Subject: Replacement diodes
Posted by bluezebra on Thu, 18 Jun 2015 04:22:21 GMT
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I don't see a suggested replacement for this large board mounted diode.
Labeled 366-D AR diode.

I see where Westinghouse replacements are no longer around. What is an equivalent replacement?

Subject: Re: Replacement diodes
Posted by chicagobill on Thu, 18 Jun 2015 06:12:03 GMT
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Which amps use these?

Subject: Re: Replacement diodes
Posted by bluezebra on Thu, 18 Jun 2015 06:26:55 GMT
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The Frankie I just got. Instead of the disc wafer type this one has
a flat bracket with four of these mounted.

Subject: Re: Replacement diodes
Posted by stevem on Thu, 18 Jun 2015 10:09:41 GMT
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No need to replace them unless any of yours have shorted out and blown the fuse
If you are looking to up grade you can use modern fast switching types but you will have to mount them on a terminal strip or two.

Subject: Re: Replacement diodes
Posted by bluezebra on Thu, 18 Jun 2015 14:46:26 GMT
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Thanks stevem,
I was wondering since I upped the main caps if these diodes could handle the load.
I'm finding this Frankie to be running a little hot. The transistors are running about 91 degrees and I'm showing 1.5 vdc at the speaker output.

Is this normal or do I need to keep looking. I notice this design is much

different from most Kustoms I've seen before.

Subject: Re: Replacement diodes
Posted by stevem on Thu, 18 Jun 2015 15:28:04 GMT
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You could install the most massive filter caps in the world and still those diodes would only get smaked with the same amount of current that the power transformer can pump out like when the amp is up full tilt!
That 1.5 volts across the speaker output should be making for a big hum out of the speaker no?
In regards to this problem here are some things to check.
1) how well balanced is the + and - voltage across each main filter?
Are all the 4 output transistors still the original matched set of RCA brand?
The resistors on the output transistors need to be checked to see how far they have drifted, in fact by the time you have unsoldered one end of each to check them, you should just replace them with 1% tolerance ones.
The big 5 watt ones can be 10 % but buy 5 or 6 of them so you can use 2 of the closest matched ones and up the wattage of the replacements from 5 watt to 7 or even 10 watt.
I have found that small differences from the schematic called for values of these resistors will knock 35 watts off of the amps output and the imbalance will make the amp run hot!

In regards to the diodes once again you can help them and take some switching noise hash out of the amp by wiring a .01uf 400 volt ciraimic cap across each diode if you care to.

Subject: Re: Replacement diodes
Posted by bluezebra on Thu, 18 Jun 2015 15:42:25 GMT
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Thanks Stevem...interesting notes.
I decided to check the output since one of the 15's was found DOA in the second cabinet.
While playing it after 20 minutes or so I find some heat coming off the back which prompted my investigation.

All the transistors were original RCA. I checked all the ceramic resistors connected to the transistors and all were pretty much spot on. There are two 8.2 ohm resistors on some terminal strips that have drifted to 10 and 12 ohm and need to be replaced as soon as I get to
the store today. I also found two 3 watt carbon comp 820 ohm had drifted to 948 ohm and those were
replaced.
While I had everything unsoldered I changed all six transistors on the chassis. I was getting 2.2 vdc on the output. The new transistors (and possibly the resistor changes) brought it down to 1.5 vdc. All the electrolytics
were changed out. Strangely enough there is no hum on the amp. Just a little bit of buzz when the

treble is turned up. Both sides of the main caps were at -39 and +39.

Subject: Re: Replacement diodes
Posted by stevem on Thu, 18 Jun 2015 17:09:29 GMT
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if you take the time yo swap one of those output transistors on the positive supply rail with one on the negative rail you can likely clean up the 1.5 volt DC offset.

Subject: Re: Replacement diodes
Posted by bluezebra on Thu, 18 Jun 2015 17:13:50 GMT
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I'll give that a try. THanks

Subject: Re: Replacement diodes
Posted by stevem on Thu, 18 Jun 2015 17:23:04 GMT
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I find it hard to belive that you have no hum, are you sure you are not reading .150 MV?

Subject: Re: Replacement diodes
Posted by chicagobill on Thu, 18 Jun 2015 21:55:29 GMT
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The Frankie power amps are completely different from the later series amps. They are very similar to the power amps in the Vox Beatle amps.

The two 8R2 ohm resistors set the bias of the output transistors. One is 25% high and the other is 50% high, replace them and I will guess that the overheating will stop.

Steve is right, the output offset voltage is controlled by the matching of the output transistors. If you have the time to swap them in and out, you might be able to get it down to less than 1/2 volt dc. If your meter has a gain test setting you might be able to try and match 4 outputs to make it easier.

Of the six transistors one is the 24 volt regulator another is the driver transistor and there are 4 in the output section, two for each half of the signal. You only need to match the 4 outputs.

Subject: Re: Replacement diodes

Posted by stevem on Thu, 18 Jun 2015 23:37:51 GMT
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And all the other Thomas Vox amps that have a duel rail power supply.
Last winter on a boring cold day I go the itch to change my Vox reverb twin over to silicon type outputs from Germinum type for better life, which ment having to rebias them for more idle current to turn them on.
After jerking around with resistor values for one hour I got it set only find that the better specs of the new transistors made for 2 more watts of peak power, but less clean RMS power due to the greater idle current draw!
No such thing as a free lunch yet!
Anyway, I reinstalled the original transistors and let it be, they lived since 1966 in the amp with its 18 watts of clean power and will likely last after my Soul has left this rock!

Subject: Re: Replacement diodes
Posted by bluezebra on Fri, 19 Jun 2015 02:21:29 GMT
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Stevem,
you had me wondering at the reading since I have an auto-ranging Fluke and sometimes don't pay attention to what it's reading, however, I just remeasured and the output is definitely 1.59 vdc...

Couldn't find the exact resistors I needed locally.

Thanks Bill for your input. I have two transistors that are incorporated into a power board on one side. I'm assuming that the other four are for the output.

Subject: Re: Replacement diodes
Posted by chicagobill on Fri, 19 Jun 2015 05:22:08 GMT
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Yes, the two transistors that connect to the sockets on the pc board are the driver and the voltage regulator. The four that are wired directly to the transistor legs are the outputs.

That's part of the problem with swapping outputs, as they are all soldered in.

Subject: Re: Replacement diodes
Posted by stevem on Fri, 19 Jun 2015 10:33:24 GMT
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Ok this has me stumped then! You should have a Monster hum taking place with that near 1.6 volts of DC.

Subject: Re: Replacement diodes
Posted by pleat on Fri, 19 Jun 2015 11:06:56 GMT
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If the amp is driving the Frankie cab with the 4 ohm 50 watt resistor, would that be a reason the DC hum isn't as loud as you would expect it to be?
pleat

Subject: Re: Replacement diodes
Posted by bluezebra on Fri, 19 Jun 2015 13:52:33 GMT
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Only thing pleat...the cab is not wired with the 50 watt resistor as of
right now. Only two 8 ohm speakers wired in parallell.

Subject: Re: Replacement diodes
Posted by chicagobill on Fri, 19 Jun 2015 16:54:23 GMT
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1 1/2 volts dc isn't that much, and it is dc so I'm not surprised that it isn't humming. Remember that this is a pure dc voltage caused by the transistor biasing, not from a circuit problem.

I would expect the speakers to thump when the amp is turned on. Once the two 8R2 ohm resistors are replaced, some of that voltage will probably go away.

The original schematic for this amp shows a -1 volt offset at the speaker jack.

Subject: Re: Replacement diodes
Posted by stevem on Fri, 19 Jun 2015 22:43:31 GMT
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Yea, now that I think about it more it's just off set voltage so it's not layden with 120 hz ripple.

Subject: Re: Replacement diodes
Posted by bluezebra on Sat, 20 Jun 2015 00:28:27 GMT
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Changed that 8.2 ohm which was reading 12.4 ohm with a good one
and now I have -2.31 vdc on output.

Subject: Re: Replacement diodes
Posted by chicagobill on Sat, 20 Jun 2015 00:41:38 GMT
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Now you need to change the other one as well and see where the offset goes. Probably more positive, closer to zero.

Subject: Re: Replacement diodes
Posted by bluezebra on Sat, 20 Jun 2015 01:11:25 GMT
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I stand corrected there is only one 8.2 ohm resistor mounted between two
wires near the small transformer that looks like a choke. Two of the power
transistors have 820 ohm resistors and they are connnected on to the other
two power transistors by a wire. These I also replaced with matched 5 watt cement
resistors. Ooops....I just found the second 8.2 ohm... changing that also.
So now one can assume that I should shoot for more matched power transistors.

NOTE: After changing the second 8.2 ohm (serves me right for not wearing my
magnifiers)...the output voltage is now -.023 vdc

Subject: Re: Replacement diodes
Posted by chicagobill on Sat, 20 Jun 2015 02:11:13 GMT
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Now there's no need to change those output transistors.

Subject: Re: Replacement diodes
Posted by bluezebra on Sat, 20 Jun 2015 02:19:52 GMT
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Hallelujah!!!
It's pretty unbelievable how a minor resistive variance can
affect these solid state amps. No wonder Stevem is always preaching
1% resistors.
Tube amps don't see that much of a difference anywhere in most circuits.

As always.... many thanks to Bill and Stevem for their guidance.
As Little Jimmy Dickens used to say:
"May the bird of paradise fly up your nose"...!

Subject: Re: Replacement diodes

Posted by chicagobill on Sat, 20 Jun 2015 06:29:33 GMT
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I think I posted earlier that your two 8R2 ohm resistors were 50% and 25% off value. They were probably 10% tolerance parts to begin with, which would be fine. Even a tube amp with resistors 50% off value would have problems.

In answer to your original question, I pulled one of my Frankie heads and checked the rectifier diodes. This one has Westinghouse 368D diodes. According to my NTE book, they can be replaced with an NTE5896 diode, which is rated 200 volts at 16 amps.

Subject: Re: Replacement diodes
Posted by stevem on Sat, 20 Jun 2015 10:11:38 GMT
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Wow, only 16 amps! Lol!

Along with that nice small .023 MV off set you likely picked up 20 more watts of un- clipped power!

Subject: Re: Replacement diodes
Posted by chicagobill on Sat, 20 Jun 2015 15:08:28 GMT
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No, that's 23mV (0.023 volts).

Subject: Re: Replacement diodes
Posted by stevem on Sat, 20 Jun 2015 19:32:24 GMT
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Yup, me bad Bill!
I just did a little test since I had my DC power supply fired up to work on a amp.
I applyed a positive 1.5 volts to a CTS 15" Bass driver I have and it kicked the cone out over 1/32 of a inch!
This offset / new zero position for the cone probibly would have started into cutting into your Amps Bass output once , or if you where to play it at about 50 % of its output, so it's very good you got that voltage down to near zip!

Subject: Re: Replacement diodes
Posted by bluezebra on Sun, 21 Jun 2015 01:03:52 GMT
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Yep Stevem,

Glad I noticed the heat and checked. It's running a bunch cooler now and I don't have to worry about reconing more speakers. Well at least not from dc voltage. 1 was enough.

Now if I could only find a Charcoal bottom for my K200 head....!!! Oopps, wrong forum for that...!