9305 TubeHead troubleshooting

For no-go situations power supply and missing input or output can be the trouble(s):

Power Checks/Tests--

TubeHead uses a 12v ac wall mount power supply (dc output types are not sufficient). It wires direct and either wire can attach as the circuit common/ground. If a connector is added, any circuit or terminal common to the chassis must be the wire to G (ground/common). If the wire used for A is in contact with the chassis via an added connector, it can short/heat the transformer. If the wire used for G shorts at a chassis mount connector it will operate but it can introduce hum. A connector with two circuits isolated from the case prevents trouble in either instance.

The spdt switch used for the power is supposed to complete the circuit between the TubeHead wiring point A and the transformer 12vac. Inspect the switch soldering and for signs of its terminals being loose or misaligned due to heat from soldering. This can cause the switch to not make the connection resulting in no voltage to A, or, cause contact with the metal bushing in contact with the case and SG shorting/heating the transformer.

Don't overlook the possibility of the twisted wires to the tube socket being a short circuit on the power supply due to the insulation melting during soldering and allowing contact between the two.

A multitester set to measure the 12vac voltage of the transformer should read about 13vac and 12vac for the off and on settings. An alligator-clip test lead can be used to connect the ground/common/black wire over to the shell of an RCA connector (dtc vers.) or the sleeve terminal of a 1/4" phone jack (hsr vers.) for the ground. It frees-up one hand while the other is used to probe with the red test lead.

It is best to measure the dc power supplies right at IC pins. The power supply voltages should be getting into the eight pin dual op-amp ICs on pin 8 (+ 12 to 15 v dc) and pin 4 (- 12 to 15v dc). Viewed from the top of the board, the pins count-up, going ccw around the part from the notch. Select negative DC polarity or swap the probes used to test the pin 4 voltages when using a tester with a meter movement that swings to the right from zero. The sixteen pin hex inverter IC originates at a point earlier in the positive dc power supply circuit and is a couple of volts more. Measure for this voltage shown as Vcc on the schematic at pin 1 of IC1.

IC1 alternately puts about Vcc voltage or 0v to the diode and capacitor voltage multiplier circuit that follows it. Measurement of the dc of this post-audio-rate pulsing should show a reading between 0 and about 15, but not a steady 0 or 15. It outputs from pins 2, 4, and 6, parallel connected stages on this IC. The pulsing should cause an increasing voltage from capacitor to capacitor on Cs 8, 9, and 10. The reading on the + end of each capacitor should be an increase of an amount about the same as the Vcc voltage to the part or 15v or so, for about 15, 30, and 45 volts.

Input/Output Checks/Tests--

Confirm the order of the input and output connections. Viewed from the rear and reading left-right they are, Out1 - Out 2 - In1- In2.

The input and output connectors could have shorts to ground and the shielded cable used in the rackmount, hsr version is a likely spot for this to occur. Look for shorts where the shield separates from the internal wire. Heat from soldering can cause the shield to melt the insulation of the internal wire and if there is tension, it can pull on through against the internal wire. Or, a stray strand of the shield might be extending over and contacting the connector tip circuit. A test can be made to confirm resistance between these points in the circuit with the power to the unit switched off. Measuring between the two terminals on each connector should yield a reading more than and not equal to zero ohms resistance.

For troubles particular to one or the other channels or the ccw and cw extreme settings of the Blend control (100% tube or solid-state paths), check the following:

The Drive and Output or Ch1 and Ch2 connections being made in place of each other can be the cause of no

change with control adjustment. Shorts between the two wires in the shielded cable or contact between the bare shield wire and the chassis can result in no change too.

On the TubeHead, only the audio, ac signal should increase or decrease with the adjustment of the gain controls in the Drive and Output sections. A dc change can make a brushing sound that goes along with a control adjustment. An open ground circuit or missing power supply voltage can cause this sort of thing. The Drive and Output gain stage controls have a connection with a ground that gets to them via a wire originating at point SG. They have resistors 'flying' over to this ground circuit. Check the ground connections along the way here by moving the wires and watching for movement in the joint(s).

A backwards capacitor at the C13, C15, C23, or C25 positions can cause dc to pass on through when it shouldn't, minimizing or eliminating audio signal. Test by measuring to confirm the Drive and Output op-amp stage output pins (pin1, pin 7) are about zero volts dc (millivolt ranges are OK).

The tubes require more force to get them seated in their sockets the first time and this along with the springs in the top of the socket cover can make it seem like the tubes are held in place by the spring. The bottom of the tube should meet the surface of the tube socket. With the right angle and some good light, you can look through a small opening in the mounting hole area of the base and see the tube fully inserted. It takes enough force when first seating the tube that you might feel more comfortable wearing thick gloves or holding the tube in a piece of heavy cloth or leather when inserting it.

etc...

There are changes mentioned in the assembly manual for use with guitar. They give more gain and higher input impedance, but it really sounds pretty good without these changes and if you connect the two channels in series, out of ch1 and into ch2, much more gain is available and affords some great overdrive effects of tubes and or op-amps. The Drive and Output of the first channel can be run up high (with Blend pre or post) while secondary adjustments are made of the Drive of the second channel to match the tube (blend set post) sound and the Output of this channel set to give the following device the right amount of signal, be it warm and soft or not.... Then its ready for switchover and use in line-level applications.

A mod on the web for putting dc to the tube filament came to be when hum was noticed from tubes labeled with a red, Made In China 12AX7, on the 9407TubeMicPreAmp. It doesn't have such an effect on the Sovtek 12AX7 tubes we normally stock (the hum from energy on the filament doesn't get in the audio). Putting the mod on a 9305TubeHead can introduce ripple currents that might cause hum that would be more apparent than any hum from tube filament energy--it is best without this particular mod.

The Symmetry Trim affects a balance of the signal through the tube stages. Start with the Blend set fully post for a 100% tube signal path. The input signal and/or Drive control setting should be advanced until the sound just begins to overdrive and then adjusting the trim will remove the overdrive, or increase it. Adjust the trim to the point the overdrive clears, but no further. Repeat this process until the trim no longer removes overdrive - advance input drive to onset of distortion, adjust sym. trim to remove. A 'scope would show a sine or triangle wave input clipping on the top or bottom and finally in even amounts.

To visualize what's happening, imagine the Symmetry Trim as being a control for the up/down positioning of a window opening and the Drive control being the control for the amplitude of the wave you're putting through the window. If there is too much input signal or Drive, then no Symmetry setting will be effective. If there is not enough input signal level, then no amount of Drive will cause the wave amplitude to exceed the window. An optimum Symmetry trim setting will allow a maximum amount of Drive signal through the tube and when it does overdrive, the clipping is in even amounts for equal amplitude top and bottom peaks.

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