

Originally Posted by Enzo

1A fuse is CT of low voltage winding. That feeds bridge D43. That makes +/-25VDC, C29,C28 filtering. That feeds two separate zener regulated +/-15VDC pairs. One per 5532 IC, plus a couple other things.

Make sure none of the 330 ohm resistors are open, and no shorted zeners. By supply rail:

+15v: D45,C34,R72 - 1N5245,22uf/25v,330 ohm

-15v: D46,C32,R73

+15v_SW: D17,C15,R25

-15v_SW: D18,C16,R26

I often find one of those rails burnt up.

I highly suspect your transient was not a signal pulse that damaged anything, rather it sounds more like a momentary short. The preamp board uses the +/-25v rails, not the 15s. It has its own tracking +/-15v regulators. SO it can independently blow that 1A fuse. Leave the preamp disconnected until the power amp is whole again.

The schematic specs 100VAC for the high voltage winding, so that means it rectifies and filters to about 140vDC. You can think of that as +/-70v if you like, though it is not referenced to ground. That is across #1-#2. Chances are if you have high voltage, it is correct unless you lost a filter cap.

But there is that little aux power supply circuit around Q4. Check that whole thing out. Bad Q4s are common, and check the diodes and resistors. I have not had to replace the IC yet, but you never know.

I was recently given a pair of SWA1501s to repair and found the above advice very handy and saved me some time. There are a couple of bits of info that I would like to add to it that I found from other sources:

1) The diagrams for the SWA1501 show a 12ohm driver, this may have been true for the better American built models but it is not for the cheaper Chinese ones. I measured the working sub I was given as a comparison and it was 8ohms. In the repair that I did, I replaced the original short circuit driver for an Eminence Kappa-15 450W Bass speaker. These are about £75 + VAT in the UK. The new speaker has a much larger magnet and I would assume a larger power rating than the original which looks like a 300W unit to me. If you are replacing an original 12 ohm unit with an 8ohm replacement like the one I mention, note that by decreasing the speaker impedance you effectively increase the gain, so the input volume set previously must be reduced accordingly.

2) From the sheer number of post showing that the 15V supplies in these units keep burning out, I would say that the regulation circuit is a bit under rated. In my repair I have uprated both 15V supplies using the following components:

22uF 85°C capacitors have been replaced with 105° 22uF versions (C15, C16, C32, C34)

15V 500mW Zener diodes replaced with 1.3W BZX85 (D17, D18, D45, D46)

The 330ohm 500mW resistors have been replaced with 2W 330ohm resistors

3) Before fitting your new speaker, and after completing the repair, use a multimeter in DC voltage mode, and very carefully measure the voltage across the speaker terminals, you are looking for a DC voltage of $<1V$ DC. If your repair is good there will be minimal DC, if a If you haven't found all the faults yet you may have $>50V$, which may well cook your new speaker, and possibly give you a shock if touched.

4) Mostly, for a well rated PA system you can run with the limit lights just flickering slightly with the bass kicks and it will run without damaging the system. This is not the case with the SWA1501s. From what I can see there is no margin added for people abusing the system, so if the yellow limit light is on at all back the volume off to preserve the life of the unit.

Many people do not realise that when you have reached the end of an amplifiers capability, typically when you run out of volts to supply to the speaker at high volume / power, turning it up further will not give you more audible volume increase, for a bass speaker, it will just overheat your speakers up, leading to premature failure.

Hi Todd,

From your description you have had a really unlucky repair. It sounds like you have a mixture of amplifier transistors and power supply parts being taken out.

Bearing in mind I don't know your experience level I'll give a complete answer, ignore anything that you already know....

1) It sounds like you have been working on the Amplifier alone, so before plugging it in again measure the resistance of the actual speaker unit. When you do this don't just measure the speaker terminals that plug in to the amp, get another person to carefully push the cone in as you can sometimes get faults that happen when the cone moves rather than just still. you are looking for a resistance of $\geq 8\text{ohms}$ to $\leq 12\text{ohms}$.

2) Unplug the input board as the main amplifier can be powered up with out it. Measure all of the silicone on the board including diodes, transistors, and IC's (for the IC's measure using the + and - rails to each of the pins to any other pin, none should be short) using diode test mode on you multimeter.

3) Measure all of the silicon on the main amplifier board, replace anything faulty. Also

measure all of the resistors too. Caps do not normally go, but if they were next to a resistor that has burned up, replace them (preferably with 105 degree rated parts).

4) Once you have the main amp board fixed and fuses replaced, very carefully, power the board up for a second and switch off. make sure the fuses have survived the power on. No speaker or pre amp board should be plugged in at this stage.

5) Power on and measure the rails both + and - 15V rails, and the main 140V bus. Be careful when doing this not to short anything out.

6) If all is good measure the speaker connection point, there should be <1V here.

7) Switch off, and assuming you have fixed any issues with the pre amp board, fit this, power up, and re-measure all the rails and the speaker output.

8) If you have got to this stage with no blowups, and provided that the speaker is found to measure OK, rest the amplifier board on something of suitable height, and plug it in to the speaker, switch on for a second, and if OK, leave on for longer.

There is that hole in the board middle for the heat sink parts. I test every semiconductor hanging into that space. Towards the filter caps, the FETs, and towards the preamp the outputs and drivers. Over in the corner near the preamp connector are a couple zener supplies, check them. and down near the opposite corner, but inboard of the large caps, is the other pair of zener supplies, check those. And on the board between the hole and the preamp side, are those small transistors with the 56 ohm resistors and stuff, check all those. And don't leave out the resistors. They usually burn open when the transistors fail. And along the board edge near the filter caps is the 8-leg IC for that extra HV supply. Check the resistors for it and the associated MOSFET. The IC is usually good. Usually.

If you find yourself replacing for example four of five transistors in a circuit, just go ahead and replace the "good" one too. It may not have failed, but it probably was stressed.

I do all that before I even start to troubleshoot.

Well, all that was a general approach, when I find a part reads as shorted, it has to come out. I can then test it again. Usually it is bad, but once in a while the short is parallel to the part and still on the board. I look at it this way. Parallel shorts on the board can make a transistor appear shorted even when it is not. But there is nothing in the world in a circuit that can make a shorted transistor look not shorted, y'know?

I am mainly looking for shorted components. SO I don;t often lift the parts first, unless they measure short.

And the small transistors? If they pass the junction drop test while in circuit, I usually leave them alone until variac time. Just stay aware that many of the parts are connected together, so if you find a shorted output transistor, it can make a good driver look shorted. SO clip out bad parts as soon as you find them.

You mean the IC for that auxiliary high voltage supply? It usually is not bad, but I can check if for shorts between pins that ought not be that way. And it depends upon what parts around it were blown up.

Maybe somebody will shoot me for this, but I find the design of this Mackie amplifier *CRAZY* and stretching the "state of the art" way beyond its limits.

It's self evident by the amount of people asking for help, plus Mr Frondelli's statement ("we repair TONS of them")

Certainly not a trust/confidence inspiring remark!!

This amp is not a +/- 70V amplifier, it's +/- 140V powered !!!!!. 😡😡

I was misled (like doubtlessly many of you) by seeing those IRF 630 as a "virtual ground", "intelligent center tap" , whatever.

I always found them *too* skimpy for that task, until I finally understood :

This amp has two 140V rails, "emulated" by a *single* 140V supply that applies the correct voltage only when needed.

When the upper output transistor conducts, they switch on the opposite lower IRF, grounding the supply negative and presto! it has +140V available; when the lower one conducts, the opposite is done.

The IRF work as switches, little or no heat generated.

Problems:

1) that serious switching takes a short but definite time but did I hear *subwoofer* mentioned? That would make the task easier. You have much more time until the next zero-crossing appears.

2) Any objectionable click (heard as buzz) that appears will be filtered by the speaker and the low freq. bandpass nature of the cabinet.

3) When amplifying low power signals, we are taxing the switching system as much as with full power ones, because it must switch on every zero-crossing, but if Dr Frankenstein , sorry, Dr Mackie stiches there some extra body part, namely an extra conventional +/-25V supply, and we hook it to the power amp via fast diodes, á la "Class H" , said power amplifier works as a very conventional "Class AB" one, for signals up to about 50VPP, say around 20W into 12 ohms.

If you still doubt my analysis, think about this: "500W continuous into 12 ohms load" you *can't* get that with +/-70V supplies, no way.

I find it a daring Idea, gone too far.

I guess a kick drum hit , amplified through this, will be certainly be chest-thumping; I also think any *continuous* signal will kill it quickly.

You can't even suggest this to a client, but if I personally owned a couple of burnt ones, I would dump that crazy board , build a conventional, time proven 300W/4r reclaiming whatever I can if worth the bother, load some excellent 15" 4r speaker as suggested above and end with a trusty sub box.

I much prefer 300 "always working" watts to 500 "iffy" ones.

Maybe it requires a fan mounted over the heat sink, it might even be some clip-on kludge, mounted only on stage and pulled for transport; anyway it would live on the backside, away from the public's hands.

I have FIVE of the damned Mackie [SWA1501](#) powered subwoofers in here at the moment. Blown up amps and melted speakers. Got a stack of speakers come in, so that's covered. Noticed they are now sending out Eminence Kappa 16 ohm in place of what was in the things to start with. They should last a lot better.

Meanwhile I am getting familiar enough with the amps that I can production line them. 5200/1943 pair, an MJ15033, a couple IRF630 and one 640, a few burnt diodes in the middle. SAme stuff. Plus I had ordered bags of 100 of things like the BAV20 diodes and the 1N5245 15v zener. Ther are two +/-15v rail sets in these, both run off the same +/-25v, each set through 330 ohm resistors to the 15v zeners. Always look in the corner and down next to the big caps for burnt 330 ohm resistors. There are a coiple green LEDs that run off

one set of rails.

When those resistors burn, I just replace the four resistors, the four zeners, and the four little caps. No point screwing around to see if some 2 cent part was damaged or not.

The power from the transformer comes in to a 5-post push-on at the corner. But the plastic housing is in two parts, so you can leave the high voltage disconnected and just power up the low voltage stuff. Handy.

SO I rebuilt one of these things, and power up. No LEDs, voltage is about 3v. BOTH sets are at +/-3v. SO what is loading me down? The diode junctions check at about .7v, nothing seems shorted. The caps are new. Each set of rails powers a 5532 op amp. They can fail, pulled the two ICs, no help. One IC has a bypass cap across it, pull that, no help. These rails don;t go to much, and nothing is loading them down. I should not be having a hard time with this, it's a plain old freaking zener power supply.

So I am looking at this bag of zeners, from Mouser yet, and it says 1N5245B 15v zener right on the bag of 100. I can't read the tiny print on the parts. SO I fired up a DC supply, grabbed a resistor and one of the diodes from the bag, and VOILA! These ain't 15v zeners in the bag. Whatever they are, they zene pretty well at 3v. Come to think of it, the little print on them looks almost like a "2v4" if my eyes ar working.

The lesson is that just because you used a trusted supplier, ordered exactly what you needed and got a nice big bag full labelled for what you expected, well that doesn;t mean that is what you got. When repairs don;t make sense, don't forget to check the parts.

SWA 1501 Diodes misplaced on pcb

Sorry to not be clear. The orientations (cathode and anode) of D19/D20 are correct. The problem is the the silkscreen is wrong, the parts match the wrong labeling. The result is the parts are oriented correctly, but placed wrong in the circuit.

With an ohmmeter (power off) verify that the BAV20(it is labeled on the diode) is between the emitter and base of Q11(2N3906). If it is not, and instead is connected between R38 and audio ground then the parts are wrong and need to be carefully removed and interchanged. Follow the orientations shown on the pcb just place D19 in D20's position and D20 in the D19 position.

I have never seen the diodes in question damaged by this error, but correcting it has removed several 1501 from the repair "frequent flyer" list.

A recent replacement amp pcb from LOUD still had this error. So even though they are

aware of the problem...check the locations. In this business the repairman is his or her own QC, and simple checks speed work and significantly reduce the dread call backs.

Mouser et al have an ever increasing selection of Asian transistor types. MCM has most of them. B&D has a (so far) safe selection of Sankens and all the other Asian types. I don't know what you consider hard to find parts.

There are industry suppliers like Antique Electronic Supply (CE Dist) and Parts is Parts (Marshallparts.com)

You will find that transistors are extremely non-critical about substitutions.. A few of various ratings can cover many needs. Larger types all pinout the same, but the small TO92s come in various flavors. The USA types like the 2Nxxxx and the MPSxxxx are EBC across the front. while Asian types like 2SC1815 or 2SA1015 will be ECB across the front. And for the life of me, no matter how many times I look it up, I can never remember the lead order on the BCxxx series. Those two Asian ones are great general purpose audio transistors, by the way. USA types 2N3904/3906 are generally useful, though I more often rely on 2N4401/4403 or the various MPS types.

The problem us that there are common parts for just about any type, but there are thousands of types too. If I work on a lot of PV SS stuff, I will stock a lot of the Moto MJ series of TO3s. On the other hand if I service a lot of Crate and Fender SS amps, I can expect to use a bunch of TIP142 and TIP 147 types. The 2SC5200/2SA1943 pair of TO247s is a great all purpose pair for that shape, Samson loves them, but then you may never see them.

Building a parts collection is an art. You order extra when you buy them, but temper that with the possibility you will never use them again. Is this the Only Ashdown amp you have ever seen? Do they sell them near you anywhere? Then maybe you don;t stock the parts they use. It is a tube amp, but there is no strong outlet for Mesa amps in my area, I see very few of them. SOmeone across the state from me might se them every day. As a result I don;t stock any Mesa specific stuff.

Tube amps use certain resistors a lot: 100k, 220k, 1.5k, 470 2-5watt, 1k 5w, 68k, some others. Solid state stuff will use many more values. Just having a good overall selection is a good idea in my mind. Little 1/4 or 1/2w film resistors might cost 15 cents each, but often

as not if you buy 100 of them it drops to 2 cents. SO two bucks will get you a dozen or a hundred, take your pick. I work on a lot of specific things. I know those Mackie SWA1501 powered subs will need a supply of 330, 56, 2.2 and some other resistors. But that PV powr amp is going to want that 180 ohm guy and the Samsons will burn up a lot of 4.7 and 100 ohm resistors.

Most powr amps will have ballast resistors, often 5 watters. 0.33 ohm is common, but so are 0.22, 0.1, and 0.47 ohm. You might replace one, but when an amp blows you could also need 10 of them - I just rebuilt a Samson power module that needed 10 0.47/5w. The Peavey PV1.3k I recently rebuilt needed a whole pile of 1 ohm 5w resistors. Don;t see those much elsewhere.

Caps? Geez, there are thousands. Power filters can be all over the map. Look at them as you service things. The low voltage supplies will all be similar, I mean everything has +/- 15v suplies, so 25 or 35v caps are common, 2200 3300 3900uf will cover many things. SMaller ones like 100,220,470uf are common. And even what I consider more signal caps like 1uf, 4.7 or 10uf. Those are just the e-caps. Tube amps like the 600v film caps, but those won;t appear in a 15v op amp circuit. Having said that, those caps in tube amps get leaky, but generally the film caps in a SS amp don;t

I always keep a bunch of 4558 around, though the more modern 4560 or 4580 drop in their place in almost all cases. I leave the fancy Burr Brown op amps to the amp fans. Worry about those if it ever comes up, it won;t during regular repair work. You should also have some TL072 and a few TL074 in stock. Most of the dual op amps can be subbed for each other with no penalty. SOme are low noise, like the 5532, which usually only matters in a high gain input stage like for a mic mixer.

And before you get the idea of replacing all the common 4558 op amps in a large mixer with low noise 5532, they draw twice the current of a 4558. One or two won;t matter, but a mixer full may overtax your power supply.

A box of 1N4007 will get you through a lot of things, and a box of 1N4148 for small signal diodes. Probably the most common zeners are the 15v 1N4744. I buy each of those 100 at a time. I work on switchers a lot, so I also stock a number of fast and ultrafast diodes, but basic amps don't need them. A selection of bridges couldn;t hurt, but I don't need them as often. A couple 35A bridges is a good idea.

Fuses? 20mm and 1-1/4", fast blow and slow blow. I have hundreds. Jacks, lots of them too, though mainly I find myself replacing the CLiff style most of the time. I don;t remotely try to keep up on pots, there are way too many.

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1. Parts and where to get them

The one thing I realize now that I'm my own "boss" is buying and finding parts. Sometimes I spend more time just trying to find a part than it takes to do the repair. So when I find said parts, even if i only need 1 or two I buy 5 or 10, so I'm slowly building up a stock of parts.

I don't know if they can be called "common" parts but I always feel that if I need 1 today I will probably need one tomorrow or the day after! of course my garage is full of stuff I keep for the same reasons. I'll probably be featured in "Hoarders buried alive" one day!

I buy from the usuals, Mouser, Allied, Digikey and Audiolabs in Georgia. Audiolabs seems to be the only descent place to get Jap transistors (2SA, 2SC etc) Anyway I digress.

Has any of you guys ever compiled a hot 100 list or something like that of parts you would definitely stock and in modest quantity's?

Any other places you would recommend for hard to gets?

I don't mess with tube amps so I don't need those parts much.

Besides the ones you mentioned:
Newark
B&D Enterprises (Japanese xistors here, too)
MCM
Jameco
Small Bear

Thanks for mentioning Audiolab. I've never used them before. Good idea for a thread. It would be nice if someone could compile a list into a stickie.

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NTE supposedly has workable substitute for millions of transistors...

and of course everything is available on ebay from asia, even ones discontinued decades ago....in shiny new packages!

Handy website for parts searching: [Octopart - Electronic Parts, Electronic Components, Datasheets](#) Automated search of all the usual suspects.

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Yea I just bought a load of MJ15024 and 25. just have to be carefull of forgeries, Especially on rare parts.

I only deal with high rated ebay dealers but its still a cross your fingers kind of deal. Thanks Ronsonic, I'll check out the site.

I find a lot of surplus parts at a place in Carrolton Tx called Tanner electronics, has just about everything.