Power Up and Test Procedure

Follow this procedure carefully. It is constructed with several ideals in mind.

- Quick and easy to do without sophisticated equipment.
- Minimise risk of damage caused by assembly faults.

Test Resistors.

The power up and test procedure uses the pair of test resistors in series with VPP and VNN to make testing less likely to damage the amplifier by a short on VPP or VNN but they are not essential. If you are assembling a Base Truepath then you can use a pair of 68 ohm 2.5W resistors.

Optimized Truepath - Test Resistors

If you are assembling an Optimised Truepath then you will have been supplied with two test resistors.

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If you don't use the resistors then you should either:

1. Use low value (200mA or so) SB fuses in VPP and VNN.
2. Use dual bench supply with variable voltage and current. (In fact a bench supply with current limiting function is preferable using either the test resistors or relying on fuses, but most Truepath builders don't have a bench supply)

The resistors ensure that there is enough **VPP/VNN current** to unmute the amp (**approximately 120mA)** but not enough to do any damage if something goes wrong and there is a sort. At this current at the Truepath VPP/VNN input terminals will be reduced to ~**38V which is the minimum needed to keep the amp unmuted.**

Setup for the Test

The test is much easier if you have several multimeters, in which case, use one for each supply. If you only have one then monitor V5 current for the V5 test and - unless mentioned otherwise - VN10 for the other tests. Do not underestimate the hassle of testing the Truepath with its 4 power supplies. It's really difficult to keep a handle on what is happening with all of these power supplies at the same time. A panel of 8 meters would allow you to see what's going on at all times (similar to the above video on Truepath).

Suggestion - V5 Standalone Test.

Ideally a standalone V5 load test should also be done here by connecting a 50mA (= 100 ohm) load to the V5 supply and ensuring that V5 does not drop below 4.9V.

Part 2: After TA3020 is fitted.

1. Switch on V5.
2. *Mute LED is ON*;
3. ***I5 current will go to 40mA for a few seconds and then step up to 50mA.***
4. Note that the amp will not unmute unless this step occurs.

If there is no I5 step then

- check the mute circuit, particularly the soldering of the little SOT-23 transistors.
- There is a PCB via in the mute circuit between R307 and R309. It's easy to form a solder bridge between of these resistors and the via.
- Read about

- and make sure you have C311 in the right way around.

If I5 steps down to ~30mA instead of up, then

- make sure the mute jumper is in.

Test VN10

Suggestion - VN10 Standalone Test.

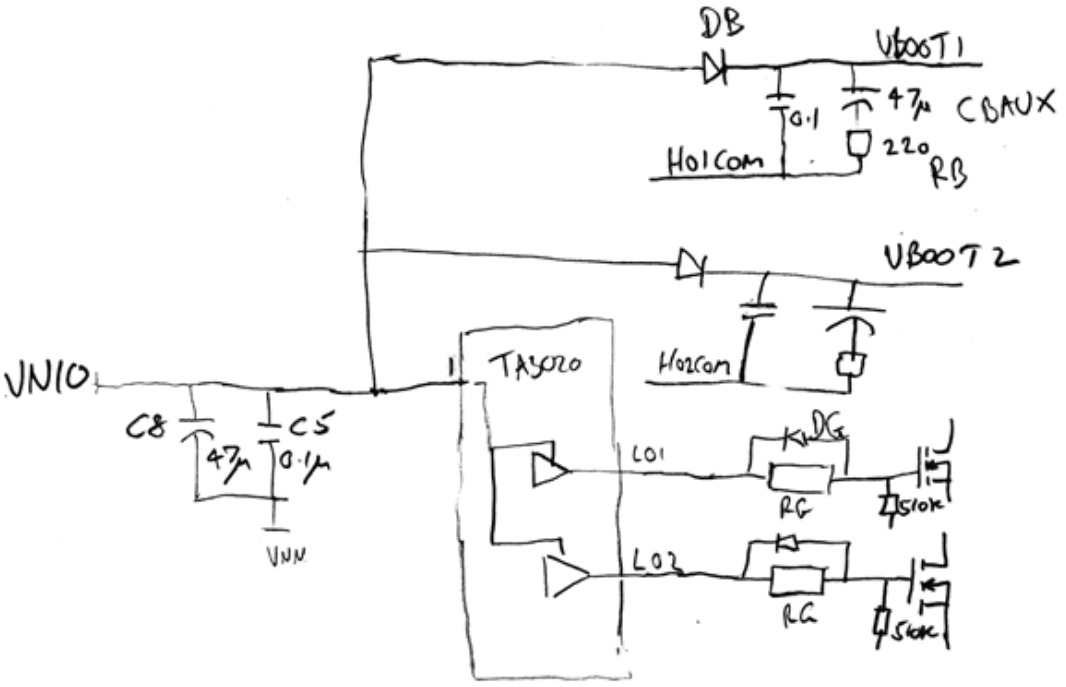
Ideally a standalone VN10 load test should also be done here by connecting a 200mA (= 50 ohm) load to the VN10 supply and ensuring that VN10 does not drop below 9.5V.

If VN10 droops then there will not be enough IN10 to properly switch the MOSFETs and a chirping or hissing sound could result. This is noted later in the section

1. Check that there is no obvious short between VN10 and VNN
2. Next switch on VN10.
3. ***There will be a little inrush as the cap charges but then the current will quickly drop back to ~0.***

Troubleshooting VN10

It is much easier to trace short circuits in VN10 if you follow this schematic excerpt which is centred around VN10; that is, shows where IN10 goes during normal operation. As you read this drawing, remember that the common for VN10 is VNN.



1. Mute the amp by removing the unmute jumper.
2. Switch on VNN.
3. *There will be an inrush followed by ~1mA. Test resistor should be cold.*
4. Switch on VPP.
5. *There will be an inrush followed by ~1mA. Test resistor should be cold.*

If you touch adjacent MOSFETS simultaneously then you will get a tingle.If current flows here then you have a short or some other fault. Test resistors should protect the amp from damage while the short is being traced, but don't leave the offending rail switched on for more than 30 seconds or so.

1. Unmute the amp.
2. *Within a second the mute LED will go off and VN10 current should jump to ~200mA.*
3. Touch the MOSFETs.
4. *MOSFETs will get warm as IPP and INN are ~120mA*
5. Switch off.

It is much easier to trace short circuits in the output circuit if you follow this schematic excerpt which is centred around the VPP and VNN; that is, one which clearly shows where IPP and INN can go. The thick lines show where most of the current flows during normal operation.

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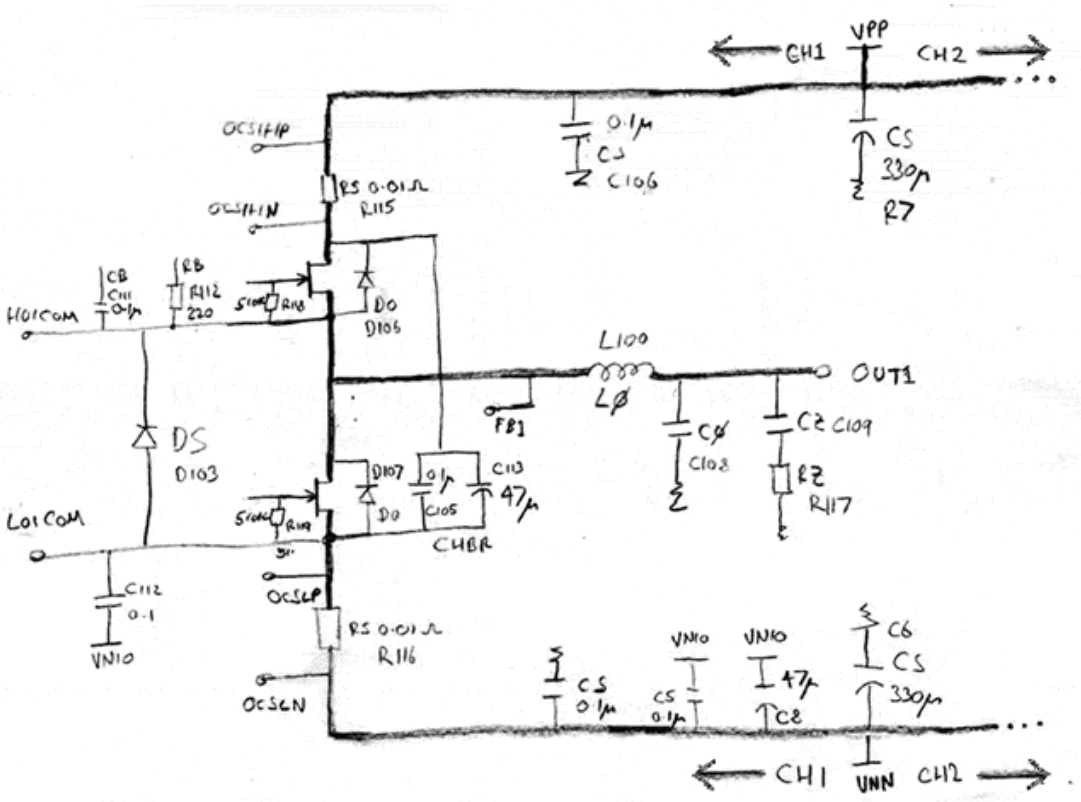


Some faults in the output circuit are difficult to find. There are many variables which interact with each other and often it's difficult to tell if you are looking at the cause or merely an effect of the fault.

Fault-finding guide.

Symptom

Fault

Solution

When unmuted:INN=IPP and not approx 120mA

BBM jumpers not or wrongly fitted.

Check that they are fitted as indicated on J2 and J3 on the component overlay.

When unmuted: - Mute LED goes off as expected. - IN10 = 0

VBoot circuit not working

-If you are using VPP/VNN test resistors make sure that the resistor is connected as shown in this diagram. If VN10 is connected to the right side of the resistor then the resistor will cause a voltage drop in the VN10 circuit.

-Measure VBootn between TA3020 pins VBOOTn and HOnCOM, where n= 1 and 2. - Both VBoot1 and Vboot2 must be ~10V. - If not, find the fault in the boot circuit.When the TA3020 is unmuted it sends 20 pulses to the gate of each low side MOSFET. In this time, each Vboot should charge. If it doesn't then the TA3020 output stops as if it were muted, but the mute LED does not come on.If the pulses don't happen when the TA3020 is unmuted (you need an oscilloscope to check this) then the amp is comatose. There is no definitive cure for a comatose Truepath, but socketing the TA3020 may help. Please post about your problem here.

When muted or unmuted and load connected: - High IPP or INN. - One heatsink hot.

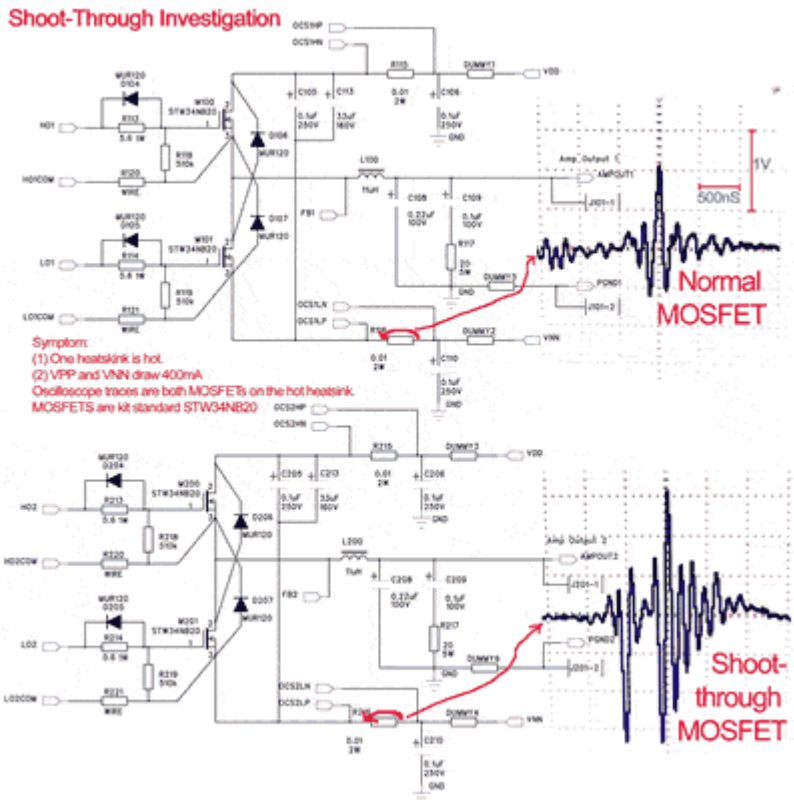
Defective MOSFET - partial short.

Find the RS that has voltage across it when muted. The associated MOSFET is defective.

When unmuted: - High but equal IPP and INN. - One heatsink too hot.

Defective MOSFET - switching time too slow causes too much shoot-through

Use an oscilloscope to observe the shoot-through by monitoring the voltage across RSs:



OR Simply replace one MOSFET on the hot heatsink. There's a 50% chance that this will be the faulty one. If it isn't then replace the other MOSFET.

When unmuted: - High IPP or INN. - One heatsink gets hot.

510k MOSFET gate pull down resistor (R118/218/119/219) is open circuit, eg from dry solder joint

With power off, ensure that there is 510k between the MOSFET gate (or either side of the gate resistor, RG) and GND.

Set Offset Adjust

Next, remove the test resistors, add the heatsinks.

1. No signal on input
2. After 10 minutes' warm-up time the offset on each channel rises by ~6mV. You can either (1) ignore this because it's such a small amount (2) run the amp for 10 minutes before doing the adjustment or (3) set the offset to ~-6mV with the amp cold.
3. Put your most accurate voltmeter across Channel 1 output (ie J101-1 and J101-2)
4. Power up the Truepath.
5. *There will be approx 2V on the output.*
6. Turn the offset adjust POT (R104) to minimise the offset. <10mV is ideal.
7. Switch the Truepath OFF.

Repeat the above steps for Channel 2, ie J201 and R204.