications will allow the amp to be very similar in sound and circuit to the custom built AC30s made by Dave Petersen for Brian May in 1999. The DP amps are extremely fine and distinctive sounding in their own way, and the modifications in this document will get you very close to their sound as long as you use similar top quality components and the work is done in a neat tidy professional way. Although I personally favour aspects of the best AC30s from the 1960s and 1970s, the DP amps must rate as some of the best AC30 style amps made.

We hope you can turn these amp 'mods' into some great sounding music.

Greg Fryer - Fryer Guitars - August 2008

FORWARD BY DAVE PETERSEN

Good amps are never truly the work of one person, and I'd like to take this opportunity to say that without the original ideas of Pete Malandrone, Brian's technical manager, and the encouragement of Greg Fryer, who I have to thank for the link-up with Brian, the Brian May Special AC30 would never have seen daylight in the first place.

Queen used earlier versions of the AC30 until their final performances in 1986, and Brian bought several of the new Marshall-built TBX version when he returned to touring with the Brian May Band in 1994. During the gap between the last Queen shows and the new band's first tour, the AC30 had been through some changes – not least that of company ownership, and the new management were keen to erase some unfavourable impressions that had resulted from attempts to rationalise the AC30's design in the recent past. This resulted in the 1994 AC30 TBX model, with its valve rectifier and Blue speakers, neither of which had been fitted to AC30's since 1978. Brian loved the sound of TBX's, and in 1998, Pete Malandrone suggested customising one as a stripped-down, more robust version aimed at preventing the occasional amp misbehaviour that had happened on tours since the earliest days of Queen (the reason for the 9 – 12 amp array that Brian made famous). The TBX made a great platform from which to launch Pete's concept of a tough, simple touring amp, like the rally version of a well-loved saloon car.

Although the complete AC30 is a complicated amplifier, the parts that Brian values are its most basic elements, and it was possible to resolve some of the touring problems by removing the large printed circuit board that is a major component of the TBX. Fortunately this can be done without also removing the all-important power-stage valves and transformers. Hard-wiring can then be installed, with fewer and less vulnerable solder-joints, and a new preamp assembly fixed to the top of the chassis, using similar build techniques to the old J.M.I. model. Along the way, the amp gets more gain (6 db's – the difference between 3 and 6 out of 10 on the Volume pot) but remains stable under wide-open conditions – not always the case with the 80's versions. Both these factors are important in the way Brian uses his amps.

At the outset it was important to get the valves further from the speakers, but this was only possible if the TBX chassis was turned 90 degrees so they stood upright. A different preamp panel then became a necessity, but would have been so anyway because of the spare holes that resulted from removing the main board and all the controls with it. The red colour scheme was intended to emulate the famous red guitar, although it's perhaps a shade more jaunty, with white script to stand out well in low light.

This minor detail turned out to be a problem area. Initially the Brian May Special was to have been a two or three unit special build, and it was feasible to use the type of rub-down lettering commonly used for prototyping. But things got out of hand, and I'd made around a dozen Specials when the white Letraset sheets I'd been using were deleted from their catalogue. I soldiered on with remainders from previous jobs for a while, modifying letters to make up shortages of others. There were never enough orders to justify screen-printing special panels (20 being the lowest economic print-run) but in any case an agreement was struck in 2002 with Korg U.S.A. whereby they would issue a limited-edition Brian May AC30 based on my work, so I didn't persist.

I made contact with Mike Ryde earlier this year. Brian May admirers all over the world, particularly those in Queen tribute bands, know Mike as a leading light in the internet May community, along with his colleague and fellow BM fan Martin Pitcher. Martin owns a TBX- based Brian May customised by me in 2000, and I carried on making these until 2003 when the agreement with Korg U.S.A. was confirmed. Mike acquired a Vox Brian May Special a while ago, but when the two amps were

compared back-to-back it was clear that they sounded substantially different. In fact a major circuit element of the original had been omitted, accounting for most of this difference, and Mike, under the guidance of Greg Fryer found other improvements that could be made by substituting TBX components for the VBMS types. He also suggested to me to restart the old hand wired TBX conversions using screen-printed panels, and with this incentive and the Letraset problem resolved, I've recently handed over to him the first of the new line.

Mike's well-informed comments (from discussions and emails with renowned luthier and amp builder Greg Fryer) form the basis of this conversion guide. Meanwhile I'd like to express here my appreciation for his support and motivation in persuading me to once more get involved in this lively and ongoing music business phenomenon.

David Petersen - Shere Sound - August 2008

CONVERSION TO DAVE PETERSEN BM AC30 SPECIFICATION.

In 2006 Vox (Korg UK) unveiled a new AC30 amplifier. Designed by Steve Grindrod (SG) in the UK, the amplifier was endorsed by Brian May. The amp was built in China to save on manufacturing costs but was dogged by problems from the beginning. The main issues were that the amp was noisy and had a dreadful undertone. The tone also seemed somewhat strange; although somehow reminiscent of the Dave Petersen (DP) modified AC30s (which Brian had specially commissioned during the late 90's). The tone was not unpleasant but it always sounded to me like an unsuccessful attempt to build a production version of the DP Vox Brian May Special (VBMS) amp. After speaking with SG he explained that his remit for this amplifier was to make an exact copy of Brian's favourite DP amp. SG incorporated a number of unique key changes to the standard AC30 which were also seen in the earlier DP design:

- Different pre-amp biasing (the BM AC30 uses the DP values for the biasing resistor, a 0.5 watt carbon film 1K5 R3). Standard AC30s use 1K5 for R3 cathode resistor on 12AX7 V1, although the valve's cathode is paralleled with its twin triode sister cathode thus effectively producing a cathode resistor value of 3K. The DP amp uses 1K5 for this cathode resistor R3, but its V1 cathode is NOT paralleled to its sister cathode, thus biasing the pre-amp differently and providing a hotter sounding output. the standard AC30 configuration R3 should be 3K carbon film 0.5 watt (the difference is subtle but definitely audible).
- The 220K+220k voltage divider has been omitted in the DP design. The early 1960s non top boost AC30s had a circuit value here of 220K to ground. This resistor gulps plenty of signal to ground at this junction and allows a "moderated" or lesser amount of signal strength through to the pre-amp phase splitter valve P2 (preamp valve 2), then on to the EL84 power stage. Not having this voltage divider will change the sound appreciably.
- The HT feeder/dropper resistor for P2 (R12) is lowered to 15K (standard AC30 value is 22K) which allows the P2 valve to push more signal to the EL84s. Actually, DP dropped this value even further to 10K.

The following were not included in the SG AC30BM:

- The use of a Drake output transformer.
- Replacing the Chinese made choke with a more substantial choke.
- Using better components in crucial places such as; BC smoothing capacitors in the power amp, better sounding cathode resistors, different screen grid resistor values and numerous other component substitutions.
- Moving choke connection from upstream of the output DC supply. This has a big difference on the tone; eliminating the undertone and also emphasising the characteristic saturated/compressed tone associated with the DP amp.

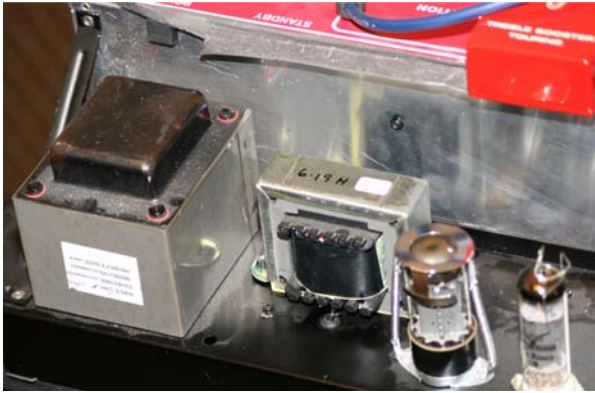
Under the guidance of Greg Fryer* the amp was converted by changing the specification to align even more closely to the DP design. Important design and wiring changes were made and components were changed/substituted to higher quality versions (using BC, Vishay and Sozo capacitors, Metal Oxide and carbon comp resistors and alternative transformers) to achieve this radical transformation.

Each important stage contains instructions and detailed pictures.

*Through Greg's extensive career, he has worked on guitars for Dave Gilmour (Greg worked with Dave during the 1988 Pink Floyd world tour, when they were in Australia) and famously restored and replicated Brian May's Red Special guitar. Since then he has been Brian's exclusive pedal builder and has also hand-built pedals and AC30s for many productions of the 'We Will Rock You' musical around the world. Greg also hand-builds AC30s for Brian some of which he currently uses when touring.

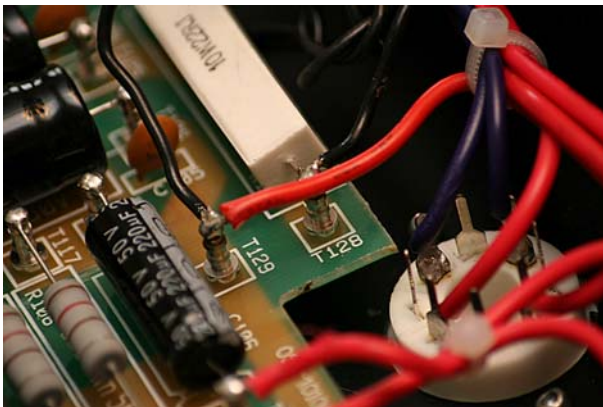
Power amp changes

1. Replace the Chinese choke with the Dave Petersen choke. This fits in exactly the same chassis mounting holes.



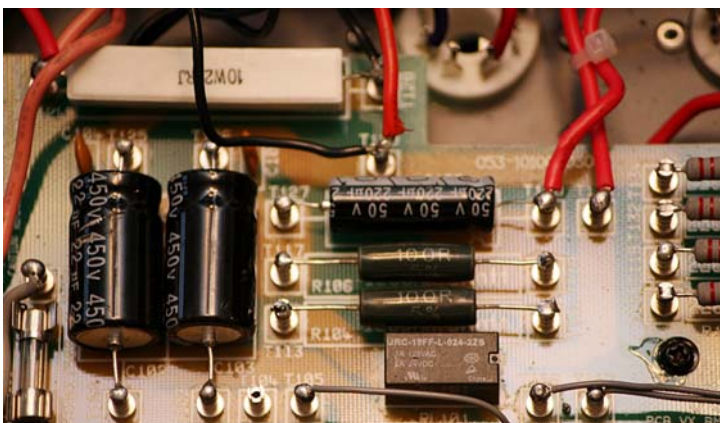
The heavy-duty 7H Dave Petersen choke.

2. The H.T. supply was modified by fitting a Dave Petersen (heavy-duty 7H) choke up stream (move the output Tx connection (red wire) from T128 to T129) of the output DC supply, being commoned to the same point. The choke filters out more undertones but significantly changes the sound and dynamics of the amp.



Move the red wire of the output Tx from T128 to T129 (now upstream of the output DC supply).

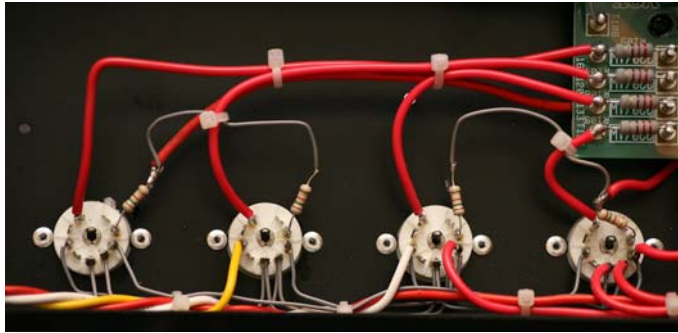
3. Change the EL84 cathode resistors (R106 and R104) to 2 x 100R 3W, carbon film or metal oxide resistors. In the photo below 100R/6W wire-wound resistors have been used (Greg Fryer alternative).



The power valve cathode resistors now are 100R/6W wire-wound, replacing the previous 120R resistors. Dave Petersen used 3W carbon film resistor.

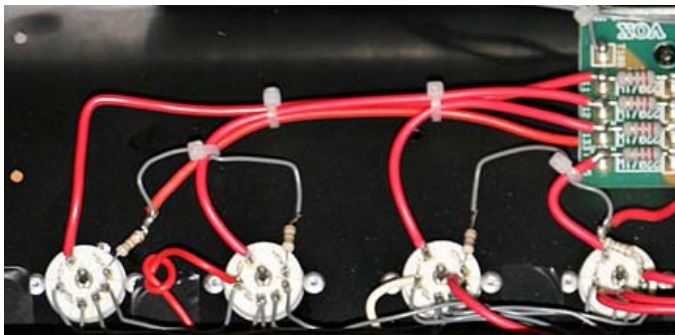
4. Upgrade the output transformer (O/Put Tx) to a UK Drake O/Put TX.

- a. Using the Drake O/Put Tx, the red and white wires are the primaries (which are the same as a TBX by way of an example) which connect to each paralleled pair of EL84 anodes (pin no 7 as per the BM AC30 yellow and white wires).



Notice the original Tx primaries are the yellow and white wire.

- b. Red to one pair, white to the other pair. Twist the red and white together. In the BM AC30. It might be good to leave both wires a little bit longer and swap them around later to experiment which sounds best on your amp (see below for what sounded best on my amp). Tape them in place. It's OK to twist red white and brown together as in this amp - that's good practice.



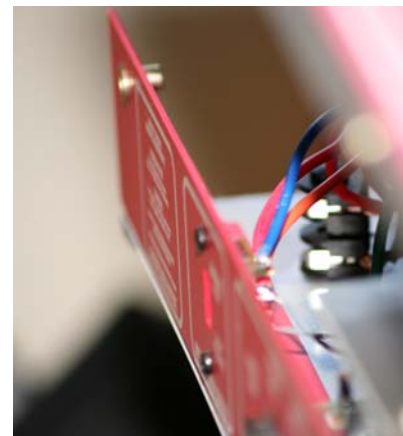
On the Drake O/Put Tx the primaries now are the red and white wires.

- c. The Brown wire is the O/Put Tx primary CT. Lie this along the folded right angle of the chassis out of the way of other wires and tape it in place.

When connecting the power stage switch, the green wire on the Drake Tx is the equivalent to the orange wire on the Chinese Tx.

N.B. These connections change yet again at the end of this upgrade (Removing Power Stage Switch), although you may find it interesting listening to the tonal differences with the switch in.

The O/Put Tx red white and brown have high DC voltages and radiate strong electromagnetic fields which other sensitive areas can be effected by. Keep

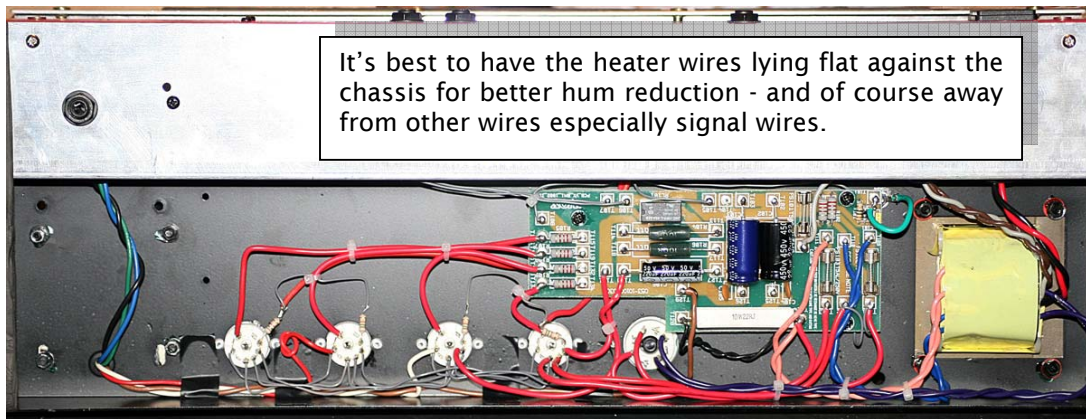


these away from wires from: control grid pin 2 signal in, cathode pin 3, heaters pins 4&5

d. Cathode wires should be away from the anode connecting jumpers and heaters - heaters and cathode wires should not be done in the uniform "grey code" as has been in the BM AC30.

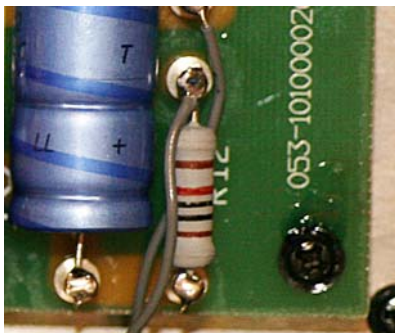
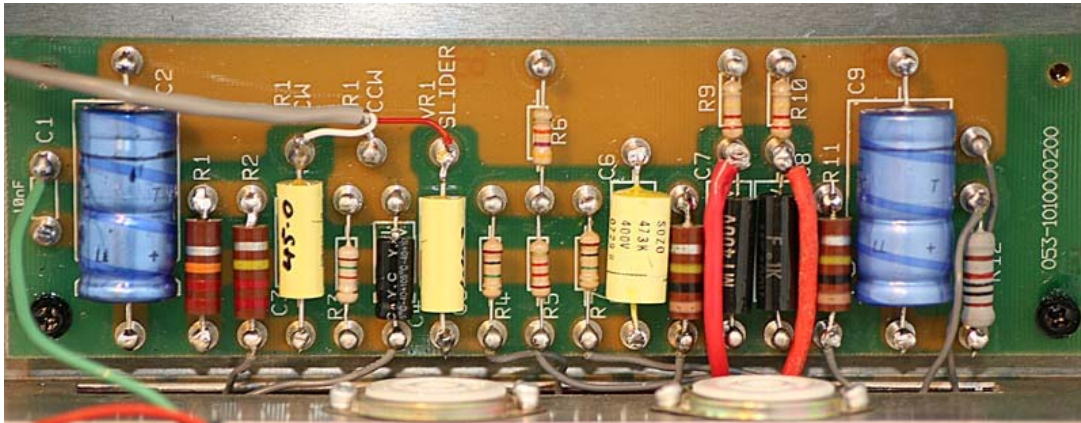
e. Being a strong source of AC hum interference, its best to have the heater wires lying flat against the chassis for better hum reduction - and of course away from other wires especially signal wires.

N.B. The heater wires should always be tightly twisted together to reduce hum, and because of the current they carry they should be the thickest wires in the amp along with earths, EL84 cathode wires and the O/Put Tx secondaries black and blue - all these should ideally be 18awg for an AC30.



Preamp component changes -

1. 47n coupling capacitors (C3 & C5) to better sounding Vishay capacitors .
2. Change P1 (preamp valve 1) anode resistor (R2) to a 220K carbon film resistor. Greg Fryer suggests an alternative 'nicer sounding' 220K carbon comp 1 Watt resistor.
3. Change dropper resistor (R1) to a 22K 2 Watt carbon film.
4. Change C6 from a 100n to a 47n Vishay cap (in keeping with DPs circuit).
5. Change C2 and C9 to BC 22uF 450V electrolytic capacitors.



6. Replace the HT feeder/dropper resistor R12 with a 10K resistor. The SG design of 15K is different to both the standard 22K and the DP 10K biasing method.
7. Greg Fryer suggestions: replace R11 and R8 with better sounding carbon comp 100K 1W or 2 W carbon film resistors.



Removing Power Stage Switch

The DP amp does not have a power stage switch (as fitted to the AC30BM) which bypasses two of the power amp valves (as the AC30BM does). This doesn't seem make much difference to the tone nor does it reduce the volume by much.

1. Remove the red wire completely which connects the tip of the speaker jack to the power stage switch.
2. Solder the blue wire to the tip of the speaker jack.

The speaker jack and O/P Tx wires before the modification.

3. Remove both grey wires connecting to the power stage switch (unsoldering from both ends).
4. Tape the orange wire up and put it out of the way (I taped it to the side of the chassis).
5. Remove the switch from the chassis.

Further suggestion from Greg: The turret posts T113 and T117 for the 2 EL84 cathode resistors 100R/6W should be hardwired together instead of relying on the relay to keep the connection between the two and to earth. Solid tinned wire of 20swg or 21swg is good for this.

The speaker jack after the removing the power stage switch.

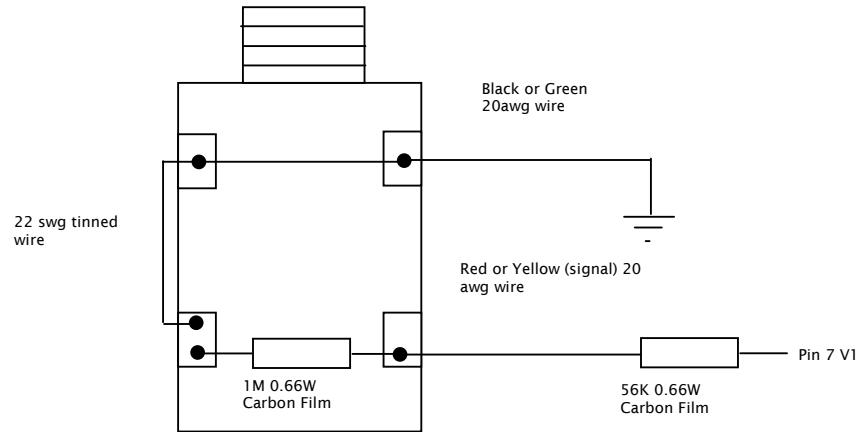


Changing the Volume Pot.

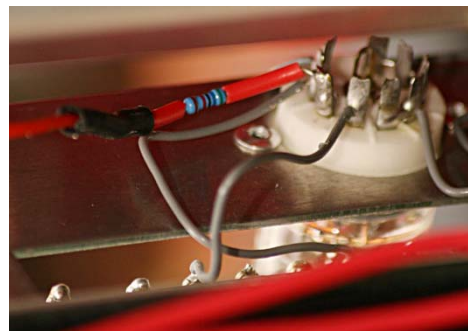
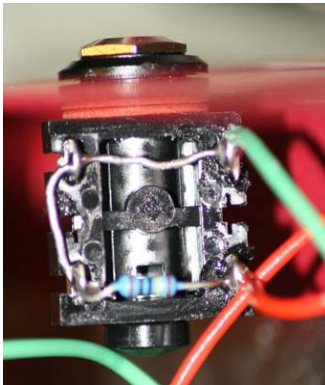
Replace the 500K short shaft Alpha pot with a 1M log Omeg pot (I used a long shaft pot and cut it down). I found that the Omeg pot base was smaller than the Alpha, however the chassis hole for the pot still needed to be drilled out to a slightly larger diameter to enable it to fit.

Rewiring the input jack

Using a good quality input jack such as Farnell (catalogue no: 148-265) connect the tip (signal) going through a 56K resistor (and a 1M to earth) connecting to pin 7 on V1. The ground can go to the C1 earth on the preamp board. Keep the 56K resistor close to the V1 connection, this way it rejects RF and other noise interference better.



Lightly twist the black and red wires together, keep them short enough and have them away from any AC sources of noise - the input is the most important to keep free of this.



Input Jack

Left: Wired Farnell Socket

Right: 56K resistor connecting to pin 7 on valve 1.

And finally....

As a final note, the input board is now totally redundant and can be removed from the amplifier. You may also wish to plug all the empty sockets with rubber bungs. I decided to leave them un-plugged to aid the air circulation.



APPENDIX 1 – Component list

Transformers

DP style choke – Contact Dave Peterson on dave@sheresound.co.uk.

Drake Output Transformer* (as used in the late 90s reissue TBX AC30s)

*For the Drake transformers look out for them on Ebay or contact Shere Sound Ltd.
(www.sheresound.co.uk)

Volume Pot - 1M Log Pot. Alpha or Omeg

Input jack Farnell -catalogue no: 148-265

Passives - Resistors

RS part no's included <http://uk.rs-online.com>

Preamp and cathode network (Carbon film 0.66W unless otherwise stated)

R1 - 22K Carbon Film 2W - 135-415 (Greg Fryer alternative - 22K: 1 watt carbon comp)

R2 - 220K Carbon Film 1W - 135-291 (Greg Fryer alternative - 220K: 1 watt or 2 watt carbon comp). Dave Petersen supplies 0.66W Carbon Film resistors.

R12 - 10K Carbon Film 2 Watt - 131-665 (Greg Fryer suggestion 10K: 1 watt or 2 watt carbon comp)

Input jack resistor 1M Carbon Film 0.66W - 133-217

Input resistor (fit to valve holder) - 56K Carbon Film 0.66W - 132-911

R8 and R11 - Greg Fryer suggestions (leave as fitted for DP circuit) - 100K 1W or 2 W carbon comp.

Poweramp

R106, R104 - 100R Carbon Film 3W - 131-918 (Greg Fryer alternate 2 x 100R/6W wire-wound). Dave Petersen's kit uses metal oxide here.

R105, R107, R108, R109 - 4 x270R Metal Oxide 3 Watt - 214-2689

Passives - Capacitors

- **C3, C5, C6** - Vishay (1000V polypropylene) 47n
- **C2, C9, C102, C103** – BC 22uF 450 Axial Electrolytic 450V
- **C106** - BC 220uF Axial 40V (Dave Petersen's kit uses 25V)

Connection Wire

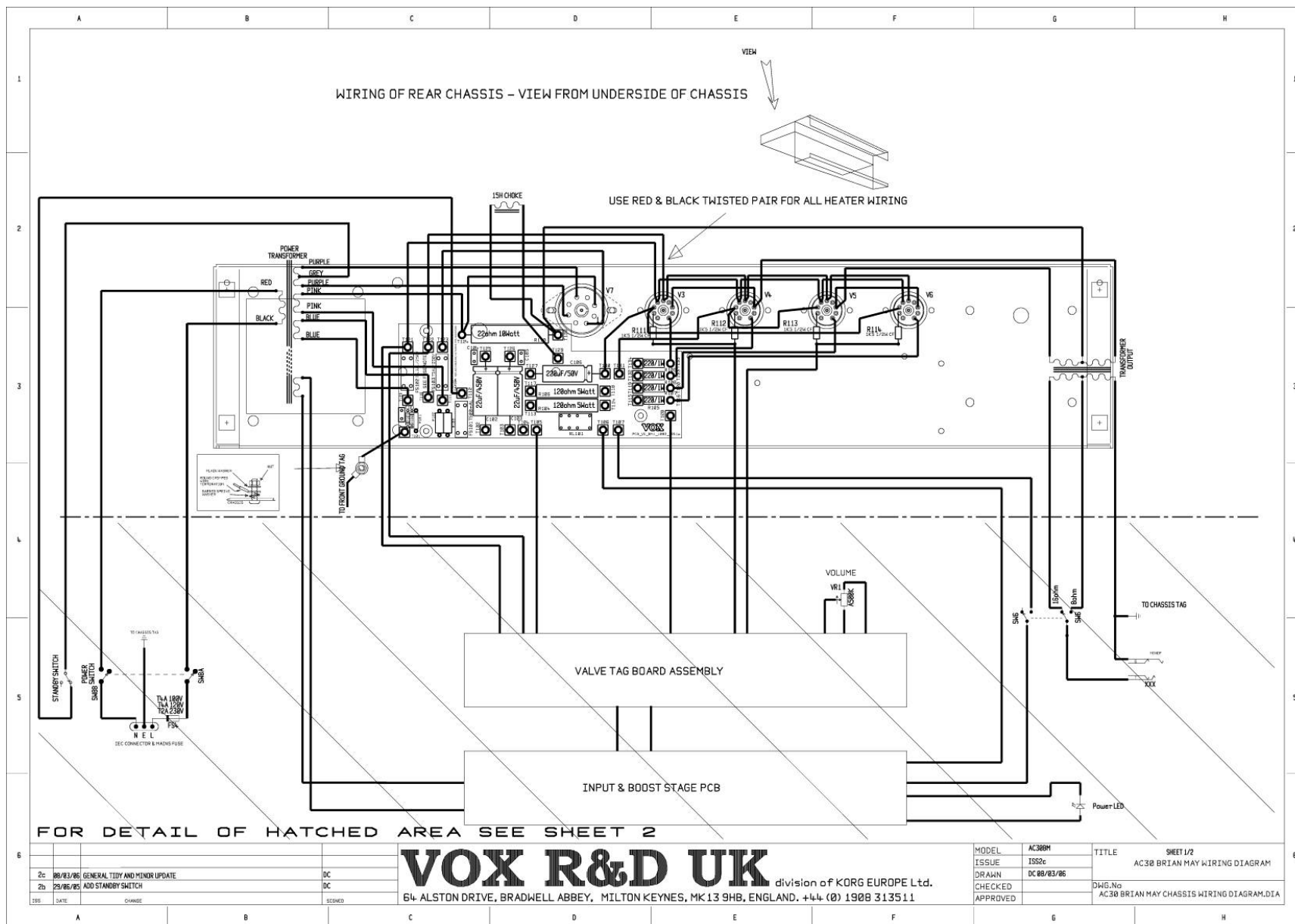
- Red connection wire (20awg, 18awg)
- Black connection wire (20awg, 18awg)
- Green/Earth connection wire (18awg)
- Yellow connection wire (20awg, 18awg)
- Shrink wrap (Large bore to cover Cap in power switch) and small bore to be used with 20-18awg wire). I've use 4:1, i.e. shrinks 4 times, this way I only need to but two types.

Suggested Suppliers

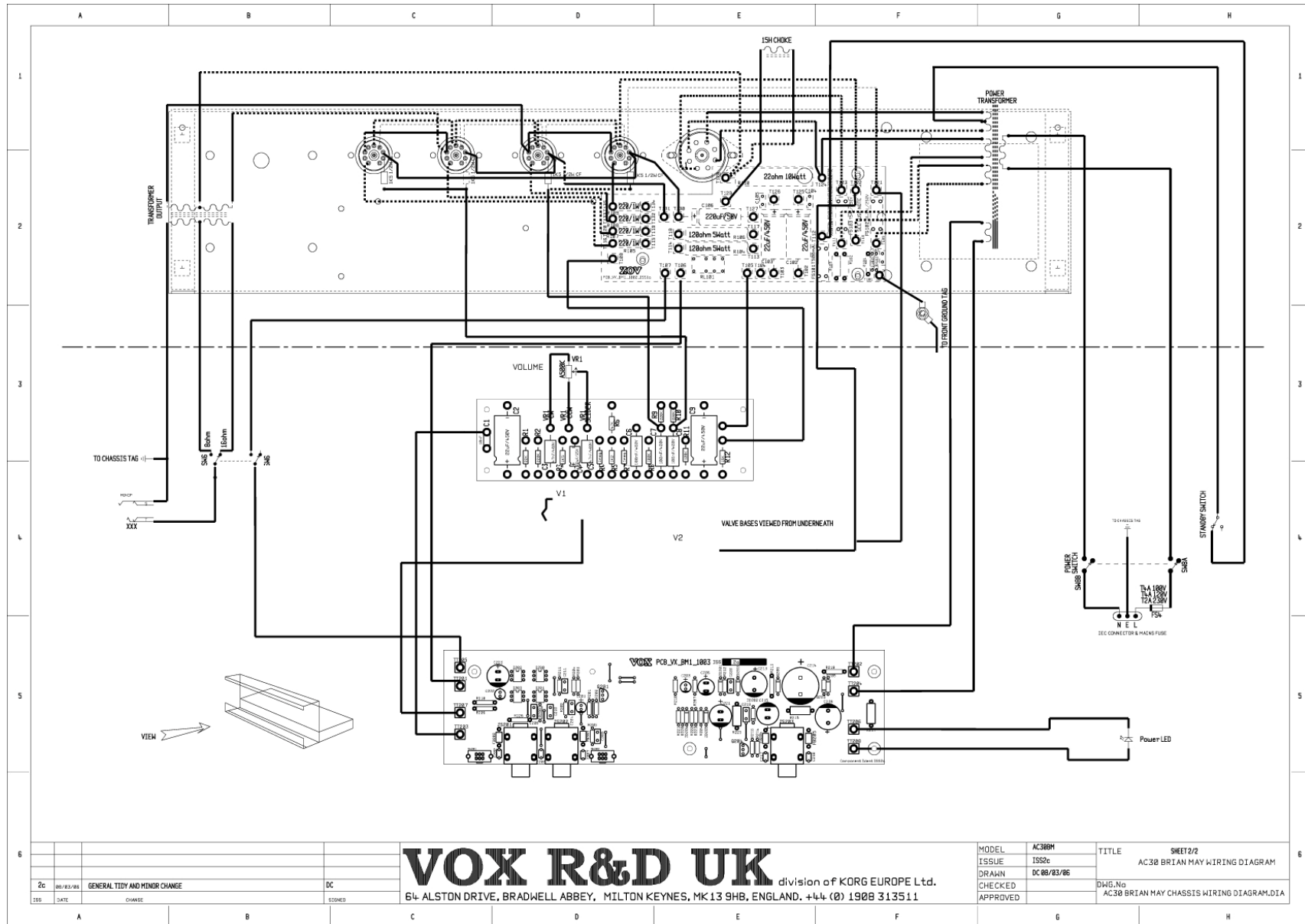
- Shere Sound Limited (Dave Petersen's company) supplies a complete kit including Drake output transformer and choke. Contact them on www.sheresound.co.uk.
- Tube Depot USA: Carbon comp 1 watt, 0.5 watt, Sozo caps.
- Vishay BC Capacitors can be found at Farnell (<http://uk.farnell.com> - order code 1165652)
- Carbon comp resistors Tube Depot or Mojo Musical Supplies in USA. I've bought from various UK and US suppliers, and there are probably good suppliers of NOS carbon comp resistors in the UK too.
- Vishay 630V caps - obtained from RS and Farnell in UK.

N.B. 2 watt carbon composition resistors are very hard to find so using 1 watt is often the only option.

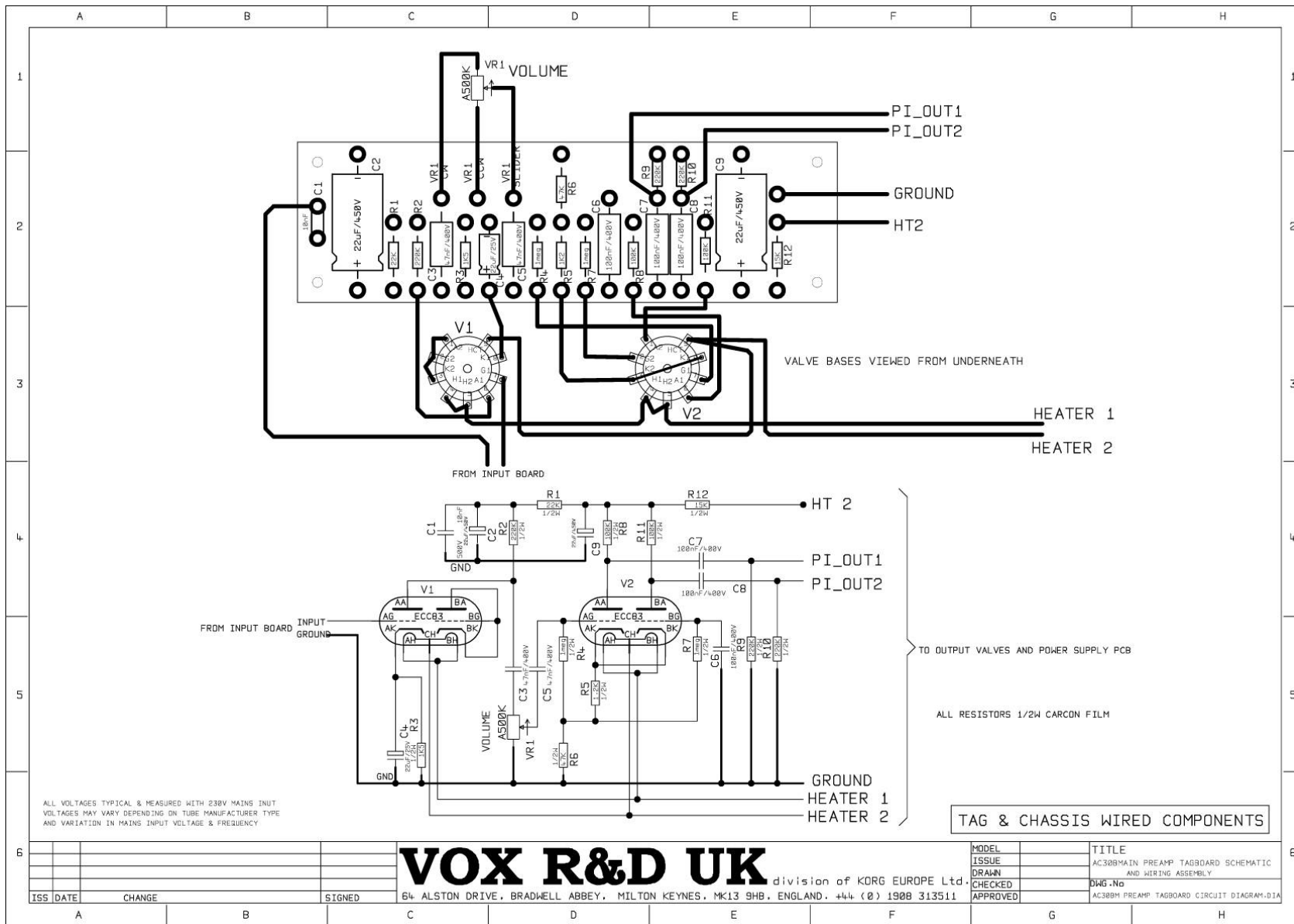
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