Ampeg SVT3-Pro, SVT5-Pro & SVT6-Pro Service Notes

3/20/09

SVT-5 Pro Asset # 003263

Low output, distorted. Powered up, expecting to find similar problem as the SVT-4 Pro's. Normal power consumption 130W @ 120VAC. Disassembled to inspect bottom of power amp pcb assy. Connections: AC Outlet Blk J13, Wht J14, Gnd J39; Ckt Brkr J15, Pwr Sw J18; Xfmr Primary Wht J21, Vio J22, Gry J23, Blu J24, Blu/Wht J32, Blk J19, Brn J16.

Solder connections on Bridge looked ok, though connections from Pwr Xfmr secondary looked suspect. Desoldered both, cleaned, resoldered. Checked all Mosfets, drivers, all ok…all other components looked ok. Reassembled, powered up. Only possible issue found was with Gate function….if input gain low & instrument level low, Gate function makes input cut in and out. All functions appear normal, work ok.

9/14/11

Ampeg SVT6-Pro Asset # 104207 "very low output" Start 2:30PM Stop 4:50PM

Pulled top cover, made quick visual check. Loose toroidal power transformer…rotated slightly and tightened down. Same traditional handle problem. Upper screws replaced easily. Will have to pull front panel assembly off to access lower screws. 3 main PCB's. I don't recall having worked on any of the SVT6-Pro's before. Pulling front PCB assembly off.

There's a shield between the toridial transformer and the preamp PCB, and the threads had been coated with a locking compound. Made it a total bitch to remove, almost had to cut one off. With the board removed, the pots' solder joints all look crusty, like maybe leadless solder or something. I've redone some, but it doesn't look that much better. I'm sure the problem is elsewhere anyway, as I haven't seen anything obvious yet.

Closer inspection on the I/O connectors revealed bad solder joints, so I re-soldered all of them on the first two PCB's. Also, the 1st tube stage socket was poorly installed. The soldering on the board, in general, looked like the flow solder machine hadn't yet come up to temperature, particularly on parts needing more heat than resistors, caps, etc.

Putting the first two modules back in, and moving towards the rear. Got the rear module removed. It requires removing the power transformer….labeled all the discrete leads, to be able to re-connect correctly. Board assembly now out, but didn't get a chance to begin scrutiny.

9/16/11

Ampeg SVT6-Pro Bass Amp Asset # 104207 Start 10:45AM

Went thru the main power amp motherboard, re-soldered the bridge rectifier, the two relays (fractured solder joint on one, the other was set down too low, and pushed the relay back down into the board for better seating, re-soldered. Re-did a number of other solder joints, but didn't find anything that was down-right obvious. Put the board back into the chassis, re-connected everything as it was prior to disassembly, and powered it up. Power supplies are +/- 65VDC. There is a variable tube supply adjustment labeled 100V to 300V. It only seems to affect the tube voltage on the power amp motherboard when I adjusted it. DC output level was nominal, low mV's.

Connected speaker, but before applying signal or bringing up the master volume, I exercised all the controls. Then, plugged in the signal and brought up the level controls. Nothing. Moved the amp around, re-connected the input to the power amp input, bypassing the preamp. Barely audible, very distorted. Something electrically wrong, I'd say, though not enough to cause DC shift in output, or draw current.

Time to look at the documentation…..I may have an actual circuit problem for a change.

I've opened the service documentation, have the power amp schematic open & the PCB layout. Single sided board….drawing shows top transparent view, but…..nothing is labeled! No schematic designation numbers on the drawing! At least the physical PCB is labeled, but this is going to slow progress down intensely. I wonder if this model shares the PCB with another? Nope…unique to the SVT6 Pro.

Moved the amp over to the test bench, and now checking for bipolar supplies, and outputs from IC102. The amp runs in bridge mono to the speaker, though for test, it can be dealt with discretely, according to the schematic. Tube front end to this, then there's a stage from the TL074 that does the inverter for the opposite half of the power amp stage. It sounds like a power supply isn't up, or an op amp crapped out. I found the bipolar zener supply, +/- 17VDC via power resistors & zeners from the +/- 65VDC supply. That's correct. IC2 only has one-half of it available, as the other half is buried underneath RTV!! They have that shit gooped everywhere, so access is nil! I feel like just sending this damn thing out, but, on the other hand, as it's going to take for F**KING ever to service it, I'll rack up the monthly allotment of time working on the damn thing.

Both sides of IC2 are at -17V. I checked the DC level of the top half power amp board, at the output rail, and it's up at +67VDC. As the op amps are inverting, and sense the output level, I'd say the bottom half (inaccessible) is also latched up at +67VDC. So, we've got a problem on this…and will have to tear it down again.

I didn't check the output stage, since the unit wasn't drawing high current. It's not drawing high current because the Source Resistors are open, the gate resistors are open, the sense resistors appear open, and the MosFets are shorted, but detached from the supplies, so no high current path exists.

So, parts are needed:

10	IRFP240R
10	IRFP 9240R
20	0.47 ohm 5W Vertical

20	47 ohm 1/2W FP
20	2.2k 1/4W
4	sheets of Bergquist K6 insulators, or TO-247 greased mica (on hand)

I went to Mouser to add IRFP240R, 9240R to my list, and they are obsolete (Fairchild source). What's the replacement part? As I looked in the drawer where I had some similar parts, to my surprise I had 10 pcs of the IRFP9240R and probably 15 of the IRFP240R's, so that cleans me out of those. Next time I have to search for replacements.

Now, ceramic bathtub 0.47 ohm 5W axial…what's available? Xicon Metal Oxide 5W size. Got the 3 resistors on my Mouser Parts list, so moving along.

9/19/11

Ampeg SVT6 Pro Asset # 104207 Start 9:20AM

Checked the schematic for what other transistors are ahead or in protection circuit for the output stage. 2N5415 & 2N3440, both TO-5 metal can, with clip-on heat sinks…need to check them. I have both on hand. Also MPS A-06, MPS A-56, both on hand. So, I think before I place the Mouser parts order, I need to check the other SVT6 Pro amp.

On the upper amp module (-) phase, I have at least one shorted 1N4743A 13V zeners. I don't have these in my inventory, having skipped over that part when I stocked up on zeners. The other zener used is a 1N748 3.3V. The two I've found are ok, haven't found the other. The 2N5415 & 2N3440 parts are ok. One of the MPS parts is bad, two others I can't quite tell, due to failure elsewhere in the circuit they're tied into. I have both on hand, so no problem there.

I added the two zener diodes to the Mouser order, while removing the two 10uF capacitor items from the order. I have given the part numbers to Tim, I think he can take care of buying inventory, as I'm stretched to the limit right now, not having this month's rent secured. I placed the parts order with Mouser

Now, meanwhile, I need to reassemble the SVT6 amp enough to store it, and move on.

Ampeg SVT6 Pro Asset # 103545 No Output Left Rear Jack Start 11:20AM Stop 11:25AM

I put this amp up on the bench to see if the amp worked or not. It does…I get output from the Neutrik NL4 (1+ / 1-) & the right-hand T/S jack, but, as indicated, nothing from the left-hand T/S jack (as viewed from the rear). So, this will be a tedious repair to fix what is probably a broken solder joint. No parts to order, from what I can tell.

9/20/11

Ampeg SVT6-Pro Asset # 103545 "left T/S phone jack doesn't work" Start 11:55AM Stop: 2PM

Pulling unit apart. This one has a thermistor wired in-line on the AC Mains to limit inrush current. Once again, I have to mark up the Fast-on terminals for correct re-assembly. Got the PCB disconnected, and lifted out. Turns out the left speaker jack has a broken solder terminal. I removed it, fashioned a sturdy wire lead to it, bent the leg up to route back into the hole, soldered it firmly to the jack terminal base before installing, then seated & soldered it back into place. Saved me spending a new phone jack (have some, but qty is getting low, or I would have simply replaced it.

Inspected the rest of the PCB for any other defects, while the board was out. Nothing found (surprisingly). Reassembling. While following the labels I put on the connectors, the installation of the thermistor looked wrong. It was. It was only in series with one of the two primary leads. It needed to be placed between the output of the power switch (AC Line) and the two primary leads, so I revised the wiring, changed the terminal numbers accordingly. Also, the Blk/Wht transformer lead wasn't plugged in….I don't know if it wasn't installed before, or if I managed to knock it out before seeing it and labeling it, so I went to the database and looked up the wiring. Found where it went, and installed it. It's for 220VAC wiring (instead of 240VAC wiring).

When I went to check the results, I still didn't have any output from the left phone jack. I looked at the jack from the inside, and saw the contact that was supposed to be engaging the plug tip was bent way up in the air, so I removed the Neutrik NL4 connector above it, allowing me to re-tension and re-form the contact. After a bit of finagling with the jack, I got it re-shaped and reliable. Powered the amp up again, and now both jacks are working fine (never even noticed the deformed contact on that jack, even after removing it from the PCB….so much for attention to detail!).

Put the cover back on, after first tying up the AC mains wiring with lacing tape (running really low on cable ties). Last month at the TRW swap meet, I almost bought a container of 1000 plastic cable ties for $5. Now I don't know why I didn't….if I can drag myself out of bed this month, and it's there again, I will buy it. Returned amp to Guitar Dept.

1/30/14

Ampeg SVT-3Pro Asset # 144884 'Rt Handle fell off' Start 10:45AM
Stop 12:15PM

After removing the top cover, I was able to locate the two handle screws and their lock washers. To get at the Left side handle hardware, I had to remove the preamp board, and to extract it, the transformer had to be dismounted and turned on it's end, as it prevented the preamp board from being withdrawn.

Got the hardware out, replaced with #10-24 x 7/8" Socket cap screws, split lock & flat washers, with a bit of loctite added to the ends of the threads. So, another of the Ampeg SVT-Pro series panel/handle screws cured. Still some more in C/S inventory to change out.

I looked over the PCB's, though I didn't stop to inspect the preamp board before mounting it. When I powered the amp up,, which came up ok….a good 10 sec or longer before the output relay pulled in, I found the control to the right of the Master Volume,

labeled Tube Gain emits an odd hum-like noise briefly when turned CCW. I don't hear any change with that control, so going to the schematic for this, as well as the OM to see what that does.

That Tube Gain control varies the HV power supply for the tubes in the power amp circuit. The manual makes mention of this momentary hum when turned all the way CCW, where it shifts the DC operating point of those tubes, and it is of no concern. That's good….don't have to tear it apart again to search for something wrong. This function takes the place of the Limiter knob on other SVT-Pro amps. It can vary the tone and breakup of the sound.

As usual, it doesn't have much gain. Changing over to Bass, as all the controls appear to work. All sounds fine with bass. Wrapped it up

2/22/16

Ampeg SVT3-Pro AuntieM A-SVT3Pro Hum Start 12:30PM Stop 4:35PM

The road case' front rack rails were both loose, so I had to tighten up that hardware.

Short cover screws with ITL washers , so the washers leave the screws while being stored in the parts tray. The Grounding screw was glued onto the PCB so it would NOT come out of the inaccessible location without profound effort! The Quick-disocnnect terminals were Black, so you could NOT label them without using white tape. And, of course, the last of my white Artist tape ran out in the process! The closest tube on the power amp board is in the way of the upper rear panel PCB to remove it, and the power transformer is in the way of the PCB , so it also had to be removed from the chassls. And, of course, the nut for the long transformer carriage bolt was NOT domestic nut size. Some ITL washers were blued to the board, others not. So, tear-down is very tedious

I've now removed the power amp PCB…still have the preamp board to removed, Now, let's see what I have on the PCB foil side.

All the Filter caps had solder fractures, as did the IEC mains connector. That grounding washer that prevented removal of the screw was supposed to be soldered into the board. It had a solder tab that was no longer in the solder hole, so it had to be re-formed and soldered down. Never seen that one before.

A lot of the 1/4" male Fast-on blades terminals had solder fractures, so had to repair those as well. None of the rear panel jacks had fractures, but some of the terminals of the MosFET's had fractures. So, I've repaired all the fractures on this board. Now, I need to remove the preamp board, as I suspect it won't be much better.

After putting this all back into the chassis, it powered up, but….there is still a substantial hum signal present, AND….tweaking the AC mains causes the output of the amplifier to shift up and down, as though there is NO ground reference for the amp. I first thought I was dealing with an artifact with the Amber 3501a again, but after putting the DMM on it in AC, and seeing there was magnitude present, sub-sonic, I connected the scope as well directly, and it's shifting by Volts until it stabilized.

So, I have to pull the PCB assy back out to find what has happened. And, need to look at the schematic to see what could possibly have failed. I didn't check any of the semiconductors while I had it out.

This amp has the two-stage vacuum tube front end to the MosFET output stage. Removing either V1 or V2 tubes creates a huge hum signal, so I put the tubes back in. The output hum signal I saw before unplugging those tubes briefly is now gone, but, Ive seen the power amp circuit break into RF oscillation by jerking on the AC mains adjustment keeping within 110V to 125VAC. It eventually settles back down, but will modulate with changing AC mains, so this is NOT a good thing.

I don't yet know where the hum signal was coming from….it looked like a triangular single-sided hum. I haven't yet tried swapping the tubes, as I don't think (thus far) that this is a tube issue. I will try swapping them, none-the-less. Swapping the tubes out yielded the same results, as I suspected..

It turns out swapping the 12AU7 AND the 12AX7 in the power amp cured the problem. I'm no longer having the RF oscillation that the 12AX7 was producing, and the 12AU7 swap seemed to lessen the DC drift.. I'm no longer hearing or seeing the 60Hz hum. It's passing signal just fine. I did loosen the power transformer mounting bolt, nad rotated the transformer to minimized the commutation noise spikes I was seeing with the graphic EQ switched in.

So, putting the cover back on, and amp back into the road case.

11/4/16

Ampeg SVT6-Pro Asset # 114207 Loud Pot on turn-on, works briefly, then dies.
Start : 1:30PM Stop 4:55PM

Opening up unit, need to see what has failed, then write up an estimate form, submit it before diving into the repairs. I don't have any new MosFET's batched and marked, but I do have parts to select from, when I have to go there. This could be one requiring replacement MosFET's, so there will be a screening process project to put a work order to.

This is a 2-Ch output stage, having tube front end in the power amp circuit. I got the power amp PCB assembly removed by 2:05PM, so I could check to see if there were any shorted MosFET''s on the bottom side of the PCB assy. No shorted MosFET's, fortunately. I don't' know about the rest of the semi's. Now, I need to start digging to see what might be causing this. I didn't bother powering the unit up…just pulled it apart, expecting to find output failures. Don't know about the tubes yet.

I wrote up an estimate # 1019 for 4 hrs labor.

Now back to the search. I found some bad solder joints on Q1 and Q16 next to it, repaired those. All the gate and drain resistors of the two output stage MosFET's are ok, All the rest of the semiconductors measure ok, though I don't' know about the two IC's.

Reluctantly, I'm putting the amp module back into the chassis. I still have the front end circuit to look at. I've been into this chassis before, and marked up the connectors of the transformer so they could go back where they came from
I am seeing a turn-on transient on the scope, even with the power amp dead-patched. Plugging into the preamp, I'm not getting sufficient signal thru the amp as I'd expect. -40dB output level, and 10V output on the analyzer, I'm not even getting full scale output. I've swapped input stage tubes, with no change.

I don't yet know if I have voltage level problems. I haven't made any electrical measurements. Just trying to find out what I have before I make another step. I did patch into the power amp, and with the burst pink noise, I wasn't able to get clipping open circuit.. I would think I could

I suppose I should at least listen to this, and see if there is a loud pop at turn on, and if it behaves as the taped message states on the top cover.

There is indeed a loud pop at turn on, and another loud pop at turn-off, so the relay circuit doesn't' appear to be doing its' job. There are MPS A-06's driven by an op amp circuit that has the delay turn-on. That's not working at power-up. So, I will have to pull the main PCB back out again and correct the relay control circuits, and power those up independent of the chassis, until I get this turning on without the relays both closing immediately!

No way to work on it without pulling it all apart again. I have enough time to gut this thing before packing it in for the weekend. I now have the amp assembly back out of the chassis again. I'm missing two more # 6-32 x 3/8" SEMS PHMS's. I had all of the hardware when I began. WHERE has it gone????!!!!

11/07/16

Ampeg SVT6-Pro Asset # 114207 Loud Pot on turn-on, works briefly, then dies.
Start : 9:30AM Stop 2:PM

I spent the morning attempting to get an enlarged print-out of the Relay Turn-On circuitry to print out, but with NO SUCCESS! Print Scrn function does not work, and the way the Ampeg schematics have been converted to pdf, the {Print Selected View function does not work. You CANNOT print an zoomed-in view. I had to bo to Victor, who was able to zoom in and his computer's Print Scrn function DOES Work. I've no idea why mine does NOT work. So, I finally got a workable view to go back to the PCB assembly and find/removed the suspect faulty parts.

Now, checking the zener diodes in the delay turn-on circuit. I replaced IC1 TL074, and Q15, Q16 MPS A-06, being the relay driver transistors. The 3W 16V zener diodes D20 & D23 measure ok…having removed them from the circuit and checked their breakdown voltage. D27 (3.3V and D11 (30V) measure ok, though haven't yet checked them for breakdown voltage.

Now, how to test this circuit out of the chassis. I can apply +/- 16V and +6%V, but the way the supplies are wired p, it's going to load down. The schematics are missing the

powering of the heaters….only one such voltage is listed H1, with there being an H2, H3 and H4, not shown. H1 comes from the 16V supply, so I think the only way I can really check this bloody thing is by extending the supply leads from the chassis, with the PCB assy set outside of it. Dangerous, as there's a lot of debris on the bench carpet. I'll have to put some insulation down to isolate that.

And, there' is SO MUCH RTV gooped everywhere on the PCB, getting at crucial test points is not really available!. I'll have to go by watching the scope for turn-on transients, I guess. This maintenance task is taking a lot longer than I expected!

I can't get the two multi-pin connectors J13 & J36 connected. Are they needed as far as the power amp is concerned? NO….just power supply voltages for the tube circuits and op amp circuits, effects loop, preamp output signal, etc. So, I think I'm ok to power this up.

It appears the Neg side relay isn't switching. I'm still getting a pulse on power up. Monitoring the voltage on Q15 & Q17, the Positive output doesn't pull in until the delay times out, but the neg side isn't pulling in…or at least Q17 isn't turning on. I don't' understand. The relaxed relay position has both outputs at ground. So, if both relay circuits ARE working, there should NOT be any turn-on transient, since the outputs at the two relays are at ground. When the relays pull in, THEN there is signal thru the two output channels (in Bridge).

I've watched the DC level on both Q15 & Q17, while watching the output from the pair of amp channels. I'm not watching the collectors on the scope, just on the scanning DMM. They remain high, yet there is a loud pulse, so somehow the transient is getting thru. With R45 & R132 shorted out, the bases of Q15 & Q17 are grounded. So they can never turn on. However, there is a loud thump regardless of that,. So, I suspect one of the relays is NOT working, and has remained closed. This time, I never heard a relay pull in. When they do pull in, tQ15 and Q17 saturate, pulled closed to less than 100mV. There is a 1.5k resistor in series with each collector from the relay.

So, now, I have to find which of these channels is not switching. And to make matters horrendous, the relays are gooped down with RTV!!! Makes me want to scream!!!

Both relays are bad. One remains closed, the other does lift off of ground, but never connects to the pole. So I need to replace both of them. I'm not familiar with the mfgr. Schrach (Austria)Model RTB14024 SPDT Form C. Dimensions overall are 28.9mm L x 12.4mm W x 15.6mm Hi. PCB dimensions are 8mm C-C for the coil, 8mm between NC & NO, with the pole set off 8mm centered between the two.16.5mm spacing between coil and one of the terminals.

Somehow I suspect these relays are not a common package. But, I did find them at Mouser, thankfully. I ordered 4 pcs @ $2.35 ea. I'll have to leave this all apart until the replacement relays arrive.

And, I'll have to revise the estimate, as this has taken considerably more time. I now have 3.5 hrs Friday and 4.5 hrs today, and I'm not done yet. This will still take another hour to finish. I'll call it 8 hrs labor. I revised the estimate and turned that in…Chuch not there, left it on his desk

Now I need to set this aside while leaving it apart, and a fashion so I can install the new relays and still power this back up without any major effort.

11/14/16

Ampeg SVT6-Pro Asset # 114207 Loud Pot on turn-on, works briefly, then dies
Start 3:10PM Stop 4:30PM

Relays arrived today, so I can hopefully complete this amp. One relay wouldn't fit back into the board due to RTV and a lead got folded over. I was able to recover, and finally get it installed. Soldered them into place, Then, plugged the power transformer into it, moved the chassis over to connect the power switch, with the amp assy sitting on the cutting board. It now powers up without popping and output sounds solid. Taking the cobbled set-up apart, now I can put it all back together and finish this one.

Tedious to re-assemble. Got it all back together, everything worked fine. Wrote up the maintenance form, returned it to inventory.

2/20/17

Ampeg SVT3-PRO Auntie M Nick Reyes owner,S/N ATKKC10073 'Low Output Start 2:35PM Stop 4:55PM

Pulled top cover for inspection. No open Source resistors, no shorted MosFET's. I don't' see any burnt parts, so I'll bring this up on the variac, watching the DC output level. This amp has a pair of tubes in the driver stage…12AU7 driver, with 12AX7 ahead of it.

The Power Am[p section appears to be working ok. Delay on output relay, no DC offset, clipping open circuit around 60V RMS, and around 50V out into 8 ohms. Haven't checked 4 ohms, but the waveform looks reasonable…a little asymmetrical near clipping. Thus far, bouncing the chassis with it running doesn't change anything, so now checking from the preamp stage, since I patched into the power amp directly at this point.

Pilot error! I had the Amber in Extended Range, offset by 20dB. This amp is clipping around 30V RMS, which is just barely above 100W into 8 ohms. It doesn't get close to 275W into 8 ohms. I swapped out the 12AU7, no difference. Swapped the 12AX7, no difference. What is the power supply voltage?

The power supply rails are only +/- 65VDC. That's NOT enough to yield 275W @ 8 ohms. That's 46.5V RMS & 66.3V pk So, actually, it is JUST enough to get there. The waveform is VERY rounded and asymmetrical. So, there must be something in the front end or current limit stage? What does it do open circuit, now that I have the Amber set right?

Q1 is a simple pass transistor that regulates the plate voltage to V11 and V12 that are in the driver stage. There's only 207VDC on the plate of the cathode follower, which drives the upper 12AU7 stage What are these voltages supposed to be? The output

from that TIP 50 is supposed to be 280V, NOT 207V.. That would explain why the output is so low. Now, the collector of Q1 is supposed to be at 300VDC. The base is a junction above the DC output, so I need to find what's dragging this supply down. I've removed the power amp board, and….I see the age-old problem behind all this. Solder fractures everywhere, causing the loss of voltage from the power supply cap and other terminals. Lifting the pair of resistors involved with the base voltage on the pass Xstr Q1, they measure ok. So, now going thru all the connections on this PCB to restore order.

2/21/17

Ampeg SVT3-PRO Auntie M Nick Reyes owner S/N ATKKC10073 'Low Output Start: 10:30AM Stop 12:30PM 4 hrs labor

Resuming the repairs to the solder joints on the power amp board. I finished restoring all the fractured solder joints on the power amp board, then removed the preamp board, repairing fractures on it…mostly the I/O headers. Put it all back together and checked the output thru Q1. It came up a tiny bit, but there's still way too much drop thru Q1..supply is only 214VDC, and not the target 280VDC. So, I need to pull the board again and see what happens when I replace Q1 a TIP 50, which I think I have on hand.

I found the answer. Pin 11 connects the 27k power resistor off the base of Q1 over to the pot on the Preamp labeled 'Tube Gain'. That sets the plate voltage to the power amp stage's 12AX7 and 12AU7 driver tubes. With that control, you can turn the plate voltage from 290V down to around 160VDC, so it it's only dialed up half way, you'll never get full output. With it at max, you get full output. Now, having solder fractures on the main filter cap for the tube circuits and all the other fractures, including half of the MosFETs certainly didn't help. So, I'll have to remember that bit of information, not ever having seen the other end of that base resistor.

Now to move the chassis around so get at the front panel controls, and give a listen with the Ampeg bass cabinet.

The Rack Rails in the road case were loose. I tightened those back up, but didn't get to the rear rails before mounting the amp into the case.

With the bass plugged in, I found I liked the tone I got turning the Tube Gain control fully CCW, though it would no doubt suck at high levels. I cranked it back up to 90% so the amp would at least get full power. I'll make mention of what that control actually does my email and invoice.
9/28/18

Ampeg SVT3-Pro Asset # 104209 Prev Maint last svc'd 11/21/14 Start: 3PM Stop:4:20PM Est Inv # 1255

2U Tube Preamp, tube-front end / MosFET output stage, single channel bass amp. Pulled the top cover to check out. I found the right hand front handle had taken a hit and the lower portion of the handle was bent in a bit. I was able to drive it back out with a Jorgensen Pony bar clamp. Then, had to debur the handle where the clamp had

buggered the corner where I was clamping. The graphic EQ is held by just two of the 4-point PCB soldered threaded rt-angle brackets, with screws going thru the EQ slider PCB into the two brackets. Adjusting the short-thru sliders makes the entire board move. And, the slide pots had kind of locked themselves into the last settings, so I don't think this amp has been getting much use.

Everything works. It does have that Tube Gain pot, which does what? It adjusts the HT supply for the 4-tube front end of the power amp, an AC-coupled MosFET output stage running on +/- 100VDC. The tube front end can be varied to starve the front end enough for tube distortion or cranked fully for good crisp front end tube drive. Interesting circuit.

The amp seems well-behaved, not hearing any issues (though the radio has been on all day, turning it off now).

9/29/18

Ampeg SVT3-Pro Asset # 104209 Prev Maint last svc'd 11/21/14 Start: 2PM Stop: 2:30PM Est Inv # 1255

I forgot to check the bias & source current on the output stage, so I'll take a look at that now. I had already sent off the invoice, and put the top cover back on. Once I was able to find a ground lead to clip onto, I checked the source terminal of each of the MosFET's on the heat sink. It ranged from around 7mV to 20mV and -7V to -18mV. I checked the bias trim pot, which was very sensitive, as monitoring the 20mV reading, it quickly jumped to nearly double, so I was able to bring it back down and left it roughly where it was, and re-checked them all. I didn't check the source resistors to see if all of them were 0.47 ohms.

Ampeg SVT3-Pro Asset # 144884 Prev Maint last svc'd 1/30/14 Start: 2:30PM Stop: 3:30PM Est Inv # 1256

Pulled the top cover, clipped the DMM leads onto both the output buss as well as from ground to the source terminals of one of the MosFET's. I began having trouble with the output and readings on the MosFET's source voltage, so I clipped between the output buss and the source terminals, accepting the nominal tolerance of the source resistors.

I was initially reading an average of 5mV, so I bumped it up to around 15-18mV. It's holding steady, so that's a good sign. The DC offset on the output is under 10mV.

What I do have on this one, which wasn't on the previous SVT3-Pro is power supply hum. It's enough to go digging for, as turning up the amp to normal levels, and engaging the graphic EQ, it's adding too much hum to the sound of the amp. I've dead-patched the power amp and moved the analyzer to look at the preamp output, and that's where it is. Checking with the output of the amp, dead-patched: I only find 60Hz hum on the output, with the Tube Gain control causing some degree of hum contribution at full tilt. Takes a good while for it to settle down when moved.

I'm going to set this amp aside, with cover off, and move on to the other two SVT Pro amps, then come back to it. I haven't yet checked / swapped any preamp tubes, as it could just be a tube thing. I'll find out on the rebound.

SVT6-Pro Asset # 103545 Prev Maint last svc'd 10/22/13 Start: 3:30PM Stop:4:50PM
Est Inv # 1257

Similar to the SVT3-Pro, in that it is another hybrid tube/MosFET power amp design, but this one uses two separate power amp channels to run in bridge-mono. The power supplies are +/- 65VDC instead of the single stage that runs off +/- 100VDC.

Mechanically, one only has access to the upper bridge channel's MosFETs, underneath a fishpaper insulator. I checked the source voltages, finding most were in the 12-15mV range, with one at 25mV. Similar on the negative side, one being around -20mV, both of those are at the rear panel end, furthest from the dual fan assembly. The only way to check the lower bridge amp is to fully disassemble the unit. Unless there's a reason to do so, I'll take it for granted the lower half is ok.

Checking the amp thru speaker is next, having already looked at the output for noise & hum issues. Just like the SVT3-Pro, adjusting the Tube Gain (tube voltage, is how this one is labeled), it causes the output to become unstable for a brief time until it settles. It can cause the output relay to open.

The amp is working fine. Only the LF Sweep control adjusted rapidly do I get any sort of control noise. I exercised it enough to not be a problem. All sounds fine with burst pink noise, so switching to Bass Guitar. Sounds really nice. Not hearing any problems, so put the cover back on.

That leaves the SVT4-Pro and the SVT3-Pro. I'll look briefly at the SVT4-Pro, though I had serviced it early this year (1/22/18). Checking those service notes. That last service began on 12/27/18, with solder fracture on one of the source resistors, and it was popping when engaging/disengaging the Mute function. I cured it of those ailments, then it came back on 1/22/18 with no output, which turned out to be a bent pin on getting the -15VDC supply to the preamp board. Not sure how that happened, but I got it restored.

9/30/18

Ampeg SVT3-Pro Asset # 144844 Excessive Hum Start 2:10PM Stop: 4:10PM
Est Inv # 1256

Shutting down the amp so I can swap out preamp tubes, to see if I'm dealing with a tube first. Pulling up the Schematics for reference.

The three preamp tubes' heaters are all in series, running off of the -65V rail, after dropping thru R59 220 ohm/10W resistor, filtered by C25 330uF/80V. The MosFET's run off +/- 65VDC, while the front end to them are on +/- 100V, with the 2-tube stage preceeding all of that.

So, trying different tubes in the stack. I'll change out V3 first. The 120Hz Hum measures 920uV (20kHz BW) with Gain & Master Volume at max, EQ flat, Graphic EQ Out, measured at the Preamp Output. This is after swapping out V2 & V3 preamp tubes with fresh J/J ECC83S tubes, same as were pulled. Swapping out the input tube made it worse.

With the Graphic EQ engaged, the Preamp noise level, all 120Hz hum components increased 10dB to 3mV (20kHz BW). Now, looking to see what the heater voltage looks like, as well as voltage. The top of the voltage string is on Pin 4/R59 220 ohm/10W. -34.5VDC @ Pin 4. Checking with scope probe there. Hum level is about 50mV p-p, with some wideband noise on it, around 10mV p-p. So, I don't think the heater supply is contributing to the hum. Where is the Graphic EQ getting all the hum?

Turning down the Gain control only turns off the noise from the 1st tube stage.

The +/- 16V supplies are derived from the +/- 65V supplies, using two 220 ohm/10W series resistors to feed 1N5353 16V zener diodes, with 47uF/35V electrolytic caps filtering the supplies for the op amps. I see a collection of TL074 Quad BiFet Op Amps on the preamp board, with one TL072, used to feed the Tuner jack and the xfmr coupled Direct Output circuit (pre-EQ).

When I looked at the output terminals of the TL074's, I didn't see any significant noise on the scope. I'll look again, since the output at the Preamp Output jack is significant with power supply hum.

After swapping the 12AX7 in the output stage with that from V3, and still not getting results, apart from seeing the Graphic EQ causing radical noise when feeding the system, now looking at the output of the power amp, I powered down, and unplugged the main multi-pin harness connector from both Preamp board and power amp board. Very hard to remove, so I only reseated the power amp board side once, while reseating the preamp board twice. That was enough to cure the hum problem! Now, with that cleared, I restored the original tubes, removing my new tubes from the preamp, and I still have the same results. So, that was the ticket. Interface cable contacts. Age old problem attacks again. I've connected the speaker to hear the difference, and now that sounds fine. So, I can put the top cover back on and call this amp done.

12/2/18

Ampeg SVT6-Pro Asset # 104207 Prev Maint Last Svc'd 11/14/16 Start: 4:30PM Stop: 5PM Est Inv # 1296 Start: 5:25PM Stop: 5:40PM

Pulling the top cover off to asses the insides, see if the tubes are all ok, check the MosFET bias & gate voltages, etc.

The Bias level seemed low…..typically 5-7mV on the output to Source terminals, though two of the N-Ch MosFET's were around 10mV. So, in tweaking the bias pot to increase the bias, something suddenly changed, I heard a grown from the power transformer, I removed the probe and bias tool, looked at the AC Mains current, seeing it had changed from around 1.25A to 1.5A, then saw the beginnings of some smoke as I shut it down.

I can't believe I've done anything wrong here….it may just be on the edge of failing, for all I know. I'm halting this for now, and will move the gear now completed over to the Guitar Dept, and come back to see what's up here, or just move on, this amp NOW needing repair.

I drove the other gear completed, took it back to the Guitar Dept, all with labels Rtn to Inv, Working, 11/30/18 SWS. There will be staff there until 12:30PM, so I can continue on here, as long as I care to.

Now back to this Ampeg SVT6 Pro, to see what came unglued, if I can tell without pulling the power amp PCB out. I just can't believe increasing the bias pot would do what just happened, as I barely saw any increase in source current, though I was only monitoring the P-Ch side. I suppose I should have monitored the two N-Ch devices that were running 10mV.

I'll begin by measuring the MosFET's, gate and source resistors. Pulling up the schematic. I loaded the PCB foil pattern, and now see what I did. That bias pot controls the amp section below the heat sink, while I was believing it was for the upper board that I was measuring! Rats! I turned the bias pot way down, walked the variac back up, stopped at around 100VAC, as it was already pulling 1.4A. I turned the bias pot all the way back down without seeing any further drop in current, and ran the line voltage back to 0. I began smelling burnt parts again, so I've killed the bottom amp assembly somewhat. This amp is NOT simple to adjust, being built that way and NOT having a removable bottom cover to access the circuit. Bad design. I've moved this aside to the check-out bench, and moved the other Ampeg amp to the test bench

Ampeg SVT5-Pro Asset # 104347 Prev Maint Last Svc'd 11/28/12 Start: 5:40PM Stop: 7:15PM Est Inv # 1295

Pulling the top cover off for starters. And pulling up the service doc's. I don't what a repeat of that again! This is another built in similar fashion, one channel exposed, the other on the bottom of the main PCB assy! I won't be able to get at that lower section without pulling the power amp PCB assy out of the chassis! Why didn't Ampeg alter the chassis design, with a removable panel to access the lower section?

Pulling the top cover now. I found two 0.062" sq pin headers with solder fractures already on the upper rear PCB. Using the 0.060 tip, I managed to actually remove one of the pins by mistake, as I twisted the tip down to the PCB level, sucked the solder off, and the pin came out. Put that pin back in, re-soldered, then did the other two, NOT repeating that. Based on just that, I see with this amp NOT having been serviced since 11/28/12, I need to pull the main Power Amp PCB out for full inspection, and also once I've corrected what I expect to see, I'll see how to power this up outside the chassis, so I can adjust both the bottom power amp and the upper power amp. This will take some time, and I won't complete it tonight, at any rate. I may as well remove the assemblies. I carefully unplugged each of the Power Xfmr primary wires, labeling them as I went. I see I've had this power amp assembly out of the chassis before, though the labels on the soft-plastic sleevings over the un-insulated fast-ons had long since faded off. The labeling on the insulated fast-ons are still legible. I pulled out the power amp PCB assy, and set the chassis aside, so I can inspect and correct anything I find on the amp assembly now. Time is 6:35PM already.

I re-soldered a number of solder fractures, and some that appeared to be heading that way. All the rest of the work from 2012 looks good, as I must have found a lot more of that back then. Looking up that service record now. Interesting reading. Noted the total lack of mechanical mounting of the aluminum plate attached to the 25A Bridge Rectifier. Just RTV and the tabs that slip thru the PCB, which are a sloppy fit, so that bridge/plate is free to flap in the breeze. I'm surprised that in the past 6 years since I've had this amp apart, the bridge is still solid without any fractures. It did have that back then, as did the Xfmr secondary connector…there's where I had to re-build the trace on one of the runs from that connector.

So, next….I'll have to cobble the chassis & heat sink assembly together so I can power up the amp, and see if I can make this work without having to put it back into the chassis. Need to see where the bias is at on the lower heat sink. I can do the upper back in the chassis.

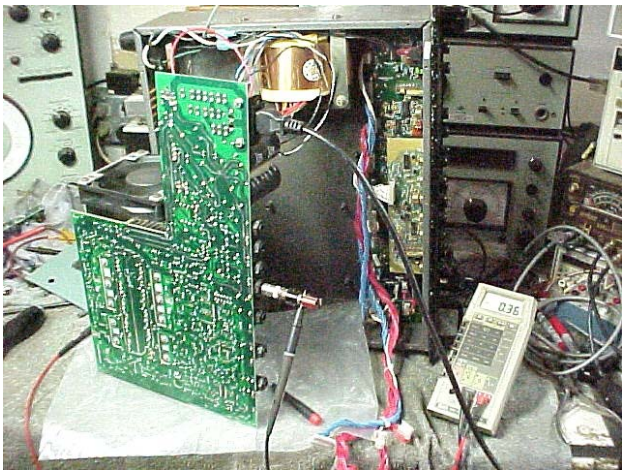
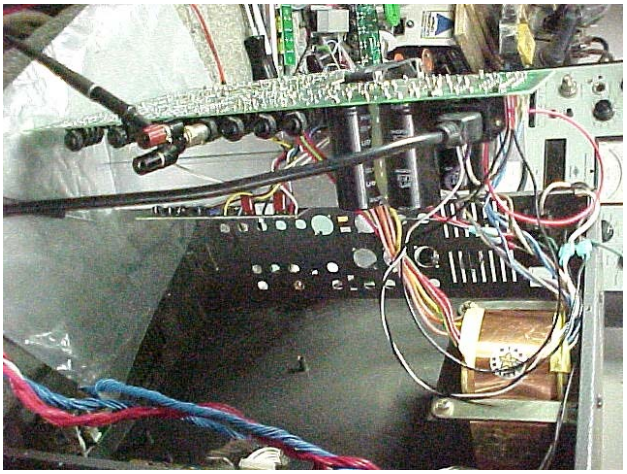
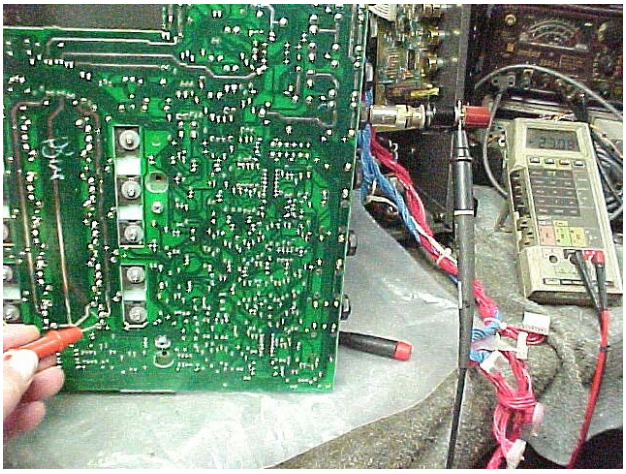
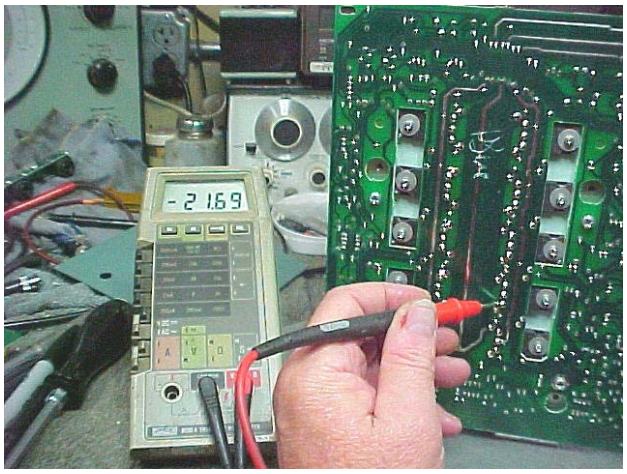
12/03/18

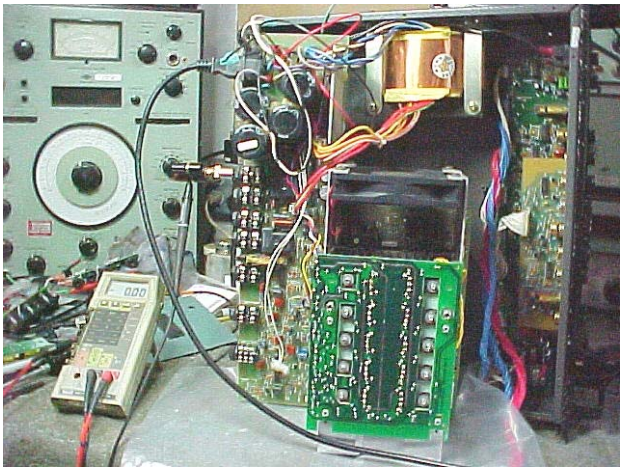
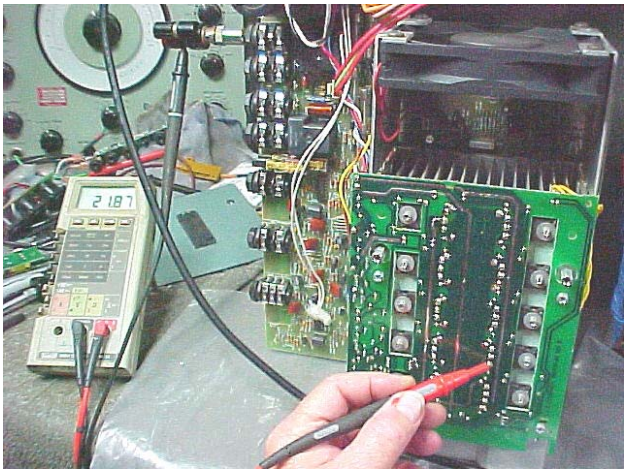
Ampeg SVT5-Pro Asset # 104347 Prev Maint Last Svc'd 11/28/12 Start: 11:15AM Stop: 2:15PM Est Inv # 1295

OK, I've moved the power amp chassis to the bench, stood up on left end, with the heat sink PCB assy standing on the left end of the heat sink. I've attached the primary wires to the PCB, extended those that needed it, and got the secondaries connected. I'm using the Output connector's Output terminal for reference. The bottom side of the PCB is facing me, so I'll be able to monitor the source terminals as I adjust bias. I'll need to let the amp run and stabilize before doing this bias adjustment. Now, I've found the PCB pot on the main board, which I believe IS the bias for the bottom side of the amp. Verifying that. Granted that is passing thru a relay, so as long as the relay closes, this will be valid…and assuming no significant voltage drop across the relay. Clipping onto the Output coil might be better.

The range seen at the beginning was between 21.4mV, -21.7mV and 33mV, with the bulk in the 24-25mV range. Getting at the top side of the heat sink in this fashion is NOT easy….might be able to twist the amp assy around, but will have to wait until I get the Ch A side tweaked, if it needs it. If the numbers remain in this range, it won't need it.

Getting some photos of this set-up. This would be SO MUCH EASISER if Ampeg had bothered to install a removable bottom panel for service access! OK, after 15 min, the bias spread is from 16.5mV to 21mV, with one at 27mV (was 33mV). I think I'll leave these as is. Now, to see if I can rotate the PCB for top access. Yes, I was able to do that. The range on Ch B was far more varied….10.8mV thru 23mV between the two channels. I bumped it up to run from 13.5mV thru 27.5mV. Now shut down, and will

reassemble the amp, as this task has been accomplished. I'll then do final check-out. All is working fine. I had to exercise a few preamp controls that were gritty, but they came out fine. Had to figure out how to combine the two channels….the rear panel push button that sets the channels separate or combine has to be pressed in so it mixes at the front, otherwise you can't get the channels to mix. Put the top cover back on, and moved it back to the floor to clear the way for the SVT6-PRO.

Ampeg SVT6-Pro Asset # 104207 Prev Maint Last Svc'd 11/14/16 Start: 2:20PM
Stop: 4:35PM Est Inv # 1296

Moved the SVT6-Pro back to the bench to pull apart. There isn't a parts placement diagram in the folder, just a PCB layout with the parts shown in place, but nothing is labeled. So, I'm partially blind in this area.

I took out the entire N-Ch stage, and I think some of the P-Ch stage. Took out all but 2 of the source resistors (0.47 ohm/5W), took all of the gate resistors on the one N-Ch stage, all of the source sense resistors on that side, some of the gate resistors on the P-Ch side and at least one of the source sense resistors on the P-Ch side. All that damage by just increasing the bias pot a bit too much? To be safe, I'll replace the entire output stage. Now, what do I have in resistors? I do at least have fresh matched MosFET's.

The Sense resistors are 2.2k, gate resistors 47 ohm 1W MO or 1/2W FP, Source resistors 0.47 ohm/5W. 3 of the 47 ohm 1/2W MO's survived, 5 of the 2.2k 1/2W MO's survived, 2 of the 0.47 ohm/5W MO's survived. One of the 1N4743 13V zeners shorted, and I don't know if I have any….none in the drawers, unless I added some. Gotta search for that.

I've been inside this amp before, and replaced the bottom output stage before, as well as the upper stage, from what I see in components. All the primary leads were marked. So, now I don't feel so bad….this may already have been on the verge of failure.

While installing the 2.2k resistors, the headlight lamp failed, so I have to open up the lamp supply and install new lamps, which I do have.

12/04/18

I spent the morning ordering replacement gate & source resistors, still have to add more 2.2k 1W MOS sense resistors to the list, as well as 1 ohm cathode resistors, a few other values. I also need to add 5W 16V/5W zeners to the list. Not sure what else I need.

Ampeg SVT6-Pro Asset # 104207 Prev Maint Last Svc'd 11/14/16 Start: 12PM
Stop: 4:35PM Est Inv # 1296

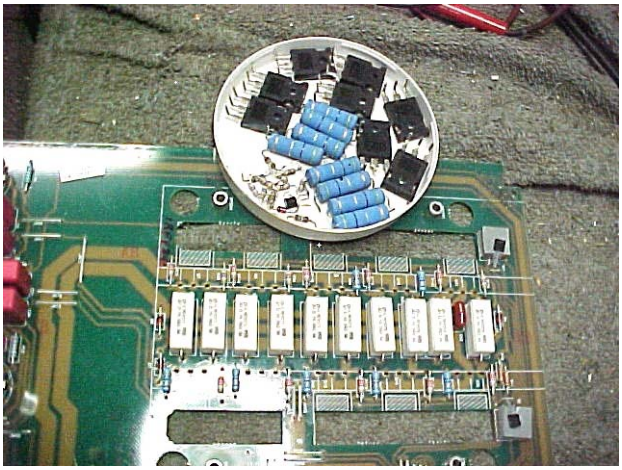
I've spent the afternoon installing the new parts onto the PCB, then selected the closest match of N-Ch & P-Ch MosFET's to install as replacements. I cleaned off the failed parts, finding two N-Ch parts that still behave as MosFET's, the rest all shorted. I had to use 1/2W 47 ohm metal film resistors for the remaining gate resistors.

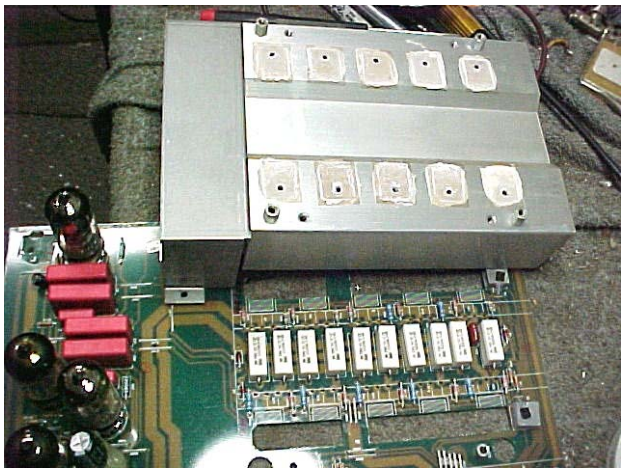
I used one of the good parts as a guild in folding the leads up to fit the PCB/heat sink, using the lead straightener tool to bend all 3 leads at once. In spite having gauged all that, I STILL got the bend wrong, and none of the holes aligned with the heat sink! And, one of the screws wouldn't thread in, finding somehow the thread is not #4-40 as the rest. It with it's washer slipped out of my hand, hit the floor while separating on the way down, and the flat washer left the building, as best as I can tell. NOWHERE IN SIGHT!!! I had to resort to another long #4-40 and as large of a flat washer as I could find.

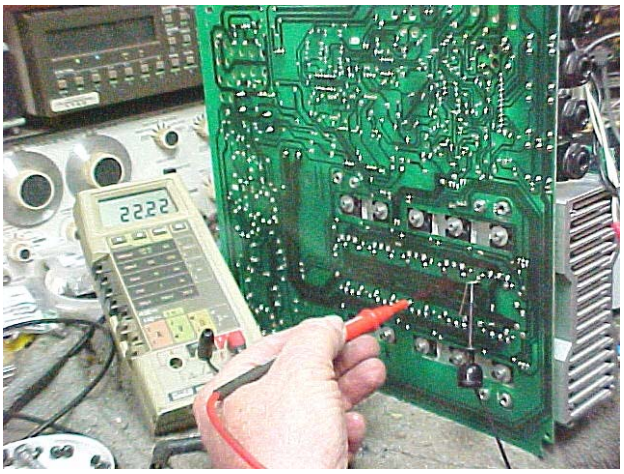
Those are now soldered into place. I'm still putting the PCB assembly back together. I'll be able to test it standing up on it's left side, with a block underneath the heat sink to stabilize it. Not sure how I'll deal with the transformer/chassis in wiring this up.
It's now going on 3PM.

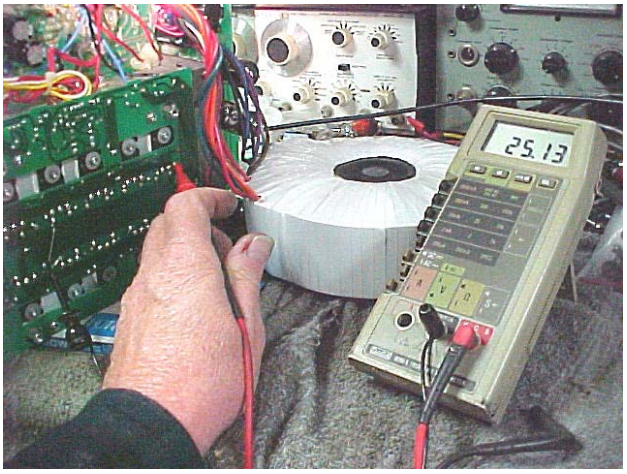
OK, I think I'm far enough along to try and cobble this together for testing & bias adjustment. I'll turn the pot down full CCW so that doesn't take off and fail as I'm powering up. I checked the SVT6 service doc for recommendation, but found none. Went back to the SVT3-Pro, where they recommend starting with the bias pot set mid-rotation. I'll do that, though setting a bit CCW just to be safe.

I removed the circuit breaker and the power switch from the chassis, plugged the power transformer into the PCB and powered it up that way. I was able to bias up the bottom side to roughly 22mV to 25mV on each N-Ch & P-Ch side. Stopping for the moment, with it powered down to go pee and then take photos.

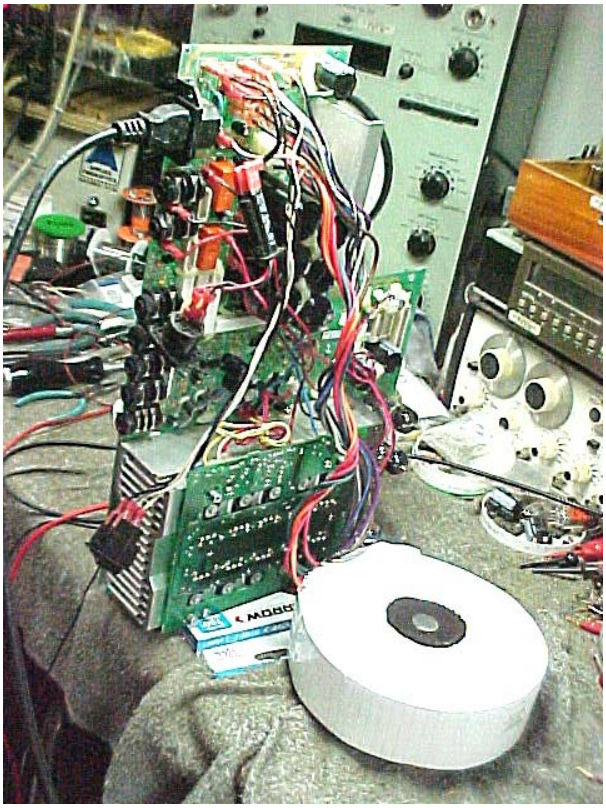








The Top Half was already biased ok…..there is a bit more min-max range here, seeing as low as 15mV and as high as 27mV. The newly restored bottom half was much closer, ranging from around 22mV to 25mV. AC mains with just the heat sink powered up was 1.46A @ 120VAC. I'll get further readings tomorrow when I put it all back together.



12/05/18

Ampeg SVT6-Pro Asset # 104207 Prev Maint Last Svc'd 11/14/16 Start: 1PM
Stop: 2PM Est Inv # 1296

OK, I posted yesterday's results, leaving the testing for signal passing to do in this state, and then re-assembly. I plugged in 400Hz sine, ran it up to 60V P-P on both channels, with it pulling around 1.5A AC mains, no load, in this state. So, I'm good to go in the re-build. Discharging the system and then on with the rebuild.

OK, the amp is now reassembled, and powered up. @ idle, current/power is 1.56A/123W @ 120VAC. All the controls are quiet, sounds just fine so far. I haven't yet plugged the bass in, which is next. Sounds fine with Bass.