AF DECK NOTES

Date: Sat, 11 Oct 1997 23:55:04 +0500
From: "Chuck Rippel" <crippel@...>
Subject: [R-390] Great audio from R390A

Was talking to Paul, WA3VJB on 75 AM this evening and one subject was getting good audio from the R390A. Paul makes a connecton from the DIODE LOAD jumper (jumper is left in place) through an RCA cord to the AUX input of his favorite amplifier. However, you have to be careful about the amp being overdriven, etc...

I checked into doing the same thing on one of my '390's. Paul was right, the levels are quite high for direct coupling of the DIODE LOAD directly into an amplifier. Plus, you don't want the additional connection to load down the diode point. Even with the 390's fairly tight AGC, a change in signal upwards will overload the amplifier until the AGC clamps the change. Plus, there is about 8.7 volts DC on the diode load jumper.

I made a simple network of a 1/2W, 470K resistor in series with a 10ufd, non-polarized capacitor and put it in series with the DIODE LOAD bus and the center conductor of the audio phono cable going to the AUX input of my amplifier. Works great! The resistor lowers the audio level and the 10ufd cap blocks the DC voltage on the diode load bus while still being able to couple well into the lower audio frequency regions. While zero beating a station usng the BFO, I could see the speaker move at about 5 hz.

An improvement would be to use a metal film resistor (1/2 Watt) and a larger value non polarized cap. Polystyrene would be nice if you could find on that high in capacity.

Date: Thu, 23 Oct 1997 19:49:18 -0600
From: David Medley <davemed@...>
Subject: [R-390] Audio conundrum solved

Last week I posted a query regarding two different R-390 audio units I had. I quickly received a response telling me that one of the units was a very early model and that several mods had come out, presumably even before the first production run had been completed. These involved removing the feedback loop and installing the infamous 8uf capacitor from the cathode of the local output tube to ground. So I performed this mod and the audio gain is now appreciably higher. Doesn't sound much different either.

Date: Thu, 30 Oct 1997 22:52:56 -0600 (CST)
From: Larry Wolken <rhys@...>
Subject: [R-390] R-390A Mystery Parts

Hi Gang -- Was looking at the AF deck on my EAC R-390A the other day and finally "noticed" something that I'd looked at many times before. On one end of the AF deck is a metal cover plate screwed to the chasis that covers two holes. One hole is marked K602 (K601 is the break-in relay) and the other hole is marked XV606, nomenclature that would indicate a tube socket. What were they for??? If they were for some earlier version (poss the R-390) why did they bother to continue to leave these holes punched all the way through 1967. Thecover plate and holes show up in the original TM-11 so I can't imagine they were for some innovation planned for the future but who knows. Anyone out

there have any ideas on what happened?

Date: Thu, 30 Oct 1997 23:48:13 -0800
From: "Joe L. Reda" <joer@...>
Subject: Re: [R-390] R-390A Mystery Parts

I believe the socket was for another 6C4 to be used as a squelch tube, a circuit that was spec'd out but didn't make it to the "final cut"??

Date: Fri, 31 Oct 1997 10:47:09 -0500
From: Roy Morgan <morgan@...>
Subject: Re: [R-390] R-390A Mystery Parts

There was a depot-installed mod for the squelch function. The FUNCTION switch contains an additional position available by moving the rotational stop in the switch. The wiring harness contains the needed connection, I am told.

Date: Sat, 1 Nov 1997 04:40:19 EST
From: paul.courson@... (An Unsigned Note)
Subject: [R-390] R-390 Squelch Details

This rounds out the discussion of the "mystery parts" posting about the '390A . For those not familiar with the older sister R-390, it has a squelch function ganged with the AGC control. With the AGC function set to SQUELCH, you then adjust and set a trigger point with the RF gain control. You reduce sensitivity of the radio, say, while listening to background noise on 10 meters, and at some point the squelch circuit activates. A carrier would then open the audio, and away you go. Nice and simple, and fairly sensitive, i.e. it doesn't take much signal to tickle the squelch to let a transmission come through.

I don't have the book or a 390 in front of me to elaborate beyond that, but knowing that the 390A was a cost-cutting version of the 390, I have to think contractors of the era were optimistic they would eventually be able to load up the newer version with all the features of the old. Hence, they left a few options on the chassis as discovered by our correspondent.

From: Colin Thompson <burkec@...>
Date: Wed Nov 19, 1997 9:52 am
Subject: Re: [R-390] 5814a/5814 & audio

Regarding the audio, I was advised to use the diode load with a 620k resistor and a 10 uf cap in series. This requires and external amplifier (integrated or seperate amp and preamp). It really opens up as opposed to the matching transformer off the local audio tap.

From: "James M. Toney, Jr." <tcltd@...>
Date: Wed Nov 26, 1997 8:05 pm
Subject: [R-390] R-390 limiter t

I had a similar problem, turn limiter off and audio output dropped significantly; there is a small mica cap under IF chassis on limiter tube socket -- that was the culprit! Jim

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From: laffitte@... (laffitte)
Date: Fri Nov 28, 1997 6:10 am

Subject: [R-390] R390A Limiter

The R390A limiter problem in which the audio was gone after turning the limiter off, was traced to a small 100uuF bypass cap (C-532) in the plate-grid circuit of V507. I am sure that others have experienced the problem so I hope this helps. I must thank listmember James Toney who provided the information that solved this problem.

From: John Kolb <jlkolb@...>
Date: Fri Nov 28, 1997 12:49 pm
Subject: Re: [R-390] LIne Level

> Good Morning all,Will some one explain to me what the function of the line
> level out on the back of this radio,i think i may know but what to be sure!!
> can it be used for a speaker in another room?? or what??Thank You all.

At least as we used R-390's aboard ship in the Navy, the audio out from the receiver went through a patch panel, and then often was piped into a speaker on the bridge or CIC (combat infomation center). Thus the local output was used for monitoring in the radio room, and the audio level meter was used to set the output level going to the remote location. Having seperate volume controls prevents the radioman turning down the level of the background hiss on idle channels while copying a weak signal on a different circuit then forgetting to turn it back up, thus causing missed msgs on the other circuit.

Even when using the signal locally, on a RTTY circuit, for example, it's handy to have one output used for the speaker at a low level to monitor channel activity, and a different level control for the output which goes into the RTTY converter.

From: "Chuck Rippel" <crippel@...>
Date: Fri Nov 28, 1997 6:25 pm
Subject: Re: [R-390] LIne Level

The R390A was used to send its audio to a remote listening location. The "Line Audio" function filled that use.

From: trinit69@... (Tom Marcotte N5OFF)
Date: Sun Nov 30, 1997 5:35 am
Subject: [R-390] 390A Limiter Mod

I found the limiter mod I was looking for, and so here is the relay requested by some of you. Credit KD0HG and Electric Radio #70.

Symptom: The limiter adds audio distortion even at its lowest setting.

Solution: Install a 33K 1/2 W resistor in series with R527 (390A) or R539 (390).

The limiter can now be used up to 1/2 the pot's range with no noticeable distortion. If you wish to try before buying, simply remove the jumper on the diode load screws at the back of the set, and replace it with the 33K resistor. This trial will demonstrate the mod without going inside the rig.

Date: Sun, 28 Jun 1998 13:29:21 -0400 (Eastern Daylight Time)
From: Norman Ryan <nryan@acpub.duke.edu>
Subject: Re: [R-390] Wattages

>Anyone know the wattages of the two resistors located behind TB102? These are R101 (6800 Ohm) and R102 (820 Ohm). Mine are missing.

Thanks to all who responded. Survey sez these are 1/2 watt though it wouldn't hurt to increase them to 1 watt. They serve to limit audio power to the phones- likely as not to keep from accidentally blowing out one's ears or burning up the headphones depending on which is more valuable. :-)

Date: Mon, 20 Sep 1999 15:01:08 -0500
From: "Larry Shorthill" <r41656@email.sps.mot.com>
Subject: [R-390] R390A audio - which side works hardest

I have noticed in recapping a few audio modules for the 390A, that in all of the examples I have (4), that the 560 ohm cathode resistors for the local amps have been replaced at least once, and that the 56 ohm resistors in each of these amps have been replaced as well. In addition, the end of the PC board with these resistors has been pretty well cooked (possibly due to the chassis mounted power resistors near by but maybe because the local side is dissipating more). I checked all of the cathode circuit resistors for both local and line and most to all of the local ones have shifted in value, while only some of the line side resistors have shifted.

I have since replaced all of these resistors to more robust film ones that have higher dissipation ratings--should be OK for audio work.

Question is, which side of this amp works harder, local or line? If local is it because that is the side that was used most often in the past lives of these radios?

Also, the amps are not symmetrical -- slightly different circuit values. I note that the schematic that I have (1970 Navships) has an apparent error in that the 560 ohm cathode resistor from pin 7 of the line side 6AK6 is not shown (R625, I think it is). Is this error called out in other manuals? What is the reason that the two amps are slightly different? Finally, what is the reason that the suppressor grid, G3, or pin 2, of the local amp was moved from ground to cathode, pin 7 in a documented field change? Why wasn't the same thing done for the line amp? My data sheet on this tube indicate that the typical operation of this type of amp is with pins 2 and 7 connected at the socket. Has anyone modified the line side to unground pin 2 and connect it to pin 7 as in the local amp?

Date: Mon, 01 Nov 1999 23:11:23 -0500
From: dave metz <metzd@cfw.com>
Subject: [R-390] Re: R390 cooling fans

Maybe this is too simple, but I have put a 220v 3" muffin fan running on 120v and you can't hear it run but they move enough air to keep those hot 6082's a lot cooler. According to the final engineering report, Collins knew that heat was a problem and that was part of the cost reduction changes in the A model.

Also, ditto the suggestion that the 47ohm cathode resistors should be replaced. While in the audio deck, I would also suggest replacing that 100pf mica bypass cap on 6082. On perhaps 6 decks that I have gone through, two of them were leaking and it creates a lot of ripple in the B+ until it is replaced. When it's running right, there is virtually no ripple in the B+ circuit.

Date: Tue, 25 Jan 2000 01:36:56 -0500

From: "Dave Calhoun" <kb2ape@vitinc.com>
Subject: Re: [R-390] Fwd: R-390 Audio.

R390A diode load connected across 50 kOhm pot, wiper into any old stereo set AUX line level. The ones with built in EQ are handy when listening in 4 kHz position on A.M. with heavy QRM. Some amps may overload at the input stage without the pot. Sounds great but a little more work to mute properly if transmitting. Better still, use 2 R390A's one into each channel with 2 separate antennas for diversity. The selective fading actually happens at noticeably different times if the RX antenna are separated more than around 0.25 wavelength.

Date: Thu, 10 Feb 2000 20:00:56 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] Audio Deck resistors

There are two sizes of resistors on the R-390A AF deck's circuit board: 1/2 and 1 watt. If you can fit 2 watt resistors where any 1 watt resistors have gone out of spec, do so. The two 560 ohm resistors come to mind. What shape is C609 in?

Date: Wed, 22 Mar 2000 19:59:34 -0500
From: km1h@juno.com
Subject: [R-390] R-390A Audio Deck Observations

Spent a part of this AM tracing down hum in a 1967 EAC deck. Found one out of tolerance resistor and 2 leaky caps on the terminal board. Replaced the resistor and all the caps....still hums. Remembered the thread about poor ground lugs. Removed the screws and cleaned the chassis under all.....still hummmmmm But I made some progress, the hum sometimes stopped when I whacked the module with a 16 lb sledge (: I then noticed that the can cap C-603 used a single lead ground to the socket rim, not to the chassis. C-606, the other can, had an additional lead from the socket rim to a ground lug under FL-601. I also notice what appears to be brass spacers between the socket mounting flange and the chassis.

Finally added a ground lug under a L-601 thread, wired to the C-603 rim and the hum is completely gone.

Collins AF decks (At least the two I have here) do not have a real chassis ground for either capacitor. I would certainly suggest adding them.

Not having a 600 Ohm speaker or a proper matching xfmr, I hooked up an unmarked 120V to 12V filament xfmr (Heck, 2 leads in and 2 leads out, give it a try) between the Local Out line and a 1939 era Hallicrafters dynamic speaker. WOW, enough audio from that little 6AK6 to fill the basement. I seem to remember a few past comments about changing caps to "improve" the audio but nothing on what the values were or the improvement expected. The xfmrs are rated to 3500Hz only so I'm guessing that the audiophiles want more at the lower end? Changing the various coupling caps from .01 to .05 or so should help a bit in that department.... but this is AM, not rocket science right? For now anyway I sort of like the high end restrictions when tuning very crowded shortwave bands. Heck at my age a 16KHz IF filter is totally wasted! Changing the limiter pot location to a functional Tone Control might be my next move to enjoying this beast.

Any comments on improving the audio deck would be appreciated...I'm not

gonna hook an external Hi-Fi system up! Are there any readily available output xfmrs with wider range that fit the bolt pattern? Maybe time to tailor the audio, change to a 6AQ5, add some degenerative feedback, etc.....Sacre Bleu, C'est un sacrilege! That Carl, he is one crazy person. Always wants to anger the gods of Cedar Rapids.

On another note a bit in tune with the corrosion thread is that I noticed several of the terminal board wire leads had many broken strands. Looked with a 10X lens and noticed a fair amount of white whatever (I barely passed HS Chemistry) right at the very slight exposed lead between the solder and the wire insulation. This was visible on the 67 EAC deck which has definite signs of prior cleaning and both 55 Collins decks which appear original untouched. This might relate to my prior comment about solder flux problems over age.

Date: Thu, 23 Mar 2000 09:28 -0800 (PST)
From: rlruszkowski@west.raytheon.com
Subject: [R-390] R-390A Audio Deck Changes

The last time I was into my audio deck I found some distortion on the local audio output. I went through it with the scope and did not find any bad caps. I see that R612 a 220K feed back resistor in the local output is different than R626 a 150K feed back resistor in the line output. Thinking the local output was to hot, I put my resistor substitution box into the circuit for R612. As I when through the value range from high to low I found that a 180K yielded the best performance. I did not do this test with a number of tubes. I like the sound of my local audio in the phones a lot better now. It is as least distortion free on the BFO CW beats and AM audio. 180K for R612 is the highest value with no distortion of a sine wave (BFO and CAL tone) and least loss of signal amplitude. Smaller values provided signal loss while higher values increased distortion. A 150K or 180K may both be good choices for R612.

Date: Fri, 21 Apr 2000 09:57:15 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: [R-390] C609

Can someone tell me why C609 is/was an electrolytic? Is it because the only way to get that large a value in that small a package is for it to be constructed with electrolytic technology? If it were possible to find an 8ufd paper cap that would fit, it would work just as well, correct? There's nothing magic about an electrolytic in this application, right?

Date: Fri, 21 Apr 2000 11:57:37 -0400
From: km1h@juno.com
Subject: Re: [R-390] C609

.....because the only way to get that large a value <snip> with electrolytic technology?

Correct.

> If it were possible to find an 8ufd paper cap that would fit, it would work just as well, correct?

Yep and be about the size of the output xfmr.

> There's nothing magic about an electrolytic in this application, right?

Nope and neither is the value sacred. A commonly available 10MF will do just fine.

Date: Fri, 21 Apr 2000 10:20:43 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] C609

Electrolytics tend to be the poorest for quality but the most compact for C per unit volume. Trouble is the wet electrolytics (especially tantalum) eat through their cases and sometimes the adjacent components. The modern dry solid tantalum is a much better capacitor than the wet tantalum.

Date: Fri, 21 Apr 2000 11:36:55 -0500
From: Randy & Sherry Guttery <comcents@mississippi.net>
Subject: Re: [R-390] C609

Right - an 8ufd paper (mylar, poly, etc.) would be HUGE. Since the most voltage that might be seen across C609 would be less than 6 volts - (V601 shorted plate to cathode) then a modern 10ufd 10V axial electrolytic would do just fine - and could be hidden inside of black heat shrink so it's "modern appearance" wouldn't be obvious there on the terminal board.

Date: Fri, 21 Apr 2000 13:34:28 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] C609

Rats. I was just in the local parts store and ran across some 8ufd @ 25V with axial leads (looked very much like the VitQ caps) that would've fit very nicely, but I didn't buy them as I thought the voltage rating might be borderline insufficient. I've seen 35V as the recommended value. Oh well, I have a 8ufd @ 35V tantalum that I'm going to use. These just had the original look-n-feel.

Date: Fri, 21 Apr 2000 17:04:14 -0400
From: km1h@juno.com
Subject: Re: [R-390] C609

It may help to obtain an ARRL Handbook or similar publication that addresses many of your basic questions. Capacitor values and voltages are a continuing issue that may be best answered in an established reference. The tube era Handbooks are a great resource.

Date: Thu, 1 Jun 2000 13:24:32 -0400
From: "Chuck Rippel" <crippel@erols.com>
Subject: [R-390] No Audio/Limiter Problem & Fix

Thanks to Randy, N4TVC for this. I have added it to the www site.
Hope all you guys are well and enjoying your goodies. Been doing the usual slaving at R390A's.

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>Audio, Distorted Audio, or No audio. When Local Gain is advanced to 9-10, audio is barely >perceptable. Audio returns to normal when the limiter is turned on. This problem exhibits >similar symptoms of other posted limiter problems. This problem appeared on an >EAC/Hammarlund R-390A while operating.

C532, 100pf (connected from Pins 6 and 7 of V507 to ground) is used to

supress any remaining IF elements in the signal while allowing audio frequencies to pass into the Limiter circuit. This capacitor had failed in a resistive state under operating conditions (read open with an ohmmeter). The additional load of this capacitor on the Plate/Grid of V507 (B section) caused the voltage at the Plate/Grid to be only about 22 volts as compared to the nominal 78 volts as shown in the technical manual. This causes V507B to cutoff. When the Limiter was turned on, the plate voltage was sufficient to allow conduction due to the re-biasing of the tube in the Limiter-On state.

Solution: Replace C532 with a 100pf 1KV disc ceramic. Note, this capacitor is located against the bottom of the chassis at the base of V507's socket and is very hard to get to.

Date: Mon, 17 Jul 2000 14:26:52 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: [R-390] Re: Squelch for R390/A

>I have never seen the squelch for the R390/A.
>Where do I find the mod schematic? I would like to add it to my R390/A.

Look in the R-390 schematic. The mod may be available in detail: Tom Marcotte may have it.

>How much do we need to add to the wire Harness?

Nothing as I understand it.. The wires are present it the harness. All changes are made in the audio module.. I have just looked at what pictures I can find and the relay and tube may mount in the audio module NOT in the IF module as I stated earlier. In any case, you will see one or two blank plated fastened to the module and it will be obvious which one is the right one.

>I am sure I can find a suitable tube and relay. The other parts would be easy to >locate.

You need a 12AU7/5814 as I remember. (It might be smart to use a 5963 which is meant for long "off" periods with no cathode degradation.) The other major part is a high resistance plate relay. .This part may be hard to find. It is operated by the tube plate current. Rat Shack probably does not have one on the shelf.

Date: Mon, 17 Jul 2000 15:05:04 EDT
From: Kenneth A Crips <w7itc@juno.com>
Subject: [R-390] Re: Squelch for R390/A

I wonder what the spec's are on that relay, Allied Electronics has page after page of relays.

Date: Mon, 17 Jul 2000 15:23:37 -0500
From: "Dr. Gerald N. Johnson" <geraldj@ames.net>
Subject: Re: [R-390] Re: Squelch for R390/A

I don't know what the original would have been but I'd have used a 110 volt DC relay in the KHP line. 4PDT 10,000 ohm coil. The contacts wipe better than the short form telephone type Collins would have used that would have been sensitive to handling and practically without contact wipe.

Date: Mon, 17 Jul 2000 15:34:49 -0400

From: pbigelow@us.ibm.com
Subject: Re: [R-390] Re: Squelch for R390/A

Don't forget the squelch control!

Date: Sun, 03 Sep 2000 17:27:05 -0400
From: antipode <antipode@ne.mediaone.net>
Subject: [R-390] T-601 Grounding on Audio Subchassis

I need some help. Upon starting the slow process of checking everything out module by module on my '55 Collins contract '390A, I noticed a rather sloppy wiring job to bring pin 13 on J-320 to ground on the audio subchassis. This wire is connected to the same terminal on J-320 as the harness wire (white) going to terminal 6 on T-601, and is definitely NOT a factory wiring job. Question: what is normal wiring scheme for chassis grounding the connection between T-601 terminal 6 and J-320 pin 13? Should there be a separate wire connected at the connector J-320/13 to chassis ground, a separate wire from T-601/6 to chassis ground, or some other method?

Date: Sun, 3 Sep 2000 18:26:06 -0400 (EDT)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] T-601 Grounding on Audio Subchassis

I'm looking at a cherry '67 EAC audio deck and here is what I find:

A solder lug under the blank cover's fastener closest to J619 has two white wires: One goes to J619-11 (about #18 gauge) and is under the last lacing loop of the harness. Another goes to J620-13 via two lacing loops of the harness. Another wire comes off J620-13 and goes to T601-6. The latter two wires are the same gauge as most of what's in the harness. All three wires are white. Nice to help get a module looking factory original. :-)

Date: Sun, 03 Sep 2000 18:40:55 -0400
From: antipode <antipode@ne.mediaone.net>
Subject: Re: [R-390] T-601 Grounding on Audio Subchassis

Ok Norm. That's exactly the kind of information I was looking for. I really appreciate your help on this. It's really exciting to belong to a group where we all share the same interest and can help each other out.

Date: Sat, 23 Sep 2000 13:08:46 EDT
From: DJED1@aol.com
Subject: Re: [R-390] 600ohm to 8ohm

Here's a trick I discovered for the headphones. It is a lot simpler and cheaper than using a transformer and trying to patch it into the headphone. The headphone jack is fed off the local 600 ohm AF output through a resistive voltage divider consisting of R101 (6800) and R102 (820). Thus low impedance phones shunt the 820 ohm resistor and lose a lot of signal through the 6800 ohm resistor. The trick is that you can change the voltage divider by putting a resistor in parallel with the 6800 ohm R101. And you can do it simply by connecting the resistor between terminals 6 and 8 of terminal strip TB102 on the back of the radio. I put in a 470 ohm resistor and have plenty of volume on 8 ohm phones, and no messy wires or transformers. The phones will load the local audio output a bit, but I haven't found that to be noticeable. Ed WB2LHI

Date: Sat, 23 Sep 2000 13:08:06 -0400
From: "James Shanks" <n1vbn@bit-net.com>
Subject: Re: [R-390] 600ohm to 8ohm

I use a Radio Shack Part # 32-1031B 70 volt to 10 watt line transformer to allow me to use an 8 ohm speaker which is an old Hi-Fidelity speaker and it works great.

Date: Sat, 23 Sep 2000 19:38:53 +0000
From: "B.L.Williams" <B.L.WILLIAMS@prodigy.net>
Subject: Re: [R-390] 600ohm to 8ohm

I bought one of those $2 800 to 8 ohm transformers years ago when I bought my first R-390A. Tiny little thing, but it has worked for all these years and I've basically forgotten to replace it. I put it in a project box and ran the inputs from the speaker or diode connections to screw terminals on the outside. I have the output from the transformer going to RCA jacks on the box. I then use the RCA plugs to go where I need them to go. I did this back then as a sort of short term measure just to get some audio out of my new radio. It has worked fine all this time. I have the parts to do the mod on Chuck Rippel's site at the diode output, but haven't started that project yet. I have thought about also doing it behind the front panel for the headphones jack.

Date: Sun, 24 Sep 2000 20:04:55 EDT
From: PABigelow@aol.com
Subject: [R-390] "Headphone resistor mod" -- results

Tried the "headphone resistor mod" between screws 6 and 8 of T102. Works wonderfully! PLENTY of volume! The line level meter seems to be a bit less responsive now at the same setting but that tradeoff had been noted. Thanks for the suggestion!

Date: Sun, 24 Sep 2000 18:34:49 -0500
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] "Headphone resistor mod" -- results

The line level meter would show the same loss of responsiveness for any properly matched line load too. It was seeing an open circuit before the headphones were attached.

Date: Mon, 25 Sep 2000 18:02:12 -0700
From: "Colin Thompson" <burkec@1stconnect.com>
Subject: RE: [R-390] 600ohm to 8ohm

My impressions of good sound and audio recovery follow.
Best: Diode load through a quality HiFi amp and speaker. Note this is only for strong signals in the clear. Otherwise the Sherwood takes the cake.

2nd: Sherwood through a quality HiFi amp and speaker.
3rd: Sherwood using it's internal amp
4th: Hammond 600 ohm to 8 ohm transformer
5th: Radio Shack transformer
Fixing up an old tube preamp/amp combo for use with the Diode Load or Sherwood is well worth the effort and expense. The Sherwood SE3 and Hammond transformers are also well worth the money.

Date: Sun, 1 Oct 2000 02:08:39 -0400
From: "JM/CO" <jmerritt2@capecod.net>
Subject: Re: [R-390] Real Audio for the R390 Modification Question

A few years ago, the line output transformer on my R-390 (ser # 127) shorted out. After checking the schematic, I noticed that it was the same as the "local" transformer. I pulled the line xfmr out and swapped the local xfmr into it's location. I than installed a small xfmr with an 8 ohm secondary in the same location where the "local" xfmr had been. Result was that I had my line output back, and had an impedance at the "local" output that matches modern headphones. I also replaced the original mono phone jack with a "stereo" one (I do this with all my radios) Now, 8 ohm stereo hi-fi phones work just fine.

Date: Sun, 1 Oct 2000 15:59:22 -0400
From: "JM/CO" <jmerritt2@capecod.net>
Subject: Re: [R-390] Real Audio for the R390 Modification Question

If memory serves, the audio output tube in the R-390 is a 6AK6-- very low power, but probably enough to run a speaker of the high efficiency variety. Any small PM speaker from a table or old console radio would be worth a try. In the 1950's a few manufacturers of Hi Fi gear made very large, very efficient speaker systems. The most famous of this group was Klipsh, from Kansas, who made the famous "Klipshorn" back loaded, folded horn bass reflex. These were super efficient. Paul Klipsh was famous for using a transistor pocket radio in demonstrations to prove this. I'm sure that a R-390 would sound great through one of those, but they are worth much more today than the radio !! Electrovoice, University, Bozak, Jensen and others made similar units, and they can still be found at yard sales and radio shows. These are from the "mono" days, and stereo pairs usually have to be acquired one piece at a time, so folks who have just one are likely candidates for a sale or trade, as most know they will never find a mate. IMHO the audio in the R-390 can be improved somewhat, but barely. I use mine as a "tuner" and run the line out into my Hi Fi rig, and it sounds great. These days, finding a small high quality stereo amp is easy, and you can drive some decent speakers with it.

Date: Tue, 07 Nov 2000 14:55:35 -0600
From: David Medley <d.j.medley@att.net>
Subject: [R-390] [R-390} Kleronomos Audio

Some time ago I carried out this mod to an R-390A following instructions contained in Electric Radio for October 1992. After I had done this I found some better instructions I think by Ray Osterwald, N0DMS. I kept this in a notebook which has been lost in my move to Texas. Does anyone out there know Ray or how I can get in touch with him? Or perhaps someone out there
has this material and could make me a copy. I have the Electric Radio but not the better instructions. Any help would be appreciated.

Date: Wed, 06 Dec 2000 09:16:23 -0800
From: "William L. Turini" <Turini@hamanuals.com>
Subject: [R-390] Why 600 Ohms?

Could someone tell me how/why 600 ohms became the standard impedance for the R390, or for that matter, the many other devices out there? Also inthe same vein, 4,8,16 for contemporary audio.

Date: Wed, 06 Dec 2000 13:07:46 -0500

From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: Re: [R-390] Why 600 Ohms?

I'm still trying to figure out how to determine the impedance of all the speakers I've accumulated over the years. Most have little or no marking, and I lack the knowledge and/or test gear to do it properly.

Date: Wed, 06 Dec 2000 10:15:18 -0800
From: David Ross <ross@hypertools.com>
Subject: Re: [R-390] Why 600 Ohms?

The 'phone company has standards for central office equipment which connects to twisted-pair wiring coming in from the customer. Those standards call for either 600 or 900 ohm impedances. Maybe 600 ohms is the impedance of the sort of cabling the telcos were using at the time. (Sorry, I don't know why the dual standard - possibly different types of wire, like mebbe the single pair non-twisted copperweld stuff vs. the those multipair cables as big as your forearm..) I'd guess that the 'phone company figured out this 600 ohm number early on (like the '20s or '30s), and then accepted it as an internal standard. A further guess is that, after the telephone companies embraced it, the 600 ohm number just kinda propagated across across the electronic industry.

Date: Wed, 06 Dec 2000 12:49:02 -0600 (MDT)
From: Richard Loken <richardlo@devax.admin.athabascau.ca>
Subject: Re: [R-390] Why 600 Ohms?

600 ohm is the standard source imedance for audio transmission over longish distances. (Long being a word that doesn't have a definiiton). According to the Audio Cyclopedia the standard audio impedances (circa 1969) were 4,8,16,150,600 with older equipment (older than what?) using 30, 200, and 500 ohms. typically high power, short distance stuff (translate that to be speakers) uses 4,8, and 16 ohms while balanced professional microphones are 150 ohm balanced (very low power stuff) and distribution equipment (medium power stuff... in mW) is 600 ohm balanced. The R390 was expected to usually feed some kind of standard audio distribution equipment and not just go four feet to a speaker, when it did go four feet to a speaker there was a 600 ohm to 8 ohm transformer in the not very acosutically designed speaker enclosure.

> The 'phone company has standards for central office equipment which
> connects to twisted-pair wiring coming in from the customer. Those
> standards call for either 600 or 900 ohm impedances.
>Maybe 600 ohms is the impedance of the sort of cabling the telcos were
> using at the time. (Sorry, I don't know why the dual standard -

Such questions are not so easily answered and the characteristic impedance of a transmission line is probably not part of the answer. According the Audio Cyclopedia, the surge impedance of the transmission line is typically ignored in audio work and as proof of that, the surge impedance of the old two wire zip cord that the telco ran from the pole to your house was about 70 ohms and the line was once popular for feeding dipoles. The definition of "dBm" will get you closer to the mark. 0dBm is 1mW through a 600ohm load and is the standard by which audio measurements are made and was made the standard in May 1939. Decibels, Popular Electronics once called them a rubber ruler... Oh yes and a 0dbm sinewave should be -4VU on a VU meter (an ever more rubbery ruler).

Again from the Audio Cyclopedia 2nd ed., p. 447:

"this reference level [0dbm] was chosen as a level which would conform to the Telephone Company's standards of limiting the signal level on a transmission line to a value that would produce a minimum of cross talk and still provide a satisfactory signal to noise ration..." And that's not all... 600 ohm is considered high impedance and is usually used with balanced lines (not the multikohm high impedance of unbalanced home audio stuff) to allow long lead lengths in the thousands of feet with minimum noise pickup due the the common mode rejection characteristics of a true balanaced line vs. noise and crosstalk introduced from outside of the wire pair on its trip from the source to the load.

Date: Wed, 06 Dec 2000 17:14:56 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] Why 600 Ohms?

600 ohms has been the balance broadcast line audio impedance for eons. The same group that designed the R-390(a) at Collins also did broadcast transmitters and consoles. Also many military audio based accessories like teletype terminal units planned on 600 ohm audio. Its a nice impedance for headphones and was commonly used all through WW2 way before the 390 was even thought of. You can send a decent amount of audio power to a load at 600 ohms with small sized conductors without having too great a voltage to be a severe shock or fire hazard. 1 amp of line current makes 600 watts. But 50 volts makes 4 watts. 1 amp at a 4 ohm load only delivers 4 watts but line loss can be high.

600 ohms was used for a few designs of fixed coil, moving vane speakers in the 30s, but generally the audio quality wasn't as good as the moving coil speakers used since then. It takes too many turns of too fine a wire (with resulting poor space factor, too much air and insulation) in the voice coil of a moving coil speaker at 600 ohms.

4 or 8 ohm voice coils are more practical for decent speakers with pretty good winding space efficiency and relatively light weight. Weight in a voice coil is not beneficial to sound, especially at high frequencies and amplitudes. A voice coil will lots of volume take up with air and insulation requires a longer magnetic gap and so lowers the flux density and the speaker efficiency is directly related to the achievable flux density in the gap where the voice coil rests. A speaker impedance varies all over the map at both high and low frequencies. The purist would measure its impedance with an AC bridge at 1000 Hz, but still the enclosure or lack of enclosure will have an effect. The speaker cone has a LF resonance where the impedance goes up. The impedance also rises at high frequency probably due the voice coil inductance and physical constraints on the cone's motion and stiffness.

As a first approximation for sorting unknown speakers, a DC measurement is about as close as that 1000 Hz measurement. E.g. a 4 ohm speaker will probably be in the 3 or 4 ohm DC range, an 8 ohm probably 6 to 8 ohms DC... All bets are off if there's a transformer. DC and AC don't relate there.

A less crude but workable technique for measuring speaker impedance could be to use a series resistor, either adjustable or fixed and an AC voltmeter. With an adjustable resistor you would drive the speaker through the resistor and adjust the value of the resistor until the voltage drop was the same across the speaker as the resistor. Then measure the resistor (out of that circuit) at DC. You could also use a fixed resistor, say 4 ohms and measure the relative voltage drop. Since the current in the resistor and the speaker are the same, the impedance of the speaker would be the ratio of voltages times 4 ohms. And like a man with more than one watch, trying that measurement at multiple frequencies will cause a lack of confidence in the measurement. Or you could

use a large (say 600 ohms) resistor in series with the speaker. First connect a 4 ohm resistor in place of the speaker and drive the pair to some convenient voltage across the 4 ohm resistor that was a multiple of 4 volts. (could be a fraction). Then connect the speaker, the voltage across the speaker for ranges under 50 ohms or so will be close to the impedance of the speaker times the multiple set across the 4 ohm resistor. Direct reading speaker Z. 600 ohms was probably closest to the impedance of 6" spaced #9 copperweld used in old overhead telephone lines.

Date: Wed, 06 Dec 2000 18:28:33 -0500
From: "Phil (VA3UX)" <phil@vaxxine.com>
Subject: Re: [R-390] Why 600 Ohms?

I read the story on the 600 ohm standard many years ago. Although I can't recall the details, Dave's rendition of it (above) sounds pretty close. The phone companies were major users of vacuum tube amplifiers and consequently, 600 ohm test equipment to serve the communications business. It looks like the 600 ohm standard simply stuck as audio moved into home hi-fi etc.

Date: Wed, 06 Dec 2000 16:45:26 -0800
From: "William L. Turini" <Turini@hamanuals.com>
Subject: [R-390] Thanks for the 600 ohm info

Thanks to all who replied on why 600 ohms. It once again shows that this is the best mailing list. For those of you who wondered why I asked the question, I work a lot around the ranch and don't get a lot of time to listen to my radios. For example, I spent 4+ hours today cleaning out the stalls. I have been wanting to set up some method of piping my radios to all the buildings. Long ago (6 years) I ran CAT-5 cables to all the buildings, so I have spare twisted pairs. I toyed with the idea of getting a fm transmitting system, but that's too modern :-) I also thought about moving one of my R-390As to the barn, but discarded that idea. Anyone have any comments about an audio distribution system, or comments on a good reference or web site?

Date: Wed, 06 Dec 2000 20:51:20 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] Thanks for the 600 ohm info

Drive the twisted pair with the 600 ohm output of the R390 and put 70 volt line to voice coil transformers from the twisted pair to speakers. Or drive the line with the 70 volt output of a power amplifier and do the same. Say you use a 50 watt amplifier. Then divide 50 by the number of speakers and pick the next lower power level. 10 speakers, 5 watts per speaker. That's what gets the background noise in every mall and super store in America. There may not be nearly enough power in the R-390 line output section to do that alone.

Date: Mon, 11 Dec 2000 22:40:42 -0500
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] C-609 Polarity

This is a "duh" question. I have here a '60 EAC audio deck with a C-609 that doesn't look so good -- tossed its cookies (or upchucked its chads, so to speak, no offense). It's a little metal rocket shaped electrolytic -- 8 mfd at 30 vdc - mounted on the PC board. As a temporary, diagnostic measure, I also have the closest thing to be found at RS -- a 10 mfd, 35 v electrolytic, which I'd like to sub in to see if it restores some functionality to this rig. What's the polarity on this

thing? I can't read anything on what's left of the original. According to the schematic, one end is connected to pin 3 of V601A, the first AF amp an the other to ground, in parallel with R604, a 1200 ohm resistor.

Ordinarily, I'd assume the minus side of the new electrolytic would go to ground. Is that right? Schematic doesn't show any polarity. Was this a non-polarized electrolytic?

BTW - The receiver is partially functional, but output is very low and the audio meter doesn't deflect regardless of the setting of the switch or line level pot. Would a failed C609 do that? Not much carrier meter deflection either -- hardly any. AGC-related?

Date: Mon, 11 Dec 2000 23:30:53 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] C-609 Polarity

That was a wet tantalum. One of those capacitors that should have been replaced before it tossed its acid out into the radio. The outside case is negative. A solid tantalum would be the best replacement. 8 at 30 or 35 volts is a fairly common value.

Date: Tue, 12 Dec 2000 02:13:20 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] C-609 Polarity

The negative end of C609 points toward the chassis wall. Tantalums are polarized. Dunno if the electrolytic will work like a tantalum. If I understand right, the tantalum was chosen because it fits in the narrow space between circuit board and frame whereas an electrolytic wouldn't. So maybe it's OK to try out an electrolytic. Purist that I am, I'd get a dry tantalum eventually. Sounds like there's more to be done on your set. Carrier meter doesn't depend on a well functioning AF section. IF deck OK? Got a working spare IF deck to subsitute? Checked the tubes? Looked for out of spec resistors? Recapped? Measured resistances to ground?

Date: Wed, 10 Jan 2001 13:20:01 -0600
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: [R-390] Audio Transformer question

I'm looking for a suitable transformer to adapt the 600 ohm output of my R390A to 8 ohms. I know the Hammond is available, but I seem to recall someone suggesting an inexpensive RadioShack transformer that performs well. Any suggestions. BTW, in case you haven't heard, the LST-325 made it to Mobile, AL this morning.

Date: Wed, 10 Jan 2001 14:39:52 -0500
From: "Ronald Reams" <wa4mjf@worldnet.att.net>
Subject: Re: [R-390] Audio Transformer question

You can use the Radio Schack 70 Volt transformer actually 500 to 8, but close enuff for government work. Use C and 10 on Primary and Secondary according to spkr needs.

Date: Wed, 10 Jan 2001 13:52:02 -0600
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>

Subject: RE: [R-390] Audio Transformer question

I assume this is available in the stores? I don't see a 70V transformer at RadioShack.com.

Date: Wed, 10 Jan 2001 14:57:06 -0500
From: "Ronald Reams" <wa4mjf@worldnet.att.net>
Subject: Re: [R-390] Audio Transformer question

RS PN is 32-1031 @ $5.99..... Page 158 of the 2000 store Catalog. In the stores...

Date: Wed, 10 Jan 2001 14:15:09 -0600
From: "Marshall M. Dues" <mmdues@hal-pc.org>
Subject: Re: [R-390] Audio Transformer question

I have been using Radio Shack part number 32-1031B successfully for about two years on my Collins R-390A. The transformer will handle from .62 to 10 watts of audio with taps for 4, 8 and 16 ohms impedance. Seems like the price was in the $7 or $8.00 range.

Date: Wed, 10 Jan 2001 15:58:16 -0500
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Audio Transformer question

When you go to RS, often the line transformer is over by the speakers and speaker accessories instead of the filament transformers, in case the store guy can't find it. They're usually used with 70 v. PA distribution systems, so look for the grilles. ;-) Some say the Hammond is better, but I've been using these with R-390(x)'s, SP-600's, etc. Seem to work fine and the price is right. One silly tip -- the plastic part of the blister pack is fairly sturdy and with some creative scissor work you can make an insulated holder for it. Or you can hang it off an existing screw on the back of a speaker enclosure.

Date: Wed, 10 Jan 2001 16:20:30 -0500
From: Gene Beckwith <jtone@sssnet.com>
Subject: Re: [R-390] Audio Transformer question

Some real good ideas posted on this subject in most recent "Electric Radio Mag..." Article discusses neat way to do impedance matching and would address our R-390X audio matching situations...

Date: Wed, 10 Jan 2001 16:22:44 -0500
From: "Ray Vasek, W2EC" <w2ec@attglobal.net>
Subject: Re: [R-390] Audio Transformer question

Radio Shack part number 32-1032, 70v line transformer. Bought one offthe shelf the other day.

Date: Wed, 10 Jan 2001 16:25:23 -0500
From: "Ray Vasek, W2EC" <w2ec@attglobal.net>
Subject: Re: [R-390] Audio Transformer question

oops! 32-1031, not 32-1032.

Date: Wed, 10 Jan 2001 16:42:38 -0600

From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] Audio Transformer question

The RS transformer is in the Public Address section of the catalog and store. If that fails try Hosfelt (800-524-6464) or MCM electronics.

Date: Wed, 10 Jan 2001 18:02:42 EST
From: Llgpt@aol.com
Subject: Re: [R-390] Audio Transformer question

Part No. 32-1031

Date: Wed, 10 Jan 2001 16:27:16 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Audio Transformer question

I'm disgusted by the responses to this post!! Where is the Hammond transformer made? Where is the Radio Shack transformer made? Who benefits from the sale local people or communist slave labor? Buy the Hammond they work very well.

Date: Wed, 10 Jan 2001 19:34:29 EST
From: Llgpt@aol.com
Subject: Re: [R-390] Audio Transformer question

And, sound better also. Les

Date: Wed, 10 Jan 2001 19:11:38 +0000
From: blw <ba.williams@home.com>
Subject: Re: [R-390] Audio Transformer question

I think this is the same one I've been using for a number of years.

Date: Sun, 14 Jan 2001 14:56:04 -0800
From: jan@skirrow.org
Subject: Re: [R-390] Audio Transformer question

Hammond started in Canada, but set up plants in the US many moons ago. They were specialists in stamped metal stuff, and produced mostly transformers/chokes etc. and chassis/cabinets/racks and the like. During WWII they produced a lot of bits of secret metal for radar tubes and other war purposes. They made (and still do) a very fine product - altho as I've said before, hanging a cadillac transformer on the jeep that is the current output transformer on the R-390A won't do a thing for the audio. Even Fred Hammond couldn't put back in what had already been removed. Fred Hammond passed away just awhile back - if anyone is ever in his part of the country (Southern Ontario) his museum is a must see. He set it up mostly for his own pleasure, but welcomed hams and interested people almost to the end of his life. Maybe someone else can provide info on whether it's still open - I seem to recall a rumour that it was to become a public museum.

>>Who benefits from the sale local people or communist slave labor?

I bought some nice 70 volt line transformers from a local electronic store - - made in Taiwan. Aren't they good guys these days??? Also, very nice 600 to 8 transformers were available from Fair for $8 each - they were the ones used in

the LS-166/U speaker (and probably others) - very nice potted US made items.

Date: Mon, 15 Jan 2001 09:29:55 -0600
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Audio Transformer question

I tried the Radio Shack version yesterday. Is it just me, or is there any real difference to be heard? I kind of figured the thing would at least be a little louder for the same volume control setting, but I couldn't tell much, if any, difference. Oddly, I have a 4-ohm speaker, but it seemed to be just a tiny bit louder when connected to the 8-ohm tap. I have a TS-585 I need to drag out and see if that shows anything different than what I'm hearing. Sure, I feel better knowing the load is matched better to the source, but it sure doesn't seem to be something from which my ears can benifit. Sure this isn't one of those "the PA tube will last longer because the load is matched" kind of things, is it?

Date: Mon, 15 Jan 2001 10:37:32 EST
From: Llgpt@aol.com
Subject: Re: [R-390] Audio Transformer question

Well Barry, the reason for that is the R-390A is only producing 50 milliwatts. Even with the more expensive and better sounding Hammond transformer, it won't be any louder.

Date: Mon, 15 Jan 2001 09:47:41 -0600
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Audio Transformer question

Okay, time for a little nest stirring: Why would the Hammond sound better than the RS? Is there that much difference in two methods of coiling some wires around a xfmr's core? Surely they both use copper wire. Does one use a different coil-winding technique (scramble vs smooth)? It's my understanding the RS is a 500 ohm rather than 600 ohm input. Surely that doesn't make the difference, does it? Hope it doesn't boil down to "oxygen-free" vs. regular copper wire... ;)

Date: Mon, 15 Jan 2001 11:50:54 -0500
From: "Jim Brannigan" <jbrannig@optonline.net>
Subject: Re: [R-390] Audio Transformer question

I had the same lack of result with a RS XFMR..... Then I hooked up "Monster Cable" to the input and output.... The results were startling!!!!!

Date: Mon, 15 Jan 2001 11:57:05 EST
From: Llgpt@aol.com
Subject: Re: [R-390] Audio Transformer question

That's " EXACTLY " what I was talking about !!!!! Do you store your wire in a container and then pull a vacuum on it when not in use?

-
Date: Mon, 15 Jan 2001 10:56:09 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] Audio Transformer question

Probably there is more copper and less insulation in the Hammond transformer

and most surely the magnetic core laminations in the Hammond are much thinner than the cheap transformer so the high audio frequency losses are smaller. More turns of copper with the same sized core will help the low end also.

Date: Mon, 15 Jan 2001 12:36:02 -0500
From: "Jim Miller" <jmille77@bellsouth.net>
Subject: Re: [R-390] Audio Transformer question

I have tried both the RS and Hammond xfmer here on my 390A. Regardless of which one you use, it is definitely worth the trouble...and the most dramatic improvement was had by doing the simple audio mods on the AF module (using .022 caps instead of the originals, replacing the electrolytic with a new one, etc.). I decided to stay with the Hammond...not sure why, perhaps it did sound a little "louder," but then again that may because it "looks" bigger. If anyone would like me to do a comparison I will although my hearing has degraded some with age. On monster cable, I have always been a believer that this is a rip off aimed at the uninformed. My old Heathkit stereo had some simple instructions on driving 100 watt speakers. Use heavy gauge wire to reduce the inherent resistance in the line. It doesn't have to be $5/foot monster cable. Some good old 12 gauge zip cord works fine for a few foot run.

Date: Fri, 23 Oct 1998 09:29:03 -0500
From: "Anderson, Craig - Ext. 1365" <CAnderso@stp.tec.mn.us>
Subject: [R-390] Audio Chassis - Hi Fi

A few years back, there was a gentlemen in Colorado, advertising in Electric Radio, a modified R390A audio chassis. He rebuilt them with a different tube line up with about 8 watts of Hi Fi output. I heard one of them and they sounded fabulous. Does any one know if this guy still does this? They were about $140 five years ago with your audio chassis in exchange.

Date: Fri, 23 Oct 1998 10:55:18 -0700
From: Philip Atchley <ko6bb@elite.net>
Subject: Re: [R-390] Audio Chassis - Hi Fi

It probably sounds quite good but I would question one thing. It probably draws quite a bit more Plate current and probably more filament current. (tubes with more output). If you leave the heaters in the radio off the transformer primary may handle it, but would the transformer secondaries hand the extra load? (rectifiers too...) Long term you may run into problems. Probably better to use the diode output with a HiFi amplifier if you want fidelity. Incidently, when I did the re-cap I replaced all 4 (yes 4) coupling capacitors with .022uF instead of .01. Also replaced the tantalum one with 22uF 35VDC. Sound does sound fuller. (If you look at schematic the grids of both output tubes AND voltage amplifiers have 470kOhm grid resistors, so if you use higher values on the outputs, the drivers would also benefit from .022uF.

Date: Fri, 23 Oct 1998 23:02:42 -0500
From: "Robert Nickels" <ranickel@mwci.net>
Subject: Re: [R-390] Audio Chassis - Hi Fi

>A few years back, there was a gentlemen in Colorado, advertising in
>Electric Radio, a modified R390A audio chassis.

Along with the recent discussions of R-390A audio, I was also wondering -how many have the Kleronomos audio chassis in use? And how many (like me) did the mod themselves?

Date: Sat, 24 Oct 1998 07:52:32 -0400
From: Dan Martin <dmartin@visuallink.com>
Subject: Re: [R-390] Audio Chassis - Hi Fi

I have used a Kleronomos modified audio deck in my '67 EAC for quite some time. I have been very pleased with it. It offers an excellent combination of 8 ohm output and very nice and abundant sound - when used with a decent little speaker such as one of the RS Optimus-7 or similar units. Will it beat the diode load tie-in for sound? Dunno. Probably not, ultimately. Depends on what you put on the diode load. No doubt use of the diode load has a much greater potential,of course, and an outboard audio amp keeps extra heat off-site but the Kleronomos deck makes for a great, all-in-one integrated package. The only downside after 3 years of use? Well, it is *not* the most cost effective way to get a convenient 8 ohm output *if* that is all you want. Also, no doubt it runs hotter than the standard chassis. That is to be expected, given what you're doing. I've had no problems or component failures associated with the extra heat but it is something that should influence your decision.

Date: Sat, 24 Oct 1998 08:13:31 -0300
From: "Robert Montgomery" <RMonty3@worldnet.att.net>
Subject: Re: [R-390] Audio Chassis - Hi Fi

No I do not but can tell you that with the replacement tube using a 6AQ5 and one wiring change can boost the audio output by almost double and the fidelity is a little improved. Makes a quick improvement for little effort.
I did it several years ago and happy I did.

Date: Sun, 25 Oct 1998 18:05:42 -0400
From: "Robert Montgomery" <RMonty3@worldnet.att.net>
Subject: Re: [R-390] Audio Chassis - Hi Fi

I think the only thing I did was to swap two pin outs on the socket. Seems the cathode and one other pin reversed and just plug the 6AQ5 in. Thats it. Pretty simple, ey! Get ready for lots of audio as the output must be double the orignal ckt. I have used this for several years now and works nicely. I will say that the primary of xtmr is not matched perfectly to the 6AQ5 but works great anyway. I have not tried a different xfomer as of yet as I wanted to get something close to the one in R390a. Have not found one yet and really have not spend much time looking.

Date: Sun, 25 Oct 1998 10:49:33 EST
From: JCStott@aol.com
Subject: Re: [R-390] Audio Chassis - Hi Fi

This is an acceptable modification to me, I tried it because the 6AQ5 is easier to find than the 6AK6. With a multi tapped 70 volt transformer the inpedance can be set close enough.

Date: Sun, 25 Oct 1998 10:37:49 -0800
From: "Spencer Petri" <spetri@e-tex.com>
Subject: [R-390] Audio Mod

I changed to a 6AQ5, replaced the audio transformer, with a 5K primary, in my old Motorola over 15 years ago and have never regretted doing it. Great audio output.

Date: Sun, 25 Oct 1998 11:06:35 -0600
From: Tom Norris <badger@telalink.net>
Subject: [R-390] Audio-hi-fi 6AQ5 mod?

I had understood the original post to mean a simple swap of tubes and not the output transformer as well. Will the 6AQ5 work with the original transformer and still give some improvement?

Date: Sun, 25 Oct 1998 12:48:06 EST
From: JCStott@aol.com
Subject: Re: [R-390] Audio-hi-fi 6AQ5 mod?

Yes, Graham Maynard suggests cutting pin 7 of the 6AQ5 off for a non intrusive mod. Just be careful in the operation as well as when plugging it in the socket as the modified 6AQ5 will plug in two different ways. Like having two keyways.

Date: Sun, 25 Oct 1998 18:10:01 EST
From: JCStott@aol.com
Subject: Re: [R-390] Audio Chassis - Hi Fi

> Scott, What gets swapped with the cathode. do have the pinout??

Pin outs:

6AK6	6AQ5
1.) G1 Control Grid	G1 Control Grid
2.) G3 Suppressor	G3 Suppressor and Cathode
3.) Fil	Fil
4.) Fil	Fil
5.) Anode	Anode
6.) G2 Screen Grid	G2 Screen Grid
7.) Cathode	G1 Control Grid

The R-390A V603 (Local) and V604 (Line) are a little different. For V603 you can just cut the pin #7 off the tube, For V604 it takes a little more effort.

Date: Sun, 25 Oct 1998 20:21:38 -0000
From: "Robert Montgomery" <RMonty3@worldnet.att.net>
Subject: Re: [R-390] Audio Chassis - Hi Fi

Funny, I guess I am not considered a collector but a user. I just want to get the most possible from a great receiver. Always looking to make things better. Working on some ideas to boost the r-f gain. Have to audio to hear it now but want to improve the sensitivity.....

Date: Sun, 25 Oct 1998 20:16:00 -0000
From: "Robert Montgomery" <RMonty3@worldnet.att.net>
Subject: Re: [R-390] Audio-hi-fi 6AQ5 mod?

You have to read what I posted. I thought I said that the output transformer did not match the 6AQ5 but still worked well. For best results the proper transfomer should be mounted but unable to find a potted transfomer like the original so I

never bothered changing it. There is so much gain, you don't notice the difference. Plus a wiring change with the cathode and one of the grids, Not sure which where reversed.

Date: Tue, 23 Jan 2001 11:37:50 -0800
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] R390A audio

>Last evening the audio level was so low .....

This may not really be a deck problem. Check your two audio deck connectors. These things will get intermittent. The harness hangs down a bit and get squished around. This just causes some of the pin pairs in the connectors to not quite make contact. I do not have a good fix for the problem. I just wiggle the plugs around some more until the problem settles down.

Date: Wed, 24 Jan 2001 06:19:33 -0600
From: Nolan Lee <nlee@gs.verio.net>
Subject: Re: [R-390] R390A audio

>I have repaired many R390As in the past 20 years but believe it or not never an audio problem. >Well, this is what happened. The audio in my EAC went down suddenly, then went up again >and did this a couple of times. It then remained normal.

Make sure that the wiring to the audio pot on the front panel isn't caught between the front panel and the mainframe. If it isn't, carefully inspect the shielded wiring to make sure that it hasn't been pinched in the past.

Date: Wed, 24 Jan 2001 09:05:18 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] R390A audio

More likely a dirty pot than a pinched cable.

Date: Wed, 24 Jan 2001 10:10:35 -0500
From: jmille77@bellsouth.net
Subject: Re: Re: [R-390] R390A audio

Could be an early sign of impending failure of a capacitor in the AF module (?). There is an electrolytic there that is notorious for leaking electrolyte. Perhaps other caps as well.

Date: Sat, 10 Feb 2001 10:15:49 -0500
From: Al Solway <beral@videotron.ca>
Subject: [R-390] Re: {Collins} R390A Audio

Try these two sites. I have used the 2 simple mods described in these sites.
Chuck Rippel. One of the best if not the best.
http://www.avslvb.com/R390A/index.html
Walter Wilson. Walter has compiled a tremendous amount of info.
His photos are the best. Follow the "Restoration Resources" link to "Modifications". http://www.knology.net/~wewilson/

Date: Mon, 12 Feb 2001 09:01:52 -0500
From: Kim Mackey <mackeyka@muohio.edu>

Subject: [R-390] R-390A Audio into Computer

Friday night I was successful in running the audio from my R-390A to my Mac G4 running a program called Multi Mode and decode RTTY from W1AW. This was pretty cool as It required no extra hardware. However, my method of tapping the audio was not the best. I was considering a audio isolation transformer (600 ohm - 20Kohm) when I read the response to an audio question on the list and was directed to Chuck's site. I've looked at the Diode load method of picking off audio to apply to the AUX input of a stereo. This looks like it might work well, but I'm not sure of a couple of things. My computer's audio input is a 3.5mm plug. It is a line level input (20K ohm if I'm reading the specs right). The input voltage is stated at 2.5v p-p. My questions about the the Diode Load Pickoff are: What is the impedance of the Diode load? How large is the signal coming from this spot? Will I get ground loop hum using this method and therefore should stick to picking the audio from the output through an audio isolation transformer?

Date: Mon, 12 Feb 2001 09:03:20 +0000
From: blw <ba.williams@home.com>
Subject: Re: [R-390] R-390A Audio into Computer

Congratulations on your G4. I'm using an overclocked G3 here.Audio into the Mac is painless. Just plug it into the 3.5mm plug like you said. I sometimes keep a RCA to 3.5mm adapter handy. I am taking audio from the diode point without Chuck's mod. Audio goes into a 800 to 8 ohm xformer and then direct into the audio plug on the Mac. I've been doing this for years on various models. You have always been able to run any audio into a Mac- stereo, direct from a tape deck, video camera, or TV via the audio input jack.

I think the audio output from Chuck's mod is 8 ohms, but it didn't work for me on my PH-56 Motorola for an unknown reason. Audio dropped to almost nothing when I tried it. The Radio Shack xformer is less than $5 and extremely easy to hook up. It takes only a few minutes unless you want to put it into some kind of box, which takes a few minutes more. I don't get hum or anything else but good audio from the diode point, so don't worry. It's safe and compatible.

Tell me more about Multi Mode. I have it but haven't decoded anything yet. Hard to tune? Narrow or wide bandwidth? Good display? That is by Chris Smolinski, right? He has some other programs you can download and hehas been very active in clandestine DXing for years.

Date: Mon, 12 Feb 2001 11:22:18 -0500
From: Kim Mackey <mackeyka@muohio.edu>
Subject: Re: [R-390] R-390A Audio into Computer

Thanks for the response. Which Radio Shack Transformer is that? Are you putting the 800 ohm side to the R-390A You're right about Chris Smolinski being the author of Multi Mode. I haven't been able to give it a real good test yet because of the less than ideal method I was using to get audio into my Mac. There was a buzzing sound which made it hard to get enough signal without overdriving Multi Mode. I was successful in getting it to correctly decode RTTY from W1AW. A couple of other RTTY stations were not successful, but I didn't know what parameters to set like I did for W1AW since they published them. I also decoded a few CW stations including W1AW but found that I had to set the speed to lower than actual to get it to work. I don't know yet about the other modes it claims to decode as I don't know how to recognize the signals.

Date: Tue, 13 Feb 2001 11:46:40 EST
From: Llgpt@aol.com
Subject: Re: [R-390] R-390A Audio into Computer

.....I'm running audio into the 800 side and using the 8 ohm side....

Radio Shack Part No. 32-1031

Date: Tue, 13 Feb 2001 17:13:25 EST
From: Llgpt@aol.com
Subject: Re: [R-390] Source for the Kleronimos R-390A Audio Mod

Electric Radio Magazine, issues No. 42 and an amendment in No. 43.
Audio xfrmr available from Antique Electronic Supply, p/n P-T291 $15.95.

Date: Tue, 13 Feb 2001 20:00:55 -0500
From: "James Shanks" <n1vbn@bit-net.com>
Subject: Re: [R-390] R-390A Audio into Computer

Part number is cat no. 32-1031B On the primary watts side connect ground to the ground tab <C> and the power to the 2.5 lug is what I use. For your reception solder the ground connection and after powering up radio with 8 ohm speaker connected to other side of transformer touch hot wire to each of the lugs to find best sounding lug from transformer. I know, not the best solution scientifically but it works the cookies on mine. On the side connect to ground and 8 ohms if using an 8 ohm speaker.

Date: Fri, 16 Feb 2001 03:42:47 -0500
From: Thomas W Leiper <twleiper@juno.com>
Subject: Re: [R-390] R-390A Audio into Computer

Funny, I have always had great results just using the line output fed right into the line input on a sound card. If you're worried about hum or too much low end response for your decoder, just throw a little RC network filter in there.

Date: Fri, 16 Mar 2001 16:21:14 -0600
From: David Medley <d.j.medley@att.net>
Subject: [R-390] R-390/390A limiter pot.

I have recently had several inquiries for the limiter pot/switch from these radios. Recently I have found a small supply of these units so anyone needing one please let me know. The cost is $4.50 including packing and shipping via 1st class mail. These units are NOS by Centralab. The switch included is an spdt unit whereas the one included in the R-390A was dpdt. However if you look at the schematic the switch is wired as an spdt. I installed one in an r-390A this afternoon and it works just fine.

Date: Wed, 21 Mar 2001 09:13:14 -0500
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] IF Module Questions

One question I've always been meaning to ask and keep forgetting: What's the story on those blanks covering two round holes on the IF modules? The underside of this particular module I just looked at is labeled for components R629, R630, K602, R631, C610 and XV606 around the two holes. I don't recall

ever seeing an IF module with those components in there -- all have the cover. While I'm at it, is the manufacturer of the BFO can indicate the mfr. of the IF module? The BFO in this one is Motorola. No, I'm not a module purity fanatic, though that IF is stamped MFP <grin>. Barry <snip>

Date: Wed, 21 Mar 2001 09:41:29 EST
From: Llgpt@aol.com
Subject: Re: [R-390] IF Module Questions

The answer is no. Many of the later BFO PTO's were manufactured by Artesan.

Date: Wed, 21 Mar 2001 09:04:24 -0600
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] IF Module Questions

> One question I've always been meaning to ask and keep forgetting: What's
> the story on those blanks covering two round holes on the IF modules?

They're for the optional squelch unit. (and they are on the AF deck)

Date: Wed, 21 Mar 2001 10:10:21 -0600
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] IF Module Questions

Is the squelch position the far right position on the Function switch (past "Calibrate")?

Date: Wed, 21 Mar 2001 10:21:43 -0600
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] IF Module Questions

The R-390 Cost Reduction Program redesigned the R-390 non-A into the - -A. Among other changes the Squelch function in the non-A was dropped. But the switch position and contact, the wires in the harness, and the space in the IF module for the needed tube, components and relay were left in. A field change was issued to enable installation of the squelch feature. R-390A's with the field change installed have been reported. You can do it yourself if you find the relay and other parts.

Date: Wed, 21 Mar 2001 10:47:59 -0800 (PST)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] IF Module Questions

Sounds like you are describing the blanks on the audio deck. These are for the very rare squelch option. The squelch circuitry is shown in drawings on the drawing CD. The PTO does not necessarily indicate the maker of the deck, however, if it is Collins or Motorola, it is a good bet they made the deck.

There are other makers of PTO's like Artisan..... which made no decks.

Date: Sat, 7 Apr 2001 12:44:50 EDT
From: Llgpt@aol.com
Subject: Re: [R-390] Squelch all that ...

Yes, there are some out there, ALL of the R-390A AF chassis have the wiring already in place for the squelch circuit. Les Locklear

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Date: Sat, 07 Apr 2001 21:34:06 -0500
From: Tom Norris <badger@telalink.net>
Subject: [R-390] 67 EAC odd Audio Behavior

Just traded for Yet Another R-390A, a 1967 EAC in very good shape. Has an odd problem, but before I dig out the manual (RTFM) figured I would ask here --- The problem : local audio can be controlled with both local and line gain. Almost like the previous owner tied them both together. Nothing looks amiss as far as the wiring harness. Guess it is time to pull the audio chassis. Hints, guys? Other than my own above?

Date: Sun, 8 Apr 2001 07:41:56 -0400
From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] 67 EAC odd Audio Behavior

Before pulling the audio deck, check the chassis wiring. Take a look at the schematic (Figure 5-23, part 6 of 7 in the Y2K manual), and notice how the line gain and local gain potentiometers are connected together. I believe if you were to lift the ground on the local gain pot (or both pots for that matter), you'd get behavior similar to what you describe. Get out the VOM and take some resistance measurements and especially check the grounds.

Date: Sun, 8 Apr 2001 09:12:06 EDT
From: Llgpt@aol.com
Subject: Re: [R-390] 67 EAC odd Audio Behavior

Look at the resistor board near top of front panel, see if R113 has been clipped. That will cause the problem, also makes the line level meter readings off.

Date: Sun, 08 Apr 2001 09:13:11 -0500
From: Tom Norris <badger@telalink.net>
Subject: Re: [R-390] 67 EAC odd Audio Behavior

Yea, I need to actually pull out the manual -- have not yet. Haven't even pulled the radio to a point where I can actually look at it in this cluttered hole of a shack. :-) Thanks to folks for all the hints. Seems I have had this happen before on one that I was refurbing from Fair a few years ago when I was giving myself hernias fixing the "repairables" for folks (doing my mini rippel/mish imitation!). Did a half dozen or so, back when I was at the job that let me store stacks of them in the work bay and did not mind my using the bench after hours. Now, no bench, just a TV cart that I use when I take my computer scanner off it. Moved a year ago, and have not yet built a decent shop area... :-(If I remember correctly, it was indeed a ground problem on the 2-3 that did that. BUT they had at least some line out, this one does not, but I will dig into it this evening and RTFM.

Date: Sun, 08 Apr 2001 12:04:20 -0500
From: Tom Norris <badger@telalink.net>
Subject: Re: [R-390] 67 EAC odd Audio Behavior

Yep, definitely have to RTFM. No clipped resistors. Both posts have a good ground return. (0 ohms). So much for the easy fixes. The good news is that I came across enough IERC shields to do fit the radio for cooler running. :-)

Date: Tue, 10 Jul 2001 15:28:34 -0400

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] I Got One

You didn't mention the 8 mfd wet tantalum in the audio deck -- (C608 or 609? -- I forget) Did you replace it? These have nearly all failed and leaked acid on the circuit board strip. If it hasn't already been replaced, you can use a 10 mfd 35v. electrolytic from RS meanwhile - or longer than meanwhile. ;-)

Date: Tue, 10 Jul 2001 14:19:19 -0700
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] I Got One

Thanks, Barry, I did mention it, but without my notes I couldn't remember the number so I just called it the "cap that rots". It looks fine. Somebody's tested it. I'll test it as time permits. Your suggested 10/35 electrolytic would be fine, although the amount of heat in there might shorten its life. If you want it to last forever, use a dry tantalum. In this application (audio cathode bypass), bigger is almost always better; use the biggest that will fit. 10WVDC is probably enough. Even 6 might be, I can't remember the exact bias. They used 30 uF because it was probably the cheapest. Or the most available.

Date: Wed, 8 Aug 2001 10:55:21 -0500
From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: [R-390] Looking for Audio Deck

I didn't have the "fastest finger time" (sorry Regis) for Phil's stuff, so I missed out. Anyone know where I can get a good audio deck -- preferably one of the later vintage like an EAC? I've tried to get Fair to locate one, but so far, not much luck. By the way, is Fair's item, http://www.fairradio.com/0102-567.htm, worthwhile for our beloved boatanchors? It's SandState and that alone might disqualify it, but it looks like a decent solution. What think the listers?

Date: Wed, 08 Aug 2001 14:23:24 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] Looking for Audio Deck (and Fair's solid state line regulator)

At 70 lbs, that baby qualifies as a boatanchor, sand state or not! Might be nice to have for truly spike sensitive gear such as sand state stuff. For classic boatanchors like our beloved R-390* family, barring huge ones, spikes shouldn't be a problem. If your line voltage varies all over the place, this should be a good solution, though. Anyone know if these things hum loudly like the Sola stuff? Be careful where you lay that puppy down. Remember Rich's big toe? :-)

Date: Wed, 15 Aug 2001 07:13:45 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: [R-390] Audio unit 3 wires ?

Hi, what is the purpose of the 3 wires inside the black spaghetti that goes nowhere on one end, on the underside of the audio unit. I find the J519 and J520 pins that they seem to be connected to by using an ohmmeter . Do these power or connect to, etc the whatever that goes where the small plate covers a hole in the chassis next to the two connector pins topside? I tried the Y2K manual but couldn't figure it out. It's probably not relevant to anything I'll ever do with the Capehart audio unit I'm trying to modify to 6360's output, and looks the

same as the EAC audio unit now in my working set but curiousity always wins my time, thanks, Dan.

Date: Wed, 15 Aug 2001 10:26:50 -0400
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Audio unit 3 wires ?

Sounds like those connections are for the optional squelch which goes where the blank is on the audio deck. Does anyone have the squelch add-on .. or ever seen one?

Date: Wed, 15 Aug 2001 11:58:27 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Audio unit 3 wires ?

>Sounds like those connections are for the optional squelch which goes where the blank is on >the audio deck.

You are right.

>Does anyone have the squelch add-on .. or ever seen one?

Not in an R-390A, but the circuit is in the R-390 non-A. which I have.

Date: Fri, 17 Aug 2001 23:30:40 -0500
From: "Dutch WB7DYW" <WB7DYW@ev1.net>
Subject: [R-390] R-390 Making a Ticking noise.

Well gang, thanks to Dave Medley's help and all of the folks on the R-390 reflector I found the "Ticking" noise it was R626 2.7 K resistor in the audio module. And thanks to Dave's help I was able to locate it and correct the problem. When checking the 180 VDC I was getting 120 and now have the full 180 VDC and the radio is running at full strength again, it still needs a little work but the big problem's are solved, my hat's off to Dave and everyone that offered there suggestions. Thanks again.

Date: Sat, 08 Sep 2001 15:03:13 -0400
From: James Miller <JamesMiller20@worldnet.att.net>
Subject: [R-390] Intermittent Audio Level

Have a strange problem with my 390a that has been in the garage all summer. Worked great several months ago but now when I turn it on the audio level jumps up and down intermittently, and there is a crackling noise, until the radio has warmed up well. I have replaced the AF and IF modules with spares and it still does it. If it stabilizes,

I can sometimes get it to start again by switching the BFO on and off, or by switching from AGC to MGC and back again. Like a sudden change in audio level causes it to start. The carrier level seems to remain constant when it does this, but the audio level pops up and down. If I disable the RF front end I still get the crackling noise from time to time.

My suspicions are something in the wiring harness, connectors, or the front panel switches/controls, like maybe moisture or insects got in there.. I have inspected and cleaned them, but still no better. Any ideas? Does this sound famiuliar to any one? Thanks Jim N4BE

Date: Sat, 08 Sep 2001 12:48:43 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: [R-390] 390a 6360 audio

Hi, I just completed modification of extra audio unit per ER articles using 6360/6DJ8/6AH6 to get some better sound out of my 390A. I am very happy with the result - this project took a couple of days besides the time I took rounding up the parts and the extra audio chassis, a Capehart unit from Phil Mills, thanks Phil. The time-consuming part was laying out the various additions on the circuit board in my mind before starting so it would end up looking tidy. This all worked out well. Once I got it together, it worked out of the gate - one minor problem with reduced volume was traced to a floating cathode on the 5814a cathode follower caused by broken wire of the cathode pin to one of the circuit board posts. I was amazed how well the set worked in spite of this open connection. This was the third one of these connections I fixed - the soldered wires at these posts don't take much flexing and tended to break - caused by my many movements of this board in attaching the various caps and resistors. As to the sound: I have been operating the 390a with an attached RCA 6V6 pp preamp/amp at the diode load connection and a direct comparison of this and the 6360 mod was made after completion. The RCA amp sounds a little better, probably because I have tweaked the bass/treble to my liking but it's a minor difference. I haven't added the 0.002 cap across the primary of the output transformer per the ER article so that may make a difference. But this modification will reduce my bench clutter and was undertaken to make the set more "compact", hi. But I kept the original EAC audio unit intact to please the next owner and my own interest in having an original unit. In locating tubes for the mod, I found the 6360's readily available at a swapmeet for a couple of bucks. I had never thought about this tube before this project and many of my ham friends wondered why this transmitter tube was put to service as an audio output tube - guess it fit the bill. I thought I had 3 6DJ8's from my own stockpile but each turned up weak so I found a 6922 that I ended up using. I wondered how well a 6BQ7a would work in place of that tube but haven't tried that yet. The 6AH6 that replaced the line output 6AK6 was seen in many boxes when I was tube searching. Out of curiousity, I wonder how many of these mod's are in sets out there?

Date: Sat, 08 Sep 2001 14:51:36 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] Intermittent Audio Level

Jim, is this the same problem Walter Wilson had back on July 23, a cable problem with coax shield shorting to wire, the coax causing this was small one going from diode load to limiter potentiometer as I recall? I'll forward the message to you, Dan

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Date: Sat, 8 Sep 2001 18:05:56 EDT
From: Llgpt@aol.com
Subject: Re: [R-390] 390a 6360 audio

I've had two of them, sound great.

Date: Sat, 8 Sep 2001 19:32:47 -0400
From: "Helmut Usbeck" <vze2gmp4@verizon.net>
Subject: Re: [R-390] 390a 6360 audio

Does anyone have a schematic on this audio mod they could send me?
Thanks.

Date: Sat, 08 Sep 2001 17:49:27 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] 390a 6360 audio

Helm, I can scan the page out of 97 ER and send it to you. If you are serious about making the mod, it'll help to have more than just the 97 schematic, namely the 91 and 97 ER articles. I have an original 97 issue but only a fuzzy copy of the first articles, which I painstakingly typed as a text file. The 97 issue doesn't contain the whole story or the 6AH6 circuit. Let me know what detail you need. Dan.

Date: Sat, 08 Sep 2001 20:36:03 +0000
From: blw <ba.williams@home.com>
Subject: Re: [R-390] 390a 6360 audio

Are these subs just for the audio mod, or can you use them on stock AF decks? I have a lot of 6DJ8's and I can't remember why I started wanting them. I must have some notes lost around here on that tube. I seem to recall that I have a lot of 6AH6's too. I never looked those up as subs for anything. I'm using 6J6's in the 2nd and 3rd mixers, and 12AT7's for the 5814's in the AF deck. The 12AT7 is supposed to be quieter than the 12AX7. The audio crowd just about worships the 12AX7, so prices are jacked up.

Date: Sat, 08 Sep 2001 22:50:51 -0400
From: James Miller <JamesMiller20@worldnet.att.net>
Subject: [R-390] Re: forwarded 390a message on coax short

Yep I bet this coax short is the problem. I was almost there... I had it isolated to the diode load line, I could see it on the scope on that line even with the last IF tube removed...so it is occurring between the detector tube and the limiter, on the diode load line I think...seems like it only does this or is most noticable when BFO is on. So I will now try the ideas in this message to isolate it to the shielded cable in question, if that is it...sure sounds like it! Must be a problem in more than one radio. Thanks to all... I will report final findings. 73

Date: Sat, 08 Sep 2001 21:11:26 -0700
From: "James A. (Andy) Moorer" <jam@sonic.com>
Subject: Re: [R-390] 390a 6360 audio

Could you please give us the ER issue numbers so we can just order them from Barry Wiseman <brw@frontier.net>?

Date: Sat, 08 Sep 2001 23:16:37 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] 390a 6360 audio

Andy, that's great idea, all articles authored by Bill Kleronomos, Real Audio for the 390a, latest article Feb 1997 p34, 1st article October 1992, correction to first article November 1992. The 6AH6 was replacement output amp for the line amplifier to reduce tube count on that side. The local amp (speaker amp) had 1 original 5814a (also part of the line amp), a 6DJ8 and the output 6360. In the first article a 6BA8 was used and this was changed to 6DJ8 in the latest article as an improvement. Dan.

Date: Sun, 09 Sep 2001 10:06:21 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] 390a 6360 audio

Jim, yes, you may be right - it was a lot of work and the dream is always better than the reality. I do about every time-consuming radio job that interests me about once - I would put this one in that category. Doing it a second time wouldn't take as much time. I put the 0.002 cap across the output primary and did some more serious listening with it yesterday. It's an improvement - it's not as good as my external amp. I counted the tube stages beyond the detector, figuring 6 for the mod, 2 triodes, 2 triodes and 2 tetrodes compared to 6 for my external amp, triode, triode, 2 triodes and 2 pentodes and so with the same number of equivalent tubes, the RCA amp does better. I suspect a lot of the difference is the bigger output transformer on the external amp compared to the Merit A2901 that I put in the 390a. I couldn't come up with anything better that would fit the space but will keep my eyes open, Dan.

Date: Sun, 09 Sep 2001 22:53:30 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] 390a 6360 audio

Ray, one way to get complete copies of these articles is to contact Barry Wiseman N6CSW editor of Electric Radio at er@frontier.net. The price for each months issue is $3.75/issue. I don't know whether he will provide copies of individual articles rather than the complete issue for the month. . I'll repeat the dates: all articles were authored by Bill Kleronomos, Real Audio for the 390a, latest article Feb 1997 p34, 1st article October 1992, correction to first article November 1992. My copies of the 92 articles are not complete and are pretty poor, as I have subscribed to ER for only the last 7 years. I made a mistake in one of my earlier postings about the first article being from 1991. It was 1992. I am a little hesitant to offer for free or to sell copies that are copyrighted without checking with Electric Radio as a courtesy to Barry and from a desire to support his magazine. Afterall, there aren't too many other boatanchor publications that I know about. Let me know what you find out about getting the articles, Dan

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Date: Mon, 10 Sep 2001 19:53:43 +0000
From: blw <ba.williams@home.com>
Subject: Re: [R-390] 390a 6360 audio

You got the wrong Barry. I'm the other other Barry. It happens all the time.(g) I read the 12AT7 sub in Hollow State Newsletter. I don't have the issue # at the moment, just a photocopied sheet that I keep as reference near the manuals. Paul Zecchino wrote about using them for audio gain. I've been running them for several years now with no problems. I did see several of them go bad on an AF deck that had major problems. It ended up frying one of the resistors on the daughter board (forgot the resistor location at the moment). That deck is not in use until I replace everything on it. I'm attributing short tube life on that deck to other problems like original caps, out of tolerance resistors, etc. I just got a message from someone else who said that the plate voltages on the 12AT7 would indicate fast burn out of that tube, but the original 2 have lasted a long time so far. He suggested the 12AV7 as a possible sub. I haven't looked at the few books I have yet, but I do remember having some of those stored away. I can see why the 12AX7 would be a choice to use. I'm lucky to have a good many on hand if I ever decide to go to either. That need for 6DJ8's is going to drive me nuts until I find out why I wanted them in the first place. Maybe it is for

another piece of gear and not the R-390A. Well, I got a few now if I ever recall why I wanted em. That's why I keep my tube notes near the manuals....except in this case. The subs for the 6AK6 listed in 2 Hollow States Newsletters are: 6AU6, 6BA6, 6HR6, 6HS6, GB 5136, and 7543. I think there are others, but I lost my best links to tube pages when my harddrive crashed a while back. The 6AK6 is only $2.00 each from Gary Brown at http://
Tubes_Tubes_Tubes.tripod.com/
He was recommended a long time ago by someone on this list. I can't find any substitute for the 6AH6. I don't know how to do a backwards search....like search all of the 6 volt tubes to see if any are listed a using the 6AH6 as a sub. Maybe I should do an OCR project this winter from my substitution ----books for one big database, or find a good website that has more complete data.

Date: Mon, 17 Sep 2001 09:05:05 -0700
From: Leo Jormanainen <lexa@mail.island.net>
Subject: [R-390] R-390A Audio

Is there any way to disable (turn off or unplug) the audio section on my R-390A? I use a Hammarlund HC-10 converter full time.

Date: Mon, 17 Sep 2001 17:57:29 -0400
From: Bob Camp <bob@cq.nu>
Subject: Re: [R-390] R-390A Audio

You might just try pulling the audio tubes out of the module. The load on the power supply will go down so the supply voltage will rise a little, but it should work. Note that you do need to leave the VR tube in place, all the others come out.

Date: Mon, 17 Sep 2001 20:24:17 EDT
From: DJED1@aol.com
Subject: Re: [R-390] R-390A Audio

It would be simplest to take off the jumper which connects the diode detector and load. You don't have to take tubes out, and it's easily reversible.

Date: Fri, 5 Oct 2001 11:16:08 -0500
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] R390A Hum

> I am hearing an audio hum every time I turn on my R390A. .....

Filter caps, for a start. From what I've seen, they are prone to failure. I've seen some posts talking about new or rebuilt plug-in caps for relatively-reasonable prices. Also check out the power rectifier(s).

Date: Fri, 5 Oct 2001 12:38:29 -0400
From: "AI2Q Alex" <ai2q@adelphia.net>
Subject: RE: [R-390] R390A Hum

Usually, if the hum goes down as the audio pot is reduced, then the hum is likely before the AF stages/volume-control. If the hum doesn't drop when you move the gain control, then it's usually in the following stages, or perhaps the power supply. Can you discern if it's 60-cycle (Hz) or 120-cycle hum? If the latter, then it's most certainly ripple (power supply filtering) related. If the former, then you need to search for leaky caps, loose wires, bad tubes, etc. Recently I

was restoring a 51J-4 and had a hum problem that I traced to one of the set's IF amplifier stages. When I placed my signal tracer probe on the chassis (sort of like shorting the test leads of an ohmmeter; a technician will do this frequently during troubleshooting sessions--sort of a conditioned reflex) there was no hum. When I placed the signal tracer probe on a terminal strip ground lug in the suspect IF stage, there was hum! A quick turn with a 1/4-in. SpinTite wrench, tightening the ground lug screw, and---voila!--the hum was gone.

Date: Mon, 15 Oct 2001 18:35:10 -0500
From: <vze2gmp4@verizon.net>
Subject: [R-390] audio mod

Finished off my audio modification of my R-390a. That took about 3 weeks. Putting it out on my web page took 3 months. Lottsa stuff going on over here lately. And everywhere else for that matter. Anyhow it can be viewed at: www.zorkler.com Comments on the mod or web page are welcomed.

Date: Thu, 25 Oct 2001 20:54:26 -0400
From: "Bill Riches" <bill.riches@verizon.net>
Subject: Re: [R-390] (Slightly OT) R-1051 output levels?

The R1051 will not drive a speaker - you must take the line out to an amplifier - I used a computer speaker system - el-cheapo with built in amp. Made up cord with r1051 plugs on one end and a stereo plug on the other to feed into the speaker-amp.

Date: Thu, 25 Oct 2001 20:49:40 -0500
From: mikea <mikea@mikea.ath.cx>
Subject: [R-390] (slightly OT): R-1051 line levels: solved

You folks are just great. Thanks to the twenty or so people who sent me tips and ideas. I went to RatShack and got a pair of RCA 4" boxed speakers, and wired them to the 70.7 volt transformers I got earlier today. Then I wired the transformers up, using speaker wire and the correct Amphenol connectors, and hung 'em off the audio outputs. Damned if it didn't work! I guess the transformer I was trying to get to go yesterday just wasn't up to the job.

Date: Thu, 25 Oct 2001 22:31:55 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] (Slightly OT) R-1051 output levels?

I've run speakers from the headphone jacks using just a 600/8 transformer. Audio quality isn't the greatest, but generally loud enough. It might depend on the efficiency of the speakers. Also try swapping the two audio modules -- they're the same.

One might be bad. As I recall, only the USB port works on AM, so if you switch to USB, you have to switch outputs. Easier to set up for "stereo" and be set up for the ISB mode too.

Date: Mon, 29 Oct 2001 08:49:59 -0400
From: "Guido E. Santacana" <laffitte@prtc.net>
Subject: [R-390] 75A2 Manual/R390A Hum Resolved

I know that this may be a bit off beat but a 75A2 just flew through my shack window complete, not working and no manual. Since I know many of you share this same interest, I would greatly appreciate a copy of the manual for this one. I will be glad to pay for copying and shipping.

Thanks to all who answered my plea for help regarding the R390A audio hum. It was the filter caps. Replacement eliminated the hum completely. I proceeded to replace them all.

From: "Joe" <joe.amp@verizon.net>
Subject: Re: [R-390] Audio resistors?
Date: Sat, 29 Dec 2001 10:27:23 -0500

I read some off the threads here and find them funny. Audiophiles guys are the worst ! One guy around here pays $300 for "Golden Dragon" (Sino Chinese) 12AX7 for his tube mic's, I can get them bulk boxed without the fancy silk-screening and screening for $60 a dozen but usually have to throw away half My main gig is working on guitar amps that have many stages of soaring gain. Go with regular carbon and double the MFD use polypro orange drops for the coupling. If you want to get into it you can look for a strong Mullard "pull" 12AU7 with matching triodes. That "WILL" sound great audio especially in the non A. If you one of the guys with SS diodes and 200 ohm resistor replacing the 26Z5: Cranking the audio loud with a strong 12A*7's in the audio section the set's PTO may frequency modulate to the audio. Use a Variac and no resistor with diodes

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From: "Mike Hardie" <hardiem@intergate.ca>
To: <R-390@mailman.qth.net>
Date: Sun, 6 Jan 2002 13:46:06 -0800
Subject: [R-390] Problem, Noise Limiter, R-390A

As the noise limiter control is turned from "off" to "1" there is no change in the audio, but past "1" to "2" there is a brief pause then the audio disappears. There isn't any change from there to fully clockwise. The process is reversed as the control is moved back to "off". There isn't much RF noise here but I'd like to get it working. Before tearing into the radio does anyone have a suggestion on where to look?

From: "Kenneth Crips" <w7itc@hotmail.com>
To: hardiem@intergate.ca, R-390@mailman.qth.net
Subject: Re: [R-390] Problem, Noise Limiter, R-390A
Date: Sun, 06 Jan 2002 17:49:55 -0700

Doesn't sound like there anything wrong to me. Mine more or less behaves the same way. But if I leave one of My light dimmers on low, or electric motors going the R390's noise limiter nails them.

From: "Kenneth Crips" <w7itc@hotmail.com>
To: r-390@mailman.qth.net
Subject: Re: [R-390] PSK-31
Date: Fri, 18 Jan 2002 23:08:00 -0700

Yes I use My R390A for PSK31, it works very well. I use the line out so I have a meter and can control the input to the sound card. I use a microphone transformer to isolate the R390 form the sound card and this let things more or less see the proper impedence. I don't know where the Mic' transformer came from it was just in one of the junk boxes. Ken

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Date: Fri, 18 Jan 2002 23:24:27 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] PSK-31

> Has anyone tried receiving PSK-31 on an R390A? <snip>

Haven't actually tried it yet, but I recently aquired a prewired "interface". This particular one is for receive only and consists of just a 1K to 1K mini audio transformer in a small plastic project box. Has a mono mini phono socket and a stereo mini phono socket with only one channel wired. Not sure if that's to accommodate a stereo line in for the card or stereo headphone jack on the more typical radios used. Looks like all the parts came from Radio Shack and was priced accordingly. I have a whole bunch of links to web sites with that circuit plus others and a variety of software for download -- but not where I'm at now. I suspect that isolating the circuits is the main thing, impedance matching not as critical. I read that output from the radio needs to be as low as possible, so you'll need some way to control it, so maybe makes sense to use the audio out so you can use the gain control.

Date: Sat, 19 Jan 2002 08:47:59 -0600
Subject: Re: [R-390] PSK-31
From: blw <ba.williams@charter.net>

> Has anyone tried receiving PSK-31 on an R390A? If so, how did you <snip>

I've not used sound in on a Windows computer, but I've been doing it on Macs for a number of years now. I've run R-390A audio thru a 800-8 ohm transformer directly into the Mac or into my stereo system and then into Macs.

Either way it is fine going directly into the computer. I don't recall ever seeing a sound card for Macs, so I can't help you there. I've tried audio from the radio to the Mac using a decoder program for Windows under emulation. I only played with it a few minutes and never actually got it to decode fax, WOLF, or code. I should go back and tinker with it. Audio from the A is very good and stable. I've never encountered any problems compared to any other sound source. I do a lot of sound work from video tapes, cassette, radio, FM stations, etc. Audio from the A is just like all the others.

From: "Kenneth Crips" <w7itc@hotmail.com>
To: r-390@mailman.qth.net
Subject: Re: [R-390] R-388
Date: Mon, 21 Jan 2002 22:00:20 -0700

RE: Generally, I think the audio quality of the whole 51J series radios sucks. That is indeed the real short coming of the 51J's. However I have a FR101 Yaesu that has the worse audio of any radio in good repair I have ever had. It is astounding to listen to a R390A when you take the audio off at the diode out and feed that into a high powered AV system, with the proper jumper of course, it sounds just like some of the old console radios.

Date: Mon, 21 Jan 2002 21:35:51 -0800 (PST)
From: Rodney Bunt <rodney_bunt@yahoo.com>
Subject: Re: [R-390] R-388 - Audio Quality
To: Kenneth Crips <w7itc@hotmail.com>, r-390@mailman.qth.net

Now if you want Quality Audio, the Hallicrafters SX-28 and SX-42, BIG AUDIO!!! A pair of 6V6 tubes in push-pull, not any old push-pull with some lousy single tube phase inverter, no no no, a full blown differential amplifier feeding the Output tubes. In the SX-42 of 1947 vintage, it had negative feedback from the speaker side of the output transformer for extra low distortion, the receiver also had two wideband FM ranges for your post war music enthusiasts, who listened to those "new fangled" FM radio stations. There was also a huge 12" Bass Refrex Hallicrafters speaker/cabinet (wood of course) approx 4ft tall and 2 ft wide for use with the SX-28, drop me a line I have a jpg of one (in colour) if you are interested.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
To: "R390 (E-mail)" <R-390@mailman.qth.net>
Date: Tue, 22 Jan 2002 08:19:17 -0600
Subject: [R-390] PSK-31 and an R390A

Got the R390A coupled to the laptop last night and copied PSK-31 just fine. Too cool to have the two technologies working together that way. Wish I could find a RTTY package that works with the soundcard that would be as easy to use as this is. Thanks for all the advice,

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Date: Tue, 22 Jan 2002 14:24:36 -0500
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: Re: [R-390] R-388 - Audio Quality

Don't forget the SX-62* series, also runs a pair of 6V6's push/pull. GREAT dial too, just picky when it comes to tuning. Apparently the SX-62 is a repackaged version of the SX-42 sans bandspread. I've got an R-388 with a bit of a hum, but I've never heard wild praise for the audio. More that it is adequate, the rig holds calibration well, and is stable as well as sensitive. Also built with the typical Collins quality. More like a communications radio than an entertainment receiver, I guess.

Date: Tue, 22 Jan 2002 14:25:42 -0500
Subject: Re: [R-390] PSK-31 and an R390A
From: twleiper@juno.com

> Wish I could find a RTTY package that works with the soundcard that would be as easy to use as this is.

There are plenty of free and evaluation TTY, CW and multi-mode programs for sound cards available on the WEB, such as TrueTTY and CWGet, etc. There's also a site that has links to all these download sites. I don't have the link here in my laptop, but I think I do at home...I'll send it if I ever get back...Stuck down in Greensboro.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
To: "R390 (E-mail)" <R-390@mailman.qth.net>
Subject: RE: [R-390] PSK-31 and an R390A
Date: Tue, 22 Jan 2002 13:35:23 -0600

Yeah, sometimes I feel a bit like Dr. Frankenstein. A little bit of the old and a little bit of the new and "voila". Yes, I admit to attaching a computer as well as a sand-state product detector to the R390A. But I kind of draw the line at that. I like the innards to stay intact. It has a 3TF7 and 26Z5Ws.

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Date: Thu, 07 Feb 2002 14:49:05 -0600
To: r-390@mailman.qth.net
From: David Medley <davidmed@sbcglobal.net>
Subject: [R-390] [r390] Limiter Problem

I have an R-390 which has a limiter problem. With the limiter off there is horrible audio distortion. As soon as it is turned on the radio sounds normal. I seem to remember some discussion of this problem a while ago re the R-390A. Would appreciate some suggestions.

From: "Jim Temple" <jetemp01@athena.louisville.edu>
Subject: Re: [R-390] [r390] Limiter Problem
Date: Thu, 7 Feb 2002 22:59:36 -0500

I just solved a similar problem. On Chuck Ripples site, there is a section in the "technical" area that discusses "frequent problem" areas. In the discussion, there are mentioned three capacitors that affect the limiter, that when replaced, will solve the problem. Check out www.r390a.com

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Date: Sat, 09 Feb 2002 15:18:02 -0600
From: David Medley <davidmed@sbcglobal.net>
Subject: [r-390] R-390 audio problem solved

I have solved the audio distortion problem in my R-390. Turned out to be a little more difficult than first thought. Anyway I have written it up and put it on my web page for future reference.
Check my Web Page at: <http://www.davemed.info>

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [r-390] R-390 audio problem solved
Date: Sun, 10 Feb 2002 18:24:44 -0600

I would like to read about it, but the website doesn't appear to be working at the moment.

Date: Fri, 15 Feb 2002 20:13:39 -0600
From: David Medley <davidmed@sbcglobal.net>
Subject: [R-390] Wanted source for pots

I need a few 2,5k audio taper and linear taper pots such as are used in the R-390 series. The el cheapo Japanese ones won't fit because of the thickness of the panel. Would appreciate any help.

From: "Bill Riches" <bill.riches@verizon.net>
Subject: RE: [R-390] Wanted source for pots
Date: Sat, 16 Feb 2002 11:05:49 -0500

I need a few 2,5k audio taper and linear taper pots .....

Check out Newark - 1-800-463 9275. They have Clarostat RN4NAYSD linear taper pots with .875 or 2.5 inch shaft. Various resistances from 500 ohm to 500 k. On page 788 of their catalog 117. Price is $9.00.

Date: Mon, 18 Feb 2002 23:08:32 -0500

Subject: Re: [R-390] Perhaps Dumb question
To: "Tom M." <courir26@yahoo.com>, R-390 List <r-390@mailman.qth.net>

It isn't the most sophisticated methodology, but it got me isolated to the AF module. Alleluia! Burnt resistors located by aroma and appearance. Will temporarily rob Peter to pay Paul, and recap the whole module. Hope to have success tonight!

Date: Sat, 23 Feb 2002 10:45:30 -0500
From: rbethman@comcast.net
Subject: Re: [R-390] Perhaps Dumb question...Now have answer

The module isolation found two crispsed resistors. Replaced same, recapped module. Popped fuse again, FINALLY tested tubes. **One each 6AK6 in AF module shorted.** Now back up and running just great! Thanks All! Bob

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From: "Mel Williams" <mel.williams@charter.net>
Date: Mon, 4 Mar 2002 15:26:31 -0500
Subject: [R-390] Speaker connections

I think I saw an article on one of the R-390 links/lists that showed how to use a 70v line transformer from Radio Shack to connect a speaker to the unit. Could someone please direct me to this information if it does exist.

Date: Mon, 4 Mar 2002 14:50:54 -0600
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] Speaker connections

It's a trivial thing; I did it w/o schematic. On the usual sort of 70V line transformer, there is a hi-Z winding. That goes across the Line Out terminals. On the Lo-Z winding, there usually are taps to match various speaker impedances. Choose the one that fits your speaker.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Speaker connections
Date: Mon, 4 Mar 2002 14:56:31 -0600

The RS xfmr has multiple taps on the primary side. One works better than the others. I think it's about 500-ohms but I don't recall which tap that it is.

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] Speaker connections
Date: Mon, 4 Mar 2002 13:23:55 -0800

A 70.2 volt line transformer will act as a 500 ohm-to-voice coil transformer at 10 watts. For general purposes, such transformers are suitable for transforming a 500 ohm audio output to a lower impedance such as with a 4 or 8 or 16 ohm speaker. Simply, a transformer simply performs conversion, based on the ratio of primary to secondary turns, from one impedance to another. Since power is a combination of voltage and current, you are using the transformer to convert a ratio of some voltage and current (higher voltage, lower current at 500 ohms impedance) to another ratio (lower voltage and higher current at speaker voice-coil impedance) with a minimum loss of power (best match). In this case, the 70.2 volt line is the primary of the transformer. The primary (or in some transformers, the secondary) may be tapped in a series of wattage specifications, which is a simple way of setting individual speaker volume when

a number of speakers are connected together in a public address system. You, of course, want the loudest setting. Such transformers can have taps on the primary winding (70.2 volt) or secondary (speaker voice-coil). Some have taps on both primary and secondary. Many of the transformers have wattage specifications, just choose the highest wattage terminals. If you are not sure which terminals to use, connect the R-390 to the "line" or 70.2 volt terminals, and experiment by testing for which ever terminals sound best with the speaker you have. Since more power is needed at low frequencies, listen for best "lows" and maximum volume from the speaker.

From: "Kenneth Crips" <w7itc@hotmail.com>
Date: Mon, 04 Mar 2002 19:37:16 -0700
Subject: [R-390] 70 Volt transformer

The attachment is the spec' sheet for the 70 Volt transformer in discussion.

Date: Mon, 08 Apr 2002 13:21:15 -0300
From: "Guido E. Santacana" <laffitte@prtc.net>
Subject: [R-390] Tantalum or not Tantalum

Hi Gang, Just a simple question. Is it better to replace the famous 8uF cap in the audio section with a tantalun cap or just a normal electrolytic?

Subject: Re: [R-390] Tantalum or not Tantalum
From: "Roger L Ruszkowski" <rlruszkowski@raytheon.com>
Date: Mon, 8 Apr 2002 10:49:15 -0700

..... Just a simple question. Is it better to replace the famous 8uF cap.....

Cap technology has come so far since the 1950's there are many wonderful new caps that will work. Today the question is how much cap can you get into the space? The replacement need not be a 8, a 10 - 20 will work very nice.

It need not be any magic kind. What ever you can find with Axial leads. Check this against the schematic. I think it is a cathode bypass cap. It was rated at 250 volt in case the tube shorted. If the new cap is not going to splatter acid all over the place if it fails, it need not even be rated for the full voltage.

If the tube does short a low voltage (50volt) cap will fail. If your going for exact historical replacement then you need the real time. If your going for functionality, then any 8 - 25 at 25 or more volts that fits in the space will work.

From: David Wise <David_Wise@Phoenix.com>
Subject: RE: [R-390] Tantalum or not Tantalum
Date: Mon, 8 Apr 2002 11:05:00 -0700

Electrically, it doesn't matter in the least. You can put in anything you want, tantalum, aluminum, whatever, as long as it's 8uF or larger, with a rated voltage of 6V or more. when I have to do one,

I'll probably use a 22/16 axial-lead aluminum, since I have many of those. The temperature under the AF deck is fairly high, so best would be a cap rated for long life at 105_C

From: David Wise <David_Wise@Phoenix.com>
Subject: RE: [R-390] Mechanical filter postmortem Kudo's

Date: Mon, 8 Apr 2002 11:11:05 -0700

PS - on your tantalum reply, I think the original was 25V, not 250V. Not that they didn't make high-voltage tantalums; I have some 160s in my junkbox. But an 8/250 would be a pretty big can.

From: "Ed Tanton" <n4xy@earthlink.net>
Subject: RE: [R-390] Tantalum or not Tantalum
Date: Mon, 8 Apr 2002 15:38:56 -0400

I disagree... there is a significantly different (lower) ESR for tantalums from 'regular' electrolytics. This could affect the loading on whatever stage is driving through it. While it probably wouldn't matter, I feel the more conservative approach would be to use the same type as the designers intended-e.g. a 'regular' electrolytic.

From: "Ed Tanton" <n4xy@earthlink.net>
Subject: RE: [R-390] Tantalum or not Tantalum
Date: Mon, 8 Apr 2002 16:12:15 -0400

Hi Guido... somehow I THOUGHT it was a coupling cap... as a BYPASS cap, a tantalum would probably do a better job-but I also never argue with success!!! So, if a 'regular' cap is working fine, that's fine by me!

Date: Tue, 09 Apr 2002 06:46:22 -0300
From: "Guido E. Santacana" <laffitte@prtc.net>
Subject: [R-390] tantalums

Thanks to all who responded to my inquiry about tantalum vs common electrolytics to replace the 8uF cap in the audio module. It seems that electrolytics will do well and that is my perception from the list. My EAC is working so well that I have done only partial electronic restoration. Now I have to remember if I ever replaced the IF caps in this one specially after seeing the post mortem of the mechanical filters.

From: Helmut Usbeck <vze2gmp4@verizon.net>
Subject: Re: [R-390] Tantalum or not Tantalum
Date: Tue, 9 Apr 2002 14:25:43 -0400

Tantalum caps are a type of electrolytic. Replacement with a regular electrolytic is OK. Or as I did in my 390a I left it out. This produces a bit of local feedback and reduces distortion. The gain loss isn't noticable.

From: "Leroy Ritta" <nextgen@nextcentury.com.au>
Date: Tue, 21 May 2002 02:30:29 +0930
Subject: [R-390] FW: Kleronomous AF Module help

Has anyone got Electric Radio issues # 42 and # 94 and a scanner.

Date: Tue, 21 May 2002 11:27:45 -0500
From: "Anderson, Craig - Ext. 1365" <Craig.Anderson@sptc.mnscu.edu>
Subject: [R-390] Kleronomous AF Module

Bill has indicated on his web page that he intneds on uploading a step-by-step procedure -including photos and drawings- of his audio mod for the R-390A audio chassis. This was supposed to happen around the first of the year but so

far I have not seen anything. If interested, you may want to drop Bill an email and encourage him to upload the info to his website. Here is his Web Page http://home.earthlink.net/~klerosb/KD0HG_Home_Page.htm

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From: "John Saeger" <john@whimsey.com>
Subject: Re: [R-390] capacitor analysis
Date: Sat, 1 Jun 2002 22:48:56 -0700

Helmut Usbek wrote: If you change the caps to 1.0uf you might end up with some motorboating at higher volume settings. This happened to me when I did my audio mod. Switched back to 0.1 uf ..... Try www.zorkler.com This is very interesting information. It could explain some interesting behavior I got with an old Transoceanic that I did *preemptive surgery* on. It was one of the old ones with the waxy gooey capacitors and I was not too careful about replacing capacitors with the same values. I was fairly cavalier about replacing capacitors with larger values which usually does little harm with decoupling capacitors, but I think I did the same with the audio coupling capacitors. Although the radio worked when previously it did not, there was a little motorboating from time to time. Maybe I should go back and have a look at what I did there. Cool web site.

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] Anyone know what a 2C254 Audio Amplifier Module is?
Date: Thu, 6 Jun 2002 09:07:08 -0700

> There is a gentleman in FT Collins that builds Hi-Fi audio modules for R390A…

The module turns out to be the low-level audio stages of an ART-13 transmitter. The toggle switch allows use of either a carbon or a dynamic microphone. I think the rotary switch is used to preset the sidetone level, it selects one of six secondary taps on an output transformer. The circuit is not push-pull, it turns out to be three amplifier stages in series, a 12SJ7 is a preamp stage. The first 6V6 with output transformer is the driver for the 811 modulators and the second 6V6 with another output transformer delivers sidetone audio.

Date: Wed, 17 Jul 2002 11:31:21 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] AGC problems

Ivan, I'm sure you'll get plenty of advice on this - I'm a relatively new guy to R-390a and the solution to this problem for me for SSB reception was: put in the two diodes that improves the agc response for ssb - discussed plenty in the R-390a archives. Improve the audio amp - first I used an external audio amp on the diode load connection out the back - this was excellent. second I built a modified internal audio amp using 6360 tubes ala Electric Radio article - this wasn't quite as good as the external amp but still very good and is what I use because I don't need any external equipment.

Subject: RE: [R-390] Can I stay?
Date: Mon, 12 Aug 2002 12:09:14 -0400
From: "Veenstra, Lester B." <Lester.Veenstra@lmco.com>

Q: " method of routing the output back into the audio amp "
A: And that is exactly what you can do using the Diode Load jumper

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Date: Mon, 2 Sep 2002 18:40:58 +0000
From: Philip B Atchley <ko6bb@juno.com>
Subject: [R-390] 6AQ5 Mod??

Working on the 2nd R-390A (Dons machine). It has one dead and one very very weak 6AK6 in the audio section (explains why the Line audio didn't work. I remember last time I rebuilt a R-390A I subbed 6AQ5's for the audio output stages. If I recall correctly all it entailed was changing the wiring on a couple tube pins (which I can figure out from the tube manual). Checking around I no longer seem to see this mod on the web. If I recall correctly, the advantage was increased audio output. Downside was somewhat higher filament current which I think the Xformer can probably handle ok. What I DON'T remember is if the cathode resistor needed a change in value??? As I have some 6AQ5's and no longer any receiver that used them I thought I could save my limited stock of 6AK6's for the IF section. Thoughts?

-Date: Mon, 02 Sep 2002 15:05:56 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] 6AQ5 Mod??

Here are my notes from WB2ADT: I also have his schematics and other stuff.. Got this from some web page.

Introduction

The audio section in most receivers seems to be at best an after thought in the overall aspect of radio design. The R-390a is certainly not the worst of the bunch but can stand an improvement. Its definitely better than today's $2000.00 rigs with their three inch squeakers. Also having dual audio amps is one aspect of these receivers I've always liked. The line level section with its VU meter is perfect as is for driving sound cards, tape recorders, and such. This section was left as is. So why bother with widening the bandwidth and reducing distortion? AKA improving fidelity. Some have the opinion that it should be left as is since the R-390a is after all a communications receiver and such things should have that touch to it. My opinion is otherwise. We're so used to listening to crummy sounding output that it's become some type of a de-facto standard. In receiver design its been pretty much a case of the guys designing the bullet proof front-ends, highly selective IF stages, and signal processing circuits that get all the glory. The audio design is relegated to a novice engineer whose been instructed to use an existing, off the shelve module or IC and see what he can do with it.

So what can we expect from your new modified audio stage?

- Listening pleasure, high distortion and narrow bandwidths produce listening fatique. Reducing it will keep you listening longer and enjoying it more.
- Honest signal reports, ever notice that the "sound" of all the signals seem to be about the same? Opening up the audio can produce some interesting results; e.g. Biff in Northern NJ has a pretty lousy sounding signal. Freddy down in Jonas, PA ssb signal seems about the same. Well, after the modification Biff's signal is worse than thought and Freddy should get an award for having a really quality sounding signal.
- Same goes for commercial and shortwave stations. Some could use some work and others have a clean signal. There's some really high quality programs produced on shortwave. Take advantage of it.

So on with the modification! Firstly a rundown of my self-inflicted rules:

- Any changes should be 100% reversible.
- Any new componients must be affordable and easily obtainable.
- No new spares to be stocked.

The last I wasn't too lucky with. You're going to have to put an extra tube on the parts shelf. Following is a rundown, stage by stage, of the changes. All the changes have some sort of reasoning behind them. Some look like maddness and I really at times can't explain what I was thinking, verything does work well though. Here they are.

1st AF Amp (V601a): A 5814/12AU7A wouldn't be my choice as an audio tube. Right out of the box its distortion is high. Things can be done to get it to an acceptable level, say 1-2% The existing feedback loop was removed, this would be C601, R602. C612 can be removed if you have it in your audio deck. This was a mod in later receivers. If there its to boost the treble. Interesting, seems someone was trying to get a little extra out of this amp. C609 is taken out. It's just a hindrance for better bass, as is C602 which is replaced with a 0.1 uf 250 volt polystyrene capacitor. The bias on this tube depends on your actual voltages produced by the power supply in the receiver. Some sets have been solid-stated, some aren't and powerline voltages are all over the place. That's where the beauty of self-biasing comes in. But we're looking for less distortion. If one runs a 12AU7 at about -4 volts on the grid its a pretty clean sounding tube. So to hold it there I opted for fixed bias. How to get it? Easy. Put two LED's in series and use them to replace R604. Result is there's always -3.9 to 4 volts on the grid. The LED idea was someone else's bad dream, not mine. Works great!

AF cathode follower (V601b): Didn't find anything to improve. No changes here. Just gives the other half of V601 something to do. I would have left this whole stage out, then again I didn't do the original design.

Local AF Amplifier (V602b): I found the design of this stage to be rather interesting. A very high value plate resistor is used, along with a rather large amount of negative feedback. Also a small amount of regenerative feedback is employed also. I had to ponder about this setup for awhile before I remembered that some amplifiers used positive feedback to cancel out distortion by working one tube curve against the other. Not a bad idea, except in practice, between parts variation and aging, it never quit worked out to well. This technique was rediscovered several years ago by a tube amplifier designer, but has been around for 50-60 years, just not used to much. Anyhow R611 was replaced with a 56K resistor, R612 was removed, so was R615, and a jumper put in its place. Two LED's in series was used again for fixed bias on the cathode, eliminating R610. A 1.0 uf capacitor was substituted C605, which completes this stage.

Local AF Output (V603): Here's where we ran into a sticky wicket. Replacing the transformer was one of the first changes I did. It was a better quality unit that matched my favorite 8 ohm speaker. It had a wider bandwidth. Boy, did the old 390a sound bad. This was before any other changes had been thought up. Opening up the fidelity brought up the old audio amp adage, high distortion, narrow the bandwidth. It works. In the original setup. After going over the output stage and even breadboarding it I couldn't get the distortion lower than 12%. Finally, after putting out a call on the 390a list I got my hands on the tube curves and some addition specs on the 6AK6. 16% distortion is the norm for this tube, about 10% with some feedback. As much as I tried I just couldn't get it down to where the audio was listenable. I even tried a single ended setup driving a push-pull transformer. This requires operating on the transformer using one

primary winding on the plate and the other primary winding on the cathode. Interesting way of setting up an amp but it didn't do a thing for it. I also went against one of my rules of keeping it simple. Splitting a primary winding is no piece of cake. So I went on search for a better output tube After much deliberation I choose the 6AQ5. Wiring it as a triode keeps the distortion down, about 2 watts output is plenty for most listening, no opening up the chassis for a nine-pin socket. It's still plentyful and cheap. Need an extra spare though. Oh well, nothing's perfect. Ok, so basically we rewire the socket to accomodate the 6AQ5. Remove the screen voltage wire from pin 6, insulate, and tuck into a safe spot in the harness. Clip the wire going from pin 2 to pin 7. Move the remaining wire on pin 7 to pin 2. Move the wire from pin 1 to pin 7. Add a 100 ohm 1/2 watt resistor from pin 5 to pin 6. Remove the 6AK6 if you haven't done so already and replace with a 6AQ5. Remove R614 on terminal board and put a 15 volt zener diode in its place. That's about it for the output stage.

Transformer: My final selection was one out of my Junque box/room. You might have something around, if not the transformer in the parts list should be OK. Mounting was done by breaking off the left-hand tab looking at the primary. It was then bolted in diagonally and then wired up into the harness.

Speakers: I've tried several so far. If it sounds good on your Hi-Fi it will do OK with this audio change. Although 2 watts doesn't sound like alot I've driven a small bookshelf speaker system that is a 2-way using a 6 1/2 inch woofer to plenty of volume. I also have a 12 inch full range speaker mounted on a 2 x 4 foot baffle. My favorite one is a Radio Shack 4 inch full range that's mounted in a 5x7x4 inch sealed box. This is one good sounding setup.

Date: Tue, 3 Sep 2002 08:16:04 -0700 (PDT)
From: <jlap1939@yahoo.com>
Subject: [R-390] Audio "Nuts" and Langford AGC. Mod.

Wanted to comment on the audio craze, and its' implications. Several commented on this in the reflector, and I had a few personal comments as well. It seems to me that my receiver mon. is ideal, and that the sound is great for its' purpose. The point in good communications is highly readable content, and Hi Fi has little purpose in voice and code communications. My unit passes from about 150 or so, to a few thousand, and it sounds GREAT. At the present, it is on the SP 600, and I can read most anything, including hard to hear pirates.. (But not as good as the 390, make no mistake....) None the less, it is nice to have a "big" sound, and I know many are seeking this, as well as the "warm" sound achieved with real high quality tube gear including new items. In checking material in various "archives" you will find a lot of suggestions, and I believe it remains a personal choice. These range from the professional additions to build it yourself efforts. Much has been written about Sennheiser, Sherwood, Koss ESP, Studio grade whatever; AND some that improve the response over TIME..like the Langford (and Mish) AGC setups, and the Sherwood unit, which are, it seems, highly regarded. (There are many other systems as well) I only mention a few I was reading about last night... (archives)... The improving for personal hearing and reading of the SIGNAL would seem to me to be the best way to go...

My concern is on the radio and the range of freq. that it actually passes. (Many even use the term, "recoverable" audio,which leaves a lot to be desired in terminology). The fact is that you cannot "recover" freq. that are not there in the first place, and the known specs. of the r-390 series would suggest that the range of freq. passed is very small...(Anyone know correctly, that range?) I do

know that a nice "hi fi" system seems to make the sound "nicer" but could it be the result of either more "smoothness" in loud areas or just "bigness" of sound? I simply don't see how you can get freq. resp. that was never there to begin with..(Maybe it is also the result in some cases, of "adding to" the sound...) On the other hand, if you can really obtain a "syncro" method, then you are helping the signal, as is the case with really nice and correctly designed AGC systems, some of which are quite elaborate. (Yet I have never really complained in my own mind, about either the 390 or 390a). Both are great TO ME, in AGC action.. The 390 in particular due in part to the improved sound with the center response position available...

Sorry(really), that this is so long, so I will end by asking for comment, and saying that for me being able to read well, any material I hear, is my main hope when I listen. When I want "big" sound, I go and listen to my (expensive, for solid state) stereo.. Regards, John

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Date: Sat, 14 Sep 2002 04:57:49 +0000
From: Philip B Atchley <ko6bb@juno.com>
Subject: [R-390] Headphone jacks, line outputs and green dial lamps.

Like many of you R-390A aficionados I spend a great number of hours listening to my R-390A. Often well past the witching hour. Most of the time I'm bandscanning, chasing beacons in the noisy longwave band below 500kHz. I have found a couple of things that make it more pleasurable for me and less disturbing to my XYL.

1. When you plug headphones in, it does not disable the speaker if it is on local audio. AND, the speaker is louder than my headset was. Hence, said XYL gets to hear all the T-storm noise, heterodyne etc that cover the longwave range better than I do! Answer: I put a separate matching transformer on the line audio output jack to feed the headphones ONLY. That way I control speaker and headphones separately. Incidentally. I didn't have a 2nd line matching transformer so I tried a 110/12VAC 1Amp transformer for the headset. I'm sure it isn't "hifi" but it sounds good to me!

2. When listening into the "wee hours" (like 3:30AM) I found that the dial was brighter than it needed to be for comfort in the dimly lit room. Answer: I had a couple of the little green rubber boots that slip over dial lamps, who know what I robbed them from. I placed them over a pair of 328 dial lamps and gently pressed them through the hole for the dial lamps. Results? A dial that has just the faintest hint of green in it's lighting that is much easier on the eyes over the long listening hours spent bandscanning.

From: "Philip Atchley" <k06bb@elite.net>
Date: Wed, 23 Oct 2002 22:34:09 -0000
Subject: [R-390] Modded my R-390A...

Today I did a couple things that I've been wanting to do to the R-390A. First I put solid state rectifiers in it (3 "fast" 400 piv series diodes in each leg as I had em) for two reasons. Less heat and I suspect more reliability (though I had two "pulled" spares that I've had for a couple years). Yes, I put a 220 Ohm 25 Watt (I had the 25W) resistor in the power supply to "compensate" for the diodes smaller voltage drop. Secondly, I wanted to change the "Local" audio amplifier to a circuit that would provide more drive to my speaker (which is not overly efficient). Sometime back Roy Morgan had sent me an email converting the local audio to a 6AQ5 which was wired as a triode. This same "mod" changed

several other items on the audio deck for better biasing of the 12AU7 tubes, removal of feedback etc. ALL being aimed towards lower distortion and wider bandwidth. This was GOOD as I had a small audio output transformer scrounged from a set that used a 6AQ5 as the output section. This transformer had BOTH an 8 Ohm and a 500 Ohm tap on the secondary. I chose to use the 8 Ohm and ignore the 500 Ohm winding (I have the "line audio" output if I need 600 Ohms. For this reason, rather than wire the 6AQ5 as a Triode I opted to use it as a Pentode so it'd match the transformer well. And rather than use the 15 Volt Zener for cathode bias of the 6AQ5 (as the mod sheet showed) I chose to use a 390 Ohm 2 Watt wirewound resistor. I DON't like Zeners in cathode biased circuits as they 'usually' fail in the SHORTED mode and this would zero bias the output tube, drawing excessive current and possibly (likely) doing other damage!!! I removed the original "Local Audio" output transformer and the new transformer fit and mounted well in the original space, though only with one mounting leg screwed down. A terminal strip was mounted below chassis to use as tie lugs for the leads that connected to the original transformer and the new transformer. THIS MOD IS 100% REVERSIBLE AS I KEPT THE TRANSFORMER ETC AND NO HOLES WERE DRILLED! The results?? Fidelity is much improved and the audio drive is more than sufficient for the speaker I'm using. YES I know this is a communications receiver but that doesn't mean it has to have lousy audio!)

Date: Wed, 23 Oct 2002 19:29:07 -0400
From: Helmut Usbeck <vze2gmp4@verizon.net>
Subject: Re: [R-390] Modded my R-390A...

Glad you liked my audio mod, Roy Morgan likes to send other peoples work out without giving credits. I haven't had any problems with the zener on the 6AQ5 shorting, but you never know. Mine's been cooking for a couple of years now. In regards to the output impedance using the 5000z transformer: it matches a 6AQ5 triode fine with -15v bias. The distortion is a lot less than running as a pentode. I would also run -17 to -18 volts instead of -15 as a pentode. Draws less current and should sound better.(My original setup before I went triode.) Just curious if you removed the 2 feedback paths in the original circuit. There are other changes than just changing the output tube. Just curious if you did them. www.geocities.com/husbeck for the complete mod.

Date: Mon, 18 Nov 2002 12:18:33 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] 6BF5 S line

Here is what I know and think. Some of this is fact, some is my opinion: Facts (as near as I can remember them):

1) In the 51S-1, the 6BF5 has a 39 ohm (unbypassed I think) cathode resistor, fixed grid bias, plate and screen at full B+.

2) The nominal 51S-1 plate voltage is 150 volts, but I found it to be something like 180 volts at normal line voltage.

3) The 6BF5 is rated at 5.5 watts plate dissipation MAXIMUM

4) Total tube dissipation from cathode current in my 51S-1 was nearly NINE watts (this includes screen dissipation, I now realize)

Opinion: 1) The 6BF5 in Collins S-line radios is run way too hot

2) If you add a cathode resistor, or change the fixed bias resistors to reduce the plate current, it will be a good thing.

3) Maximum audio output for a given distortion will be reduced, but almost nobody needs full audio output from these radios.. If you really do, consider using an external audio amplifier.

There is a web site with a 6AQ5 audio mod for the R-390A:
<http://www.geocities.com/husbeck/CONTENTS.HTM>
I recommend you go look.

Date: Sat, 23 Nov 2002 21:47:22 -0600
From: Ron Gerut <rgerut@megsinet.net>
Subject: [R-390] Speaker and SSB question

Hello: Was there a matching speaker cabinet for the R-390s? If so, what is the model number? Also, is the outboard product detector unit still available-- or was this a rare device.

Date: Sat, 23 Nov 2002 23:03:48 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Speaker and SSB question

There is a matching LS-206 Speaker Assembly for the R-390 series.
Rick Mish offers them for sale.

From: "Drew Papanek" <drewmaster813@hotmail.com>
Date: Fri, 13 Dec 2002 13:11:56 -0500
Subject: [R-390] Re: UTC 68819 xfmr

>Hi, does anyone happen to know the prim/sec impedance of a UTC 68819
>transformer, Army #2Z9986-2; the box is marked ?50-ohm to 75,000 ohm
>but not legible enough to make out the primary. It's small unit about 3 inch high

You can easily determine the unknown impedance from voltage measurements. Apply an AC signal of appropriate frequency to the known winding (110 VAC 60 Hz works well for a typical high impedance audio transformer winding). Measure AC voltage on secondary. Divide this by primary voltage and square the result. This gives you the impedance ratio from which you calculate the secondary impedance. I have used 6.3 VAC on a low impedance winding and measured the resultant on the high impedance winding. Don't apply high voltage to a low impedance winding or you'll let the smoke out.

Date: Fri, 13 Dec 2002 20:13:22 -0500
From: Dave and Sharon Maples <dsmaples@comcast.net>
Subject: RE: [R-390] Re: UTC 68819 xfmr

Drew: That's an excellent technique. I think in this case I'd be inclined to apply 6 VAC to the 75,000 ohm winding, and measure the other winding. That way the resultant will be in the millivolt range, and the transformer won't pull any serious current...

Date: Fri, 13 Dec 2002 18:08:39 -0800

From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] Re: UTC 68819 xfmr

Hi all, thanks for the suggestions on the transformer. It was id'd by one member as 150/75000 ohms, a transformer used in RC 47a & c (probably from the 40's or late 30's) same as UTC 46779. After first suggestion to do so, I measured it as 187 ohm /75000 ohm so am satisfied I know what it is to the degree I need to know (still curious why the voltage ratio didn't give the exact impedance ratio though). Since my first query, I dug out three more of these in my pile plus some other interesting input transformers including some WE transformers and some signal corp small xfmrs so I have a number to experiment with and explore. thanks to all for providing what I needed. Dan

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Date: Mon, 16 Dec 2002 13:20:39 -0500
Subject: [R-390] Re: R-390 digest, Vol 1 #496 - 8 msgs

The 187 ohm vs 150 ohm disrepancy that you report could be due to measurement errors. Yes, the higher voltages must be used with discretion. I like to see meter readings in the multiple volt region where my instruments give better accuracy.

Date: Wed, 5 Feb 2003 15:09:31 -0600
Subject: Fw: Re: [R-390] Electrolytics
From: windy10605@juno.com

<snip> Found a qty of "line to 4-8 ohm" transformers ...apparently they work well from 600 ohms to 8 ohms. Gads, I threw away about 20+ of them because I didn't know what they could be used for. The R-390A is playing already, but not on all bands. Jumpers on the terminal strips in back ....in the correct places, makes a BIG difference.

Date: Thu, 13 Feb 2003 02:29:15 -0800 (PST)
From: "KC8OPP Roger S." <kc8opp@yahoo.com>
Subject: Re: [R-390] r390, not the a, audio problem, possibloe agc problem

> .....My problem is this, I have to turn the limiter on to hear the stations. Radio seems to >work pretty good. When I turn the limiter off the carrier level is not affected. When the >limiter is off I can hardly hear any audio, but I do hear some ac hum.

I had the exact same problem here with one of my R390's. But I never determined what the problem was. During trouble shooting and alignment I noticed the problem and put it on the list of things to work on, a long list for this particular radio. As time went by, the problem diminished and finally disappeared all together. The only thing I did was keep the radio on and operating. Now after 2 years, there is no evidence of the problem, although I know it is lurking in the background. This is a mostly Motorola set and I leave it on 24/7 as part of my AM station. Sorry I don't have a solution for you, but I would be interested in what you find out. In the mean time, plug it in and let it play. Could work for you too.

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] r390, not the a, audio problem, possible agc problem
Date: Thu, 13 Feb 2003 11:50:03 -0800

(1) Check jumper is installed across TB101 pins 14-15.

(2) I would suspect a leaky C528 (0.22 mfd) or C527(0.047 mfd) capacitor. But any open resistors around V507 or V510 could cause the problem.

(3) If you can loop a small wire around pin 6 of V507, then reinstall the tube, you should see B+ voltage at this point when the limiter switch is off. It should go to zero when the limiter switch is on. If you don't see B+, either C528 or C527 is leaky, or R543 or R541 is open. You can use the same test with pin 1 of V510 to gain more information. Does the limiter work when it is switched on? C102 (0.22mfd) is sitting in front of the limiter control. Obviously audio is getting through, but are there any other symptoms?

From: ToddRoberts2001@aol.com
Date: Thu, 13 Feb 2003 15:19:50 EST
Subject: [R-390] Re: r390, not the a, audio problem, possible agc problem

If the audio comes through in the receiver only when the limiter switch is turned on, it is very likely a problem in the limiter circuit. The limiter circuit in the R-390 non-A is in the IF chassis, not the audio chassis. You have indicated no difference when subbing another audio chassis, so this points to the IF deck. I would check the components around V507 and V510. There are some high-value resistors in this circuit that can open up or radically change value.

Date: Fri, 14 Feb 2003 12:40:59 +0100
From: Fabio Liberatori <liber.fab@iol.it>
Subject: [R-390] LS-3 info

I have found a loudspeaker/box marked "Signal Corps. - US Army LS-3" by Best Manufacturing Co. Anybody knows about its impedance value ? Is it a good speaker ? Thanks in advance,

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From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] LS-3 info
Date: Fri, 14 Feb 2003 08:52:11 -0500

Hi Fabio & list The LS-3 was used with the BC-342 HF receiver according to the mil lists. The BC-342 was the BC-312 with a rectifier (AC) power supply instead of the dynamotor. I imagine the LS-3 was also used with the BC-312 and BC-314. It's a black wrinkle speaker, right? I think the impedance would be 500 or 600 ohms.

There is probably a matching transformer in the case with a 500-600 ohm primary and 4 to 16 ohm secondary going to the speaker driver. It should be easy to open up and check -- and the transformer might actually be marked with the impedances. In all these years, someone may have removed or bypassed the transformer, and possibly replaced the driver also. As for sound quality, it certainly is not "hi-fi". What it will sound like will depend more on the condition of the speaker driver -- cone, spider/suspension and voice coil -- after 60 years. Of course, not all LS-3's were made the same to start with. I am particularly suspicous of a firm that called itself "Best Manufacturing Co."

This was a subsidiary of LB Industries (Lowest Bidder) ;-). It probably fell off a truck some time after the Anzio invasion. It's OK, you can keep it. The US Army doesn't use BC-342's any more. But, now ... you are going to need one to hook up to that speaker. ;-)

From: "Peter Worrall" <g4gjl@btopenworld.com>
Date: Sun, 29 Jun 2003 23:43:12 +0100
Subject: [R-390] R390A AFGain Pot Repair

I had noticed a marked deterioation inb the Audio quality and level of a Blue Streak 390A I have here. When I renovated the receiver I never changed any of the pots, spending most of the time on the cleaning and re-capping of the modules. Any how I measured the AF Gain pot, and found that it had soared to more than 8k-ohm in value. I had to get the DVM on the bench, as I did not believe what my AVO-8 was telling me!....Bothe were in agreement in the end, so I changed the pot for a 2500 ohm one from the junk box as an initial replacement. The result was perfect audio and lots of it too! This pot is in one of the audio stage cathodes and, I guess mine had just worn away with use. Anyone with weak and distorted audio would do well to ckeck the value of the pot before launching into a more detailed diagnosis!

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From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] R390A AFGain Pot Repair
Date: Wed, 2 Jul 2003 08:36:53 -0500

Not sure where you can find one, but one thing to watch out for is the new pots don't always have 3/8" threads. Many of them are using metric threads. It's not too much of a big deal, but they aren't very original. I found a replacement for an old Fender guitar amp there that I couldn't find anywhere else. Have you looked at Antique Electronic Supply? They have a lot of pots but I doubt if they are milspec. Also, did you ask Fair Radio?

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] R390A AFGain Pot Repair
Date: Wed, 2 Jul 2003 08:41:28 -0500

Oops. I added the comment about the Fender amp at the wrong place and notice the first paragraph doesn't make much sense. I found the pot at Antique Electronic Supply.

From: krkaplan@cox.net
Date: Fri, 11 Jul 2003 10:06:48 -0700
Subject: [R-390] 70v line transformers sale

Radio Shack has their 70 line transformers (32-1031B) on sale for $2.49 thru 7/27. I finally got one for my 390A.

From: "Forrest Myers" <femyers@attglobal.net>
Subject: Re: [R-390] Rush Limbaugh sure sounds good on '67 EAC ;-)
Date: Fri, 11 Jul 2003 14:55:26 -0400

Yes, I did use the 70/25 vole line transformer you gave me. Before hooking it up, I did some calculations assuming an 8 ohm speaker. I figured that 600/8 = 25. The square root of that is 8.66. That should be the turns ratio for a 600 to 8 ohm transformer, 8.66/1. Also calculated for 4 ohm speaker and came up with a turns ratio of 12.24/1. Then took my ohm meter and figured out which side of the transformer had the primary wires and which had the secondary. The primary side had three wires. I don't remember the colors but I figured the black one , marked "C", was the common wire. The other two wires on the primary side

were marked 25 and 70. The other side of the transformer had at least four wires coming out of it, maybe five. There was a black wire there also, marked with the letter C. The other taps were labeled with a number followed by a "W". I don't remember the numbers but I think they were 5, 10 and such. I hooked up the primary of the transformer to my audio signal generator and set it for 1000cps (that's 1000hz for the younger crowd). To start with, I hooked the 70v and the common wire across the audio generator output. Measured the AC voltage going into the transformer and noted that value. Then started measuring across the various taps on the secondary side for the proper voltage according to a turns ration (or voltage ratio) of 8.66/1. I didn't find a good match so re-connected the primary using the 25v and C wires. This time, I got a match on the secondary side using the common lead and the second wire away from it. Found that the common lead and the wire next it gave correct results for a 4 ohm speaker. Since the mystery speaker I was using was assumed to be 8 ohms, I wired up the transformer accordingly. On the primary side, I used the common wire and the 25v wire to connect to the local audio output of the R-390A. On the secondary side, I hooked the common wire and, skipping one, the third wire from the end to the speaker terminals. Fired it up and it sounded pretty good. Did some experimenting by changing both primary and secondary taps while listening to the R-390A and found the primary taps were correct. Found that the secondary side needed to be wired to the common wire and the second wire, not the third. It appears that my mystery speaker was a four ohm speaker instead of an 8 ohm one. It sounded OK as originally wired up but was a little louder on the other secondary tap. This is a fairly long winded explanation and probably confuses more than it helps. I'm currently beefing up my workshop infrastructure to be able to support working on a radio as large and heavy as the R-390. I've worked on the audio unit and swapped out the blocking capacitors in the IF unit. However, I have to get a bigger and stronger workbench before I can remove the front panel and get into serious work. Serious work like re-capping the RF unit and cleaning up the gear train. Am really enjoying working on the radio though.

From: Llgpt1@aol.com
Date: Fri, 11 Jul 2003 16:50:39 EDT
Subject: Re: [R-390] 70v line transformers sale

32-1031 will get it.

Date: Fri, 11 Jul 2003 17:58:17 -0700 (PDT)
From: <jlap1939@yahoo.com>
Subject: [R-390] Teleregister Receiver Level Monitor

I try this every year or so hoping to find someone who knows the particulars about my unit. The talk about transformers reminded me. The only answers I have got is about Teleregister, and I have never found anything on the Net, but I am pretty bad (!!!) at using the search engines.. I will put the information as it appears on the nomen. tag, on the front. The unit has a concealed hinge door on the front and the components are behind the door, and on the rear. It has large and heavy duty line filters and a large low pass filter, as well as others. It is VTVM, w/four vacuum tubes doing the work... All trim is chrome, and the panel is black crackle.. This Nomenclature tag is black w/gold letters,rather large, as follows:

Receiver Level Monitor
Made for Department of Commerce
Civil Aeronautics Administration

Type CA 1318 Contract Cca-26540
Serial NO. 383
The Teleregister Corporation
New York, N.Y.

The one normally used control, a volume, has a black knob w/ dark purple skirt. There is a screwdriver adjust calibrate through hole in front cover as well. Input is a reg. phone jack on ft. cover. It is in my opinion, without any real flaws, for running any receiver through. I have run the 390 and SP 600, as well as the NRD 515 and SB 303 and 313, and a Hammar. HQ 180..

They are wonderful, on the 5 inch PM speaker in the unit..Flawless sound for speech It allows me an excellent speaker sound without the need for transformers, as it is able to allow for any input, it would seem...runs the same from the phones jack, or any of the line set-ups...just slight differences in volume setting. The wiring is that old point to point, in PERFECT line-up, with stress loops at every connection, always matched to each neighbor...(You have all seen this wiring I am sure....).

The Ft panel height is 7 inches.and it is normal rack mount... Anyone ever see one, or know anything? How about when it was built?? Also, wonder if I should have THE ELEC. CAN FILTERS rebuilt..And how would I get it done? Is it necessary? (There are several lg ones..) I don't hear anything wrong, but don't know what I should be looking for with electrolytics.

Date: Tue, 15 Jul 2003 20:52:44 -0500
From: "Dave Kamp, KW0D" <kw0d@netexpress.net>
Subject: [R-390] Query re. 70v line xformer

Got one of these on-sale-specials from RadioShack... the 70v line transformer... got the 4-ohm secondary connected to an appropriate speaker. Which tap do I use for the primary? They're not marked in impedance... they're marked at 0.62w, 1.25w, 2.5w, 5w, and 10w... For 600-ohms (er, 500ish) Do I use 0.62w?

From: <Tarheel6@msn.com>
Subject: Re: [R-390] Query re. 70v line xformer
Date: Tue, 15 Jul 2003 22:07:20 -0400

You use the 10 watt tap. This by way of $R=E^2/W$. Do the math and you'll see that 10 watts yields an impedance of about 500 ohms. Close enough.... I found several of these xformers in Greensboro for $2.49!! Hooked one up to my R-390A. Hooked another xformer up to my ARC-5 rcvr and used the 3920 ohm tap (uuhhh, that is the 1.25 watt tap). Both worked great. What a deal...

From: Llgpt1@aol.com
Date: Tue, 15 Jul 2003 21:46:31 EDT
Subject: Re: [R-390] Query re. 70v line xformer

Use the 10W tap.

From: "Don Reaves W5OR" <w5or@comcast.net>
Subject: RE: [R-390] Query re. 70v line xformer
Date: Tue, 15 Jul 2003 21:45:22 -0500

Radio Shack has these specifications listed for that transformer on their web

site. This must be a sample of 5 units. 10 Watt 70 Volt Audio Transformer
320-1031 Specifications 320-1031) Specifications Faxback Doc. # 9663
Transformer

Dimension measurements are within specification.
Primary Impedance (at 400 Hz 5V): Secondary Primary Watts

Loading	Range	No.1	No.2	No.3	No.4	No.5
4 Ohm	10 W	535	535	540	547	525
	5 W	1025	1060	1040	1035	950
	2.5 W	2020	2000	2105	2010	1900
	1.25W	3905	4035	4050	4050	3850
	0.62W	7120	7365	7205	7200	6855
8 Ohm	10 W	570	595	585	590	595
	5 W	1110	1115	1150	1130	1135
	2.5 W	2050	2090	2245	2240	2240
	1.25W	4205	4100	4150	4305	4100
	0.62W	7650	7400	7750	7605	7350
16 Ohm	10W	555	565	565	555	550
	5 W	1070	1070	1090	1085	1020
	2.5W	2105	2100	2200	2190	2050
	1.25W	4070	4050	4100	4130	3960
	0.62W	7405	7395	7400	7410	7150

Primary Inductance:	7.5 H	7.2 H	7.4 H	7.4 H	7.3 H
Primary Resistance:	198Ω	201Ω	202Ω	197Ω	200Ω
Sec DC Resistance:	0.888Ω	0.892Ω	0.886Ω	0.898Ω	0.917Ω

Insulation Resistance:.....100 Meg Min. at 500 VDC
Hi-Pot Test:.....1000 VAC 60 Hz for 1 min without breakdown
Impregnation:.....Varnish Impregnated
Frequency Response.....100 Hz to 10 kHz

Specifications are typical; individual units might vary. Specifications are subject to change without notice. (IR-04/12/95)

From: "John Page" <k4kwm@hotmail.com>
Date: Wed, 16 Jul 2003 02:59:20 +0000
Subject: [R-390] Low audio

Thanks to all who helped me with my last 390 problem. But here I am again. Just purchased another one (R-390A). Jeez, you would think I had learned my lesson. Oh well, my dad always told me I had to learn things the hard way. But back to the problem at hand. This one is a Stewart Warner and in pretty good shape. It even has the original meters. I got it home and into the basement. It needed a new power cord even though the guy had been using it I put on a new 3 wire cord. Hooked it up and turned it on and it worked very well. All bands worked and all filter positions worked. Well at this point I figured I would chnge out the cap in the IF module so I wouldnt lose a filter. I used a .01 600v. orange drop.

Now the first 3 filter positions have very reduced audio. Its there but you have to turn the gain up to about 3/4 full. The 4, 8, and 16kc positions work normally.

I checked to see if I had maybe bent some switch terminals or something. I took the IF module out of the other one and of course it worked fine in the new one. I took a lot of resistance readings on the bad one in the filter area following the schematic and couldnt see a problem. Anytime something looked suspicious I would measure the same place on the working unit. My conclusion is a bad 2kc filter. But it works a little???????

What does the group think? Thanks in advance. John

Date: Tue, 22 Jul 2003 12:00:54 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: [R-390] Sound powered headphones?

> Does anyone have any experience using sound powered headphones with a tube radio?

I have a couple of pairs that I bought for crystal sets - they are great and better than the venerable Baldwins that I used before. I think they are around 200 ohm impedance, depending on whether they are hooked series or parallel for the two ear pieces. I bought input transformers to use to get a good match. As you probably know, there's plenty of info online regarding various transformers in the xtal set domain.. I can't think why they would enhance a 390 or 392 since there's plenty of audio gain available. For a one tube regen, there would probably be an advantage for weak stations - you would have to have an appropriate transformer, high to low impedance. I'll have to try this sometime with some of the simpler regen sets I have. Dan

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From: "James Bischof" <jbischof@nycap.rr.com>
Date: Tue, 22 Jul 2003 17:17:39 -0400
Subject: [R-390] limiter pot

I need a the pot with switch that is used to turn on the limiter circuit. Any one know where I can get one?

From: "Kenneth G. Gordon" <keng@moscow.com>
Date: Tue, 22 Jul 2003 14:24:18 -0700
Subject: Re: [R-390] Sound powered headphones?

> Does anyone have any experience using sound powered headphones
<snip>

Yes. I purposely bought a pair of the "deck-talkers" on eBay a couple of years ago to build a pair (or two) of good headphones out of. The deck-talkers have pretty hefty bandwidth limiting built into the interconnect box, probably to eliminate as much "ambient noise" from the guns and/or airplane engines as possible.I removed the mic and filter units and connected the headphones in series, properly "phased" so that both diaphrams moved the same direction at the same time. I used shrink tube and other means to make them as nice as possible.I have not yet measured their impedance directly, but, as you say, they are pretty low. I'll do that and e-mail you back about what I discover. However, their sensitivity is really amazing. They are the best 'phones I have ever used. I have used them with every receiver here and they work fine. All the receivers I have used them with are either 600 ohm output or higher. I also use them with my Instructograph which has a 600 ohm output and the sound level from them is much higher than a speaker with a 600 to 8 ohm transformer in its box. I am not sure that exactly matching impedances would make much difference in how

they have worked for me, but I intend to find out and will post you about it as soon as I get the dope.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] limiter pot
Date: Tue, 22 Jul 2003 16:29:55 -0500

If no one on the list responds, Fair Radio probably has them.

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] limiter pot
Date: Tue, 22 Jul 2003 20:15:48 -0700

They're the same on both models. 500K with a SP-DT switch arrangement. (To be precise, SP-ST, NO and SP-ST, NC) Agree, if someone requests a part it is better to at least specifiy for which radio, and, if known, the component description. Don't think I have one.

From: "Ed" <ca.urso2@verizon.net>
Subject: Re: [R-390] limiter pot
Date: Wed, 23 Jul 2003 18:06:33 -0700

LIMITER POT P/N: INFO, TM 11-5820-357-35P, TO 31R1-2URR-414, 04 Nov 59:
R390/URR - R124: FSN 5905-284-3200, Resistor, Variable, 500KOhms +/- 20%,
2W, Allen Bradley P/N J52-U5042-FS3058; Collins Part/Dwg 380-0464-00 -

Note: S105 not listed separately. Assume it is furnished as part of R124.(my observation). This is a linear type pot.

R-390A/URR - R120 : FSN 5905-284-3200, Ref.No. SMC283203, Mfg.Code 80063,
Item No.Ref Desig. A1A34R120. INFO: TM 11-5820-358-34P, Feb 72 , Pgs. 114, 156, 95, Fig.22.

Note: S108 not listed separately so assume it is furnished as part of R120 (my observation).

Note: The excellent 21st Century Reference Manual Y2K-R2 (See The R-390A FAQ Page, http://www.r-390a.net/) lists R120 & S108 on P. 7-9, Fig 6-32, & P. 6-80.

Date: Wed, 23 Jul 2003 20:19:53 -0500
Subject: Re: [R-390] Audio Equalizer Info
From: blw <ba.williams@charter.net>

Not trying to get contrary here, but I'm wondering about the value of a DBX unit for expansion/compression. This is one of those discussions where nobody is wrong about it. I've got 4 DBX units here from over the years and have used 3 of them in various places with R-390As. At first glance it would appear that they would be of value. I dunno now. Maybe, maybe it helps some with noise since you can compress out of the noise floor and open up dynamic range elsewhere in the audio spectrum. Expansion did add a bit of artificial life to weak audio. The best unit is the DBX-3BX. I can compress the highs to elimate hiss and

some static while expanding mids & bass for voice/music. I was expecting more and I'm aware that this is a personal thing with everyone. I always ended up taking the DBXs out of the audio loop and staying non-digital for avoiding hiss and tinny audio effects. I have several cheap equalizers that I've gotten from pawn shops. I think I got them all from shops near the miliary bases. Those can help and they can harm audio too. Depends on your needs & tastes. I always found that mine added some hiss to the audio and the digital nature of them just didn't end up producing good audio. Then again, when you need one you really need one. Serious question- was there ever a tube type equalizer for home use?

Date: Mon, 4 Aug 2003 16:13:18 -0700 (PDT)
From: <jlap1939@yahoo.com>
Subject: [R-390] Gain Problem Cont.

Friends, First of all, I would like to thank those who had a suggestion for my recent problem. To refresh, The PHONES jack on the front of my 390 non a was running wide open, rather than controlled by the LOCAL GAIN on the front panel. I failed to notice until I tried to use for SWL in chasing a station I found on the 600...The reason I missed it.. , the 390 was running through a fairly elaborate rec. amp/mon. and I was using that gain and the RF on the 390 to follow SSB/ham activity on 75M, (tho' I do remember thinking the background was more than "summer" noisy..)

I was using headphones on the 600, and just plugged them directly into the 390 when I tried the SWL. (By the way, they are 16 ohm...?? O.K. ?) The "temporary "fix" until I can get some help to get it back out of the rack: suggested by one of our posters..Use the terminals #'s 10 and 13, for line audio. This would allow the line gain pot to control the output to whatever...! In fact it works just FINE, and no noise at all from the receiver, which is very quiet and sen. now..I do need to add that I listen at a very low level, as I did in Mil. pratice, w/'phones...

QUESTION to all: Is this O.K. to do? Will I hurt the radio, or, less important, the headphones? Thanks very much for kind thoughts...

From: <wb5tcd@sbcglobal.net>
Date: Thu, 14 Aug 2003 20:51:53 -0500
Subject: [R-390] c609 replacement

I need to replace this capacitor. Should it be the same tantalum type? Why is this type used for this circuit is there something critical about it? Wayne

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From: "Glen Galati" <eldim@worldnet.att.net>
Subject: Re: [R-390] c609 replacement
Date: Fri, 15 Aug 2003 00:24:55 -0700

I would continue to use Tantalum as it is known for it's high stability, large capacitance and small size. I don't have a schematic to view the application, or part number. Any other particulars, such as Value, Voltage, Part Number, Stock number, and I'll see if I have one in stock.

Date: Fri, 15 Aug 2003 10:46:49 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] c609 replacement

> I need to replace this capacitor. Should it be the same tantalum type?

Not necessarily. It serves as the cathode bypass cap in the audio preamp stage. Modern electrolytic caps will be both smaller and longer lasting. The actual voltage on the cap is far below the rating of the original cap, being the self-bias voltage developed by the cathode current in the cathode resistor..Something on the order of a few volts (do check the tube voltage charts/diagrams to see what the normal voltage is.) I recommend you find whatever small cap you can that fits physically and has a capacitance value greater than the original and any DC rating above 5 volts. The bass response of the receiver may be extended to a lower frequency.. I doubt that you will mind that

>Why is this type used for this circuit is there something critical about it?

The only thing critical about it is that it be small enough to not get mashed when you put the module back in the radio.. You can mount the replacement UNDER the circuit board if you have only a cap which is physically too large. Go to rat shack with two bucks and solve your problem.

From: "Philip Atchley" <k06bb@elite.net>
Subject: [R-390] c609 replacement
Date: Fri, 15 Aug 2003 15:11:55 -0000

I Used a new 47uF 35 VDC 'lytic in my receiver restoration. Works fine and as noted below the audio seems "fuller", but then I did the C. Ripple audio mod, replacing the two specified .01uF caps with .033uF.

From: "Drew Papanek" <drewmaster813@hotmail.com>
Date: Fri, 15 Aug 2003 11:44:50 -0400
Subject: [R-390] C609 replacement

C609 is the cathode bypass cap for the first audio amplifier stage. That is not a critical circuit. I believe tantalum was used to achieve performance over the entire military temperature range. In the sheltered lives that most of our R-390(*) lead, aluminum electrolytic would be more than adequate. For a few dimes more you can use a tantalum part. The 35v rating is not necessary; even with the tube shorted plate to cathode C609 would not see more than about 6v.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] c609 replacement
Date: Fri, 15 Aug 2003 15:28:21 -0400

That's the Alien-Acid-Bleeder in the AF deck, right? Apparently it's not critical. I've been using the 10 mfd 35v electrolytics from Radio Shack. Their catalog number is 272-1013 -- 99 cents. It's an axial lead cap that fits easily on the board. They also have a 10 mfd 16vdc dipped tantalum for $1.49. This is a lower voltage rating, but as Drew pointed out that the actual voltage the cap sees is something like 6 volts. I don't know that the tantalum-ness buys you anything and the dipped/radial form-factor isn't particularly helpful. Of course, you can use non-Radio Shack parts, and you may well have a suitable electrolytic in your parts pile. I just get a (small) kick that there's still _something_ in that store that can be used in an R-390A. The list is shrinking.

From: <plmills@attglobal.net>
Date: Sun, 17 Aug 2003 15:18:47 -0500

Subject: [R-390] FS NOS GE 6360's for Klermonos audio mod

An earlier post reminded me that I have some of these that I will not get around to using in this lifetime..... So, I have a total of 4 NOS GE 6360's in original boxes to sell.Two for $12 or $20 for all four....price includes priority mail shipping in US. Thanks, Phil

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Date: Tue, 19 Aug 2003 15:10:41 -0700 (PDT)
From: David Medley <davidmed82@yahoo.com>
Subject: [r-390] Strange R-390 problem

I have an R-391 here which arrived with a known intermittent low audio problem. I quickly checked it out by replacing the audio and IF decks with known good units. Same problem. The problem was thus in the mainframe. Checked the volume control. Not that. While I was fiddling about on the rear apron I found that by wiggling the jumper on the diode load the radio suddenly came good and then died completely as the jumper fell apart in my hand. In the R-390 these jumpers are made of wire soldered in to spade terminals as distinct from the metal ones in the R-390A. Anyway in this case the joint with one of the spades had fractured probably due to stress giving an intermittent connection. Replacing the jumper with a good one made the radio play just great. Dave

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From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [r-390] Strange R-390 problem
Date: Tue, 19 Aug 2003 19:27:17 -0400

Not so strange, I guess. We often start speculating about leaky caps, Ohm's Law, grid emissions and esoterica. Then you go and wiggle something, which is a more primitive version of the pointed stick approach. When I "fix" these odd problems, I have mixed emotions. I'm pleased to have made the repair, but, on the other hand, the accomplishment didn't draw much from my intelligence and education. Feel like a rocket scientist scratching his head and then some guy who looks like Ed Norton (Art Carney) with a rumpled pork pie hat and his hands in his pockets saying "Y'know whatcha got dere? Whatcha got dere is bad CONTINOOOOITEEE." Then he gives the rig a tap with his Stilson wrench and the rig starts blasting. "Yah see?". Then the guy in the white coat says "Zo den vhy did I bodda goink to de University?" Trouble is, both the Norton guy and the Von Braun guy coexist in one skull and it drives me crazy. It's great for procrastinating though. ;-) Just keep in mind -- some think in terms of Ohm's Law, but it's really all a matter of ..... CONTINOOOOITEE!

From: "John Page" <k4kwm@hotmail.com>
Subject: Re: [r-390] Strange R-390 problem
Date: Wed, 20 Aug 2003 01:43:20 +0000

<snip> Also had a low audio problem on my other one and as several people suggested. It was the 2kc filter. Thanks for the advice. John

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From: Jhowings@aol.com
Date: Mon, 25 Aug 2003 14:19:15 EDT
Subject: [R-390] Audio Transformers

Saw an audio matching xfmr mentioned for the R-390 series the other day; being a Radio Shack 70v line type with 4/8 ohm sec.

Well after several RS stores, I was told that item was being phased out, so if any need this item, it might be the time to acquire them.

It does make a real spkr (other than the LS-166) much better audio. Maybe it's just scarce here in St Louis, but I was only charged $2.49 ea. rather than $6.99 as listed in the catalog.

From: "JM/CO" <jmerritt2@capecod.net>
Subject: Re: [R-390] Audio Transformers
Date: Mon, 25 Aug 2003 23:27:16 -0400

Not to worry. This is a standard catalog item from any company that sells to the commercial audio industry. Just because Rad Shak has no vision, doesn't require a run up on their prices.

From: Jhowings@aol.com
Date: Sat, 30 Aug 2003 11:04:52 EDT
Subject: [R-390] R-390A Audio hiss

Having just become the proud owner of an R-390A. I have a question to pose. Having used an R-392 for a while, 600 ohm audio/xfmr to 8 ohm Heath SB-600 spkr with excellent audio(using minimal RF gain). I find that using the same spkr/xfmr from either the "local" or "line" outputs on the R-390, I have a very objectionable hiss from the spkr constantly. Can anyone tell me what I'm doing wrong??

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] R-390A Audio hiss
Date: Sat, 30 Aug 2003 10:54:28 -0700

Gassy tube, noisy resistor, leaky capacitor? Haven't noticed hiss from the receivers here.

From: "John Page" <k4kwm@hotmail.com>
Subject: Re: [R-390] R-390A Audio hiss
Date: Sat, 30 Aug 2003 19:55:28 +0000

IF gain set incorrectly? John

Date: Sat, 30 Aug 2003 20:59:28 -0500
Subject: Re: [R-390] R-390A Audio hiss
From: bw <ba.williams@charter.net>

Maybe you need a bit more advice on this one. Well, it could be anything. Maybe trying the simple things first will find the problem. Do you have spare tubes? You need those anyway. Swapping out the audio deck ones first is easy and may cure the hiss problem. If not, resolve yourself in swapping out all of them.

While you are at the swapping tubes job, take the time to test the originals and your spares on a tube tester. It may not give totally accurate readings, but make notes. It may help later down the road. Since you have the tubes out of the radio, clean the pins good. A soft, nonabrasive rubber eraser cut to size works wonders. Put a tiny drop of DeOxit on each pin. You may find the results sounding like a new receiver...like I did on mine.

You can try the Gain Adjust next to the Carrier Meter Adjust with the radio receiving. I've done this on 2 radios and found that there is only a little bit of room to adjust down out of the noise without decreasing apparent sensitivity. My radios never had that much high end noise to qualify as audio hiss, but give it a try. Maybe yours is cranked way up and could use a lot of backing off. It only takes 1 or 2 minutes. Get back to us about the hiss. It could be something else that requires cap or resistor replacement(s).

Date: Tue, 02 Sep 2003 08:28:07 -0400
From: Gord Hayward <ghayward@uoguelph.ca>
Subject: [R-390] Audio Hiss

It could be a lot of things. Try pulling tubes one by one and see when the hiss vanishes.When you pull the detector, all thats left is the audio, and if the hiss remains, you know where its coming from.

Date: Tue, 02 Sep 2003 12:52:24 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] R-390A Audio hiss

Adjust the IF gain setting..It is very common for folks who don't understand to set the IF GAIN adjustment too high. They think it "makes the receiver hotter." It is a mistake. (It is also a mistake to put higher gain tubes in place of the normal ones..Check that you have the correct tubes installed, especially the 6DC6 in the first RF amplifier.) Here is the IF Gain set procedure: <snip> see IF tips for details

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Date: Tue, 23 Sep 2003 12:29:43 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] Radio Shack Impedance Matching Transformer

Okay, maybe I'm dense. I picked up a few of those Cat# 32-1031 70 Volt 10 Watt PA System Line Transformers. First reason: One of my R-390As was converted by its previous owner to an 8 ohm audio output. I want to use one of these outboard to take the 8 ohm to the 600 ohm input to an Hallicrafter's R-42 Reproducer. Can someone provide me with guidance to connect which tabs to connect the line to the R-42? It IS clear which to connect the 8 ohm input.

From: Llgpt@aol.com
Date: Tue, 23 Sep 2003 16:06:37 EDT
Subject: Re: [R-390] Radio Shack Impedance Matching Transformer

Use the 10 watt tap and the common of course.

From: "Tony Angerame" <tangerame@earthlink.net>
Date: Fri, 30 Jan 2004 10:36:03 -0800
Subject: [R-390] Re: bad audio

That's because those nasty old LIFER Staff Sergeants did not want we young cool Airmen to listen to Radio Luxembourg. We kept and SP-600 and R-390 (Non A) for that clandestine purpose. (End Flashback to the sixties) Actually I found the audio amps in the R-390a to be very flat so I agree must be those Mechanical Filters. I use the 16kc position and pipe the IF into a Rycom R-1307. Much better. Maybe picking off the IF before the filters would be even better? Having said that I still love my R-390a!

From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Re: bad audio
Date: Fri, 30 Jan 2004 15:08:39 -0600

Well the trick, that is documented somewhere out there, is to take your audio off the Diode Load point on the rear of the radio. Feed it through a matching circuit and into an external HI-FI amp and quality speaker.(anybody remember that) I understand it sounds very good that way....now mind you it probably won't ever sound as good as a radio such as the R-390 or SP-600 with LC filters, on a big 12" speaker but with the increasingly crowded conditions on the bands at times the tighter mechanical filters may make the difference between being able to enjoy the signal or not. There are also some AF deck mods that perk up the audio quality as well. Mr. Rippel has info on his page about that.

Date: Sat, 31 Jan 2004 19:48:42 -0600
From: bw <ba.williams@charter.net>
Subject: Re: [R-390] Re: bad audio

That does make a difference. Still, the audio isn't that terrible on a stock A, imho. It ain't great like the SP-660, but those are two different environments. I don't bandcruise a lot, so maybe I'm not missing a lot from the SW bcst stations. Speakers or headphones make a bigger difference to me than the filters. Maybe it is just impressions, but it seems to me that I get more audio 'data' from the tighter filters like station ID, what they are saying, etc than I do with wider filters and increased band noise and hets. Music is better on the SP, but is music that great on HF with any radio?

Date: Mon, 02 Feb 2004 09:26:11 +0200
From: "Bryce Ringwood" <BRingwoo@csir.co.za>
Subject: Re: [R-390] Re: bad audio

There I was thinking how nice it sounded through an EL84 amp and home-made speaker in the 16kHz position. The audio must be better than my ears - or is it that our local AM stations put out a high quality ?

Date: Mon, 2 Feb 2004 08:41:08 -0600
From: Tom Norris <r390a@bellsouth.net>
Subject: Re: [R-390] Re: bad audio

Yes, getting the audio out of the confines of the bandwidth limited audio deck of the 390A does help quite a bit. I have to agree the Super Pro is much much better when it comes to "listening quality", the SP-400 even more so. I foolishly sold the one I had and only have an SP-600 (actually 3 of them),. The SP-660, is that similar to the SP-666 which only picked up rap, heavy metal and 24 hour pro wrestling stations??? heehee.

Date: Wed, 11 Feb 2004 17:18:16 -0500
From: Jim Brannigan <jbrannig@optonline.net>
Subject: [R-390] Hum

I have a '67 EAC R-390A with a low level hum that is making me crazy. The hum is controlled by the AF gain control and therefore before it. It is influenced by the 800cps bandpass filter and disappears when V601 (1st AF amp) is removed. The plug in capacitors have been replaced with new electrolytics. C609 in the cathode circuit has been replaced and the Rippel audio mod

installed. The tube has been swapped for another and the hum still persists. Short of replacing every component in the 1st AF amp, I'm stumped!! Any suggestions?

From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] Hum
Date: Wed, 11 Feb 2004 21:53:44 -0500

Hi Jim, the hum might not be in the audio deck. Here's some tips..... Does it go away when you click ON the noise limiter? If so bypass cap C536 in the IF deck could be open. You could also have filament to cathode leakage in one of the detector or noise limiter tubes. To further isolate the trouble, disconnect the Diode Load jumper (TB103 terminals 14&15) which will break the connection from the detector and see what happens.

Date: Thu, 12 Feb 2004 08:10:52 -0500
From: Gord Hayward <ghayward@uoguelph.ca>
Subject: [R-390] Hum

I had a similar problem and as John mentioned, it was a filament to cathode leak in the noise limiter. The impedances in that stage are high so the leak was small enough not to show up on my tube tester, but big enough to give lots of hum. Replacing the tube fixed the problem, but I only found it by substitution.

From: "AI2Q" <ai2q@adelphia.net>
Subject: RE: [R-390] Hum
Date: Thu, 12 Feb 2004 15:43:22 -0500

Jim: Tighten down all under-chassis hardware, such as terminal strip grounding points. That cured a nasty 60-cycle audio hum problem here in a recent 51J-4 overhaul on my bench.

From: "Bernie Nicholson" <vk2abn@batemansbay.com>
Date: Fri, 13 Feb 2004 12:24:02 +1100
Subject: [R-390] 390a hum

I had hum in my 390a and after some searching I found that it was caused by heater cathode leakage in the 6BA6 in the VFO replacing the tube fixed the problem But I initially looked in the audio and IF module

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From: "Steve Hobensack" <stevehobensack@hotmail.com>
Date: Tue, 23 Mar 2004 17:21:36 -0500
Subject: [R-390] Audio cuts out

The audio cuts out to a low level on my '62 Imp/Tel intermittently. It is difficult to troubleshoot because it may work fine for an hour or more. It stays at the low volume state for less than a minute. Turning the unit to standby and back will correct it, or a loud static crash will correct it. I swapped audio modules, no joy. The S meter/dB meter stays steady during the trouble. It seems the trouble is after the S meter circuit and before the audio amp. I think I remember a reflector post during the past year about bad diode load coax? Any ideas? Thanks.

From: "JimMiller" <jmiller1706@cfl.rr.com>
Subject: Re: [R-390] Audio cuts out
Date: Tue, 23 Mar 2004 18:14:33 -0600

I had exactly the same problem and, yes, in my case it was bad coax from the IF module back to the diode load terminals and then up to the front panel. Good luck.

From: "Dallas Lankford" <dallas@bayou.com>
Date: Mon, 5 Apr 2004 10:31:54 -0500
Subject: [R-390] AF LF Frequency, Distortion, & Power Mods

Recently I did Chuck Rippel's change of C604 and C605 to 0.022 or greater for improved LF response and found they worked very well provided you don't increase them too much, which may cause motorboating at higher LOCAL gain settings. I also tried the conversion of XV603 for a 6AQ5 as a triode as well as associated changes. It worked poorly, with increased distortion and power output was not increased. So I restored XV603 for the stock 6AK6 and paralleled 1200 ohms across R614, which increased the gain but also increased distortion, and 330K & 200K paralleled across R612 for increased negative feedback to reduce the (excessive) gain and reduce distortion. The net effect was an increase in 6AK6 max power output from 0.90W to 1.0W into 8 ohms real (through an impedance matching transformer) and a reduction in distortion (compared to unmodified). With Graham Maynard's 6AQ5 mod, which cuts off pin 7 of the 6AQ5 and then replaces the 6AK6 with it, lower distortion is maintained while max power output is 1.4W RMS into 8 ohms real. If you want more power, you should probably use the LINE out to a hi fi.

My mods require no removal of parts, only paralleling resistors across existing resistors. If you don't like the mod, you can easily remove it. There is a picture with description on the Yahoo R-390A reflector FILES section.

From: "Michael Murphy" <mjmurphy45@comcast.net>
Date: Fri, 9 Apr 2004 11:16:39 -0400
Subject: [R-390] R390A Basics Finished

Well folks, I have finally completed the basics on my 1960 Stewart Warner. This radio had good synchronization and basically worked on all bands like a normal radio. All tubes were tested as good. I had five problems which were driving me nuts:

- 1. The classic stuck ON power microswitch
- 2. I had a weak band (8-16 MHz) with no antenna trimmer action
- 3. Sensitivity to varying wildly day to day. Shorting the hot plate trimmer on the RF coils to ground (Z20x series) would temporarily fix the problem -spark!.
- 4. Cal signals weak.
- 5. I had a a weird audio gain control problem at the top of the range and generally low audio gain.

Anyway, I did the did the basic IF Module and Audio Module cap and resistor changeouts and pulled the front panel and did the RF Deck. The power supply was inspected but not touched. 149.9 Volts on E-607. I also did the typical gearset cleaning using Mystery Oill and a lube with Mobil-One. The thing was reassembled. I then did a quick tune up per the manual.

The results: <snip>

Scratchy Audio - The audio module got the treatment and I found that the front panel audio pot had a value of 5K instead of 2.5K. I must have put this in years ago not realizing that the cathode followers could not tolerate the DC bias shift. I found the original pot and disassembled it, cleaned it and replaced it. This was all it took.

After a quick tune up, the radio is a new beast indeed. All on my list responded beautifully. I used the NTE MLR-Series dark orange mylar film caps throughout. These caps are just as inexpensive, available and fit better than the Spragues. Here is the data sheet on the NTE caps: http://www.nteinc.com/capacitor_web/pdf/mlr.pdf

Next - AGC, Product Detection and Audio improvements. <snip>

From: R390rcvr@aol.com
Date: Sun, 18 Apr 2004 19:47:54 EDT
Subject: [R-390] Cleaning sealed pots?

I am working on a R-390, with sealed pots for the AF and line gain pots. Both are very erratic, obviously need to be cleaned, but, they are the high quality sealed units. The quality is nice, but how do you clean them? Can one very carefully drill a hole through the side, with a bit of grease on the bit, and a drill stop, and then spray in a bit of Deoxit? They don't look like they would be easy to disassemble either. Any thoughts would be appreciated.

Date: Sun, 18 Apr 2004 18:56:46 -0700
Subject: Re: [R-390] Cleaning sealed pots?
From: ronald j deeter <k6fsb@juno.com>

Randy- it is possible to open the pots- both CTS and AB-by un-doing the tabs that hold the back in place..this allows cleaning and lubrication.....it also allows inspection of the carbon film and wiper. some times the carbon film has been damaged, how I'll never know....but if it is slightly raised or has a raised/bump, do not try and clean(scrub..pressure etc...) the raised area only further damage will occur not much can be done except replacement of the element.

I've been able to change shafts/elements....having lots of pots with the wrong shaft/configuration.. then again it is nice to have a machine lathe to cut off the peened/crimped areas holding the wiper, drill and tap the shaft then replace/reinstall the wiper.

From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] Cleaning sealed pots?
Date: Mon, 19 Apr 2004 01:54:45 -0400

Don't use Deoxit for cleaning pots, it's a contact cleaner and is designed to dissolve metal oxides (guess what some pot elements are made of) and leave behind a light lubricant. The R-390 pots are very susceptible to this kind of solvent damage and of course I found out the hard way. I make a habit of measuring the pot elements before and *after* I work on them, and watched one of the front panel's controls double in value after I Deoxited it. :^(

So the next time I decided I'll try some CaiLube, after all it's designed to be used on controls, and after an extremely gentle application to the element of a

replacement used Limiter pot (500K) that I was preparing, I saw its value go from about 800K to 3 Meg after just a few rotations of the control shaft. :^(

The original Limiter pot I was replacing was completely shot, its element measured 75 Meg, almost not there. In the same radio the IF Gain pot on the IF deck measured 10X greater than it was supposed to be; in each of these I suspect solvent application as the cause of the damage.

I don't know what to recommend as a good cleaner or lubricant now, it almost seems like voodoo. Some audio guys swear by WD-40, and others swear at it. Other remedies I've heard included Vaseline as well as some kind of silicone gel that also provides mechanical damping, and another fellow in one of the radio newsgroups makes his own secret homebrew formula that he sells. One thing is for certain - always measure the part after treating it to see if its value was affected.

Often the 390 pots are not just a little dirty but actually worn out. I've had a couple of RF Gain pots that were mechanically worn out at the 10 o'clock position that they normally sit at; there was simply no more resistive element at that one spot.

I'd definitely like to find a good replacement source for the Audio/Line pots, but 2.5K panel pots with 0.25" shaft and audio taper are near impossible to find; if they were 5K it wouldn't be so bad.

I've actually thought of trying a dual 5K pot with all the connections paralleled.

From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Cleaning sealed pots?
Date: Mon, 19 Apr 2004 08:49:19 -0500

I agree with you John, Deoxit was not meant for pots....and will damage them over time. How much time depends on the wear the pot has experienced prior to treatment with Deoxit.

Options...MG chemicals makes a product called NU-Trol which has worked well for me. It's quite lubricating though....just a small amount covers it. It also has solvents for cleaning. Another option that has worked well also is a product by GC electronics called De-OX-ID. Not to be confused with Deoxit. GC's product has been around longer as I understand it from the friend and owner of the local parts store where I get it. Remember the old Quietrol....worked great...I still have a small amount...but have been told the GC De-OX-ID is basically the old Quietrol. RS also markets a small can of control cleaner...not sure how it works though.

CaiLube is strictly a lubricant...mainly used for lubricating the sliders on a mixer board. Keeps them sliding smoothly. It has no cleaning properties. Don't understand it causing problems with a vintage pot unless it caused the phenolic base to swell opening up a thin spot in the carbon trace...which may happen with any of these...don't know.

Anyway...just some options to consider. I wouldn't use WD-40...it gums up rather quickly....And don't use the new reformulated Blue Shower (not Blue Stuff.... abrasive tuner cleaner...Yuk!)....it melts some plastics....learned the hard way on that one....melted a 70's audio pot into one piece. It was sold by another store as a suitable environment friendly replacement for the old Blue

Shower. NOT>>>> The old blue shower was good to use on pots....Oh well..so much for environmentally friendly...

From: "Drew Papanek" <drewmaster813@hotmail.com>
Date: Mon, 19 Apr 2004 17:50:53 -0400
Subject: [R-390] Potent I/O Meters...

>I don't know what to recommend as a good cleaner or lubricant now.....

I've used WD-40 and it seems to work reasonably well, although it gums up after a while. I have also had success with 100% isopropyl alcohol (applied generously with an eyedropper). It also works well to remove solder flux and to clean tape heads. Let it evaporate before operating the equipment; alky is extremely flammable. The most readily available small quantity source I have found is isopropyl formula gasoline dryer/antifreeze. Rubbing alcohol is usually 70% iso alky and the rest water; hence does not work well.

>Often the 390 pots are not just a little dirty but actually worn out.....

Sometimes the wiper can be bent to sweep a different radius and ride on a previously unused portion of the element. That worked well for a Mazda volume airflow sensor in a friend's car (the sensor is a pot whose shaft is coupled to a spring-loaded vane in the air intake).

>I'd definitely like to find a good replacement source for the Audio/Line pots, but 2.5K panel >pots with .25" shaft and audio taper are near impossible to find; if they were 5K it wouldn't >be so bad.

One could use a 5k unit with 4.7k or 5.1k fixed resistance parallelled across the element. That would keep the load impedance presented to the previous stage at the design level. The source impedance feeding the following stage would change but would have no effect as the input impedance of the following stage is many times higher than that from the pot's wiper in any case.

> I've actually thought of trying a dual 5K pot with all the connections >paralleled.

How about a "stereo" pot? Concentric line and local level controls would be a neat feature if suitable knobs could be found.

Date: Tue, 20 Apr 2004 09:55:01 -0700
Subject: Re: [R-390] Cleaning sealed pots?
From: ronald j deeter <k6fsb@juno.com>

re On potentiometer lubricants....lubriplate white grease seems to work quite well. another product-tuner lube white lithium grease is also good. anybody have any experience with synthetic lubes???? cleaning isopropyl alchol (100%) is a good cleaner.

An old trick to change a pot from linear to log is to use a resistor (standard value as close as possible) about 11% value (10.9% if you want closer) of the pot from wiper to one side (not across the element). this will be avery good approximate. also gives up or down taper as needed. ie 25K linear taper and a 2.7k or 3k will do fine.

From: "Larry Saletzki" <wa9vrh@mtco.com>
Subject: Re: [R-390] Cleaning sealed pots?
Date: Tue, 20 Apr 2004 17:06:48 -0500

I maybe coming into the middle of this thread but I thought I was reading from the start. The discussion of all the cleaning/lubing agents has been great. My question is on a sealed pot. How do you get the stuff in there? Especially if it is buried in a chassis?

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] Cleaning sealed pots?
Date: Tue, 20 Apr 2004 17:18:50 -0500

There's a guy who makes a threaded adapter that screws onto the 3/8" sleeve. The adapter is hooked to a tube with a pump whereby you can force cleaner/ lubricant into a pot in the small gap between the 1/4" shaft and the I.D. of the 3/8" sleeve. Not sure if this is meant for sealed pots, but I think that's why he made it. At least I *THINK* that's what the apparatus is for; I could be wrong. I haven't seen one, but I can ask him if there's interest.

Date: Tue, 20 Apr 2004 15:50:56 -0700
From: "Kenneth G. Gordon" <kgordon@moscow.com>
Subject: Re: [R-390] Cleaning sealed pots?

GC used to sell a device which looked like an overgrown hypodermic device which screwed onto the threaded bushing which holds the pot to the panel.

You took the knob off the shaft, filled this hypodermic device with your cleaner, screwed in onto the pot, and forced the goop into it through the shaft-to-bushing space by working the plunger. It worked pretty well as I remember it. I lost mine many years ago.

Date: Tue, 20 Apr 2004 22:31:18 -0700
Subject: Re: [R-390] Cleaning sealed pots?
From: ronald j deeter <k6fsb@juno.com>

Larry- unfortunately remove the pot form radio for dissembly/inspection/lube and or replacement.... sometimes easier said than done
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From: "D. ball" <ke1mb@hotmail.com>
Date: Thu, 06 May 2004 19:51:20 -0400
Subject: [R-390] R-390A IF and AGC

<snip> On another note I removed a scary mod in the audio section. Someone had used a line transformer as a plate transformer!!!!.. Did this guy know anything about voltage ratings? I removed that mod quickly and lucky there was no damage due to the mod. The old caps were replaced with new ones for safety and all works well. I bought a 500 to 4 ohm transformer and installed it in the speaker. No need to mount a transformer on the back of the radio.

Date: Wed, 16 Jun 2004 18:57:30 -0400
From: "Forrest Myers" <femyers@attglobal.net>
Subject: [R-390] Re chirping CW and low audio plus strange PTO problem.

Found the problem causing the low audio in my Capehart SN 557. It was C537 that changed from a capacitor to a 33k resistor. It was in the cathode circuit of the limiter. I didn't have a direct replacement for it so put in one, temporarily, about ten times larger than the original 1800pf.

Audio is great and it seems to have helped the CW chirp too, don't ask me how. Have ordered replacement capacitor of the proper size, actually a 1000 pf and an 850 pf which will be paralleled. <snip>

Date: Sun, 20 Jun 2004 20:18:30 -0700
From: Dan Merz <djmerz@3-cities.com>
Subject: Re: Fw: [R-390]

Lee, I haven't tried the 6AQ5 audio mod in the recent ER but it looks interesting and should be an improvement. I completed the earlier mod mentioned in the article which put a push-pull 6360 tube (twin tetrode) as output tube in place of one of the tubes, also an ER article.

This was somewhat more complicated and works very well and is less likely to saturate the core of the small audio transformer that can fit on the chassis. I was a little surprised the recent author didn't do some sort of comparison or even mention why he didn't go with the earlier 6360 mod, but I'm guessing it was because his mod is easier to do (doesn't require changing a tube socket).

His article did have the word SIMPLE in the title !! And maybe he thought a 6AQ5 should be used because after all it's an audio tube whereas a 6360 is a vhf transmitter tube.

I bought a second audio chassis for the mod but I haven't put my original chassis back in since - the audio is very good. Maybe the next owner will want the original so that is why I kept the chassis I got with the set in its original state.
best regards, Dan

Date: Mon, 21 Jun 2004 18:20:28 -0400
From: "Michael Murphy" <mjmurphy45@comcast.net>
Subject: Re: Fw: [R-390]

The values in the text of article will give you a little more than a watt on the internal R390A iron or with a small All-American-5 transformer. The actual "final" schematic shown is for the larger transformer from AES. I did not get data on this to ER in time for publication.

Note that the cathode resistor is 220 Ohms (lower that the value in the article); anyway I got 2.4 Watts out with the larger transformer. Also note that I threw in some feedback around the transformer in addition to the primary side feedback which was retained.

Date: Tue, 22 Jun 2004 16:51:05 -0400
From: "Drew Papanek" <drewmaster813@hotmail.com>
Subject: [R-390] 6AQ5 audio mod

Reading of 6AQ5 modifications for the R-390x series leads me to relate my experience with a very simple 6AQ5 mod I did a few years ago. After hearing stories of generally short life with the stock 6AK6 it occurred to me that the beefier 6AQ5 might provide longer life.

All I did was to disconnect one of the grid leads at the tube socket and move the other grid lead to accommodate the 6AQ5's different basing. I did not alter any resistor values. Cathode current with the stock cathode resistor measured about the same as for the original 6AK6.

I contemplated lowering the cathode resistor to increase plate current and make use of the 6AQ5's greater power capability, but was concerned that increased plate current would lead to core saturation of the stock R-390A output transformer with attendant distortion and loss of low frequency response. Hence, the stock cathode resistor (network) was retained.

Results? Same gain, same maximum power output capability. The audio, however, sounds cleaner with less distortion than the stock R-390x setup.

The downside? The 450 mA heater current drain adds more heat to that lower compartment, but I did not notice a temperature increase using the highly scientific "calibrated hand" technique.

All in all, the mod works quite well, but for those wanting good sound I suggest using the diode load connection with an external amp/speaker.

Some of those el cheapo amplified computer speakers sound pretty good, better than regular R-390x audio.

Date: Wed, 23 Jun 2004 11:55:08 +1000
From: "Bernie Nicholson" <vk2abn@batemansbay.com>
Subject: [R-390] 390a audio

I found the simplest solution was to replace the audio transformer in the local channel with a transformer out of a 51J4 [same size and mounting] then rewiring the socket for a 6AQ5 result is plenty of audio 3.5 ohms output as well as 600 , I purchased from Fair radio the transformer very reasonablly and this conversion has been trouble free for quiet a few years now and every one who hears it and knows the reciever wants to know where all the audio is coming from

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Date: Tue, 22 Jun 2004 22:54:42 -0500
From: "Don Reaves W5OR" <w5or@comcast.net>
Subject: RE: [R-390] 390a audio

A few years back, I bought a tall rack cabinet surplus from the FAA. Just this week I stumbled across a piece of gear that came out of that cabinet. At the time I paid it little heed, but now it looks more interesting for it is a multi-channel 600 ohm mixer, rack mounted in a 2U box. Marked Audio Mixer - Amplifier Assy Eight Channel Model No. MAA-8/600 made by G.R.M Corp in Medford NJ. My question is does anyone know about this unit or the company that made it. Some of the channels are marked as Flight Data 1, FD2, preflight, RDO. This might make an ideal audio mixer for all the 600 ohm output receivers that need to be tamed here. No mods necessary to the R-390s. Each channel has way too many input/output pins (24) to casually reverse engineer.

Date: Wed, 23 Jun 2004 10:54:27 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: RE: [R-390] 390a audio

Well, it would be a simple matter of a few minutes with a voltmeter to find the

output pins among those 24. Put a signal into the thing with a pot half way up. Then start with pin1 and measure to each of the other twenty three pins. Then measure from pin 2 to pin three through 24, then pin three to pin 4 through 24. Soon you will fiind at least two pins that have output. If you find two pairs (likely with a common pin) the common one will be the center tap, and may or may not be grounded. Good luck. I recently bought an uncompleted mixer with a pot and switch for each of four channels and a master, octal tube sockets, and little else. I plan to build a mixer for receivers with it. I'll feed a 1950's home brewed Williamson amplifier with triode connected 807's and a period "hi-fi" speaker. That plus a modest patch panel and I'll have a very flexible system for sound.

Date: Mon, 28 Jun 2004 14:44:40 -0500
From: "K3PID" <k3pid@comcast.net>
Subject: Re: [R-390] Odd...

>Funny. I hooked up an 8-ohm speaker to my R390A and it worked. Did I do something wrong?

Speaker terminals or headphone jack? No distortion? You'll get the audio of course but unless someone has put in a 600:8 or similar transformer on the speaker line OR if you connected to the headphone jack they might have changed the resistor network, there will be significant distortion as you try to increase the volume.

Date: Mon, 28 Jun 2004 15:30:05 -0500
From: Tom Norris <r390a@bellsouth.net>
Subject: Re: [R-390] Odd...

Gee it's a Hammond transformer too! And low priced, well so far. I'm sure it'll go for some "holy relic" value when all is said and done, being Hammond is the Collins of transformers. Being sold by the same guy that buys the 2 for 12 dollar headphones from Fair Radio and gets $15-20 for them.... no bail-out cords either! Speaking of which, the headphone jack is *not* 600 ohms or is it, my brain ain't up to figuring out the actual impedance of that pad that connects the headphones to the local audio out. (6800 ohms in series from local out to phones, shunted to ground with 680 ohms) Hmm, maybe it is. If I tried selling headphones that way, I'd get bidders wanting 3 for a dollar.

Date: Mon, 28 Jun 2004 16:58:47 -0400
From: N4BUQ@aol.com
Subject: Re: [R-390] Odd...

Judging by the responses, I guess I didn't make it clear that my comment was meant to have a fair amount of sarcasm injected into it. From the claims on the auction page, the guy makes it sound like you will get nothing from the R390A without a matching xfmr which isn't the truth.

Is an 8-ohm speaker a mismatch to the 600-ohm output? Yes.
Do you get great sounding audio without a matching xfmr? No.
Do you really get great sounding audio with a matching xfmr? No.

It will, however "work". I have a matching xfmr in mine right now, but before I got it, I hooked up a speaker to the 600-ohm output and got reasonable audio. I just thought the ad contained a fair amount of hype.

Date: Mon, 28 Jun 2004 22:12:44 -0400

From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Odd...

Sorry I think I'll wait for the ones made by Hammond in *Canada* as opposed to the knock off's made in the USA (since last time I checked the real Hammond does not have factories down here). They sell stuff out of Buffalo but they make it all up north .... An 8 ohm speaker works just fine with a 570 ohm resistor in series with it. It even reminds you of running an R-392 ..... If the speaker is efficient enough it doesn't take much to get a lot of sound. A nice big horn comes to mind. Of course with a decent horn you could just order up a 600 ohm driver and forget about the transformer.

Date: Mon, 26 Jul 2004 08:32:16 -0400
From: "Steve Hobensack" <stevehobensack@hotmail.com>
Subject: RE: [R-390] Never heard the real R-390

Chuck, just in case you don't know, the speaker output is 600 ohms impedance. You can use a cheap radio shack 12 volt filament transformer (smallest one) to match the common 8 ohm speaker. Even then, stock audio isn't impressive.

Date: Mon, 26 Jul 2004 08:52:15 -0500
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] Never heard the real R-390

I suspect that when the RX is tweaked to meet the book specs, which include 1% THD if I recall correctly, the sound from the Diode Load terminals is at least a bit better than "not impressive". I may be wrong on the THD figure, though, and if it's much more than 5%, it could indeed be not impressive.

Date: Mon, 26 Jul 2004 17:46:13 +0200
From: ccc24547@vip.cybercity.dk
Subject: [R-390] Sound of the R-390A

It is easy to sound better than the NRD-545, its many other qualities untold. And with the diode load hooked up to a hi-fi amplifier the R-390A does in fact sound impressive. It does not, however, quite rival the Eddystone 880, some of which were used by the BBC for its relays in Australia others for monitoring. Its output stage can also be used for Public Address purposes. Full, bassy sound which can be toned down if one is going for DX legibilty.

Date: Wed, 28 Jul 2004 13:43:38 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Never heard the real R-390

>....the sound from the Diode Load terminals is at least a bit better.....

Mil Spec 13947B says: "3.13.41 Audio harmonic distortion.- Harmonic distortion shall be no greater than 1- percent with 500 milliwatts outputs at the local audio channel, and no greater than 6 percent at the line audio channel. (See 4.41)" "4.41 Audio harmonic distortion.- Audio harmonic distortion shall be measured with a Distortion Analyzer Hewlett-Packard Company Type 330-B, or equal, to determine compliance with the requirements of 3.13.41. Signal input shall be 1000 microvolts. The receiver audio outputs shall be loaded with a non-inductive resistance of 600 ohms, one Watt rating or larger."

Date: Wed, 28 Jul 2004 16:41:00 -0400

From: Sheldon Daitch <sdaitch@ibb.gov>
Subject: Re: [R-390] Never heard the real R-390

Maybe I have missed it, isn't 6 per cent distortion pretty high? I asked a colleague and his idea on 6 per cent was pretty high, and should be very audible. But he also said below about 3 per cent starts to get into the area where folks stop complaining. Audiophiles want it to be a lot lower, though, and maybe with good equipment, you can hear in A-B testing, between 3 per cent and something a lot lower. I believe the old standard for AM broadcast transmitters was a maximum of 5 per cent, except at the lower audio frequencies, where the limit was 7.5 per cent. I guess I ought to check an old rule book.

Date: Tue, 27 Jul 2004 14:29:37 +0100
From: "Andy Jackson" <andy@champ1.freeserve.co.uk>
Subject: RE: [R-390] Never heard the real R-390

A good source for 600 Ohm to 8 Ohm matching transformers is the LS-166/U loudspeaker used with various vehicle and manpack sets. The transformer is rated at 2 Watts and has a stated frequency range of 250 cps to 5000 cps. Either use as-is or connect to a better 'speaker for improved "Fi". They are not too hard to find even in the UK or Europe so I imagine even easier in the US.

Date: Thu, 29 Jul 2004 12:06:39 -0500
From: Tom Norris <r390a@bellsouth.net>
Subject: RE: [R-390] Never heard the real R-390

And the Hammond transformer has better freq response than the one out of the LS-166

Date: Thu, 29 Jul 2004 13:42:07 -0400
From: "James M. Walker" <chejmw@acsu.buffalo.edu>
Subject: Re: [R-390] Never heard the real R-390

Some time back in years, I bought the Radio Shack 1K ct. to 8 ohm transformers, about 10 of them. I also purchased blue perfboard and "stacking terminals" mounted the transformers on the boards. I use one on each output of the various receivers that have 600 ohm output for the audio, including SP-600JX-17, SP-600JX21, a pair of R-390As and my band cruising Hallicrafters SX-62A, all with no problems and the audio sound great. I have a PA amp at 30 watts that is in the garage and it is fed from a single R-390A in the house, also sounds darned good outdoors.

Date: Thu, 29 Jul 2004 13:44:34 -0400
From: "James M. Walker" <chejmw@acsu.buffalo.edu>
Subject: Re: [R-390] Never heard the real R-390

That is because the LS-166 is termed a "Communications Quality" speaker system.

Date: Thu, 29 Jul 2004 12:57:15 -0500
From: "Laird Tom N" <LairdThomasN@JohnDeere.com>
Subject: RE: [R-390] Never heard the real R-390

AES part number: P-T119DA ($18.32) www.tubesandmore.com quote: Developed in response to requests from the "Collins Collectors Association",

this is a matching audio transformer for older equipment with 600 ohm audio output, driving modern speakers. Or for "classic" high impedance speakers used with newer equipment, simply swap primary for secondary (ie...4 or 8 ohm input and 600 ohms out).

Date: Thu, 29 Jul 2004 13:02:13 -0500
From: Tom Norris <r390a@bellsouth.net>
Subject: Re: [R-390] Never heard the real R-390

Nahhhhhh, I'd have never knowb it, he says, looking at the probably half dozen LS-166's and other green radio gear on his shelf.

Date: Fri, 30 Jul 2004 19:19:51 -0400
From: "Drew Papanek" <drewmaster813@hotmail.com>
Subject: [R-390] real R-390 Never heard the

>A good source for 600 Ohm to 8 Ohm matching transformers is the LS-166/U
<snip>

Don't forget the common 70.7 volt line matching transformer used in PA systems. Connect the secondary (typically has taps for 4,8,16 ohms) to match your speaker. Connect your 600 ohm source to the primary 10 watt tap. That will present a 500 ohm load to your 600 ohm source, close enuf fo' gummint work. Mouser sells those transformers and last I checked Radio Shack did also. Of course, the Hammond transformer would provide better audio quality.

Date: Sat, 28 Aug 2004 17:45:30 +0100
From: Charles B <ka4prf@us-it.net>
Subject: [R-390] Question 1

I am a new owner of an R-390A. I have a question about the speaker and ear phone socket. Is there a connection on the rear of the receiver that will allow me to hear the speaker without earphones, but when the ear phones are plug in, the speaker cuts out? Just like modern receivers do?

Date: Sat, 28 Aug 2004 14:03:36 EDT
From: DJED1@aol.com
Subject: Re: [R-390] Question 1

Afraid the R-390A doesn't work that way with the earphone jack. I put a switch on the speaker so that i can turn off the speaker when listening to the headphones. Also, note that the headphone jack and the speaker are for 600 ohms. You will get better audio if you insert a transformer between the speaker output and an 8 or 4 ohm speaker.

Date: Sat, 28 Aug 2004 14:24:21 -0400 (EDT)
From: John Lawson <jpl15@panix.com>
Subject: Re: [R-390] Question 1

Hi Chuck - I'm a newcomer to this list, but have had several (6) 390s over the years, as well as many other Boatanchor radios. If you envision one of the roles of the R-390 - a multiple reciever set-up - say, on board a destroyer - you might have ten of them in a rack.

Some would be feeding teletype circuits, some receiving crypto, some hearing

voice or SSB - all feeding their respective outputs to the various 'users' via audio circuits. You, as the attendant of the radio room, get a call that Channel 6 is fuzzy and not readable.

You walk up to the rack, plug your headphone into Radio 6, and discover that the sending transmitter is off it's assigned freq. You nudge the dial a bit, now the signal is clear. You check the output meter, reduce the LIne Gain a bit to bring the output level back near a 'zero', and unplug the headphones. Now - if the headphone jack interupted the Line Audio feed - and, let's say that it was feeding a crypto set - you would have just caused a loss of sync, or a garbled line of the TTY. That's why the two outputs are seperate.

You can monitor without disturbing the feed. To do what you want to do, the easiest (IMHO) would be to just turn the Line Gain down when you don't want the speaker on. And I *know* it's a mismatch to hook a speaker up to the Line Outs on the back, but it works well enough for most applications - you can always use a transformer, or an external amp if you wish... I don't. Then you can use the Local Gain to control your headphone volume.

Alternatively, you can hook a 'normalled' jack up to the Line Out, and when you plug your headpones into that, it will interupt the speaker feed. However, I find it very convenient just to lower the Line Gain pot when I'm using phones with the 390.

Date: Sat, 28 Aug 2004 14:41:54 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Question 1

The R-390 is in a class all by it's self in this respect. It actually has three audio channels and two volume controls. You have the two back panel outputs, each with it's own volume control and the headphone output. Since you have so darn many audio channels nothing cuts out anything else. If you want to go nuts you can actually look at the diode load output as another audio channel and hook it up to a high impedance input on an amplifier. I typically run the audio around to a 1/4 inch jack panel and patch things around that way. I have more radios than speakers .....

Date: Wed, 22 Sep 2004 21:39:26 +0100
From: Charles B <ka4prf@us-it.net>
Subject: [R-390] Speaker 600

Where can I find a 600 ohm speaker or where can purchase one?
Is it possible to convert an 8 ohm speaker to 600 ohms?

Date: Wed, 22 Sep 2004 19:52:39 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: Re: [R-390] Speaker

Well, you can't really. The don't make them that I know of. I will be happy to sell you (or anybody else) a NOS military transformer that converts 600 ohms to 8 ohms for $15, postage included (US only). (sorry for the appearance of crass commercialism, but I don't really make any money off this - I just do it as a service). Actually, the transformer is marked as 9 ohms, but that is close enough.

Date: Wed, 22 Sep 2004 18:54:34 -0500

From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] Speaker

They're not very common, but 600-to-8 ohm transformers are; I use 'em on all my military radios with 600-ohm speaker outputs.

Date: Wed, 22 Sep 2004 19:46:31 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Speaker 600

Well there are a couple of routes. You can watch the auction site and find one on there....they are usually fairly easy to find...but you never know for sure what kind of shape the cone and voice coil are in. What most folks do is use a high quality 8 ohm to 600 ohm transformer to do the conversion to a more conventional speaker. Many of the guys are using a specific Radio Shack speaker and transformer combination. I have also heard you can use a 70 volt line transformer to do the conversion. One other option is to connect a nice stereo amplifier and speakers to the diode load terminal on the rear of the R-390X through a coupling capacitor. If you search the archives you will find a good bit of discussion in years past on all the above.

Date: Wed, 22 Sep 2004 21:17:02 -0400
From: "Dave Maples" <dsmaples@comcast.net>
Subject: RE: [R-390] Speaker 600

Chuck: One of the easiest ways to do this is to get a Radio Snack 70-volt line transformer. The correct tap on that transformer will come out to about 500 ohms--plenty good for this purpose. I just checked and I use the 10-watt tap for this.

Date: Wed, 22 Sep 2004 21:38:31 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Speaker 600

It's been a *long* time since I have seen a normal sized speaker with a 600 ohm impedance. What is normally done is to get a 600 ohm to 8 ohm (or 4 ohm) transformer and use a normal speaker. The transformers are available from a variety of sources ranging from eBay to Digikey to Radio Shack Typically ones that are big enough to do the job run in the $10 to $20 range.

Another option is to get one of the military speakers. The ones you want have an 8 ohm speaker and a transformer built into the enclosure. Some of these can be a little expensive but they often look neat teamed up with an R-390.

To get a "true" 600 ohm speaker I would look into the horn speakers you commonly see used in stadiums. The horns and drivers are generally sold separately. Drivers are available in a variety of impedances including 600 ohms. I'd have to admit that 600 ohms is not exactly the most common driver to find lying around ...

The final option is to pick the audio off the radio at the diode load test point and drive it into a high impedance input on a audio amplifier. This takes the whole audio section of the R390 out of the act. A lot of audio amplifiers will work. A good old tube based mono amplifier is often used.

Date: Wed, 22 Sep 2004 18:46:14 -0700

From: "Bruce Stewart" <skywarrior01@msn.com>
Subject: Re: [R-390] Speaker

I have always used a LS-166/U speaker with my R-390's. You would just need to change the cable or U-77 connector.

Date: Wed, 22 Sep 2004 21:14:41 -0500
From: "Robert Nickels" <w9ran@oneradio.net>
Subject: Re: [R-390] Speaker 600

Agree with that approach, especially since you can still find great old mono hifi amps and speakers at most hamfests and this is a great way to put them to use. The current issue of QST also has an article on building your own high quality speaker system, sounds like a good winter project, either with an external amp or with a 70 volt line transformer.

Date: Wed, 22 Sep 2004 23:56:44 -0300
From: "fev" <fev@ciudad.com.ar>
Subject: RE: [R-390] Speaker 600

In Antique Electronic Suply http://www.tubesandmore.com/ you can buy one for 16.50 dollars , here is the description:

TRANSFORMER, AUDIO INTERSTAGE, HAMMOND, 12 WATT
Developed in response to requests from the "Collins Collectors Association" , this is a matching audio transformer for older equipment with 600 ohm audio output, driving modern speakers. Or for "classic" high impedance speakers used with newer equipment, simply swap primary for secondary (ie...4 or 8 ohm input and 600 ohms out). Key Features Isolation unit: (i.e. seperate primary and secondary)

Primary: 600 Ohm (with 6" wire leads)
Secondary: 8 Ohm with 4 Ohm center tap (with solder lugs)
Power: Rated at 12 watts
Frequency Response: 30 Hz - 20 kHz
Weight: 1.3 lbs.
Mounting: 2 hole u-bracket mount - on 2-3/16" mounting centers

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Date: Thu, 23 Sep 2004 10:19:56 -0400 (EDT)
From: "Paul H. Anderson" <paul@pdq.com>
Subject: Re: [R-390] Speaker

I found that the LS-166 sounds pretty awful (at least mine does). I modified a used LS-166 by removing the vehicle/something rotary switch, putting a switching quarter inch plug in its place. I wired it so that I could plug in external 8 ohm speakers (which shuts off the internal speaker), or remove the plug and use the LS-166 as-is. Seemed to work pretty well. But I prefer the diode load approach most, since I just ran the output over to a cheap powered speaker from a computer. A long time ago, someone posted a simple DC isolation circuit for it that I made. I don't remember the values of the resistor and capacitor.

Date: Thu, 23 Sep 2004 10:41:18 EDT
From: Radiograveyard@aol.com
Subject: [R-390] 600 ohm speaker

The best sounding speaker to use with the 390s or anyother comm. rcvr. for that matter is the Hallicrafter R-42. Big but a terrific sound.Pete

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Date: Thu, 23 Sep 2004 10:24:33 -0500
From: Jerry K <w5kp@direcway.com>
Subject: RE: [R-390] Speaker

At least on board ships, almost never was a speaker driven directly from a receiver output. All receiver audio was taken from line outputs and wired to a batch of audio "patch" panels (actually just a bunch of multipole switches in a x-y matrix).

Wired to the same patch panels were "Speaker-Amps" (don't remember the designation of the amps) strategically placed around the ship, which in turn were hardwired to an accompanying speaker, usually an LS-166 type.

In Radio Central you could simply walk over to the patch panel and connect any receiver to any speaker-amp (or to any CW operating position's phone jack) by a simple twist of the correct switch. Similarly, you could switch any transmitter and it's audio/key/sidetone lines to any place on the ship you desired, as long as that place was wired with a mic and speaker/amp or phone jack/CW key position.

Fidelity wasn't the issue, communications readability was, and readability was pretty good when teamed up with the proper amp. For obvious reasons most CW operation was done from dedicated CW positions in the radio shack, where a mill, hand key, set of phones, and a stack of R-390A's (or whatever) was available directly in front of the operator.

It has always surprised me that those audio switching panels (usually comprised of a 5x10 matrix of multipole rotary switches) aren't seen on the surplus market and used by hams. I'd love to have two or three myself.

They were compact, extremely reliable, and simple to wire up and use. Heck, they were so reliable maybe they are still using the same ones and none have ever been surplused!

Date: Thu, 23 Sep 2004 18:19:24 -0400
From: "Michael Murphy" <mjmurphy45@comcast.net>
Subject: Re: [R-390] Speaker

Good idea Chuck, Why not a 600 Ohm speaker? For extra credit, carefully detach the speaker cone and spider from the 8 Ohm speaker voice coil. Unwind the voice coil. Now attach the voice coil form to a lathe which has been outfitted with a slip mechanism. Wind approximately 1000 feet of #38 wire in a back and forth pattern. Make sure that the winding occupies the same footprint as the original 8 Ohm winding. You should measure around 500 Ohms of DC resistance. The AC impedance will be higher of course. Glue the voice coil back onto the cone and spider and reattach the leads. This technique may take practice.

http://www.vintage-radio.com/repair-restore-information/valve_philips-speakers.shtml
http://www.mwaspeakerparts.com/speaker_parts.html

Date: Thu, 23 Sep 2004 21:29:31 -0400

From: "Dave Maples" <dsmaples@comcast.net>
Subject: RE: [R-390] Speaker 600

All: Cecil's recommendations are all sound. I have used a standard 70.7 V transformer rated at 10 watts for this. It comes out to 500 ohms, which is plenty close enough for this purpose. If you can locate an 8-watt 70.7 volt line transformer, that comes out to 625 watts. I don't think you'll do much better than that. both the 10-watt and the 8-watt 70-volt transformers are pretty easily located. Another possibility is a 25-volt, 1-watt transformer. That also comes out to about 635 ohms (again plenty close). For what it's worth.

Date: Thu, 23 Sep 2004 22:23:56 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Speaker

Your right about patience.....I would give a novice doing a one off a near zero percent of success in maintaining the Gap dimensions. The thickness of the windings that has to pass through the Gap in the magnet pole pieces. If not kept in tolerance rubbing will occur. A 1000' of even #38 wire results in a good bit more thickness that the original windings. Then one has the task of gluing the bobbin back onto the cone....and perfectly centered. I have reconed many EV and various other manufacturers speakers over the years...even with their recone kits that are specifically designed for the purpose it is sometimes difficult. I won't say it is not doable....just not something one would expect someone who has never done it before to be successful at doing...especially just once. I have been thinking recently about maybe having a speaker maker doing a run of 600 ohm speakers....maybe in a 10" or maybe 12". One could build a nice wooden cabinet and get a great sound out of our classic tube radio's... I went to a tube guitar amp repair/restoration class out in Texas a few months back and the guy that taught the class was having speakers custom made for the amps he built. For a speaker maker I wouldn't think 600 ohms would be much more difficult that the 4 or 8 ohm speakers they normally make... certainly they are equipped to do that type of work with great success. I could check with him and see who he uses...

Date: Tue, 05 Oct 2004 00:28:05 +0100
From: Charles B <ka4prf@us-it.net>
Subject: [R-390] Humm problem,

Any ideas on the following problem. When I turn the R-390A on and wait until it warms up, I get nothing but a Humming sound in all three positions: AGC, MGC, CAL? There are no signals. This happened unexpectedly when I turned the receiver on one morning.

Date: Mon, 04 Oct 2004 21:08:42 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Humm problem,

Well it depends a little on just how loud the hum is. Lots of hum probably means a blown filter capacitor. A blown filter cap probably would not take out the rest of the radio. One quick "assumption" is that the audio gain still works. In other words the hum gets louder when you turn the gain up. Assuming this is true then:

The first thing you need to check before anything else is the magic blocking capacitor in series with the mechanical filters. DO NOT rotate the filter select

switch until you are sure the cap is ok. If you have re-capped the radio then disregard this .... Best bet would be one of the tubes later in the IF strip. When you lose one the gain of the stuff that's left isn't enough to give you noise on the output. All you get is the background hum that was there all along. Depending on how you have the IF gain set up you may get the same set of symptoms when one of the tubes in series with the current regulator goes open filament. There is also a marvelous piece of coax that goes from the detector over to the audio chassis that is known to do pretty much the same thing.

If the assumption above is not correct then you have lost one of the tubes on the audio deck past the gain control.

Either way an open filament is likely to be the way the tube went out. A quick check to see if they are glowing or not may be the fastest way to find the problem.

Date: Tue, 05 Oct 2004 23:14:04 +0100
From: Charles B <ka4prf@us-it.net>
Subject: [R-390] Audio Output Transformer

Today I purchased an Audio Output Transformer from Radio Shack. It's a 1K ohm center-tapped to 8 ohms. The primary wires are: blue, black, and green the secondary wires are: Red and White Input is 1 K ohms; Output is 8 ohms what's the combination of wires do I need and how will I hook them up for 600 ohms?

Date: Tue, 05 Oct 2004 19:49:41 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Audio Output Transformer

Transformers are kind of odd. The impedance ratio is the square of the turns ratio. Since the center tap is mid way on the input half of the windings are on each side. Each half of the input winding has an impedance of 1K / 4 = 250 ohms. I agree that this is about the strangest thing in electronics, but that's the way it works. If you have a four ohm speaker then your 1K to 8 ohm transformer should work just fine.

Date: Tue, 5 Oct 2004 19:57:40 -0400 (EDT)
From: John Lawson <jpl15@panix.com>
Subject: Re: [R-390] Audio Output Transformer

Look at the transformer, or it's box, or (perhaps) the data sheet that came with it. You have a transformer with a 1K Primary, divided into two 500 Ohm sections via the center tap. I don't know if they are following the old RETMA color codes or not - but let's say that the 1K winding is the Black and Green wires. You can actually test this with an ohmmeter, though the DC values will be different from the AC Impedance stated. If in fact the Black and Green wires are the 'start' and 'finish' of the Primary, then the Blue wire should be the mid-point. It should measure about 500 Ohms to either the Black or Green wires. So you'd hook up the Blue wire, and either the Black - or - Green wire, (not both at once), to the 600 Ohm output. Then you attach the Red and White wires to your speaker. You don't say what wattage the transformer is, (or your speaker, for that matter)... so if it's a tiny little device it's possible you could blow it out with high levels.. Anyway, the 500 Ohm center tap is close enough (IMHO) to match it. If this doesn't work out for you, write me privately off-list and I'll send you a 600 Ohm-to-8 Ohm voice-coil unit that will do the job.

Date: Wed, 6 Oct 2004 10:47:27 -0400
From: "James M. Walker" <chejmw@acsu.buffalo.edu>
Subject: Re: [R-390] Audio Output Transformer

I run two R-390A receivers, and sometime back (years ago) I got the same transformer from Radio Shack, actually a pair. They came with the wiring info on the back of the bubble pack. I used the center tap and one outside connection to the 390s' 600 ohm output, the other side goes to a pair of small studio production speakers, works great, sounds great. I also got the LS-204 on the panel pair and relegated the military version to a box as I really prefer the studio speakers sound connection for me was blue and black to r-390A and red and white to speakers. As with all things, your mileage may vary.

Date: Sun, 16 Jan 2005 19:51:39 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Limiter function?

The other guys can straighten me out if I get off course here but my understanding is that it is a simple diode peak clipper implemented with tubes of course and the control just sets how deeply it cuts down into the waveform. The problem with peak clippers is that they create distortion and that is what you are hearing. Works pretty well with ignition noise and electric fence hash but that's about all.

Date: Sun, 16 Jan 2005 19:59:54 -0600
From: bw <ba.williams@charter.net>
Subject: Re: [R-390] Limiter

From what I remember, the limiter sets the audio waveform clipping at thetop of the spectrum when you use the lowest limiter setting. As you increase the limiter value, the clipping level gets lower and lower, approaching the quieter voice/ music waveforms. The best use is to lower the clipping level, by increasing the limiter value, to clip (lop off) the offending spikes before you increase the value enough that speech or music audio becomes clipped too. Spikes can be lightning, auto ignition noise, etc. I've used it with success in the past.

Date: Mon, 17 Jan 2005 15:14:49 +0000
From: "Gene Dathe" <dathegene@hotmail.com>
Subject: [R-390] Limiter

As you say, the limiter doesn't do much for AM signals. The real functionality is removing static crashes (lightning) from RTTY signals. A major use of R-390As was the regular routine "chatter" between the various ships in the Fleet, done with RTTY, and the limiter can remove the peaks, while providing a recognizable signal to the RTTY unit in the next rack...

Date: Tue, 18 Jan 2005 14:19:59 -0800
From: "David Wise" <David_Wise@Phoenix.com>
Subject: RE: [R-390] RE: New R390A owner with some questions.

<snip> > Also, engaging the sharp position with the audio response switch seems to kill the >audio no matter what mode it is in.

"Sharp" = extremely sharp, as in "CW only". It's only a couple hundred Hertz wide. Unless you're listening to code, you'll never use it.

Date: Sat, 12 Feb 2005 15:55:23 -0800
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] FS: R-390 Small leftover parts.

Hi, It was worthwhile for me to make this installation. It is not a trivial job mainly because of the connection cables and the tight quarters for changing the filament circuit of the R-390 i.f. chassis. I also have a modified R-390a audio chassis in my set ala the ER article on putting a 6360 tube in as the final audio. It produces pretty good audio compared to other boatanchors I have, maybe not as good as a Hallicrafter's S-28a but it's certainly up to listening to broadcast a.m. music and such. I think the R-390 chassis helps but the audio mod helped more. I'll probably never revert to the original configuration.

Someday when I get rid of this set along with the two "original", unmodified chasses, the new owner can restore the 390a to its original condition without using a soldering iron and the modified chasses can be reclaimed for whatever purpose he desires. Until that day, I will enjoy this radio immensely. It also works quite well on SSB (except the AGC needs help from my hand on the rf gain control-about like the original IF chassis in that regard). Yes, it was worth the effort but not an easy one to accomplish considering you first have to find an unattached R-390 i.f. chassis. No need to go to this measure if you have a complete R-390, imho, Dan.

Date: Tue, 19 Apr 2005 14:23:01 -0500
From: "Barry" <n4buq@aol.com>
Subject: [R-390] The total capacitance of capacitors in parallel is equal to the sum of each capacitors

Okay, pretty much everyone on this list knows this; however, I have a question. I would like to try Chuck's modification where the coupling capacitors in the audio deck are increased from 0.01uF to 0.022uF, 0.033uF, or more to yield better low frequency response. I assume the theory here is that the higher value capacitors produce a lower capacitive reactance at the lower frequencies thereby allowing a greater low-frequency voltage on the grid of the final PA enhancing the low-frequency response. Given the subject line of this post, I proceeded to place 0.033uF capacitors in parallel with the existing 0.01uF capacitors. Theoretically, this should have yielded 0.043uF; however, I didn't notice any change in the sound. I assume this is because while the total capacitance is now greater, each capacitor acts independently; however, why didn't the 0.033uF capacitors still allow the low-frequency voltages and I would still get a better low-frequency response? Is it possible I just didn't notice the difference or was my method completely invalid?

Date: Tue, 19 Apr 2005 16:01:08 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] The total capacitance of capacitors in parallel is equal to the sum of each capacitors

Well it could be because the laws of physics have been suspended by act of congress. Assuming that both capacitors are working and in the circuit then you should have them add when they are in parallel. With a 4x increase in the capacitors you should push the low end a bit more than an octave down. That's *if* the capacitor is the only thing limiting the low end. I would guess that the output transformer drops out somewhere down low. Do you have anything you can sweep the audio response with? Usually that is the only way to be sure you

are winning or loosing. A partial octave improvement can be tough to hear below 100 Hz or so. It's a lot easier to hear below 100 cps.

Date: Tue, 19 Apr 2005 18:24:17 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Audio Capacitance

Audio Capacitance, are you sure you have enough ear to discern the lower lows? Did you get all the caps in the chain from the detector to the output? If you missed one then that one is still limiting the lows. Get the cathode by pass caps also. These will keep you from hearing a difference. Does your speaker or headphones have enough low end to enable you to discern the difference? Your R390 may have more bottom end than the speaker or headset or ears can reproduce. Why do you believe the signal you were hearing has any more bottom end to hear?

Do not be deceived easily. Stay with it and review what going on in your receiving environment. There may be more low frequency than before, I just may not be as overwhelming as you expected. You are not going to get a boom box out of a 1/2 watt audio amp. Work with your BFO against a CW signal generator and listen for an improved lower audible frequency as you zero beat the BFO. Big caps is better sound for sure. Many or have been there and done something. Those that have stay with it long enough to get all the items changed are happier with the sound. Caps in parallel all add up to a simple sum. You are better off just doing a replacement. Things are not critical in the audio deck. Your not likely to send it into oscillation by doing cap replacement. The new caps are so much smaller you can do the whole deck with some 450 or 600 volt caps in some 0.1 or 0.3 values in place of the .01 values. Find the 8uf and put a 20 or so in there. A low voltage elec will be OK.

Date: Tue, 19 Apr 2005 18:28:58 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Audio Capacitance

Yes I did say go from 0.01 µfd to 0.1 µfd or 0.3 µfd A jump to .03 from .01 just will not give you enough to hear the difference. As some of the other post pointed out the transformers and other things are still effecting the changes

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Date: Tue, 19 Apr 2005 20:17:42 -0400
From: "Michael Murphy" <mjmurphy45@comcast.net>
Subject: Re: [R-390] Audio Capacitance

Beefing up those caps is good practice. But, it is a little like standing on your sprinker hose with both feet and taking one foot off. Do the Rippell - C604 and C605 to 0.033 uF and a 10 UF cap for C609. This should get you somewhere near 100 - 200 Hz for your -1dB point on the low end and your high end should be fine. Perhaps too fine. My top end was peaking above normal. Removing or reducing the value of C612 (68 pF) will flatten the high end. In any case you should be going out above 10KHz to the -1dB point. This should get you to 300mW at under 3% distortion. 1 Watt or so is about the maximum I could get out of the stock 600 Ohm iron for 11% distortion with this mod. If you should try to bypass R614, the cathode resistor, with a 100 uF electrolytic in order to increase gain, the positive feedback at R615 will cause trouble, producing a novel circuit - more suited to a code practice oscillator. The positive feedback produced by R615, the 56 Ohm job, is yet another mystery circuit of the R390A. I have elected to short this little bugger out. If you are willing to do a simple

rewire to replace the 6AK5 with a 6AQ5, lower R614 to 270 Ohms or so and install a small all-american 5 type output transformer, you can easily get to 1 watt at less than 1% distortion and obtain 30 Hz to 20 kHz bandwidth. With a better transformers and more fooling with the circuit, 2 - 3 Watts is possible. Warning - Playing with this circuit is addictive, buy another audio deck.

Date: Wed, 20 Apr 2005 07:00:08 -0400
From: "Michael Murphy" <mjmurphy45@comcast.net>
Subject: Re: [R-390] Audio Capacitance

> RE: R-615 I had an audio deck that was oscillating. Put out a high pitched
> squeal. Finally traced it to R-615, which had gone high -- as I recall to about
75
> ohms or so. Replaced it with a 56 ohm resistor, and it stopped oscillating.
> I don't understand the theory of why that happens, but it sounds like you
> do. What happens, if anything, if you short out R-615? thanks, -tom

The "how" is positive feedback. This is a path which feeds some of the output signal from the output stage (developed on the cathode resistor), back, to the cathode of the audio driver stage. The "why" is less understood. This feedback method must have been added in the design to generate a deliberate effect that the designers wanted - like a peak in the response. The guys on line can help you more than I can. All I know is that positive feedback if taken too far can cause some nasty effects like oscillation! Adding a bypass or having the increased resistance is like turning up the regen control!

Date: Wed, 20 Apr 2005 08:32:32 -0500
From: "Barry" <n4buq@aol.com>
Subject: Re: [R-390] Audio Capacitance

C604 and C605 are the ones I was jumpering with 0.033's. I replaced C609 with a 10uF too. I need to try this again, this time with the calibrator signal and maybe watching an output meter. I may see some increase at the low frequencies that way, but if I can't really hear the difference, then it won't matter. One thing I wasn't doing during the experiment was to listen through the 600 to 8 ohm transformer. That makes quite a difference too. I'll try to hook that up in the test this time.

I'm currently in the process of making a jumper cable to allow me to power the PTO (and the RF deck for that matter) away from the radio and onto the bench. I don't want to take any more chances on shorting anything else out while doing my PTO linearity work. BTW, this one looks pretty bad linearity-wise. I plotted the output in Excel and it looks pretty pitiful. Hopefully I can replace the capacitors someone mentioned and improve this thing right off the bat. I'm worried, though, that the "curve" looks like a sawtooth pattern in places. Maybe someone else has already tried "correcting" the stack. Dunno...

Date: Mon, 25 Apr 2005 08:33:36 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: [R-390] 390A Audio Deck ?

Things went from lively to dead all of a sudden. Thought it might be a good time to ask a question. While contemplating the construction of the R-390A audio deck questions in my mind have come up about the planned use the original designers had for the mirrored relay and tube socket holes that are blocked off.

The various builders of the audio deck in all cases seemed to have punched all the holes and labeled the chassis then covered it all up from the top side with a block off plate. I haven't gone as far as removing the plate to see if the tube type is even designated...i'm assuming it would be another OA2....but maybe not. Just thought I'd check with the group for some history about this. I can't say I remember it ever being discussed..

Date: Mon, 25 Apr 2005 11:15:23 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] 390A Audio Deck ?

As I recall from old posts -- it was for an optional squelch. If not, maybe it was like one of the three B-29's the Russians kept and copied during/after WWII. It had a patch in the fuselage. All the TU-4's they made had the the same patch because they were told to make an exact duplicate. Not likely, but I don't know that anyone has ever seen the audio deck without the patch and the optional "kit" installed. OK, so I'm a rumor mongerer. Practicing to become a TV news pundit able to speculate on cue.

Date: Mon, 25 Apr 2005 14:20:36 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] 390A Audio Deck ?

That is correct. The function switch has the needed extra position and the wireing harness has the needed wires to install the squelch. There have been reports of R-390A's with the squelch installed (though I don't have one). It could be done by a field change involving a relay, the tube socket and tube and a few components. If I remember correctly, it used the existing relay in the audio deck that grounds the audio signal, in addition to the added relay and a new marking plate for the Function switch. I would suspect that the added relay was a 10 milliampere type arranged in the plate circuit of a 12AU7/5814. See the R-390/URR schematic for the details.

Date: Thu, 28 Apr 2005 01:11:45 -0700
From: "mparkinson1" <mparkinson1@socal.rr.com>
Subject: [R-390] kleronomos audio mod

Does someone have a copy of this audio mod I want to give it a try something to do so to speak like I don't have any R-390a to work on. I don't have a copy of the ER article that would be great also I was wondering if someone had it and scan to me or what ever it would take to get an email copy of this.

Date: Thu, 28 Apr 2005 07:09:09 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] kleronomos audio mod

I don't have a copy of the mod. I have seen it and it's a major bunch of surgery on the audio deck. Last time I checked used audio decks still were in the sub $30 range. I would suggest grabbing one of those to do the mod on. That way you still have a working original to swap back to. Like a lot of mods going back and forth trying things will be part of the process.

Date: Thu, 28 Apr 2005 09:19:36 -0700
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] kleronomos audio mod

Hi all interested in this mod, I put this mod on a second audio chassis and it's in my 390a currently, probably to never be removed as long as I have the set. I have both articles relating to this mod published in Electric Radio and can send to those that want it. Please email me directly and I'll wait a few days and send them all at once. I'm quite happy with how it turned out. It does entail putting a 9 pin socket in place of the 6AK6 seven pin socket for the 6360 !!! output tube and adding a small output transformer in that unused area (squelch circuit area?) of the 390A audio chassis.

There is another audio mod, also published later in Electric Radio June 2004 "Simple Audio for the 390a" by Mike Murphy. I believe this mod, which doesn't involve as much chassis hacking and uses a 6AQ5 is a good one, but I have no direct experience with it. I'd probably try it if I were doing the mod now because it's easier. If I feel so disposed, I may try this one in the 390 non-a if I can find a spare audio chassis. I could scan this article also if enough interest. The article documents the performance before and after the mod pretty thoroughly.

Date: Thu, 28 Apr 2005 19:49:27 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: Re: [R-390] R-390A Audio Decks

You should contact the folks at Fair Radio (www.fairradio.com)
They may be able to pick some EAC decks out of their pile.

Date: Thu, 28 Apr 2005 21:18:21 -0400
From: Larry Walker <kw4a@direcway.com>
Subject: [R-390] Audio Mod

Kleronomos Real Audio Mod: This is a major (non-reversible) mod that is documented in Electric Radio issue 42. It converts the AF deck to deliver 5 watts of push-pull audio into an 8-ohm speaker.

Date: Thu, 28 Apr 2005 19:49:42 -0700
From: "Dan Merz" <djmerz@3-cities.com>
Subject: [R-390] Kleronomos audio mod

Hi, such a hot item and yes there is probably a copyright issue here. I'm not selling this to anyone or advertising it as available; I remember when I tried to get the first Kleronomos article from ER before I made the mod a few years ago. It wasn't available. I had the second article in my own subscription copies of the magazine. No back issues were available and as I recall ER did not object when I asked the editor, then Barry Wiseman, about my providing the copy I finally obtained to someone that requested it. I was concerned about providing something that ER might be selling. I notice in my latest issue of ER that any back issue is offered for $3.75 including shipping, or you can buy the entire set of back issues for $375. They don't provide copies of individual articles to my knowledge. $3.75 isn't a ripoff - I think I pay $2.67 per issue with my subscription. I finally obtained a copy of the 92 article from a ham friend. He sent a jpg that I could barely read and I ended up retyping it completely to avoid eyestrain. I have subscribed to ER since about 1995 so don't have any of the earliest articles, which covered the 390a in several articles. A complete index to ER is available online. Electric Radio is a unique publication in many ways with heavy emphasis on AM ham operation. But it has many interesting ideas, projects, reviews etc for general hi-tech radio buffs with little reference to solid state. I continue to read it with interest even though I am not a ham. Some of the

articles are personal recounts by old timers. I recommend it. I'll be more careful in the future about offering copies in an open way. If you feel unjustly awarded with a freebie, I suggest subscribing to make amends for our sins. That should make the editor happy.
The issues were:

Real Audio for the R-390a Oct 1992
Real Audio for the R-390a Revisited Feb 1997
Simple Audio for the R-390a June 2004

If you're going to do the Kleronomos mod, you should have both of the first two articles. The Simple Audio article stands alone. Dan

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Date: Tue, 10 May 2005 18:28:10 -0700
From: "James Cottle" <jim_cott@earthlink.net>
Subject: [R-390] Diode Load Tap for Audio

Hmmm..Interesting. I soldered up the Diode Load tap for audio as per Chuck Rippel's web page instructions and get no audio out!!! The R-390A I have works great if I use headphones..but alas, not an peep from the output of the phono plug through a 10uF NP capacitor and 470K resistor connected to the Diode Load jumper..Anyone have any idea why?

Date: Tue, 10 May 2005 21:57:55 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Diode Load Tap for Audio

A. The diode died of heat when soldered.
B. Diode is in backwards.
C. Cold solder Joint.

Been to the circuit and done it.
It does work as advertised, so you do have a hardware problem.
Remember the diode load is a minus voltage.

Date: Tue, 10 May 2005 22:05:23 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Diode Load Tap for Audio

Opps, sorry last post was bad.
470K resistor and cap do work.

Been to the circuit and done it. It does work as advertised, so you do have a hardware problem. Some times you have to use a value other than 470K because of the load you are working into for your amplifier. As you have no audio, try a 47K or even a 4.7K. The amplifier input you are trying to drive may be a lot lower impedance than you expect. Watch out that you are not trying to drive a dynamic mic input that has a DC voltage associated with it. That will put a charge on the cap and cut the signal off also.

Date: Tue, 10 May 2005 23:02:12 -0700
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] Diode Load Tap for Audio

Jim, I assume you connected the amp ground to the radio ground via the shielded wire, as prescribed by Rippel. I have this circuit in a small box and used it today on the 390 and it worked fine. Boy, what great sound with an

external amplifier. The sparks are visible when you make the ground connection on the 390 and no sound until you do that because, in my case, the amp has a two wire power plug and the chassis on the amp doesn't necessarily have ground in common with the 390 (I should fix that, shouldn't I). Maybe your problem has something to do with an inadequate ground connection on the phono cable at one end or the other. Dan

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Date: Thu, 12 May 2005 18:43:09 -0700 (PDT)
From: "W. Li" <wli98122@yahoo.com>
Subject: [R-390] Re: little things

Over the years, I have made some little additions to my trio of R-390A's that may be of use to you guys. Most are obvious and simple (about my speed nowadays). Most are not original with me, but have been mentioned in earlier posts through the years.

<snip> TB-103
Jumpered 6 and 8 to bypass R101 (6800 ohm) to increase output. Works.

Audio deck
Nolan had an idea to mount four washers as a "mini-stand-off" under this subchassis to allow some heat to leak out when it is mounted into the frame. This may or may not make thermal sense, but it doesn't hurt. <snip>

For those like me who don't remember the details: TB-103-6 is local audio out (600 ohms), TB-103-7 is ground, TB-103-8 is phones out, in parallel with the front panel phones jack. So this mod changes the output impedance of the phones jack and rear terminal from about 7.4k to 600 ohms.....

Date: Fri, 13 May 2005 10:34:11 -0700 (PDT)
From: "W. Li" <wli98122@yahoo.com>
Subject: Re: [R-390] Re: little things

Thanks for your kind comments!

1) TB103 I'll wager that most folks do not know that the native R390A has a 7.4K phone jack impedance, so that ALL of our receivers ought to have this mod installed. For myself, I mounted my 600ohm->8ohm transformer in a ext. small cabinet that houses a 6" spkr so that it can be used with any 600 ohm mil recvr. A slide switch can allow direct connect to the 8ohm spkr if required.

Date: Sun, 31 Jul 2005 14:25:33 -0700 (PDT)
From: "W. Li" <wli98122@yahoo.com>
Subject: RE: [R-390] Sub 6AU6 for 6BA6? (or 6AK6)

I can not comment on your proposal..... BUT there is a published older article re 6AU6 sub for a 6AK6 as output audio, that appeared in HiFi Annual AudioHandbook by Lawrence Fleming back in the 50's. It involved dropping R614 from 560 to 220 ohms, and adding a 33K ohm screen dropping resistor. He claims that the audio output for 1.5v audio input would be 360mW as opposed to 65mW for a 6AK6. Seems to me that it'll be an interesting exercise to see if that would make any "rational improvement" over what the Collins engineers planned.

Frankly, I suspect not, and the idea of taking off the signal from the diode load jack is much more appealing for much better "hi-fi" as Chuck Rippel says. What

I eventually did was merely jumper R101 (connecting contact 6 with 8 on TB102) to gain significant increase in phone audio output with no alteration of the underlying Collins circuitry.

Date: Thu, 11 Aug 2005 21:39:56 -0700 (PDT)
From: Mike Castellana <rocket_no9@yahoo.com>
Subject: [R-390] revelation and the diode load ...

Finally got around to checking out audio off diode load... I can't believe the improvement. Going from 390A (w/ resistor/capacitor) into a Macintosh MC-40 into a single Dynaco A25 (Only had one, knew I'd need it eventually); Working the radio is SO much more pleasureable. Inteligibility has been improved greatly. Bass response is out of the ballpark and high end has been tamed... Distinctions between selectivity settings have become more useful. And of course ... when a signal is booming in opening radio to 16kc is a ball. Is it a good idea to remove V603 and V604 if I continue to use an outboard amp? Seems like radio might run cooler.

Date: Fri, 12 Aug 2005 09:21:52 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] revelation and the diode load ...

Good for you. Everyone should try this.>... Macintosh MC-40 into a single Dynaco A25 Bravo on the McIntosh amp. A nicer 6L6 amp is hard to find! (I have one here.) I found that the Dynaco 25 is a speaker. Some info and box diagrams are at:

http://www.t-linespeakers.org/classics/dynaco.html

I have here an Acoustic Research AR-2 that may be of similar vintage. It's got an unfinished pine case and is quite beat up. I expect to try it in a setup very similar to yours.

>Is it a good idea to remove V603 and V604 .....

It will run a bit cooler, and tube life is greatly extended by storage in a box. heheh

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Date: Fri, 14 Oct 2005 00:56:01 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] R-392 help - Green Speaker-ology

I coulda' told ya' ... the primary limiting factor with the LS-166 (and LS-454, etc.) is not necessarily the transformer, it's the basic speaker/enclosure design. They are built to be waterproof and blast/concussion resistant. The R-392 is waterproof, which was bathtub-verified by one of the list members a few years ago -- and actually floats, though face-down -- which is not particularly convenient. ;-) The LS-166 and others of the series, can be called Accidental Acoustic Suspension design. In addition, the cone is made of heavily varnished/sealed cloth and has two form-fitting grilles or baskets front and aft as part of the water-proofing and blast resistance, respectively. The suspension is very stiff. Also, the intention is to cover the code and voice frequency ranges, to hopefully improve intelligibility, as with other "communications" type speakers. That's on the presumption that much of the signal content outside the range of, oh, 300-3,000 Hz is likely to be noise or not needed.

I used to home brew speaker systems years ago -- with hightly variable results -- so had studied up on it. So here's some more background for what it's worth.

There are two basic types of speaker enclosure designs -- unsealed and sealed. For the most part, until the late 50's or so, maybe mid 60's, the unsealed were the rule. These ranged from simple open back designs -- like many popular acccessory speakers for communications gear, to rather elaborate bass-reflex designs. It all has to do with the back-wave. When a speaker driver physically oscillates, it produces both. For HF transducers, it doesn't matter much as high frequency audio is directional. However, the back wave of a regular or LF/woofer speaker cancels out much of the front wave. If you run a woofer driver outside of an enclosure, sometimes you can barely hear it. If you do the same with a full-range driver, it will lack bass and you'll mostly be hearing the higher frequencies.

So, a primary challenge in speaker design is to deal with the back wave. Simple open back speakers sort of deal with it -- providing side walls which suppress/ redirect some of it. Then there were the bass-reflex designs and variants which generally attempt to make use of the energy by physically reversing the phase of the back wave and putting it out the front of the enclosure through a tuned port. Just how well in-phase it becomes as well as a bunch of other parameters would determine resulting frequency response and overall fidelity. Bass reflex designs usually benefitted from size -- the bigger the better -- but not always -- as the "monsters" I built proved out.

Along came the acoustic suspension design. The basic idea was to bottle up the back wave -- but as with most things, there's a lot more to it. This design is inherently less efficient, requiring more power, but allowed for a more compact enclosure. (Remember the wattage wars of the old days? -- Triggered by the introduction of lower efficiency speakers.) Not only is the back wave not make use of, but sealing the enclosure puts much more physical resistance on the movement of the cone -- the driver is basically "trying to" compress and expand a given volume of air. This begat the need for more compliant suspension parts - -surround and spider (corrugated disk that supports the voice coil), yet stiffer cone material. Many drivers are specifically designed for either accoustic suspension or free-air enclosures. In fact, some of the more extreme suspension drivers can self-destruct if operated at high volumes in free air because the thing is supposed to be impeded by the trapped air and there's nothing to restrict movement.

Anyway, you can buy a small metal speaker unit about the size of the LS-166 that is acoustic suspension and will sound pretty good. That's largely because the driver is high-compliance and acoustically matched to the enclosure. They also sell a lot of small bass-reflex speakers of similar size -- they have small ports either front or back. Which reminds me .... If you take an old National, or similar, open back communications speaker and place it so the back is about 12 inches from a wall, it will improve the lower frequency end. You can experiment with varying the distance -- effectively tuning the phase of the reflection of the back wave. Also may benefit from being in a corner - as with many speakers - for that and other reasons. There are a number of other relevant parameters re speaker systems, such as dealing with peak resonance of the drivers and enclosures, etc. Fortunately, I don't remember the rest of it all that clearly. ;-)

Back to the LS-166. Here's a simple experiment -- try running it with the back off, if you haven't already, and vary its position. There may be some improvement. However, the tinny sound is also due to its construction -- the stiff, waterproofed cone and suspension materials, etc. which restrict movement.

In addition, the enclosure was not designed and "tuned" for best fidelity either. The next step would be to replace the driver, however, I'm not sure what would be the best choice. A unit made for acoustic suspension may require higher wattage than the R-392 can put out. Probably better to use a universal type and leave the back off. There would still be the limitation of the transformer, but you could use a Hammond instead. Or, leave the LS-166 for display and use a different speaker, or even amplified computer speakers and bypass the audio stage of the R-392. (You can remove the 26A7 and reduce heat.)

Oddly though, the speaker in the "Angry-5" -- AN/GRR-5 R-174 "gas" receiver -- built into the power supply half, is of similar design -- waterproof, concussion-resistant -- front and back screens, etc. However, they sound a good deal better -- actually not all that bad. I'm sure part of it is due to the larger enclosure space -- the power supply section - but the driver is somewhat different and, I suppose, other factors are involved. They were from the same time frame as the LS-166's, though. Probably more than you wanted to know about speakers, eh?

Date: Sat, 15 Oct 2005 18:42:39 -0600
From: "SAM LETZRING" <sletz@msn.com>
Subject: Re: [R-390] R-392 help - Green Speaker-ology

I have an old Klipschorn I built in 1966- they are VERY efficient- have it out in the shack- maybe I'll try it with the 390A- right now it's connected to my McIntosh MC-60 and my Sherwood tuner- possibly could take the IF out into the MC-60 and then into the Klipsch. I got the plans from Paul Klipsch back in the early 60's and built a couple of them while in the AF

Date: Sat, 15 Oct 2005 18:10:43 -0700
From: "Dan Merz" <djmerz@3-cities.com>
Subject: RE: [R-390] R-392 help - Green Speaker-ology

Ian, I've seen this transformer advertised by Antique Electronic Supply with the comment that the Collins Collectors group prompted its production, so I assume this is accurate. Hammond seems responsive to making items that fill a need for old radio collectors. I haven't tried one, as I have other types of transformers around to make the match when I've needed it. It should be high quality based on its size, rated at 12 watts, and about $18.

Date: Sun, 11 Dec 2005 21:45:05 -0800
From: Frederick Bray <fwbray@mminternet.com>
Subject: [R-390] Low Audio

I am a new R-390A owner and am encountering a problem. Over the weekend, I pulled the front panel so that I could align a couple cams and clean the pots and switches on the front panel with Deoxit. I also pulled the power supply and audio deck to do basic chassis cleaning with a paint brush and WD-40 on a cloth.

Upon reassembling the radio, I found it has very low audio, with some distortion when I crank up the local audio gain. However, everything else seems to be working normally. I have swapped the audio deck tubes with known good ones, just in case, but this made no difference. It was working before I started, but clearly needed to have the pots and switches cleaned. Is there anything obvious I might be overlooking?

-
Date: Mon, 12 Dec 2005 00:53:14 EST
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] Low Audio

Try turning on the limiter and see if the audio sounds better or louder. If this is the case there may be some bad caps around the limiter tube V507. The ones that usually cause trouble are C532 and C537. Also check limiter tube V507.

Date: Mon, 12 Dec 2005 07:22:00 -0500
From: JMILLER1706@cfl.rr.com
Subject: Re: [R-390] Low Audio

Sometimes WD-40 or Deoxit and high-impedance tube circuits don't mix well. If sockets or wafers are soaked with the chemicals and absorb them, they might form enough of a path to ground to degrade operation until the stuff evaporates.

Date: Mon, 12 Dec 2005 06:28:51 -0800
From: Frederick Bray <fwbray@mminternet.com>
Subject: Re: [R-390] Low Audio

Thanks for the suggestions so far. I tried to use the Deoxit, etc., sparingly and with q-tips, but it is a good point. It looks like I will have to run some tests. Well, at least I know that most of the radio is working correctly.

Date: Mon, 12 Dec 2005 10:27:54 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Low Audio

WD-40 should be kept far, FAR away from your R-390 and any other switches that operate on low voltage, it leaves varnish on the contacts when it dries.

Date: Mon, 12 Dec 2005 13:33:29 -0500 (EST)
From: <w9ya@arrl.net>
Subject: Re: [R-390] Low Audio

While the oil in WD-40 will clean about as well as any oil, when WD-40 dries out it leaves behind a waxy substance. i.e. One must *truly* clean-up the residue of WD-40 to maintain good electrical contact. Needless to say I do not use WD-40 for anything around here. If I need wax, I use wax. If I need an oil I use one that does not leave behind what WD-40 does. Being honest about things I have never been able to give away my unused stock of this stuff.

Date: Mon, 12 Dec 2005 19:44:35 -0000
From: <fwbray@mminternet.com>
Subject: Re: [R-390] Low Audio

Thanks for all the comments and suggestions so far. For clarification, the WD-40 was just used on a rag to clean the chassis, not sprayed on parts, etc. One other symptom is that the line meter no longer has any indication and the line gain pot no longer has any effect on the audio level. (Previously, turning it up would increase the audio level slightly.) I did clean that pot, so maybe that's the bad one? I will let everyone know how it turns out.

Date: Mon, 12 Dec 2005 12:53:03 -0700
From: DW Holtman <future212@comcast.net>

Subject: [R-390] WD-40

If you google the MSDS for WD-40, you will find out it is a lubricant as well as a cleaner. It contains 50% Petroleum Distillates, which is a cleaner (such as kerosene) and *25% Petroleum Base Oil*, I think it is a 10 weight oil. It is not a pure oil, but leaves a light coating of oil for protection on the surface. It is a great cleaner, but not so good used alone for oiling gears etc.

Date: Mon, 12 Dec 2005 13:50:00 -0700 (MST)
From: Richard Loken <richardlo@admin.athabascau.ca>
Subject: Re: [R-390] WD-40

I used it to loosen up the rusted and frozen leveling legs on my washing machine yesterday. It works well for that kind of work so it will remain on display in my shop. Hee hee, maybe I will use in in a potentiometer as recommended by Tekronix as 1975 but I would just do that to piss you all off.

Date: Mon, 12 Dec 2005 10:52:44 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Low Audio

There is no oil in WD-40, it isn't a lubricant of any kind, neither shows on the can anywhere. The only thing I use if for is to dry out wiring which is its intended purpose. But it also leaves a nice shine on cast iron surfaces like the table saw or band saw, apply with the wire brush on the grinder,.... nice! But keep it out of the electronics shop.

Date: Tue, 13 Dec 2005 13:05:27 -0500
From: roy.morgan@nist.gov
Subject: Re: [R-390] Low Audio

> did clean that pot, so maybe that's the bad one?

Fred, Sounds like an open pot. If you used WD-40 to clean that pot, the stuff may have dissolved the carbon material in your pot and rendered it useless. Use Caig MCL (Moving contact lubricant) on pots. Only. www.caig.com

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Date: Tue, 13 Dec 2005 20:24:18 -0000
From: <fwbray@mminternet.com>
Subject: Re: [R-390] Low Audio

Update on the low audio problem. Last night I used a VOM to check the pots. All three of those cleaned (RF gain, local audio and line audio) with Deoxit report the correct values and seem to track correctly when I measure between the wiper and either side. So, the problem would seem to be elsewhere. I am going to make resistance and voltage measurements on the audio deck tonight.

Date: Tue, 13 Dec 2005 18:58:52 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Low Audio

One of the audio problems with the R390 or R390A is in the wire harness shape. On some receivers the loop in the audio harness to audio deck is a bit long. Setting the deck on a surface will scrunch the wires in the harness a bit. Some times it will cause the wire harness plug to pull off the deck connector. Over time things break. As many thing as you have had to try from the mail list

here has not gotten the problem fixed. So its time to look into the audio deck wire harness back shell for a frayed wire. I is right that the line audio and local audio should both die. There is only one detector, one limiter, and one audio amp V601 a 5814 in the audio deck. Then the audio comes through the deck plug J620 to P120 to the front panel. The audio is wired common going out on pin 2 of the plug to both the local and line gain pots. Check your diode load jumper on the back panel. This is the 1/2 way point between the detector and the audio deck. With an AM station and no BFO you should see -4 to -10 volts on the diode load. With the BFO on a cal tone you should have over -20 volts on the diode load.

If you have it travel to the audio deck.....
If you do not have it travel to the IF deck.....
Why do you think you have an Audio Problem?
Just because you were working on the Audio pots when the receiver died may have nothing to do with your problem. Hope this helps

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Date: Tue, 13 Dec 2005 20:04:19 -0500
From: "Tom Bridgers" <Tarheel6@msn.com>
Subject: Re: [R-390] Low Audio

Have you checked for leakage from the pot to ground? I have found many pots that tested okay as far as resistance goes, but what tripped me up (and caused problems in the circuit) was that the pot was shorting to the pot case (and therefore to ground) at a relatively high resistance. Some older pots are failing this way. Heath VTVM pots are notorious for this.

Date: Wed, 14 Dec 2005 18:02:13 +0000
From: "Gene Dathe" <dathegene@hotmail.com>
Subject: [R-390] 600 to 8 ohm phone mod

Question: I would like to plug in my Heil phones into the phone jack. Are there any ready made plug in 600 to 8 ohm converters out there? Or; How have you modified yours?

Date: Wed, 14 Dec 2005 13:41:47 EST
From: DJED1@aol.com
Subject: Re: [R-390] 600 to 8 ohm? phone mod

I don't know if this made it into the "pearls of wisdom" but there is an easy fix for the headphone impedance problem. The reason the low-Z phones don't work well is that there is a 6800 ohm series resistor between the audio line and the headphone jack. Thus 600 ohm phones divide the voltage a little, 8 ohm phones drop the voltage a lot. However, you can parallel the resistor by connecting another lower value resistor from terminal 6 to terminal 8 of the audio terminal strip on the back. I used 470 ohms, but it can be adjusted to suit your phones. Works good with my 8 ohm phones.

Date: Wed, 14 Dec 2005 13:53:38 -0500
From: Gord Hayward <ghayward@uoguelph.ca>
Subject: Re: [R-390] 600 to 8 ohm phone mod

I put a tiny 600-8 ohm transformer in a film can with appropriate plugs. It seems to work well.

Date: Wed, 14 Dec 2005 18:48:37 EST

From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Low Audio

>I have concluded that it is an audio problem -- versus an rf stage problem based on carrier >level readings I get on local AM broadcast stations. Frederick Bray

Fred, Great job. You know every thing from the Antenna input to the carrier level meter circuit in the last IF stage is working. Keep checking as you get the time you will find the problem. I ask these questions trying to be helpful. Being the nut I am and a lazy typist, some times the questions read somewhat antagonistic. I do not mean them that way. I like to think I am getting better at my mail. However I am not going to ask for a reader poll. A very good reply from you and you are making progress that will get you to the problem. Keep us posted.

Date: Wed, 14 Dec 2005 19:17:12 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Low Audio

>I measured the diode load and have over -30 volts on both AM and with the calibrate/bfo, >depending upon where I set the RF gain control. I pulled the hoods on both of the cables to the >AF deck and could not find any broken /lose wires. Guess its time to start measuring things in >the AF deck. Thanks.Fred

From the diode load the signal goes back into the IF deck and to the limiter V507. The tube is a 5814. Turn the local gain all the way up. As you turn the limiter on and off you should hear a pop or click in the audio output as the limiter tubes goes into conduction when turned on. From V507 the signal goes to the audio deck and V601. The tube is again a 5814 and both sides of it are used as audio amps. The signal out of V601 goes to both the line gain and the local gain controls on the front panel. You should be able to hang an AC voltmeter on the controls and measure a small AC signal when you have a good AM station or Cal tone and BFO on that pegs the carrier meter.

If you have AC signal on the local and line gain controls that you can very in voltage by changing the RF gain control, the you are good to that point.

If you do not have a measurable AC signal on both the line and local gain controls, you will have to explore V601 in the audio deck or V507 in the IF deck. You also need to keep the wire harness in mind as you are exploring. Do an eyeball on the 5814s to ensure you filaments on both side of each of the tubes.The wide sharp audio response switch is associated with V601. You may need to explore this switch behind the front panel for a problem. When you dropped the front panel to clean the other controls, you may have the wide narrow switch and wiring giving you problems. It may have seen you working on the other controls and feels a need for a snit as it was being ignored. Roger

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Date: Thu, 15 Dec 2005 11:09:39 +0000
From: "Gene Dathe" <dathegene@hotmail.com>
Subject: [R-390] 600 to 8 ohm phone mod

Thanks to all who responded both on and off list. Ed had what I was looking for; I half remembered that mod but forgot the details--quick, easy, reversible. Thanks for the early Christmas present.

Date: Sat, 17 Dec 2005 09:40:08 -0800
From: Frederick Bray <fwbray@mminternet.com>
Subject: [R-390] More On Low Audio Problem

First, let me thank everyone who has replied -- both on and off list. I think I have narrowed the problem down to the first AF amp/cathode follower. I would appreciate it if those who are more experienced that I with the 390A can confirm that I am on the right track. I used an audio signal generator to ascertain that a signal injected at the local and line level controls seems to produce a normal audio output. Using a VTVM, I confirmed that on there is an AC voltage on terminal 1 of the wide/sharp switch and that I can trace this voltage through the switch. Jumpering this voltage to terminal 6 on the switch seems to restore the audio level to approximately normal, or at least much closer to normal. From looking at the schematic, I think that what I am doing is bypassing the first AF/ cathode follower and going directly to the local and line AF amps. Does this make sense? Thanks,

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Date: Sat, 17 Dec 2005 11:53:58 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] More On Low Audio Problem

In the wide position the response switch S-104 should be already shorting pin 1 to pin 6. If you are using a clip lead to connect pins 1 and 6 and it restores audio you have a bad contact on S-104 or a broken wire between pins 3 and 9. Looks like you are close... I didn't have a schematic for the 390A from the shop but used the pull out in the TM11-4000 that was already on my desk here in the house. I hope the designations are correct...I believe the schmatic to be.

Date: Sat, 17 Dec 2005 11:58:34 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] More On Low Audio Problem

Of course another possibility is that the switch is inadvertently in the sharp position which would yield low, strange sounding audio as described....

Date: Sat, 17 Dec 2005 10:02:37 -0800
From: Frederick Bray <fwbray@mminternet.com>
Subject: Re: [R-390] More On Low Audio Problem

I should have noted that it also works if I jumper terminals 1 and 4 of the switch. In the wide position terminal 7 connects to terminal 4. Jumpering from 1 to 4 works regardless of whether the switch is in the wide or sharp positions.

Date: Sat, 17 Dec 2005 12:22:12 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] More On Low Audio Problem

I went and got the real live R-390A manual to be sure there were no pin designation issues and there weren't. My drawing shows no connection between pins 7 and 4 except through a 470K resistor isolating those two points in the circuitry. (R608) Jumpering between pins 1 & 7, and 1 & 4, is doing the same thing just on opposite sides of R608....basically bypassing S-104 which appears to be where you problem is!

Date: Sat, 17 Dec 2005 12:28:36 -0600

From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] More On Low Audio Problem

Got a bit crosseyed....should have said 1 and 7 not 1 and 6....

Date: Sat, 17 Dec 2005 13:44:41 -0500
From: "Jim M." <jmiller1706@cfl.rr.com>
Subject: Re: [R-390] More On Low Audio Problem

Ask yourself, what could have happened when the front panel was removed and replaced. There are large cable bundles that get flexed when you remove the panel. I have broken many wires going to gain pots in the process of removing the panel. Something could have happened to a wire on the audio pot of wide/narrow switch. Sometimes the twi multipin connectors to the AF module work loose. Hopefully a wire wasn't crimped under the panel when you replaced it.

Date: Sat, 17 Dec 2005 13:01:31 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] More On Low Audio Problem

I have been studying the schematic since we swapped some emails and went back and read your original post this morning to see what I had missed. Here is what I see.... If you can trace a signal from pin 1 through the switch, which would be out pin 3 to pin 9 then out pin 7 which goes to pin 7 on V601B then through R608 at a lower level (about half I would expect) then back to pin 4 which is connected to pin 6 within the switch and out to both the Line gain and Local gain pots. It should work. The only thing in that signal path the switch and R608. You might check R608 and make sure it's not broken or way out of spec. By jumpering pin 1 to 6 you are bypassing the switch and R608.Just some additional thoughts...

Date: Sat, 17 Dec 2005 15:18:47 -0800
From: Frederick Bray <fwbray@mminternet.com>
Subject: Re: [R-390] Low Audio Problem Solved!

I finally discovered that the problem was with a broken wire to the local audio pot. The particular terminal is supposed to have two wires going to it. However, one had broken and had slipped up under the cable lacing where it was not readily visible. Since I could see a wire going to each of the three terminals, I thought everything was okay. Only by using the schematic and testing every pin on the connector did I discover that one was completely open. Jumpering the broken wire to the correct terminal on the pot restored the audio.

I still have to clean up the wiring. The last person who replaced the pots did a terrible soldering job, among other things. I have to decide whether just to fix this with the old pots or wait until the new ones I have on order arrive and swap them out. Thanks to everyone who helped.

Date: Thu, 02 Feb 2006 14:00:08 -0500
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: [R-390] The infamous squelch non-option

I've been able to figure out that the empty filler plate on a R-390A's audio deck is for some sort of squelch option. As I get more receivers accumulating around the shack, I'm starting to appreciate how squelch could make sense in a lot of

environments. The blank plate covers the mounting holes for a tube socket and a relay, right? What other componentry had to be added? I see the non-terminated wiring harness near that spot, anyone have a schematic diagram of what might go there? I probably will try to rig up some sort of squelch system, and probably outside the various receivers. In particular what I want to do is be able to monitor a couple of HF utility frequencies and have them break in over SWL broadcasts when there's something happening, this is more of a prioritizing rather than a simple squelch scheme. Still, I'd like to see how they thought it would be done in the R-390A.

Date: Thu, 02 Feb 2006 12:20:50 -0700 (MST)
From: Richard Loken <richardlo@admin.athabascau.ca>
Subject: Re: [R-390] The infamous squelch non-option

The squelch is an artifact from the R-390 so if you look at an R-390 manuals then you should be able to figure most of it out. Me and my manual are separated at this moment or I would provide more tangible data.

Date: Thu, 2 Feb 2006 14:23:46 EST
From: DJED1@aol.com
Subject: Re: [R-390] The infamous squelch non-option

I haven't tried to do a squelch, but it shouldn't be too hard. You've got the AVC line and the diode load jumper available on the rear terminal strips, so you could use the AVC voltage level to switch the audio on or off. Let us know how you fare Ed

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Date: Thu, 02 Feb 2006 14:54:36 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] The infamous squelch non-option

>The blank plate covers the mounting holes for a tube socket and a relay.....

Right.

>What other componentry had to be added?

Not a lot. The relay is a plate load relay of some 10 Kohms DC resistance, I think, and operates in the plate circuit of a 12AU7 or the like. The Mode switch is likely capable of that function. You will find that it's stop is set one from the end. You move the stop and add a panel label or plate and that's it on that end. The harness contains all the wires needed.

>I see the non-terminated wiring harness near that spot, ...

See the R-390/URR manual. That has it as standard equipment.

>I probably will try to rig up some sort of squelch system, ...

The AGC or Diode Load terminals on the R-390 would be useful.

Date: Thu, 2 Feb 2006 18:57:43 -0600
From: Tom Norris <r390a@bellsouth.net>
Subject: Re: [R-390] The infamous squelch non-option - I got a drawing

I've got the schematic of that "option" It's in an older R-390A schematic I have

from someplace. Let me make a "snip" of it and put it online.

Date: Fri, 3 Feb 2006 17:10:49 -0600
From: Tom Norris <r390a@bellsouth.net>
Subject: [R-390] 390A Squelch info online part II

Slight edit of content, changed file name. See below. The audio module partial schematic is slightly more readable and there is a photo of the front corner of the audio module for those who may not know where the "optional squelch" was supposed to go.73

I did a quick grab of the 390A squelch and wrote a tiny bit about it. Included some of the original schematic so you can see it in context. It picks up its signal from the diode load at pin 11 of J620. The circuit is enabled via the function switch at one click past CAL. This voltage appears at J619-8. It simply grounds the audio line via J620 pin 2. The wiring harness for the circuit should be installed in the deck -- even my 1967 EAC has it tied off and unused. Here's the circuit --

http://www.fernblatt.net/A/390A_squelch.zip

Not to be a blasphemer, but it would be mo' easier using FET's. The "squelch B +" might need to be messed with in that case. The switches do appear to have wiring in that last position, and there is wiring in the audio decks, whether the twa' ary meet, I canna say.

Date: Tue, 06 Jun 2006 17:37:33 -0400
From: shoppa_r390a@trailing-edge.com (Tim Shoppa)
Subject: [R-390] New favorite listening speaker

After some serious long-term listening to my 390A's, I've decided on the ultimate listening speaker for SWLing: Electro-Voice EV4's. These are mid-60's (? Lasnerian) vintage Hi-Fi speakers with 8 ohm inputs and a midrange horn + tweeter and woofer with a crossover. Most of the action when listening to SW is of course the midrange horn with a little bit out the woofer. Coupled to my 390A with a 600-to-8 ohm transformer, they are sensitive enough that with the local gain cranked to 5 or 6 I get a real good mellow sound out of them that covers most of the basement. By comparison my metal bookshelf speakers (old Minimus 8's) no longer sound very good at all.

The EV4's are not as sensitive as the Minimus 8's but the 390A's output stage can do a pretty good job of driving them. I could see going back to the Minimus 8's for voice communication maybe where maybe some tinniness helps. The EV4's are really mellow and filling by comparison, with very little directionality. I also tried a supposedly high-end PC-clone speaker system (two little satellites plus a woofer) on the insistence of a local ham and it sounded like total and complete crap to me. Of course I was biased going into that test too :-). My new favorite antenna is a two-turn electrostatically shielded (e.g. in copper pipe with an insulating joint) 2.5ftx2.5ft loop in the attic, hooked up to my 390A via Twinax. Far and away this is the best way to suppress local QRM/RFI, even if it is not as sensitive as a longwire.

Date: Tue, 6 Jun 2006 18:06:25 -0400
From: "Bob Young" <youngbob53@msn.com>
Subject: Re: [R-390] New favorite listening speaker

I have a mid 60's 15" Utah coaxial speaker waiting for my R390A to come back from Chuck Rippel. I'm going to make a box for it, haven't yet decided on the design, sealed or ported. Probably ported as they're more efficient, although I may try the diode out on the back through an old tube hifi amp I have and see how that sounds.

Date: Tue, 06 Jun 2006 16:11:32 -0700 (MST)
From: Richard Loken <richardlo@admin.athabascau.ca>
Subject: Re: [R-390] New favorite listening speaker

I am not terribly surprised, the Minimus 8 is a very small speaker and an accoustic suspension to boot so I think it is remarkable that R390 has enough jam to drive it as well as you claim. The EV4 will have do until you can find an Altec 604 in a full sized base reflex enclosure. Actually, setting aside all levity, I had access to just such a speaker at one time and it sounded wonderful even when it was commected to a 100mW transister radio. Nice report. I will try finding a nice big HiFi speaker for my R390A in the unlikely event that I ever get around to restoring the darn thing.

Date: Tue, 6 Jun 2006 17:22:52 -0600
From: "SAM LETZRING" <sletz@msn.com>
Subject: Re: [R-390] New favorite listening speaker

My favorite speaker is my home-built Klipschorn I built about 30 years ago- 93 db/watt sensitivity! Most power I have ever put into it is about 15 watts- and at that- we had to tape a large picture window! Incredible design.

Date: Thu, 5 Oct 2006 20:35:17 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] SS 6V6/6AQ5 Article

Below is the link to an Electronics World article from April 2001 on an inexpensive SS replacement for 6V6 and 6AQ5 tubes. The MOSFET is carried by Newark for IIRC $1.19.

http://img158.imageshack.us/img158/7918/tubesub8od.jpg
http://img109.imageshack.us/img109/1686/tubesub26xv.jpg

This may prove very useful in A's and R388's where space is a premium. If interested I have a slightly modified improved ckt of it in a jpeg format. Reply off list for a copy.

Date: Fri, 13 Oct 2006 09:29:23 -0500
From: Rick Brashear <rickbras@airmail.net>
Subject: [R-390] Audio transformer

I am searching for a 600 ohm to 4 to 6 ohm transformer for the audio output on my R-390/URR. PLease, contact me off list if you have one for sale.

Date: Fri, 13 Oct 2006 18:37:54 -0400
From: "Drew Papanek" <drewmaster813@hotmail.com>
Subject: [R-390] (no subject)

You can use a 70.7 volt line matching transformer as used in PA systems. Connect speaker to appropriate secondary impedance tap, connect radio to 10

watt primary tap. With secondary terminated in its rated impedance, the 10-watt primary tap will present a 500 ohm load, close enough.

Date: Fri, 13 Oct 2006 21:52:52 -0400
From: Scott Bauer <odyslim@comcast.net>
Subject: Re: [R-390] (no subject)

I have 2 speakers that are hooked up to a line transformer and they work quite well.

Date: Sun, 15 Oct 2006 22:27:54 -0300
From: "Francisco E. Viegener" <fev@ciudad.com.ar>
Subject: RE: [R-390] Audio transformer

You can buy such transformer in Radio Daze. The Part number is HX119DA.
Price 18.76$ Audio watts 12W Primary Z ohms 600 Secondary 8 and 4 ohms.
Wt(lbs) 1.3 Web page: www.radiodaze.com

Date: Sun, 15 Oct 2006 22:06:48 -0400
From: jcoward5452@aol.com
Subject: Re: [R-390] Audio transformer

Ditto.I recently bought one and mounted it in a small box with binding posts in and out to use as lab gear for the HP-200-B for testing speakers and such.Radio Daze just sent me their catalog and it is choke full of good stuff!

Date: Mon, 16 Oct 2006 01:02:33 -0400
From: "Dana Cobb" <objoyful@tampabay.rr.com>
Subject: [R-390] Hammond audio transformer 600/8 ohms

I went to the Web page: www.radiodaze.com and ordered one of these transformers for my R-390/URR after several people mentioned this site here. The description of this transformer stated: Built by Hammond in response to requests from the "Collins Collectors Association" for a matching audio transformer for older equipment with 600 ohm audio output. This should put to rest questions of where an audio transformer is available. grin...
Dana - K1RQ

Date: Mon, 16 Oct 2006 08:08:30 -0400
From: "Bob Young" <youngbob53@msn.com>
Subject: RE: [R-390] Hammond audio transformer 600/8 ohms

I have one of those transformers, it has both 4 and 8 ohm taps, also works well with my SP-600

Date: Mon, 16 Oct 2006 11:39:20 -0400
From: jcoward5452@aol.com
Subject: Re: [R-390] Hammond audio transformer 600/8 ohms

Fair Radio has a stock of 600:8 ohm transformers from LS-166 loud speakers. They are small canned type.

Date: Mon, 16 Oct 2006 12:11:12 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>

Subject: Re: [R-390] Hammond audio transformer 600/8 ohms

f.y.i. - I have a box of NOS Hammond 39921 transformers with 600 ohm primary. The secondary has 6 taps. One at 9 ohms. There are taps at a bit over 4 and a bit over 2 ohms, plus some others. Works great for R-390 series, SP-600, CA-88 and others. These were made for the military contractor Marsland Eng. Ltd. $10 plus shipping, which is generally about $5.

Date: Wed, 18 Oct 2006 19:13:30 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] Another possible solution for 600 ohm outputs.

Triode Electronics sells a new single-ended output transformer with a 5000 ohm primary and both 4 and 8 ohm secondary connections. The transformer is rated 100 Hz to 20 KHz -2 dB at 5 watts with 40 ma (maximum recommended) primary current. Reducing primary current improves the bandwidth ,because this is a single ended transformer. Good for as 6BQ5/EL84, 6BM8/ECL82, 6AQ5/EL90, 6CM6, 6V6-GT. TF103-48 $16.95. They're on the web.

Date: Fri, 27 Oct 2006 20:10:26 -0400
From: Carole White-Connor <carolew@bellatlantic.net>
Subject: [R-390] 6AU6 for a 6AK6

I have a bad 6AK6 in my AF section. Is there any problem using a 6AU6 as a temporary substitute until a new 6AK6 arrives next week?

Date: Sat, 28 Oct 2006 07:44:34 -0700
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: [R-390] 6AU6 sub

On the tubes, the Collins engineers knew what they were doing. Wait for the correct tube. About the only tubes on the R-390A that can be played with are the ballast tube, which can be removed pins 2 & 7 jumpered (then the BFO&PTO toob replaced with 12BA6's) and the two rectifier tubes can be solid stated. Ask around and see if anyone local has a tube collection and selling at reasonable prices. Hamfest are another source, I'm getting tubes there for my R-390A at one buck each.

Date: Tue, 28 Nov 2006 09:31:35 -0800
From: "Dan Merz"
Subject: RE: [R-390] R-390 <> R-390A IF decks?

<snip> would add that the greatest improvement I made to the 390a was modifying an audio deck and putting that in. I used the 6360 tube mod; there are others including a later one by Mike Murphy written up also in Electric Radio June 2004. If you are interested in more details, contact me. There are easier ways to achieve good audio just by connecting an external amp to the diode load terminals at the rear but I succumbed to having a mod inside the radio on a spare audio deck. Dan.

Date: Sat, 6 Jan 2007 09:56:31 -0600
From: "keller family" <kellerfamily01@charter.net>
Subject: [R-390] Signal Increases With Limiter Switch

Some time ago, someone on the net suggested that if a nearly dead R-390A showed an increase in signal strength by turning on and increasing the limiter

switch, it was indicative of a specific problem that's easily corrected - a specific capacitor or something else that simple. Does anyone recall that advice and what was it?

Date: Sat, 6 Jan 2007 12:33:37 EST
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] Signal Increases With Limiter Switch

Nine times out of ten that problem was traced to a bad capacitor in the limiter circuit, either C532 or C537. These are both small molded silver mica caps that tend to get leaky and short with age, taking the audio out with them. These are in the schematic between Detector tube V506B and Limiter tube V507. C532 is a 100pf silver mica and C537 is a 180pf silver mica. It wouldn't hurt to replace them both as long as you are in there. They are in a very hard-to-reach area beneath other wiring so it is a tedious job to replace them but well worth it to bring the audio back to life. It might not hurt to replace C531 .1uF with something newer also while you are in there although C531 rarely seems to give trouble.

Date: Sat, 6 Jan 2007 13:01:11 -0500
From: "Norman J McSweyn" <normn3ykf@stny.rr.com>
Subject: Re: [R-390] Signal Increases With Limiter Switch

I also had the same problem. (limiter action when limiter knob set to off) It was caused by S108 not grounding the cathode of v507 when in the "off" position.

Date: Sat, 14 Apr 2007 20:22:16 -0700 (PDT)
From: Masters Andy <nu5o@yahoo.com>
Subject: [R-390] W0BT and N6PY mods in ER Magazine

Good evening list. Recently, I decided to modify my R-390A based on the September 2006 issue of ER magazine. I made the following mods: <snip> 1. N6PY's noise limiter circuit. Result-it does work more effectively with less apparent distortion when the limiter is turned on. It also works nicely when the BFO is turned on. <snip> I have also discovered some issues in my audio amp (a Kleronomos mod audio amp). I can see nice flat waveform on the IF from about 40hz through 6+Khz onthe IF with my signal generator and using the 8 or 16 khz IF filters, but the audio is only flat from about 80hz through basically 3Khz and then it rolls off through 6+khz passing audio out to about 10 Khz. The issue seems to be in the audio amp but I don't know where yet. All of this to say if your thinking about doing these mods, they do work.

Date: Thu, 23 Aug 2007 11:25:58 -0400
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: [R-390] 600-ohm phones?

What 600-ohm headphones are out there? I've got a number of older military radios that evidently were built to drive 600 ohm phones. Some sort-of drive 8-ohm modern phones but have some problems with level or matching or something. New I know that available new there's the JRC-3, which look real nice to me but I haven't actually listened to them. Surplus-wise, I'm sure that Fair Radio or some other outfit has some but I'm not familiar with the details. I used to have a pair of Califone 600 ohm mono headphones that I thought were pretty good, but those are long gone now. Maybe I'll check out their website and see if they still sell them (I was quite impressed to find the ceramic cartridges/needles for some of the older Califone stuff still available this past spring.) I mostly listen

to CW, SSB, AM and I am singularly unimpressed with the dinky little headphones that people commonly use with walkman's/ipods/ or MP3 players. I also am not looking for an external headphone amp, I just want to plug in the headphones and go. But if you really want to recommend I broaden my search you can!

Date: Thu, 23 Aug 2007 11:31:44 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] 600-ohm phones?

Telex made jillions of 600 ohm headphones. They were used in the language labs of high schools and colleges. I've got 2 or 3 pairs here. The model number is 610-1. I see them in flea markets all the time.

Date: Thu, 23 Aug 2007 20:28:50 -0400
From: Ron Hunsicker <ronhunsi@ptd.net>
Subject: [R-390] RE: 600 ohm headphones

My only experience is with the JRC ST-3. Compared to other headphones that I have had, I find them very comfortable. I don't find the sound fatiguing. And I use them with all my radios, not just the R-390A.

Date: Thu, 23 Aug 2007 19:19:51 -0600
From: DW Holtman <future212@comcast.net>
Subject: Re: [R-390] 600-ohm phones?

There are lots of new 600 ohm headsets out there for sale. Here in one example.

http://www.smarter.com/
telex_instructional_610_41_binaural_ear_cup_600_ohm_headphone---pd--ch-2--pi-671077.html

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Date: Thu, 23 Aug 2007 19:23:15 -0600
From: DW Holtman <future212@comcast.net>
Subject: Re: [R-390] 600-ohm phones?

This is the company I bought mine from. http://www.califone.com/charts/monauralheadphone.php

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Date: Tue, 28 Aug 2007 14:29:16 +0100
From: "Graham Baxter" <graham@delphe.co.uk>
Subject: [R-390] Audio output transformer

You may recall that I have been looking for an audio output transformer. My friend John Branson offered me a cosmetically good transformer with an open circuit primary. Of course I could not resist! If there is any interest I will offer a web page for the rewind on the lines of my filter repair. In the meantime, so that it is recorded for posterity, here are the turns counts. The secondary has two windings, each of 417 turns. The entire secondary when connected in series therefore has 834 turns. The primary was not counted. The number of turns was calculated as 3152 after allowing for the effect of the resistance of the windings on the impedance transformation ratio. The measured diameter of the primary wire including the varnish was 0.0035 inches. I chose to use 0.071mm wire to allow for the varnish. Had I had any, I would have used 0.08 or even 0.09mm since the resistance per meter was higher than the original. The diameter of the

secondary wires was 0.0065" including the varnish. I used 0.125mm . It is now all reassembled, with minimal blemishing of the paintwork. It is working very well although my primary resistance is a little higher than it should be.

Date: Tue, 28 Aug 2007 09:38:35 EDT
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] Audio output transformer

Congratulations on your repair job to the R-390A output transformer! Did you take any pictures of the disassembly/reassembly?

Date: Tue, 28 Aug 2007 14:52:08 +0100
From: "Graham Baxter" <graham@delphe.co.uk>
Subject: Re: [R-390] Audio output transformer

My friend Steve G8LMX and I took some pictures of every step, with the exception of the initial removal of the base. I can describe this in words though! If there is interest, I will make a web page.

Date: Tue, 28 Aug 2007 19:43:22 +0100
From: "Graham Baxter" <graham@delphe.co.uk>
Subject: Re: [R-390] Audio output transformer

There is now a BETA of the output transformer article at
http://www.delphelectronics.co.uk/optrans390a/

I look forward to your comments, suggestions and corrections.
Please forgive the English spelling.

Date: Tue, 28 Aug 2007 14:52:08 EDT
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] Audio output transformer

Thanks very much for making your article and pictures available to us. Always nice to have good repair information available for the R-390A. Thanks again for your efforts and the great article you put together!

Date: Tue, 28 Aug 2007 15:16:40 -0700
From: "Dan Merz" <mdmerz@verizon.net>
Subject: RE: [R-390] Audio output transformer

Hi, much thanks for posting this process. I've rewound many audio transformers for old battery radios but never figured out how to make the core without the end bobbin supports as a permanent part of the core. I typically glued up pvc or polystyrene and left the end pieces on - which takes up space. Your process of holding the end pieces in place was enlightening. Nice job and thanks for sharing the details.

Date: Wed, 29 Aug 2007 09:18:16 +0100
From: "Graham Baxter" <graham@delphe.co.uk>
Subject: Re: [R-390] Audio output transformer

Its called an ETA, manufactured by a company called Wiretool of Leicester UK. I don't know much about its history, and I have never seen a manual for it. I use it all the time. Thanks for your interest Graham

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Date: Thu, 30 Aug 2007 15:48:10 -0400
From: rbethman <rbethman@comcast.net>
Subject: [R-390] [Fwd: Re: [Premium-Rx] Collins 390a, 600 ohm audio]

f.y.i. - I have a box of NOS Hammond 39921 transformers with 600 ohm primary. The secondary has 6 taps. One at 9 ohms. There are taps at a bit over 4 and a bit over 2 ohms, plus some others. Works great for R-390 series, SP-600, CA-88 and others. These were made for the military contractor Marsland Eng. Ltd. $12 plus shipping, which is generally about $5 in CONUS.

Date: Mon, 3 Sep 2007 03:11:09 -0500
From: "Dan Cotsirilos K9DTC" <k9dtc@comcast.net>
Subject: Re: [R-390] 390A audio

http://www.r390a.com/html/diode_load.html

Date: Mon, 3 Sep 2007 08:54:16 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] 390A audio

If you are going to do the diode load pick off be *sure* you have a high impedance amplifier input. It's one of those "higher is always better" kind of things. Audio is going to also depend on the performance and condition of your IF filters. R-390'a are getting old enough that bad filters are showing up with some regularity. If the filters look good and the audio still has problems then start working back from the diode load towards the antenna. IF stage and AGC problems can also show up as audio issues.

Date: Mon, 3 Sep 2007 09:19:47 -0500
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] 390A audio

I think a good start on a lot of your questions would be to take a look at this site. http://www.r-390a.net/Pearls/index.htm It is a collective work of significant stuff about the R-390A divided into categories for easy access. Better than having to search the archives. Also to answer your question that is done by many....something like a 0.1mfd cap and a good amp and speaker and you have much improved audio.

Date: Mon, 3 Sep 2007 11:53:29 -0700 (PDT)
From: Rasputin Novgorod <priapulus@yahoo.com>
Subject: Re: [R-390] 390A audio

Thank you for all your excellent advice. I followed the r390a.com directions, and it works well. The only capacitor I could find that was big enough was a 10uf 15v electrolytic ~polarized~. It hasn't exploded yet with this low level audio; should I replace it? I'm amazed at the wealth of resources for my radio. I've spent the entire long weekend reading, and hardly scratched the surface.

Date: Mon, 3 Sep 2007 16:22:45 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] 390A audio

Electrolytics of any sort are not a real good idea on the diode load test point. They leak, and the leakage current can drive the radio a little nuts. A 0.1 uf ceramic bypass capacitor is a reasonable choice. A 1 uf plastic (mylar or what

ever) cap would be better, but low leakage comes first and then larger values.

Date: Mon, 3 Sep 2007 21:06:30 -0400
From: "Jim M." <jmiller1706@cfl.rr.com>
Subject: Re: [R-390] 390A audio

I have good audio with a bookshelf speaker, after doing the capacitor replacement in the audio module suggested by one of the modifications. I also use a matching transformer to match the 600 ohm audio output of the radio to an 8 ohm speaker. Without the matching transformer, the audio will sound a bit weak and thin. Hammond makes a good quality matching transformer if you can find one. For AM broadcast reception, the 8 khz filter setting works well, anything less will reduce "high" fidelity. But keep in mind that the average AM broadcast bandwidth is not very wide, so don't expect a lot of "highs" in the audio...it's not a 20 kHz FM stereo signal!

Date: Wed, 5 Sep 2007 21:39:51 -0700 (PDT)
From: Rasputin Novgorod <priapulus@yahoo.com>
Subject: Re: [R-390] 390A audio

> I'm not very happy with my audio.

Speaking of audio, for $50 at a hamfest, I picked up a HP-3550a Carrier Test set (AN/USM-181), consisting of a HP-209A audio Oscillator, HP-353A Impedance patch panel and HP-403-B RMS Voltmeter 0.001vac to 300 vac (-60 to +50 dB).

This was originally used to test 600 ohm phone-lines and comms. The patchbay is 135, 600 and 900 ohm impedance in/out. The patchbay and meter would be ideal to connect up to the 390A 600 ohm audio-out to measure levels when aligning, etc. These useful things should be available surplus and cheap. I'd forgotten I'd had it. I'd actually bought it for the audio oscillator. These old fashioned CL oscillators are suppose to be much cleaner than modern synthesized oscillators, and I wanted to pair it with my distortion analyzer. When I bought it, I didn't see any use for the patch bay, and I had better meters; I'm glad I kept and restored it all. Google shows Fair Radio with one. It's too expensive, but nice photo:
<http://www.fairradio.com/catalog.php?mode=view&categoryid=187>

Date: Thu, 06 Sep 2007 08:45:27 -0400
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] 390A audio

> Google shows Fair Radio with one. It's too expensive, but nice photo:
> <http://www.fairradio.com/catalog.php?mode=view&categoryid=187>

Those sorts of test sets are a bargain at any price! For super-low-distortion oscillators look at Jim Williams' Linear Technologies app notes. Wien bridge oscillators engineered down to 0.001% distortion - very very good stuff. But putting "390A audio" and "0.001% distortion" in the same E-mail message seems like comparing a firehose with a syringe or a micropipette:-)

Date: Thu, 06 Sep 2007 09:13:42 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] 390A audio

Re: the HP-3550a Carrier Test set (AN/USM-181)
This test set is quite handy, and runs on batteries.

>For super-low-distortion oscillators look at Jim Williams' Linear Technologies

I found those articles at:
http://www.linear.com.cn/company/news/media_art.jsp
The low distortion oscillator is at:
http://www.elecdesign.com/Articles/Index.cfm?AD=1&ArticleID=12002
"µP-Controlled Oscillator Delivers Rock-Bottom Distortion"

Date: Thu, 06 Sep 2007 10:40:40 -0400
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] 390A audio
To: <r-390@mailman.qth.net>, "Roy Morgan" <roy.morgan@nist.gov>

He's done it without microprocessors too. One of his app notes shows how hard it is to improve on the light-bulb-in-a-Wien-bridge, and then he does it, not one way, but five ways! And still comes back impressed with the simplicity and elegance of the HP light-bulb-Wien-bridge. He mostly does solid state stuff but he has an excellent grasp of technological evolution over the past century of electrical engineering and advanced experimental techniques in real-world applications. When he started explaining Sir Dennis Wilkinson's pinball-machine A/D converter and pulse height analyzer, I was hooked! (I had had Sir Dennis explain the scheme to me before and was completely and utterly captivated, at how a solenoid, tilted table, and a bunch of ball bearings makes a perfectly workable if low rep rate pulse height analyzer.)

Date: Thu, 4 Oct 2007 10:42:25 -0400 (EDT)
From: "William A Kulze" <wak9@cornell.edu>
Subject: [Fwd: Re: [R-390] 390A audio]

I know this is quite late, I'm WAY behind in reading my mail. I have gotten good sound also with the cap/resistor coupling to a good amp. I have a question for the group and a comment for Rasputin. First the comment, if you are hooking a speaker directly to the audio out terminals, definitely get a 600ohm to 8ohm xfmr. I think I burned my original output xfmr out way back when before I learned that. Might as well have shorted the output.

The question, Is it acceptable to use 2 electrolytics back-to back to create a non-polarized electrolytic? If I remember correctly, the method calls for non-polarized and I did the back-to-back before getting one. And does it matter which legs tie together?

Date: Tue, 30 Oct 2007 20:45:03 -0400
From: Scott Bauer <odyslim@comcast.net>
Subject: [R-390] 600-OHM INPUT AUDIO TRANSFORMER FOR R390 R390A RECEIVER - (eBay item 160174823844 end time Nov-06-07 14:17:09 PST)

Hi Gang, here is a audio transformer for the r-390xx.
Though made in China, the price is good. Usual disclamer. Scottt

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Date: Tue, 30 Oct 2007 20:28:33 -0500
From: "Les Locklear" <leslocklear@cableone.net>
Subject: Re: [R-390] 600-OHM INPUT AUDIO TRANSFORMER FOR R390

R390A RECEIVER -(eBay item 160174823844 end time Nov-06-07 14:17:09 PST) I would rather pay the extra for the Hammond transformer.

Date: Tue, 30 Oct 2007 22:33:51 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: [R-390] NOS Hammond 600 Ohm to 9 Ohm Audio Transformers

This seems like a good time to remind folks of the following: I have a crate of NOS Hammond 39921 transformers with 600 ohm primary. The secondary has 6 taps. One at 9 ohms. There are taps at a bit over 4 and a bit over 2 ohms, plus some others. Works great for R-390 series, SP-600, CA-88 and others. These were made for the military contractor Marsland Eng. Ltd. $10 plus shipping, which is generally about $5. Breaks for 3 or more. Apologies for the blatantly commercial email, but it does relate to R-390's and these transformers seem to be getting harder to find.

Date: Wed, 31 Oct 2007 06:56:25 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] NOS Hammond 600 Ohm to 9 Ohm Audio Transformers

They are a lot better thing to use than the "single tap" transformers you see running around. Matching impedances isn't a bit deal with solid state gear, but it does matter on something like an R390

Date: Thu, 1 Nov 2007 07:34:29 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] R-390A Audio Module

A while back Fair Radio had 90% complete audio modules pretty cheap. They may still have some if that will meet your need.

Date: Thu, 1 Nov 2007 08:02:04 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: Re: [R-390] R-390A Audio Module

I have buckets of them at $45 (plus shipping - maybe $12). They will need tubes. You will want to replace the infamous C-553 and give the unit a good bath, but otherwise they should require little effort to bring up. There is some rust on the transformer cases.

Date: Thu, 1 Nov 2007 14:00:27 -0400
From: <robert.boyd@servicecanada.gc.ca>
Subject: RE: [R-390] NOS Hammond 600 Ohm to 9 Ohm Audio Transformers

More blatant commercialism.....I have several NOS Hammond 119DA transformers, 600 ohms in, 4 and 8 ohms out @ 12 watts. Same price as Andy's

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Date: Thu, 1 Nov 2007 22:08:06 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] R-390A Audio Module

But do any of them have Western Electric audio transformers on them..... Sounds like a good deal.

Date: Fri, 21 Dec 2007 15:08:09 -0600

From: "Bill & Becky Marvin" <wmarvin@hickorytech.net>
Subject: [R-390] R 390A Audio Pot

As I near completion reworking of my R 390A. When I removed the Front panel some wiring on the Audio Pot broke off from it. The Y2K manual wiring shows two wire bindles.....Blk/Wht , Blk/ Wht, (Wht, Wht Both Commons) I also have a RedWht - (Wht Common)?? which is not shown in the Y2K manual diagram? I have a true Collins "55" R390A. Maybe I will be done before Xmas. Anyone why the discrepancy?

Date: Tue, 15 Jan 2008 10:28:06 -0500
From: "Richard Spargur" <k3ui@comcast.net>
Subject: [R-390] RE: R-390 Digest, Vol 45, Issue 15

Bill, I have seen different colored wires on harnesses. I have a Collins version and two Amelco versions. I have an Amelco version that has all white wires on the local gain. If pin 1 is Wht/Blk it should be the wire that connects through the harness to connector P119 pin 15 (the audio response switch MUST be in the "Wide" position). An ohmmeter can check. The center pin connects to the grid of V602A through connector P119 pin 1. The third pin and the shield of the center pin cable go to ground. As a last resort, it should be relatively easy to ring the harness out with an ohmmeter at P119 and the local gain control from the bottom without removing the front panel. If you need it I will open up my Collins and take a picture of the local gain control tonight if that helps you.

Date: Fri, 18 Jan 2008 12:02:00 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] R390A Local Gain Pot (R105)

Worry not about the exact colors of wires. Get out the schematic and ohm meter. One end of the Local gain is ground. The wiper goes to pin 1 of plug p120 on the audio deck. The other end of the pot comes from the sharp wide switch and daisy chains to the line gain pot. These three items are all on the front panel. Some meter checking will help you sort the broken wires out and get them fixed. Try not to do 2 inch extension wires. Go for 6 or more inches and loop the extension back into the wire harness. This gets the splice back off the end of the wire, give you some length to work with and some wire to make things look neater.

Date: Sat, 16 Feb 2008 19:45:25 -0700
From: "Tony Casorso" <canthony15@msn.com>
Subject: [R-390] R-390a Audio Improvement

I just wanted to my experience with the R-390a audio out here for informational purposes. I was unhappy with the audio. I had made the audio deck cap changes that Chuck Rippel recommends to improve audio and I was still unhappy.

Finally I removed the diode load link from the back of the set and connected my audio generator to the inbound side of the link. Monitoring the line out with my scope I saw that the low end rolled off about 3db between 600 and 700 Hz. This is way higher than the published audio curve. I checked all caps and resistors in the audio deck and everything was fine.

Finally I decided to replace C549 at the limiter output in the IF deck with a 0.1uf

(it was .01). The audio improvement was dramatic. The .01 cap had already been replaced by me with a brand new mylar back when I got the receiver. The low end rolls off now between 100 and 200Hz.

Date: Fri, 18 Apr 2008 10:56:16 -0500
From: "Danny Lunstrum" <dlvnstru@netins.net>
Subject: [R-390] R-390 Audio Transformers

I have just begun restoring an R-390 (non-A) and started with the power supply/ audio unit. It has an audio mod I would like to take out to make it original. To do this, I need two audio output transformers. I bought another audio unit some months ago, and believe it or not, all three of the audio output transformers are bad. None of them show any DC continuity through the windings.

I have a spare audio unit out of an R-390A that has two good transformers on it. The electrical characteristics are approximately the same, but I hate to tear up what looks like a nice audio unit. Does anyone have a couple of audio output transformers, part #TF1A13YY (Motorola p/n 325A107), or the equivalent of, they would be willing to part with?

Please reply off list with the condition and price.

Date: Sat, 28 Jun 2008 12:56:33 -0400
From: <jdkopke@cablespeed.com>
Subject: [R-390] Re: R-390A Problem

My receiver [Amelco # 1852] developed a problem recently, strong intermittent distortion wipes out audio [It is a strong buzzing noise like when you put a headset plug in halfway].When this happens th= carrier meter pins to the left . The receiver functions as normal otherwise, no bandsetting or other function seems to matter. Maybe this is simple problem that can be fixed easily .

Date: Sat, 28 Jun 2008 20:01:42 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Re: R-390A Problem

First step: this is a tube receiver.
The usual suspects to round up for questioning are all the tubes.
There is no such thing in an R390 or R390/A that cannot be isolated and fixed.
Sure hope you have access to a tube tester and lots of time.
The other choice is some spare tubes to do substitutions.
A quick test will not do for this problem.
The tube may be intermittent flaky.
So you need to leave each tube in the tester long enough to give things a chance to flaky.
Unplug the RF deck and the IF deck.
Leave the receiver on and listen to it.
If it still goes bad then you are only looking at a few tubes in the audio deck.
If the problem does not appear then plug the IF deck back in.
If the problem pops up then you are looking at an IF deck problem.
If not then your on to the RF deck.
Is the power supply solid stated or do you still have 26Z5's in the power supply?

These tubes will arc and pop and give you all kinds of noise problems.

After you get all the tubes checked and are sure you are just not looking at a

simple old tube gone bad, then you have to consider a cap going intermittent.

The R390/A have some big fat plastic caps that are known to be going bad as they are over 40 plus years old. The nice silver metal looking caps are OK. Some of your caps may need to be replaced.

The plug in power supply filter caps on the audio deck are also suspect but these do not tend to go intermittent. They mostly go with a full failure. Check the tubes first and see what you find.

Date: Mon, 30 Jun 2008 18:59:16 -0400
From: shoppa_r390a@trailing-edge.com (Tim Shoppa)
Subject: Re: [R-390] Re: R-390A Problem

I've experienced the same thing - intermittent 60Hz hum that greatly reduces sensitivity but makes loud buzzing noises. In my case it was a 5814A (actually a modernish "JJ"-brand 12AU7) with an intermittent heater-cathode short and I could induce it or make it go away by tapping on the tube. It was in the IF deck.

Date: Mon, 22 Sep 2008 20:41:22 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] Adding Squelch to the R390A

Prof. Johannes Fischer from Germany developed a circuit for and wrote an article on how to add a squelch circuit to the R390A. I converted it into a 4 page PDF file which I've asked Al to post on the FAQ site. I will also be glad to email a copy to any who wish it. Please reply off list.

Date: Mon, 8 Dec 2008 10:44:01 -0800
From: "Mike Hardie" <mike46@shaw.ca>
Subject: [R-390] Local Gain Problem

My R-390A, attached to an LS-3 speaker through terminals 6 and 7, is too loud with an "average" strength station, using any local gain setting above about 1/2 way to 1. With the local gain set at 0 the volume can be controlled at a comfortable level using the RF gain control, and the receiver seems to work normally otherwise. Any thoughts on where to start looking?

Date: Mon, 8 Dec 2008 13:48:28 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] Local Gain Problem

Your AGC is not working.. the radio is running wide open.
(Check that the AGC jumper is present on the rear terminal strip.)

Date: Tue, 9 Dec 2008 16:13:37 -0800
From: "Mike Hardie" <mike46@shaw.ca>
Subject: [R-390] Excessive Volume

As per a previous post the jumper is in place between terminals 3 and 4 of TB102. The voltage was measured on the jumper with various signal strengths: 0 uV signal resulted in +.05 V on the jumper, 6.5 uV = 0 V, 10 uV = -0.5 V, 100 uV = -3.5 V, 1000 uV = -6.0 V Does anyone know if these figures are in the ballpark?

Date: Tue, 9 Dec 2008 19:49:42 EST

From: DJED1@aol.com
Subject: Re: [R-390] Excessive Volume

A little low if you accept the numbers from the 11-856A manual, but I would expect that the numbers are dependent on how you have the IF gain set, among other variables. The numbers from the manual as best I can quickly read off the graph are:

10 microvolt: -2V;
100microvolt: -4.5V;
1000 microvolt: -7V
10000 microvolts: -9.5V.

Date: Mon, 29 Dec 2008 23:44:25 -0600
From: "Tisha Hayes" <tisha.hayes@gmail.com>
Subject: [R-390] Limiter (distortion generator)

Has anyone looked at changes to the limiter circuit to make it less of a distortion generator? Talk about a fairly useless feature as it is today.

Date: Thu, 8 Jan 2009 02:33:15 -0500
From: Bob Young <youngbob53@msn.com>
Subject: [R-390] need help with R-390A symptom

After my radio been on for perhaps 10 minutes, the volume will instantly increase along with some hum to where you can still hear it with the volume on 0, this happens suddenly almost like a bad connection just got straightened out excpet for the hum. Something as simple as switch from one antenna to another will make the radio go back to normal. Also turning it from on to standby and back again always straightens it out. The AGC seems to work fine. I had suspected maybe a partially burned antenna radio relay at first but don't think it could be that. It will do this off and on for a while and sometimes after several hours it seems run normally for a while. Any ideas on where I should begin to look?

Date: Thu, 8 Jan 2009 08:00:24 -0800
From: "Craig C. Heaton" <wd8kdg@worldnet.att.net>
Subject: Re: [R-390] need help with R-390A symptom

Easy things first, have you checked the volume pot?

Date: Thu, 8 Jan 2009 11:13:41 -0600
From: "Tom Frobase" <tfrobase@gmail.com>
Subject: Re: [R-390] need help with R-390A symptom

Volume control shield / ground wire loose, I have also had a similar system when the pins on the audio module we no seated or a little corroded ... Tom,

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Date: Thu, 08 Jan 2009 10:46:56 -0800
From: "Dan Merz" <mdmerz@verizon.net>
Subject: Re: [R-390] need help with R-390A symptom

Bob, as I understand it, hum and higher volume are the "abnormal" condition and no hum and lower volume are the "normal" condition. My first thought was that one of the tubes is hanging with a grid voltage that is too positive or one of the tubes is bad. A poor grid return, bad connection, high resistance might

cause this. I believe switching to standby also takes high voltages off most of the tubes so this could be the effect that is resetting things and not something related to the antenna connections per se. The cure might be as simple as establishing a better connection somewhere, perhaps on one of the tube pins, but maybe you've already explored that. Dan.

Date: Thu, 8 Jan 2009 14:51:19 -0600
From: "Ed Wirtz" <ewirtz@hbci.com>
Subject: Re: [R-390] need help with R-390A symptom

I agree with Dan. Without actually experiencing the problem. from what you said I would suspect something that is heat related. The only thing that heats that fast in your radio is probably the tubes themselves unless there is also a leaky filter cap. In addition, it sounds like it's probably in the audio section, since you said that AGC appears to be normal, which means that the RF stages are working as well. Is the hum low pitched and constant or is it more like a bad audio ground? If it's low pitched I would suspect a bad filter cap. If it's higher pitched I would look for a bad tube or connection that is intermittent. Wiggle the tubes around in the sockets. Quite often that will identify a bad connection in a tube socket which happens more that you think. Have fun. I love these old radios!!

Date: Thu, 8 Jan 2009 18:08:42 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] need help with R-390A symptom

Hmm, not knowing how long you've had this radio, it could be new to you, or what kind of work you've done on it so far, I will guess that one of the first things that should be done is to clean it thoroughly and tighten all of the ground connections looking carefully for any sign of corrosion. That would be all of the tube socket bolts, too.

Next would be to test all of the tubes properly, that means to do the "shorts" test while tapping the crap out of the tube with your fingertip or the little rubber hammer that was meant for such. Wearing the headset that can be used with the TV-# series testers will help to show any problem tubes. Also, leave the tube in the tester to heat up before testing. Yes, it takes forever.

Then, if you still haven't found "A" problem, or not "THE" problem, turn the radio on its' end and with the covers off use a variety of wooden sticks of different shapes and sizes to poke around at the wiring harness, the connectors, and anything else that looks suspicious just to see if anything makes noise.

Check tube pins and sockets for corrosion and looseness, check tube pins for straightness. Report back with anything you find,

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Date: Thu, 08 Jan 2009 22:38:06 -0500
From: Gene Beckwith <W8KXR@neo.rr.com>
Subject: Re: [R-390] need help with R-390A symptom

Excellent advice to any trouble shooter... Btw...I use Chop Sticks...some Chinese style...usually here in the states...longer and round at the ends vs Japanese style, shorter and square...any of these make excellent 'pokers' (probes) for anything from rapping on a tube, to applying contact cleaner, holding wires in place while soldering, to testing harnesses, as u suggest... They're cheap...if u buy the lunch...and for simple field survival under nasty conditions, one should develop a certain level of proficiency to stave off

starvation when all else fails... Oh, btw....they can be sharpened to accommodate lots of 'poking around situations... electronics especially, but it is not proper to spear a shrimp...just not cool, and signals your total lack of decorum...except when at the work bench . . .

Date: Fri, 9 Jan 2009 01:40:29 -0500
From: Bob Young <youngbob53@msn.com>
Subject: [R-390] need help with R-390A symptom

A little background on this radio, this was my first R-390A and I had Chuck Rippel restore it and he did a beautiful job so that's probably all I have to say about that. Whatever is going in it has been a gradual thing, it's more of an annoyance than anything and yes the lower volume no hum condition is the correct one as I'm sure you all know. I haven't had it apart lately will probably try to trace it with a scope, the BFO now needs adjusting also, little minor thing, I've used it a real lot over the past three or so years. I am going to check all the tubes though and poke around the wiring harnesses although I don't think it is a loose wire or anything like that. I think some componant is shorting and/or shorting to ground perhaps. I'll report back when I have some time.

Date: Fri, 9 Jan 2009 08:54:30 -0500
From: Steve Hobensack <stevehobensack@hotmail.com>
Subject: Re: [R-390] need help with R-390A symptom

Look at C603B in the audio module. I had one go bad which introduced hum, it also permitted audio from the line audio section to couple over to the local audio section via the screen grids of the 6ak6's. I still had audio even when the gain control was at zero.

Date: Fri, 8 May 2009 04:45:53 +0000 (UTC)
From: odyslim@comcast.net
Subject: [R-390] C-609

I was poking around in an r390-A. I was looking for a bad relay on the audio deck. What I found is someone in the past replaced C609 and installed it backwards. I have owned the radio over 10 years and never had any noticeable problems. It still works fine with the cap installed backwards. I am going to replace it but wonder what the effect will be. My original problem turned out to be a bad connector on the rear panel antenna relay.

Date: Fri, 8 May 2009 04:34:51 -0400
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] C-609

I had to look it up to discover that C609 is the first audio cathode bypass cap: 8uF, 30 volts. My Y2K manual shows the cathode voltage at that point to be 2.4 volts. It's likely that the replaced cap worked ok in reverse at that low voltage. The original part was rated at 30 volts. You don't need that voltage, since there is no surge voltage at that point like in a plate supply for instance. So if you find a lower voltage part in the Junque Box, don't worry about using it. With due respect to the flogging of dead horses, you don't need a tantalum cap: common electrolytic will work just fine.

Date: Fri, 17 Jul 2009 14:07:15 -0400

From: <Anthony.Treace@kraft.com>
Subject: [R-390] WTB: LS-206 A/U Loudspeaker for R-390A

Looking for a LS-206 A/U loudspeaker to go with my R-390A.
Does anybody have one that they are willing to part with?

Date: Fri, 17 Jul 2009 13:26:45 -0500
From: "Les Locklear" <leslocklear@cableone.net>
Subject: Re: [R-390] WTB: LS-206 A/U Loudspeaker for R-390A

Look here: http://www.dxing.com/r390/ls206.htm

Date: Fri, 17 Jul 2009 16:15:10 -0400
From: Norman J McSweyn <normn3ykf@stny.rr.com>
Subject: Re: [R-390] WTB: LS-206 A/U Loudspeaker for R-390A

Actually, that's one of my personal projects. Will be done thus: Free: CAD file so that you can drill your own. OR use a punch and a drill press to make it. Roll it yourself: Panel drilled and machined. You paint and add speakers and Hammond xformers. Cardboard box is optional. Shouldn't be that expensive. Learned CAD a few years ago so that I could make an extender card for an HP instrument that needed TLC!! Pretty simple once you get the hang of thinking in vectors.

Date: Fri, 17 Jul 2009 20:06:22 -0500
From: <wb5uom@hughes.net>
Subject: Re: [R-390] WTB: LS-206 A/U Loudspeaker for R-390A

I got a very nice one built by Rick Mish. Give him a shout

Date: Thu, 6 Aug 2009 09:41:48 -0700 (PDT)
From: John Flood <kb1fqg@yahoo.com>
Subject: [R-390] Line audio output problem and 6C4 RF tubes

Working on another R390A. This one a "67 EAC" Dawg, all EAC modules but non-matching serial numbers. Local audio is fine but line output has a problem. No audio across the output. However one side of the line to the center-tap has audio but the other side to center-tap has no audio and the VU meter is bouncing away (yes the jumper is in place). I haven't had a chance to dig into this yet but was wondering if anyone has seen this as well to possibly save me some time. <snip>

Date: Tue, 11 Aug 2009 17:50:19 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Line audio output problem.

>.....one side of the line to the center-tap has audio but the other side.....

Grab your trusty schematic and ohm meter. The line output transformer output side has wires coming out of the audio deck in several ways. All through the audio output connector jack. There are two connectors to the Audio deck. One is mostly power supply and audio input. The other jack is mostly audio output. The audio output of the transformer goes to the line meter. Since the meter works the problem is between there and the terminal board. The center of the transformer goes to a jumper pair on the terminal board. Mostly one wire or pin

on an audio connector goes open. Mostly in the harness side of the connection because of the sharp bend in the harness. This is also why you get open pins in that connector. Once you find the problem, you may remove a harness clamp from the harness near the audio connector to get a bit more freedom. You also may want to remove the harness clamp to drop the front panel. Good luck and happy troubleshooting.

Date: Mon, 07 Sep 2009 12:27:24 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Alternative to IERC tube shields?

An R-42, is the Hallicrafters R-42 "Reproducer". It is a 12", (I think IRC.), speaker in a bass reflex housing that has ports on the lower front for the bass. They come with a 600 ohm too 8 ohm transformer inside and a capacitor to switch between "Hi-fi" vs "Communications". While they aren't made or designed for neither the R-390A nor the SP-600, they do make for a nice audio sound. Binding posts are standard on the rear.

Date: Mon, 7 Sep 2009 18:34:06 EDT
From: JRFKE5RI@aol.com
Subject: [R-390] R-42

Here is some more info on the R-42 with some pictures, too. No, I have nothing to do with ebay, I just found the pictures there.

_http://cgi.ebay.com/HALLICRAFTERS-R-42-REPRODUCER-BASS-REFLEX-SPEAKER_W0QQi
temZ200380230204QQcmdZViewItemQQimsxZ20090904?
IMSfp=TL090904213004r19274_
(http://cgi.ebay.com/HALLICRAFTERS-R-42-REPRODUCER-BASS-REFLEX-SPEAKER_W0QQite
mZ200380230204QQcmdZViewItemQQimsxZ20090904?
IMSfp=TL090904213004r19274)

Date: Sat, 03 Oct 2009 19:22:16 -0600
From: "Dr. Gerald N. Johnson" <geraldj@weather.net>
Subject: Re: [Collins] Need advice: diode load output on R-390A

>All: does this diode load output on the R-390A require a preamp? I would like to homebrew a >6V6 single ended amplifier to obtain better audio output. Inquiring minds want to know.

Nearly all AM radios have two stages of audio (except for Command sets) after the detector to drive the speaker. The command set works better with another stage. Usually a triode like a 6AT6 (half a 12AX7 would be similar) to develop the 12 volts or so peak that the 6V6 needs. The detector probably puts out no more than half a volt. And that's what is at the diode load. The typical first audio triode has a mu of about 100. I'm sure there are some octal based tubes with that high a mu, but I don't remember them off the top of my head. But whatever was used as a detector/first audio would be about right. I could look them up but you will need to use what you have or can find.

Won't need a preamp for millivolts like a microphone or turntable though.

--

73, Jerry, K0CQ, Technical Advisor to the CRA

Date: Mon, 5 Oct 2009 08:13:27 -0400
From: "Bill Riches" <bill.riches@verizon.net>
Subject: Re: [Collins] Need advice: diode load output on R-390A

Easy way for great sound from the diode load is to feed it into a computer speaker system - sub woofer and two speaker kit from Staples for under a hundred bucks. Just remember to tie left and right channels of the input together!

Date: Mon, 5 Oct 2009 14:16:32 -0400
From: "Carl" <km1h@jeremy.mv.com>
Subject: Re: [Collins] Need advice: diode load output on R-390A

Many of us use an old hi-fi or small audiotorum amp such as a 20W Bogen and similar fed from the diode output of a R-390 series. Sounds fine that way, especially with a good speaker. I use a 3 way system from some old home entertainment unit with 12", 5", and a tiny tweeter all with the original crossover networks. It sure rocks the house with an old RCA hi-fi amp using PP6V6's.

To feed a single 6V6 a single triode preamp is sufficient since you are running Class A and no driving power is required, just voltage. Half a 6SN7, 6SC7, 6SL7, 12AU7, 12AX7, etc will be fine or their equivalents in a single triode such as a 6J5, 6C4, etc.

Date: Tue, 6 Oct 2009 10:09:59 -0400
From: "Carl" <km1h@jeremy.mv.com>
Subject: Re: [Collins] Need advice: diode load output on R-390A

5W output is exceeding 6AQ5 ratings in Class A. Keep it down to around 2.5W max for reliability.

Date: Wed, 21 Oct 2009 06:53:23 -0700 (PDT)
From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] an audio deck saga (long)

Recently I had the occasion to do a ground-up audio deck restoration. This unit appeared to be a St Julians survivor with some surface rust and dirt. I used the excellent schematics in the Y2K v3.0 manual as my reference, the many posts from members of this list, as well as recent articles in ER re audio deck modifications.

Inspired by Nolan Lee's description of his compulsively complete EAC restoration a few years back, this time around, I decided to approach the project as if I had all the time in the world. So I totally stripped the unit down the chassis and threw everything into a bucket. First checked every component, wire, and socket during reassembly. Rust and chipped paint was dealt with first (easy part).

I found a few loose ground lugs, lots of deteriorated solder connections hidden under the black insulation on J619 and J620, and many loom wires coated so bad under the insulation as to not take solder. Near all of the carbon resistors had drifted up as expected, but none of the 50 year old Vitamin Q capacitors from General Instruments showed any appreciable leakage at 250v. Luckily all the chokes and transformers had their DC resistances very close to specs, and

none had any leakage to the case. All the tube sockets were discolored (overheating?)... so new ceramic sockets went in their place. New electrolytics were stuffed into octal relay cases. Most all of the small components were replaced with new or checked units. I ran a single copper bus down the middle and grounded it securely at one point. Known good tubes from my stock were installed.

Having rebuilt it as well as I could, I was happy to see it closely matched resistance and voltage parameters seen in my other units; and, when powered up.... worked. So far, so good.

Then, I got to thinking about improving the audio. Since this receiver was basically designed as an intercept unit, I wondered what could be done improve its performance in just that area.

Ray Osterwald wrote a nice history behind the audio deck back in 2004 (ER vol 181 pp45-46). Seems a lead Collins engineer named HE Houge spent some 3000 hours designing the deck in 1949 to meet the requirements set down by the US Signal Corps. A large amount of negative feeback thru R612 was employed not for the usual reasons of dropping harmonic distortion and improving frequency response etc... but to meet the Corps specifications re output impedance. The resulting gain loss was treated by adding positive feedback through R615.

Chuck Felton published his audio modifications (ER vol 183 pp 7-10) which made interesting reading.

There has been an enormous amount of comments and experience from this group dating back to 1997 re audio mods, which I looked over again. Armed thusly, I went ahead and tried a few simple easily reversible changes to the now functional deck. The rationale behind these moves have been outlined by others.

a) removed R612
b) dropped R615 to 24 ohms (probably should be removed)
c) removed C609 (the troublesome small wet tantalum electrolytic)
d) added a 10M resistor from plate of V601A to grid of V601B
e) kept the original 6AK6 and T601
f) shorted R101 (to get rid of the voltage divider)
g) ran the local output to a surplus 600 to 8 ohm transformer mounted in a Navy aluminum speaker box (pseudo LS-206...); a half cubic ft aluminum box with a 6 inch car speaker. Looks swell, with ridiculous acoustical properties.

End result was short of amazing for such small changes. Audio was louder, with intelligibility clearer probably due to limited frequency response. No squeals or hum at any gain setting. I suspect that fixing the various grounds, replacing all the out-of-spec resistors, replacing various wires, resoldering everything, and using known good tubes contributed a lot to the final result. Anyway, for speech, I found best results using the 8KC filter.

I confess I originally had the intention to perform the Kleronomos audio addition, but upon mature consideration, it was easier to just run my old single channel 20 watt Williamson (6L6GB's) amp off of the diode load jack, whenever I really wanted great hi-fi. Obviously, I could have gotten *radical* by employing a 6AQ5 or 6BQ5 in place of the low power 6AK6, or installing a nice Hammond 600-8ohm transformer etc etc; but what I wanted to see, was if any improvement

could be achieved just employing small parts. I think it can.

Thanks for the bandwidth.. duckin' and running....

Date: Wed, 21 Oct 2009 11:27:54 -0700 (PDT)
From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] audio deck saga *more*

So set up the receiver for a signal-noise gain test as outlined by Roger R. Set IF gain so the diode load was -7vdc with 150uV at my particular IF Xtal frequency injected into J513. Turnng off the audio modulation on the URM 25F I saw 0.010 VAC (-38dB) across a 600 ohm local audio load resistor. Turning on the 400cps at 30% modulation raised the reading to 2.2VAC (+9dB). This calculates to a difference of 47dB. I kept flipping the URM back and forth not believing what I was seeing. Too good to be true I *ses*..... so what did I do wrong? Does this make any sense? Maybe I have to go back to radio school....

Date: Thu, 22 Oct 2009 18:46:30 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] audio deck saga *more*

Not a problem.

You changed some parts so you changed the gain of the stages. At least at the 400 hertz band pass. You think it sounds better so this is good. Opening up the band width for better fidelity looks as if you did not hurt the signal to noise of the stages.

As you open up the band pass you get more noise through the pass for the same narrow signal in the pass.

It may measure real good on the instruments. The change is all in the audio after the detector stages. So it will not change the receivers ability to discriminate between signals. A 2Khz IF filter is still trimming the input. The detector is still giving you the same audio envelope of the signals. You just get more audio fidelity because you opened up the audio band pass (those caps changes) and you get more gain (because you changed some resistors to change some stage gains).

So I do not think you will get a lot more noise when working real signals.

As today, there was lots of bad thinking going around and people in charge made poor choices or at least choices we would not have elected. I think you found some changes that will let these receivers sound better.

Now as you put RF into the antenna input you expect to get better than 20:1.

On a stock receiver we put 455 into the IF and expect 30:1 and put RF into the antenna and expect 20:1.

I do not know if your 47:1 at the IF will yield 37:1 at the RF. But I think you could expect something better than just 20:1.

A nice hot 30:1 would let us pull some more CW out of the air.
I bet AM radio sounds much better.
Do you think SSB is better the same or poorer after your changes?

If you think the audio is sounding better then the change is worth the effort. Could you give us a list of part number, old value, new values for your changes. Good job on all the work and bringing it in on a project you like the end results of. Roger Ruszkowski Al4NI

Date: Mon, 26 Oct 2009 17:24:58 -0700 (PDT)
From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] audio deck saga numbers

Well, by re-evaluating my unit after the audio deck rebuild with the previously posted small modifications.... and injecting 4uV into the antenna jack as suggested by D. Wise.... I gained 2dB improvement in the CW vs CW+mod test. This is makes more sense, since all the work was done in the audio deck. I ran a comparison with a known good audio deck, using the same tubes, and the numbers came out real close during testing with the modified deck being little better by the numbers.... just as one would expect.

Final result, this Collins is slightly better than 20:1. My Capehart is a 30:1 unit, so this one *needs work*.

In summary, any improvement was qualitative and not quantitative. Things just sound louder and clearer to me. Need to put a sweep audio thru the deck as my next move.....

I did not check it on SSB yet.

Here is the list of changes:

part	original value	new value
R612	220K ohms	N/A since it was removed
R615	56 ohms	24 ohms
R101	6800 ohms	zero ohms (shorting wire)
R102	820 ohms	820 ohms (no change)
C609	8uFD 50v	N/A since it was removed
Rxxx	N/A	10M ohm from pin 1 to pin 7 of V601
C606	45-45uFD/300v	45-45uFD/350v (new)
C603	30-30-30uFD/300v	30-30-22uFD/350v (new)

Thanks

W. Li
Mercer Island, WA

Date: Tue, 27 Oct 2009 10:57:56 -0700 (PDT)
From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] audio deck saga

Don: Thank you for your insightful analysis. The rationale for these changes were published in ER by the original modifiers or have appeared on this list. What I did was try them out selectively. Your points are well taken and I shall try them next time the deck is out and remeasure the numbers.

Date: Sat, 7 Nov 2009 23:32:49 -0800 (PST)
From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] final word on audio deck saga (long)

After much rumination and thought re the many responses to my audio deck *saga*, I had some second thoughts and redid a few things again (!)

(a) restored some negative feedback by increasing R612 to 330K
(b) removed R612 with a wire bypass thus eliminating positive feedback
(c) took out the 10M resistor
(d) reinstalled a new C609 electrolytic to restore V601A cathode bypass
(e) kept the wire bypass of R101
(f) removed R102 so T601 outputs straight to phone jack
(g) added F102 and F103 (this particular unit was originally a one-fuse unit)
    mounted a small box over the reserved squelch area
    added pin jacks along side so I could check on B+ easily
(h) kept the #14G copper ground bus down the middle, grounded at only one point, no grounds to chassis ground lugs
(i) all new caps and resistors, each checked for value and leakage
(j) new ceramic tube sockets (I had them already so why not?)

So in the end, these changes are minor, and the deck is *almost* stock. I know some would object to having the fuses *hidden* on the deck. However, I did not want to take apart the chassis cabling or drill new holes in the rear panel. Anyway, if a B+ fuse blew, one should be prepared to pull the receiver out to discern the cause before replacing the fuse. Wiring up the additional fuses was real easy in that location. I sleep better knowing that B+ is fused.

Works swell. Loud audio, excellent speech intelligibility, nice low-fi music (I can't hear anything over 7KC anyway). Stable audio running all day. No squeals.

OK, next was an objective evaluation of noise:

Stuck in the lowest noise tubes that I had
Usual warm-up interval, best ones for V601, V602, V603, V501 and the other IF amps
Isolated the IF-AF deck from the RF deck
Set the URM to 150uV at 455KC, modulated at 30% at 400cps
Injected IF modulated signal into J513
Looked at dB across the 600 ohm load resistor
Centered the URM frequency on my particular Xtal (mine is 454.698KC)
Reset bandwidth to 2KC
Set AF and RF gains to 10
Set IF gain for -7VDC at the diode load
Saw that my output was now +23dB
Switched the URM back to CW
Changed no other controls (important)
Saw my output dropped to -13dB
The difference is 36 dB (WOW)
Repeat x4
No change
Go to bed and do it all over again the next day
No change
I believe these numbers

Date: Tue, 5 Jan 2010 09:32:00 -0800
From: "Michael Hardie" <mike46@shaw.ca>
Subject: [R-390] Audio and BFO

I'm still hunting down the cause of "over sensitive" audio, with the gain at "1" the audio is at a level that should be heard with the control closer to "10", and <snip>

Date: Tue, 5 Jan 2010 10:13:20 -0800
From: David Wise <David_Wise@Phoenix.com>
Subject: Re: [R-390] Audio and BFO

Have you checked the AF GAIN pot? Sometimes a carbon pot will develop a crack in the resistance element. Output goes from 0 to 100% as the wiper crosses the crack. If the endpoints are riveted, that's where it will let go. Another suspect is feedback resistor(s) which normally reduce the gain. <snip>

Date: Tue, 5 Jan 2010 14:33:09 EST
From: DJED1@aol.com
Subject: Re: [R-390] Audio and BFO

<snip>..... As for the audio, I've seen similar problems with a broken pot. Also, check the grounding of the bottom lug on the audio pot. you should be able to find a replacement pretty easily. Or, like I did on my Drake Rx, I disassembled the pot, used a little conductive paint to fix the break, and it's been fine. (the Drake pot was unobtainium).

Date: Wed, 6 Jan 2010 19:30:14 -0500
From: Steve Hobensack <stevehobensack@hotmail.com>
Subject: Re: [R-390] Audio and BFO

Where can I get this conductive paint?

Date: Thu, 7 Jan 2010 21:22:02 -0800 (PST)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] Audio and BFO

> Where can I get this conductive paint?

For repair of broken traces on flexible printed circuit tapes, I have used the conductive repair paint which was intended for repair of automobile rear window defogger traces and is available from auto parts stores. Not sure how it would work on a carbon pot element, but if the element is useless anyway, couldn't hurt to try, unless someone else can recommend a proven repair method.

Date: Fri, 8 Jan 2010 06:48:48 -0600
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] Audio and BFO

For what it is worth I just purchased some pot's from Mouser in Texas for about $7 each.

Date: Fri, 8 Jan 2010 11:22:42 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Audio and BFO, pot repair

You need to be careful with the conductive paint. If you get too much of it on the potentiometer you could reduce the pot to a dead short. Identifying exactly where the broken area is on the pot is very important. If you do not have resistance from end to end *(two outer leads on the pot) then the conductive trace is completely broken. I managed to save two pots by dissecting them and cleaning them with DeOxIt on a cotton swab. Usually this is all it takes to fix a wire-wound pot as they are more robust than the "magic dust" glued to a piece of plastic of phenolic.

Date: Mon, 18 Jan 2010 15:47:51 -0500
From: frankshughes@aim.com
Subject: [R-390] headphone suggestions for R-390A

What are some good options for headphones? I'm not as concerned with the frequency response, as the hearing I have remaining is "narrow band". Comfort and compatibility w/ the R-390A interface is what I seek.

Date: Mon, 18 Jan 2010 19:35:58 -0600
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] headphone suggestions for R-390A

I bought a pair of Koss Pro4AA on eBay, the trick is when you get them return them to Koss for refurb, they are warrantied for life. $6.00 for return shipping ...

Date: Mon, 18 Jan 2010 21:48:37 -0500
From: "Shoppa, Tim" <tshoppa@wmata.com>
Subject: Re: [R-390] headphone suggestions for R-390A

JRC ST-3, without a doubt. 600 ohm phones, especially desgined around "communications receivers" in mind. Right now I'm listening to 40M CW with my ST-3 headphones plugged into a Mini-R2 receiver. Sweet.

Date: Mon, 18 Jan 2010 22:11:04 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] headphone suggestions for R-390A

eHam.net has a number of positive evaluations by users: http://www.eham.net/reviews/detail/404. I've put them on my want list.

Date: Tue, 19 Jan 2010 08:56:18 -0500
From: Ron Hunsicker <ronhunsi@ptd.net>
Subject: [R-390] headphone suggestions for R-390A

I really like the JRC ST-3 headphones. I've had them for over ten years and use them with every receiver that I have.

I didn't notice if anyone mentioned it, but they are 600 ohms and a 1/4 inch mono plug.

Date: Tue, 19 Jan 2010 08:22:03 -0600
From: "Bill Breeden" <breedenwb@cableone.net>
Subject: Re: [R-390] headphone suggestions for R-390A

I have a pair of Japan Radio ST-3 headphones that work great with my R-390A. They are very comfortable, 600 ohms impedance, and equipped with

a 1/4 inch mono phone plug. They are available from Universal Radio for under $70.

Date: Mon, 16 Aug 2010 16:03:15 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: [R-390] 600/8 ohm transformers

This seems like a good time to mention the following: I have a crate of NOS Hammond 39921 transformers with 600 ohm primary. The secondary has 6 taps. One at 9 ohms. There are taps at a bit over 4 and a bit over 2 ohms, plus some others. Works great for R-390 series, SP-600, CA-88 and others. These were made for the military contractor Marsland Eng. Ltd. They are small sealed units about 3" tall with a 2"x2" base. One of them had a date of 1963 on it. $15 plus shipping, which is generally about $5. Breaks for 3 or more. Apologies for the blatantly commercial email, but it does relate to R-390 and other mil. radios and these transformers seem to be getting harder to find.

Contact me off-list if interested.

Date: Sat, 11 Sep 2010 11:17:51 -0500
From: <ka9egw@britewerkz.com>
Subject: Re: [R-390] The saga cont pt 5

Just finished paralleling the BFO output coupling cap with a 47pF and the "Rippel audio mods" [replacing C604 and C605 with .022/600V Orange Drops--R614 was already 560ohm/2W and measured 556 ohms so I left it alone].

I had to mount the Orange Drops on the opposite side of the board AND offset about 3/8" to clear the transformer mounting studs and be able to seat the board properly. A bit of teflon tubing on the leads took care of the possibility of shorting.

The difference in audio quality [feeding a 16VCT filament transformer's primary off the LOCAL OUT and an 8 ohm speaker off half the filament winding--not ideal but better than it was] is astonishing, even on SSB. I haven't added the diodes across R546 and R547 yet, and given how good it sounds on SSB now, I don't know if I'm going to bother. <snip>

Date: Mon, 31 Jan 2011 12:21:15 -0500
From: Robert Young <youngbob53@msn.com>
Subject: [R-390] R390-A problem

The radio works normally then after about a ten minute warm up the volume jumps up maybe double (normal listing level with local gain on 0) and 120 cycle hum is audible. If I click it from AGC to standby or AGC to calibrate and back it drops down to normal volume again for a few seconds then goes back up, it's almost like something is not conducting and needs a little voltage spurt to get going again.

This was intermittent when it first started a few years ago but is now predictable although it was sometimes go back to normal by itself. Everything else is the same either way, just the volume jumps up (I have to turn down the RF control to get it silenced) AGC seems to be working normally. This radio was restored by Chuck Ripple about 5 years ago and i have changed some tubes since then but have pretty much left it alone besides tubes, it works great except for this little annoyance. The power supply was solid stated by him. I'm wondering if a

cap in the audio chain is on it's way out. I have another audio module but it's inaccessible right now. I suspect something in the audio section, anyone have any ideas?

Date: Mon, 31 Jan 2011 11:21:11 -0700
From: Robert Moses <rhmoses@earthlink.net>
Subject: Re: [R-390] R390-A problem

It sounds like it's time for freeze spray.

Date: Mon, 31 Jan 2011 10:23:13 -0800
From: Robert Fish <rwfish@comcast.net>
Subject: Re: [R-390] R390-A problem

Technician in a can!

Date: Mon, 31 Jan 2011 13:35:34 -0500
From: "Shoppa, Tim" <tshoppa@wmata.com>
Subject: Re: [R-390] R390-A problem

Sounds like cathode to filament short (hum is the smoking gun but the gain shift is telltale too). These are often intermittent. Switching to or through standby interrupts B+. Most likely it's any of the 5814A's and I'm guessing somewhere after the detector.

Date: Mon, 31 Jan 2011 13:44:16 -0500
From: Gord Hayward <ghayward@uoguelph.ca>
Subject: Re: [R-390] R390-A problem

I had that happen in the limiter (limiter switched off gave no problem). Swapping tubes is the best diagnostic as my tube tester didn't catch the fault.

Date: Mon, 31 Jan 2011 15:37:50 -0700
From: Robert Moses <rhmoses@earthlink.net>
Subject: Re: [R-390] R390-A problem

An insulated stick is also useful for poking around to find parts that
are cracked or poorly soldered.

Date: Mon, 31 Jan 2011 20:29:44 -0600
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] R390-A problem

I'm certainly no expert but could it be the function switch? Mine has done the same thing as yours for more than 15 years. I've been too lazy, over worked, or unorganized to check it out. Mine will regain audio by going to any other switch position most of the time. The off function hasn't worked the whole time of this, but it works to get the audio strength back.

Date: Tue, 1 Feb 2011 11:12:35 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] R390-A problem

The AGC circuit does some quite wild things to voltages. Many folks think that this is one circuit that could have been redesigned as you get "the moment of

silence" when switching AGC modes.

It is either a tube or a capacitor, most likely in the audio stage. If you attached a voltmeter to the diode load connection on the back it may help you narrow it down to the AF deck.

Date: Tue, 1 Feb 2011 12:46:51 -0500
From: Robert Young <youngbob53@msn.com>
Subject: Re: [R-390] R390-A problem

I'd like to thank everyone for all the ideas. I'm certain it's not the function switch as that is fine. It does go back on briefly when the B+ supply is interrupted and switched back on. I'm first going to sub the 5814A's to see if one is indeed shorted as Tim Shoppa suggested, I did check them all a year or two ago but the problem was too intermittent at that time to catch and I don't think I subbed 5814A's back then, I think i tested them in my tube tester. I also completely forgot about freeze spray, haven't used it for probably ten years, an insulated stick is also a good idea. I'll probably start Friday as most of my tools are now in storage. But I'll be back to let you guys know what is going on,

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Date: Tue, 01 Feb 2011 13:54:50 -0600
From: Barry Williams <ba.williams@charter.net>
Subject: Re: [R-390] R390-A problem

Changing out 5814s didn't help mine, and there has never been any hum.

Date: Tue, 1 Feb 2011 22:35:37 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] R390-A problem

> .... I'm first going to sub the 5814A's.....
Good plan. No cost if you have spares (or at least one!).

> ... an insulated stick is also a good idea.....
Go out for Chinese dinner. Use chopsticks and bring them home. Good testing prods.

Date: Tue, 1 Feb 2011 21:36:05 -0800 (PST)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: [R-390] R-390 Problem

This could be narrowed down by connecting an external audio amp to the diode load terminals on the rear panel terminal block.

Date: Wed, 2 Feb 2011 09:28:44 +0100
From: "Prof. Johannes Fischer" <prof.johannes.fischer@t-online.de>
Subject: Re: [R-390] R-390 Digest, Vol 82, Issue 1

Hallo Bob, it is always the same. The B+ voltage is way too high, after that modification in the power supply, I experienced this with an original Collins, which was field changed this way. You have to determine, which cap is gone, but before - please - restitute the 26Z5W's, they last for years! Mine are from 1967, still going strong, and the EAC R-390A never ever complained. Best regards, Johannes, Bavaria, Germany. prof.johannes.fischer@t-online.de

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-Date: Wed, 2 Feb 2011 08:24:09 -0800 (PST)

From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] R-390-A problem

I, too, was frustrated when my audio volume suddenly faded after being in operation for 5-30 minutes. I got led down the *garden path* thinking that being powered up had something to do with the cause. Not so. There was a poor electro-mechanical connection in the phono plug.

When the SAME phenomenon occurred a decade later: it was a loose screw on the speaker terminal strip causing an intermittent !

Date: Tue, 26 Sep 2006 15:42:35 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Still wondering about the 100mV detector test

You are OK. Love Boston and Ayer Mass. Fort Devens is now a gated upscale community. There is a prison over on the Shirley gate end of the post.

TM 11-5820-358-35 page 37 para 25. Line Audio Channel: "The maximum audio power output available at TB103 terminals 10 and 13 is at least 10 milliwatt's." You report 15. 10 milliwatt's is +1 VU

I see some of the other things you added about the switch in +10 and reading +2. However I think things are crowded up on that end of the meter. I think you are doing OK.

VU	dBm	Volts	Power
0	0	0.775 volts	0.001 watt
+1	10	2.449 volts	0.010 watt
+2	20	7.740 volts	0.100 watt
+3	30	24.494 volts	1.000 watt

The 5 200 ohm resistors in the H pad toss 490 milliwatt up in heat.
There is a meter circuit in your R390.
The designers knew you would hang a meter on the back panel.
The designers knew the transformer existed.
The designers knew the 200 ohm H pad was going into the circuit.
The designers selected meter resistor values to deal with all these problems.

What the VU meter reads and what is on the terminals of T602 do not agree.

What the VU meter reads and what is on the terminal board TB103 terminals do agree.

Keep your fingers outside the box.

I rewired my audio deck as follows:

Remove the terminal board TB103 jumper between pins 11 and 12.
Move the wire on T602 pin 4 to pin 3
Move the wire on T602 pin 5 to pin 6

Add a jumper on T602 from pin 4 to pin 5.
You now get a 1/2 watt out on pins 11 and 12.

Pins 10 and 13 act just like they always have.

-
Date: Tue, 26 Sep 2006 15:45:34 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Still wondering about the 100mV detector test

I really did write that the line and local should both be a 1/2 watt.
Looking at the TM is see this is not true.
Line out is only 1/10 watt.
You have 15 mW so you are good there.

-
Date: Sun, 11 Sep 2011 15:42:46 -0400
From: Steve Hobensack <stevehobensack@hotmail.com>
Subject: [R-390] Scratchy Static

After my 63 Imperial warms up, there is a low level scratching in the speaker. It is there when the local gain and rf gain control is all the way down. I have isolated the problem to the audio deck, specifically the 5814 audio driver tube to the 6ak6 local gain audio output. It is not present on the line gain side of the circuitry. Before I begin clipping and testing, is there a troublesome component that others have found? The problem is still there after tube substitution.

Date: Sun, 11 Sep 2011 16:31:08 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Scratchy Static

I found the 2W, either R-601 or R-605 had gone south - and - the 6AK6 had apparently shorted. That is the area I'd start looking first. It happened on my '67

Date: Tue, 13 Sep 2011 22:08:54 -0700 (PDT)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] Scratchy Static

A possible cause could be the plate load resistor for the 5814 audio amplifier stage. High value carbon composition resistors sometimes go intermittent or open in circuits impressing a relatively high voltage.

Date: Fri, 4 Nov 2011 09:19:08 -0700
From: Wayne Heil <wjheil@gmail.com>
Subject: [R-390] R-390A Speaker

I am looking for a good speaker to use with my R-390A.
Any suggestions? Anyone have one for sale?

Date: Fri, 04 Nov 2011 12:25:30 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] R-390A Speaker

I just use a Hallicrafters R-42.

I have another one on my SP-600.

Date: Fri, 4 Nov 2011 14:10:24 -0400
From: "Ronnie" <n1udi@att.net>
Subject: Re: [R-390] R-390A Speaker

Here's what I use for for my set up. I got a Signal Corps Loudspeaker, Reproducing Equipment MC-364-D. It consists of two loudspeakers 9" in Dim that are in one cube that split in half, ie: two triangles. There is an Amphenol connector on the end of each cable from the speakers. If you have a Amphenol male 105-4 connector two pin, just use that on the sec: side of your 600Z to 8Z transformer so no need to cut the cable. I don't use the transformer any more sense another device is in the audio output chain. I like the response of the speaker it has a good solid sound and it's Millspecs.

Date: Fri, 4 Nov 2011 15:54:45 -0400
From: Thomas Chirhart <k4ncgva@gmail.com>
Subject: Re: [R-390] R-390A Speaker

We used the LS-474 speakers with the R-390's onboard ship when I was in the Navy. We also patched R-1051's to monitor the old HF HICOM voice channels and monitored 500kc with the WRR 3B using them. They show up from time to time. I got several off of old ships being scrapped several years ago. They were used in Radio Central, on the Bridge and up in Combat/CIC and were a general use speaker. They even had some variants down in Sonar too.

Date: Fri, 4 Nov 2011 17:46:13 -0500 (CDT)
From: nryan@mchsi.com
Subject: Re: [R-390] R-390A Speaker

I like my Navy LS-305 ("Shipboard Announcing Equipment" according to its tag.) It works off the 600 Ohm output.

Date: Sun, 6 Nov 2011 11:44:29 -0800 (PST)
From: wli <wli98122@yahoo.com>
Subject: [R-390] R-390A speaker

I found a nice cast aluminum case 8.5 x 8.0 x 5 inches that may have come out of a ship as it multiple tapped holes and thick walls. It had a Jensen logo cast into the front and inside was a multi-tap transformer for 3 to 600 ohm speakers. The original 6 inch speaker was water damaged, so I mounted a 6 inch 8ohm new car speaker. Painted it grey to match the R390A's, and it looks swell next to them. The sound is great for voice, and lo-fi for music. If you can not find a LS-type speaker, look for something like I found at a hamfest to use for a lot less expense.

Date: Wed, 4 Jan 2012 10:05:57 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] Audio components replacement.

There are also some capacitor modifications that can improve the low frequency response of the audio deck. You will want to get rid of the 8 uFd "acid capacitor of death" that is in the middle of that strip under the audio deck. Chuck Rippel, WA4HHG had a pretty comprehensive list of components to replace that make a real difference to the sound of the receiver. That can be found in the Y2K documents under the supplements section where most of the mods are incorporated into one chapter.

At one time Chuck would sell a little kit of capacitors for the mod. I do not know if he still does that as I think he has taken a less active role in restorations as it was becoming more of a full time job.

I would not go so drastic as the Felton mods where there is major rewiring and tube change-outs. I have modded one RF deck to add the squelch facility (really tough to find that 10 Kohm relay) where the blanker plate is located on the audio deck (near where the modular plug is). That takes a an additional tube socket (6C4) a relay and a handful of other components with a slight mod to the power rotary switch to allow you to rotate to the hidden squelch setting on the knob.

I have looked over the resistor component values in the audio deck and while there could be some optimization of values it just did not seem to be worth that much effort. Actually running the audio off of the diode screw terminals into a high quality equalizer and amp gave the best results so far.

Date: Fri, 6 Jan 2012 12:02:14 -0800 (PST)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] Better R390A Audio Mods

Wrote: But I understand that there is a better mod. There are two: Cheaper and Simpler Upgrades for the R-390A HF Receiver is found in Chapter 11 of the Y2K-R3 manual. The other is by Bill Kleronomos KD0HG. This excellent sounding mod requires an extensive modification of the AF deck as well as a new output transformer.

Date: Sat, 28 Jan 2012 18:14:58 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390 revival woes...

<snip> …..and power it up, takes a few minutes until >audio comes on. When it does comes in gradually over 5 seconds or so like when a tube >is being first turned on. Strange! Sig strength meter works in interim, but not line level >meter.

The signal strength meter is off the fourth (last) IF tube before the detector. The line level meter is the last of the line audio channel. As you do not hear the audio in the local channel the problem is before the line and local channels split and after the signal strength meter. I vote for a cold solder joint or leaky cap. Time for some trouble shooting.

Date: Sat, 14 Apr 2012 13:25:36 -0400
From: Barry <n4buq@knology.net>
Subject: [R-390] Microphonic Parts?

I know that tubes can be microphonic. Is it likely for passive components to be microphonic as well?

I have an old Marconi LCR bridge that I'm trying to get working correctly again (it doesn't want to stay NULLed in R mode). Whilst poking around at the input of the first amplifier (an EF86) with a small plastic stick and looking for bad grounds or solder joints, I noticed that a very light tapping on the components connected to the control grid causes quite a lot of noise at the detector (as observed on the scope).

The components that seem to cause the most noise are a 1M resistor and a 470pF cap. The cap is connected directly to the grid and the resistor is connected on the other end of the cap to ground.

I've loosened and retightened the ground points at the tube base and gently pushed on the solder joints but nothing seems to produce this noise like the tapping does. Tapping the tube itself produces a small bit of noise, but not nearly as much as these components.

Is this "normal"? I tend not to think so, but the control grid of the first amp is a pretty sensitive place to go knocking around on so I'm not sure if this might just be expected behavior.

Not directly related to an R390 but I know you guys are a great source of help for things like this.

Date: Sat, 14 Apr 2012 13:37:22 -0400
From: "MICHAEL TALLENT" <mwtallent@comcast.net>
Subject: Re: [R-390] Microphonic Parts?

Yes, ceramic capacitors can be microphonic see this for more info--
http://www.edn.com/contents/images/6430345.pdf

Date: Sat, 14 Apr 2012 14:52:11 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Microphonic Parts?

Make that a 10M resistor. It's the AGC line to the grid.

If I move my finger near it, the detector sees a significant increase in signal and I assume that's just line noise being picked up by the resistor and that's understandable. Apparently the EF86 is a high-gain amp and it's doing what it should; however, if I replace that part with a new carbon resistor, things settle down quite a bit. It will still pick up the AC noise from my finger, but the inherent noise on the detected waveform is significantly less.

Looking at the resistor, it appears to be a rather special looking unit, unlike the other carbon comps used in the other circuitry. There are other 10M units that are plain old carbon comp. Not sure why they would want such a different style resistor there. I don't have a parts list for this model so I can't verify anything specific about it. It does measure very close to 10M, though.

Date: Sat, 14 Apr 2012 14:53:19 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Microphonic Parts?

I looked for "microphonic" and "vibration" in that article and didn't find anything. Is there a particular section that talks about this?

Date: Sat, 14 Apr 2012 16:15:08 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Microphonic Parts?

> Looking at the resistor, …….

Looking closer, this is a Welwyn Panclimatic C22 10M resistor. Apparently these were very high-quality units for their time. Not sure why it would be more inclined to make noise, though. Any experiences with these?

Date: Sat, 14 Apr 2012 19:01:24 -0400
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Microphonic Parts?

One of the characteristics of this resistor is "non-magnetic". It's located near a vibrator/chopper so that may be why they chose it. Are modern carbon film resistors affected significantly by magnetics?

Date: Sun, 15 Apr 2012 10:24:48 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Microphonic Parts?

We do accept that a tube will go microphonic. Some of us have experienced a solder joint or mechanical connection that has gone microphonic. Not a common problem but resistors can go microphonic in the same way as a mechanical joint does it. The resistance strip in the device has a crack and is sort of open. But you do get an open reading with a low current test meter. But in fact the part has a mechanical defect. You just can not get to the defect and make an examination. You can get a break in any part where the leads open internal to the device or some internal part cracks / breaks open. You do not get a gap at the break that gives you an open failure. So it may act microphonic.

Date: Sun, 15 Apr 2012 11:33:24 -0400
From: "Bernie Doran" <qedconsultants@embarqmail.com>
Subject: Re: [R-390] Microphonic Parts?

With a 10 Meg resister in the grid, they must be using the electron cloud to generate the bias for the stage. so the flow through the resister is well under a micro amp. I can see almost anything causing noise with that setup. it would be interesting to check that cap with a Megger. That is what I use to check caps, at 500 V it reads to about 2000 Meg Ohms Bernie W8RPW

Date: Thu, 19 Apr 2012 11:42:45 -0400 (EDT)
From: chuck.rippel@cox.net
Subject: [R-390] THE R390A Audio Transformer ! Do You Have One?

Most know about this but just in case.

I was having a conversation with the late Fred Hammond some years ago. During the conversation the subject of 600-8/4 ohm audio transformers came up and how hard they were to find. Fred was not aware of the difficulty finding them and mentioned he had a personal design used when they were building Collins 75A-4's in Canada back in the day. Fred said, let us wind a few, I'll send you a couple and let me know what you think.

Wow ! The transformer is good for 12 watts (approx 24X the R390A's rated audio output, you won't saturate it) and is flat from something like... 30-20,000 cps. It just sounds great ! In passing the feedback to Fred, the subject of price came up. Cringing, I waited for his answer. "How about about $17 bucks," would that sell? Heck yes ! So, Fred put it in Hammonds transformer line.

That transformer is still available and works great with R390A's. It’s gone up to $26.20 over the years; Antique Radio sells it: http://www.tubesandmore.com/

Model P-T119DA

Transformer - Audio Interstage, Hammond, 12 Watt
Developed in response to requests from the "Collins Collectors Association," this is a matching audio transformer for older equipment with 600 ohm audio output, driving modern speakers. Or for "classic" high impedance speakers used with newer equipment, simply swap primary for secondary (ie...4 or 8 ohm input and 600 ohms out).

Key Features Isolation unit: (i.e. separate primary and secondary)
Primary: 600 Ohm (with 6" wire leads)
Secondary: 8 Ohm with 4 Ohm center tap (with solder lugs)
Power: Rated at 12 watts
Frequency Response: 30 Hz - 20 kHz
Weight: 1.3 lbs.
Mounting: 2 hole u-bracket mount - on 2-3/16" mounting centers.
There 'ya go. Chuck Rippel

Date: Thu, 19 Apr 2012 18:26:33 -0400
From: Jeff Adams <physicist@cox.net>
Subject: Re: [R-390] THE R390A Audio Transformer ! Do You Have One?

Yea. Digikey has them also, and they are always sold out.
I need a few more for my R1051.
Radio Shack no longer sells the line transformers....

Date: Thu, 19 Apr 2012 20:26:13 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: [R-390] NOS Hammond 600 Ohm to 9 Ohm Audio Transformers

This seems like a good time to remind folks of the following: I have a crate of NOS Hammond 39921 transformers with 600 ohm primary. The secondary has 6 taps. One at 9 ohms. There are taps at a bit over 4 and a bit over 2 ohms, plus some others. Works great for R-390 series, SP-600, CA-88, R-1051 and more. These were made for the military contractor Marsland Eng. Ltd. Don't bother to look up the Hammond number. They haven't made them for years. Transformers are about 3" tall. They are cylindrical with a 2" square base. $15 plus shipping, which is generally about $5. Breaks for 3 or more. Apologies for the blatantly commercial email, but it does relate to R-390s, boatanchors, and these transformers seem to be getting harder to find. N.B. - this is NOT the transformer Chuck mentioned - this one is much more modest. 1 watt max - response flat to about 8 kHz. James A. (Andy) Moorer www.jamminpower.com

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Date: Fri, 20 Apr 2012 08:39:33 +0200
From: Clemens Ostergaard <clemenso@gmail.com>
Subject: Re: [R-390] [Hammarlund] NOS Hammond 600 Ohm to 9 Ohm Audio Transformers

As a 'mass consumer' of this transformer of Andy's, I can vouch for their high quality, audiowise and mechanically. Lives up to the R-390A itself.

Date: Fri, 20 Apr 2012 09:06:41 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: [R-390] MX-2840/URR

Anybody know anything about the the MX-2840/URR?
It is supposed to be some kind of detector for the R-390A.
There is one on the e-place, auction 290700638971.

Date: Fri, 20 Apr 2012 08:44:39 -0500
From: Mike Andrews <mikea@mikea.ath.cx>
Subject: Re: [R-390] MX-2840/URR

1U high transistorized 455KHz IF (SSB?) to audio described at
<http://www.r-390a.net/faq-systems.htm> and imaged at
<http://www.navy-radio.com/rcvr-ssb.htm>.

Date: Fri, 20 Apr 2012 10:17:07 -0400
From: Nick England <navy.radio@gmail.com>
Subject: Re: [R-390] MX-2840/URR

It's an AM detector and audio amp. Not an SSB product detector or BFO.
Nick K4NYW www.navy-radio.com

Date: Sat, 21 Apr 2012 10:17:37 -0400
From: Steve Hobensack <stevehobensack@hotmail.com>
Subject: Re: [R-390] R-390 Audio Transformer

An 18 volt filament transformer will do the same thing as the more expensive audio transformer. 120 to 18v is the ratio for maximum power transfer that I found experimentally. Radio shack used to sell them. I don't know if they still do. I don't know about the frequency response though. I also compared it to a multi-tapped 70 volt line to voice coil transformer, and my ear couldn't tell the difference.

Date: Sat, 21 Apr 2012 07:36:18 -0700 (PDT)
From: Michael OBrien <mikobrien@yahoo.com>
Subject: Re: [R-390] R-390 Audio Transformer

I have 1 or 2 of the RS 70v line transformers Do you remember what taps to use?

Date: Sun, 22 Apr 2012 07:48:06 -0400
From: Steve Hobensack <stevehobensack@hotmail.com>
Subject: [R-390] Subject: Re: R-390 Audio Transformer

My TCS rx uses C and 0.62 watts for primary and c & 16 ohms to the speaker voice coil found experimentally. I don't remember the connections on the R-390 because I use the filament transformer. You can find it experimentally by listening for best/loudest sound by ear or you can use a Simpson 260 VOM on A/C. Put the R-390 on calibrate with a 1000 cps tone output, look for max volts on the speaker.

Date: Sun, 22 Apr 2012 10:00:01 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Subject: Re: R-390 Audio Transformer

I bought about 5 or 6 of those Radio Shack PA Transformers. Still have several in their bubble pack. On the Audio Output of R-390A, use C, (Common), and 2.5W for input. The Speaker side - C, (Common), - Then the impedance of speaker being used, 4, 8, or 16.

Date: Sun, 22 Apr 2012 11:18:29 -0400
From: "Dave Maples" <dsmaples@comcast.net>

Subject: Re: [R-390] Subject: Re: R-390 Audio Transformer

All: The 70.7 volt transformer is marked with various wattage taps on the primary side, and speaker impedances on the secondary side. Assuming the speaker I plan to use is matched to the proper secondary tap, then if 70.7 V RMS is delivered to the primary, the speaker will be driven with the power marked on the primary tap. For example, if I select the 1-watt tap on the primary side, and connect an appropriately-matched speaker to the secondary (e.g. 4-ohm speaker to the 4-ohm secondary connections), then if I deliver 70.7 volts RMS to the primary, one watt of audio will be delivered to the speaker.

Now for the math. The ^ symbol indicates raising the number before it to the power after it. In this case all we are going to be doing is squaring some numbers. Since $P= E^2/R$ (i.e. " P equals E squared over R"), then $P*R= E^2$, and $R=E^2/P$ ("R equals E squared over P").

For this activity, we want to find the load impedance of the transformer primary for a given wattage tap, so for the 1-watt example, we have:

$R= (70.7)^2/P$, or
R= (70.7*70.7)/1 = 5000/1 = 5000 ohms

(As an aside, now you know why the 70.7 volt standard was invented...it made the numbers really easy to calculate.)

If I have a 10-watt transformer, and select the 10-watt tap instead of the 1-watt tap, I get:

R= (70.7*70.7)/10 = 5000/10 = 500 ohms

If I have an 8-watt transformer and select the 8-watt tap, I get:

R= (70.7*70.7)/8 = 5000/8 = 625 ohms

I can also use a 25-volt speaker transformer as well:

R=(25*25)/P = 625/P

If I have a 25-volt transformer, I can use the 1-watt tap and get 625 ohms, just like with the 70.7-volt transformer. Either one will work pretty well against the 500-ohm source from the R-390, and will work very well against a 600-ohm source from some other equipment.

What about a filament transformer? Well, for a 4-ohm speaker I need an impedance transformation of 500:4 = 125:1. In order to know the voltage ratio involved, I take the square root of the impedance transformation. The square root of 125 is 11.18, and the square root of 1 is 1. That means I need a voltage ratio of 11.18:1.

A 12-volt transformer will provide a ratio of 10:1, which is close. A 10-volt transformer would be better but is non-standard. If desired, I could use the 12-volt transformer with a small series resistor to raise the impedance to not overload the R-390A. A 6.3-volt transformer would underload the R-390 output.

It doesn't have to be exact; it just needs to be reasonably close.
All this is offered for what it's worth...

Date: Sun, 22 Apr 2012 08:36:27 -0700
From: Dan Rae <danrae@verizon.net>
Subject: Re: [R-390] Subject: Re: R-390 Audio Transformer

For years I've been using a small filament transformer (117 Volts to 12.6 V 1 Amp) as a 600 to 8 Ohm transformer with my 390 and 390A. Cheap, it was maybe $5 new, and it works fine, has a tested -3dB 20 c/s to 20 kc/s response.
But if you want to get complicated...

Date: Sun, 22 Apr 2012 12:21:48 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Subject: Re: R-390 Audio Transformer

The math is great. There is a 'but' in this all. The audio output on the rear apron/ back panel is, (according to TM11-856A), is a *whopping* 500 mW.
This also needs to be put into the equation. It hasn't. How much audio is lost by power in the windings? Curiosity makes myself want to know.

Date: Sun, 22 Apr 2012 13:33:57 -0400
From: "KR4HV" <kr4hv@numail.org>
Subject: Re: [R-390] Subject: Re: R-390 Audio Transformer

This is a good buy at Amazon. About $10.00. The advertized specs are below. Just use 10w & common to R390 (or any other 500 ohm source) and connect to either a 4 or 8 ohm speaker. Viola!! You are there. I haven't used one yet so I can't vouch for it. It should work fine. NXG Technology NX-70VTR 70-Volt/20-Watt Line Matching Transformer The NXG 70-Volt Line-Matching Transformer is designed for use as a connection between loudspeakers and a 70-volt audio or paging system. This transformer offers primary taps at 5-, 10-, 15- and 20 watts with secondary impedances of 4- and 8 ohms and it operates within a frequency range of +/- 1 dB from 20Hz - 20kHz. With minimal insertion loss and a wide frequency response, this transformer delivers a robust sound with negligible distortion even at the lowest frequency.

Date: Sun, 22 Apr 2012 13:58:44 -0400
From: "KR4HV" <kr4hv@numail.org>
Subject: Re: [R-390] Subject: Re: R-390 Audio Transformer

Here's another one with less spec. for $6.25. Constant voltage, isolated line matching transformer for use with public address amplifiers utilizing a 70.7 volt carrier line for sound transmission. Frequency response: 40-20,000 Hz. Secondary impedance: 4 or 8 ohms. Part #: 300-039 Weight: 0.90 lbs.
There is yet another one at Parts Express, Part #: 300-040, with 10w tap but 100-12000cps for $4.90 See, something for everyone!!!

Date: Sun, 22 Apr 2012 21:10:47 -0400
From: "FISCH, MICHAEL" <mfisch@kent.edu>
Subject: [R-390] audio transformer

A few years back I found Bogen 725T 70.7 V transformers on the net for about $5. it seems to work well and there is lots of info about how to use it various impedances, etc. on the net. I had equal success with a 12.6 v filament transformer, but had trouble finding it for the same price. Good hunting, the fun

is in finding what works and why.

Date: Mon, 23 Apr 2012 21:07:04 -0700 (PDT)
From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] R 390 audio transformer

Bought a beat-up Navy speaker LS-474/U for $10 at a local fest. Inside was toast except for a nice 600 ohm transformer. Painted outside with Rostoleum gray to match my receivers. Installed a new 6 inch 8 ohm speaker, used both front case holes for two mono jacks... one 8 ohm, other 600 ohms. Simple, looks swell, sounds good.

Date: Tue, 24 Apr 2012 03:12:09 -0500 (CDT)
From: nryan@mchsi.com
Subject: Re: [R-390] R 390 audio transformer

Nice going, W. Li, I lucked out with a nice Navy LS-305 SIC. It looks like this: http://www.dynalec.com/pdfs/ldspkrs/ls305.pdf. Speech is nice and clear -- not prized by your basic golden ear audiophile.

Date: Tue, 24 Apr 2012 21:36:47 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] R 390A Audio and AGC

No matter what brand of 600 ohm to 4/8 ohm transformer one uses, one still has the same original crapola sound.

There was an article titled Cheaper and Simpler Upgrades for the R-390A HF Receiver by Chuck Felton KD0ZS (Felton Electronic Design PO Box 187 Wheatland, WY 82201 published in Electric Radio Magazine August 2004. Among many improvements he covers are the factory audio problems. I have Chuck?s permission to redistribute his article. If interested reply off list and I'll email a copy. There are some audio improvement mods to be found in the Y2KR3 manual also.

For a few dollars more for a P-P output transformer from antique audio, one can do the Kleronomos mod. This mod can be modified to use P-P 6AQ5 tubes mounted in place of the 8 pin plug in capacitors by using modern replacements mounted on a terminal strip underneath the large filter chokes. Of course if one doe this one should remount the three power resistors underneath the chokes to the top side of the chassis. I have a copy of that schematic also if one needs it.

Date: Wed, 25 Apr 2012 07:03:18 -0400
From: "Bernie Doran" <qedconsultants@embarqmail.com>
Subject: Re: [R-390] R 390A Audio

One more audio option that I have started using is to clean off most of the vacuum tubes and audio transformers on the module and simply mount one or two of the vast assortment of solid state audio chips. 12 volts provides a room full of audio at distortion lower that most can even measure with a frequency response that is way beyond anything usable. Plus these rascals only cost a few bucks. one thing I have noticed is that, like most solid state, they do not like RF, so it may be necessary to kill the supply voltage to them on transmit. And if you are green, sorry for you, but this does save some energy and heat. Regarding solid state in a 390, remember the rectifier change is pretty much

accepted.

Date: Sat, 28 Apr 2012 09:12:12 -0600
From: Anthony Casorso <canthony15@msn.com>
Subject: [R-390] What's going on here?

I have been sitting here answering email with my R-390a on but turned down. Suddenly the audio comes up like I turned up the volume control. Wiggling the local gain back and forth doesn't fix it (and is not scratchy sounding). Finally I flipped the function switch back and forth to CAL a few times and it went back to normal. What the heck?

Date: Sat, 28 Apr 2012 11:15:29 -0600
From: Anthony Casorso <canthony15@msn.com>
Subject: Re: [R-390] What's going on here?

I didn't describe what happened very well. The local gain was all the way down and suddenly the sound level popped up like I had the gain at 2 or 3. Messing with the gain control had no effect. Messing with the function switch made it go back down.

Date: Sat, 28 Apr 2012 13:40:27 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: [R-390] What's going on here?

I had the same problem with mine a few years ago with the same temporary fix (flipping the function switch), I swapped out the audio module for another, everything is now OK, I never went beyond testing the tubes in it, will do it once I'm set up again,

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Date: Mon, 30 Apr 2012 12:48:26 -0400 (EDT)
From: chuck.rippel@cox.net
Subject: [R-390] Audio Gain

Sounds like you lost the ground reference on the LOCAL volume control or the pot is bad.

Date: Mon, 30 Apr 2012 11:32:31 -0600
From: Anthony Casorso <canthony15@msn.com>
Subject: Re: [R-390] Audio Gain

Thanks Chuck. I'm not sure where the ground is for the local gain control. I don't recall seeing it near the control so it is probably at the other end of the shielded cable. It happened again last night and I was more careful about it this time. I actually had to flip it to Standby and back in order to fix it. The control seems to be OK, not scratchy or erratic when it's working. When it's not working, playing with the control doesn't have any effect on the symptom. Only flipping that function switch seems to fix it. The ground that you and others have mentioned is the only thing that makes sense to me. Not sure how the function switch is involved.

Date: Mon, 30 Apr 2012 13:22:09 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] Audio Gain

Make sure the audio module connectors are in tight, I have had a

similar symptom with dirty or loose connections.

Date: Tue, 1 May 2012 19:49:37 -0400
From: Steve Hobensack <stevehobensack@hotmail.com>
Subject: Re: [R-390] R-390 Audio Gain

I had a similar situation with the local gain. The volume wouldn't go quiet. Later I noticed that the line gain would silence the speaker and it wasn't even connected to a speaker. I found the problem with a bad (open) electrolytic cap in the audio deck. It was connected to the 6AK6 screens and common to them, the audio was mixing between the two audio output tubes.

Date: Fri, 4 May 2012 18:30:52 -0600
From: Anthony Casorso <canthony15@msn.com>
Subject: Re: [R-390] R-390 Audio Gain

Just some feedback on this problem. I was in the process of making some sensitivity measurements when this weird stuff started. I had the receiver sitting on a couple of pieces of 2x4 to keep the radio up off the bench and the bottom cover was off. Based on Steve's comment about the electrolytic, I decided to tip the radio up on it's side. When I did that, I saw J620 a bit cocked. This is one of the two plugs going into the audio deck and is the one that carries the wires for the gain controls. I pushed it back into place and then took out C603 (the electrolytic that might allow cross coupling between the line and local audio circuits), C603 had some signs of leakage around the base but the caps check just fine for leakage on the cap checker at rated voltage. I ordered new ones anyway. But, since putzing around in there, the problem has not reoccurred. I checked the grounds and they seem fine. In fact the gain pots are grounded whether or not J620 is plugged in. Looking at the schematic, I can't see how a loose J620 could cause the symptom. It's a mystery. Maybe the ground pin of C603 was making poor contact due to the small amount of leaked electrolyte. It didn't look like it got down to the pins but I'm reaching. The problem occurred several times after running for an hour or more over a period of several days. Nothing since I tipped it up and messed with it. It is still on it's side. Mazybe I should leave it like that :) ?

Date: Sun, 6 May 2012 20:09:55 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390 Audio Gain

I hate these type problems. You just do not know if was a loose plug or some real problem. Put the receiver back to gather and enjoy it. If it is a real problem it will come back.

Date: Sun, 27 Jan 2013 12:10:53 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] 12BH7A

<snip> I had a "local" light up when I was disconnected from the antenna, with a 3ft piece of RG-58 attached and the radio on. There was a "sudden blast" through the attached R-42 speaker. I was turning down the audio as soon as it happened. <snip>

Date: Sun, 27 Jan 2013 10:58:55 -0700
From: Transmaster <22hornet@gmail.com>
Subject: Re: [R-390] 12BH7A

What is fun to do is pipe the audio output from an R390A and use software DSP's and decoders to listen to all of the digital modes being broadcast the link below has numerous software packages to play with. Have fun. www.fiio.com.cn/products/index.aspx?MenuID=105026001

Date: Sun, 27 Jan 2013 11:02:39 -0700
From: Transmaster <22hornet@gmail.com>
Subject: Re: [R-390] 12BH7A

Wrong Link, here is the correct one I was referring to above: http://www.chace-ortiz.org/umc/software.html

Date: Mon, 18 Feb 2013 20:54:03 -0500
From: Robert Newberry <N1XBM@amsat.org>
Subject: [R-390] Audio

I'm in the process of rebuilding my R-390. I've been doing some reading on the net how some people use a resistor and DC blocking cap and feeding the diode load into an audio amplifier. I've also heard about a modification that is a more permanent mod that involves changing out tubes and re-working the audio section. Although I haven't come across that information yet. I'm looking for input as to what other people are doing.

Date: Mon, 18 Feb 2013 21:05:02 -0500
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] Audio

Excess audio decks used to be a pretty common / cheap item. Swapping around tubes and circuits was an "easy to try" sort of thing. One of the many weak links in the deck (hi-fi wise) is the output transformer. Once you decide to pull it, there's not a lot of use to the deck. You'll get better performance simply running a *good* blocking capacitor on the diode load and feeding the audio into a decent high impedance pre-amp input. Use what you have. What ever it is, it'll give you better audio response than the built in audio chain. The radio was designed for limited bandpass communications use. It's great for that purpose. Not quite so great for music...

Date: Mon, 18 Feb 2013 21:36:33 -0500
From: "quartz55" <quartz55@hughes.net>
Subject: [R-390] Audio

Yeah, I just tap off the diode load and feed it to an LM380. As long as you're not feeding some mongo speaker it works great. Any good audio chip will work fine.

Date: Tue, 19 Feb 2013 10:13:41 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>

Subject: Re: [R-390] Audio

Going so far as to rewire tubes (Bill Kleronomos/ Thomas Bones (KD0HG/ KK8M) mod) can be pretty extreme. I would suggest "The Rippel Mod" of better caps at better values so you can leave most of the audio deck intact. If you want high fidelity then you can use the diode load connection through a capacitor to an external audio amplifier and bigger speaker.

http://www.m82a1.us/radio/R390A_Audio.pdf
http://www.amwindow.org/tech/htm/r390aud.htm

I have no problem in finding 600 ohm to 8 ohm audio transformers. Some folks use the 70 volt transformer (used to be available at Radio Shack) as an impedance match. I have a bunch of 600 ohm speakers that I can directly use of I could scavenge out one of the transformers from one of those.

Date: Sat, 2 Mar 2013 07:35:52 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Capacitor replacement C609 Audio Deck 8 uFd, 30V

I found a perfect replacement capacitor for the sometimes leaking and corrosive C609 8 uFd, 30 volt tantalum cap on the bottom of the audio deck. On eBay there is a seller who has the next version of the 8 uFd cap but at a 35 volt rating. This is not a liquid filled tantalum but one of the solid bodied, later versions. Just do a search on Kemet Tantalum axial 8uF. They are being sold in lots of 10 for $4.99 per pack.

Auction; 230807410986

I have used Kemet tantalum caps before on some circuit design work before back in the 80's and 90's. They are very good caps. A few times I had caps fail due to transients (lightning) and they crack apart, release stinky smoke but no acid residue. The ones for sale right now are rated at 35 volts where the originals in the receiver were rated at 30 volts.

Tantalum caps are usually not available in voltages much past 100-200 volts. The design of the capacitor is fairly unique and does not adapt well to higher voltage applications. These caps are about the size of a 1 watt resistor.

On the auction the "5 sold" were to me (I have 50 of these little caps). I will keep them in my bottomless purse so if I meet any of y'all at a hamfest I will give you a couple. My friend Perry will get a bunch when I meet him up for the Tullahoma TN hamfest in a few weeks.

I have no idea how many the seller has available. I have no relationship with this person. Hopefully they have thousands!

Date: Sat, 2 Mar 2013 10:13:53 -0500
From: bill kirkland <kirklandb@sympatico.ca>
Subject: Re: [R-390] Capacitor replacement C609 Audio Deck 8 uFd, 30V

I have always loved how the bar on tantalums is the positive while on electrolytic it is negative. This has led to endless fun in the lab on the 1st cut pcbs. Plug'em in and wait for the inevitable pop of the tantalums. Rumour has it one poor summer student s**t himself. Thanks for the info Tisha.

Date: Sat, 2 Mar 2013 09:25:21 -0800 (PST)
From: Garry Stoklas <jergar@sbcglobal.net>
Subject: [R-390] Capacitor replacement C609 Audio Deck 8 uFd, 30V
(Tisha Hayes)

The value of the listing is actually 6.8 uf, 6R8 uf, with the "R" representing a decimal point. I have a number of them I got at a surplus dealer in El Cajon (San Diego area). Also, I?worked for the large component distributor, Hamilton/Avnet in the 1970's and sold Kemet tantalum capacitors for many years.
The seller clearly doesn't know their part numbering system. I've tried both 6.8 uf 35v and 10 uf 35v solid tantalums as replacements and didn't see a discernible difference. Either should work.

Date: Sat, 02 Mar 2013 19:09:04 -0500
From: "Charles P. Steinmetz" <charles_steinmetz@lavabit.com>
Subject: Re: [R-390] Capacitor replacement C609

Indeed. C609 is just a cathode bypass capacitor on a 5814 (= 12AU7) audio stage. There is absolutely nothing critical about it, although if you're going to use a different value it should be larger than 8 uF, not smaller. Mouser has three pages of 10 uF/35 V solid (dry) tantalums in stock, from about $1 to $40 in single quantity.

But there is no need for C609 to be tantalum, wet or dry -- any plain aluminum electrolytic will do (and is the capacitor of choice among audiophile designers in a cathode bypass application).

In this application, reliability at temperature is much more important than getting the theoretically most ideal capacitor. A capacitor rated for at least 105 degrees C is advisable, as is a higher voltage rating. ESR doesn't matter, ESL doesn't matter, dissipation factor doesn't matter, dielectric absorption doesn't matter, voltage coefficient of capacitance doesn't matter, and high-frequency resonance doesn't matter (in the sense that any newly-manufactured capacitor you buy will be way better than necessary in all of these areas, assuming it is operating nominally). Note that aluminum electrolytics are readily available with 105C temperature ratings, but solid tantalums are generally available only with an 85C rating.

I use a Vishay TE1305-E3 (Mouser 75-TE1305-E3) 20 uF/50 V ultra-reliable high-temperature aluminum electrolytic when I replace C609. If I were to use a tantalum, it would be the Kemet T322E106K050AT (Mouser 80-T322E106K050AT) 10 uF/50 V high-reliability solid tantalum (but note the 85C rating).

Date: Sun, 3 Mar 2013 22:32:40 -0800 (PST)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: [R-390] Capacitor replacement C609

Note that the voltage rating of C-609 need not be this high. In a cathode-anode short condition in the associated tube, C-609 would only see a bit less than 4V. Normal operating voltage would be much less. A 6V part would be more than adequate.

Date: Mon, 04 Mar 2013 06:48:46 -0500

From: "Charles P. Steinmetz" <charles_steinmetz@lavabit.com>
Subject: Re: [R-390] Capacitor replacement C609

When you are considering only the voltage rating, that is true. However, when you consider reliability, you find that there is very good reason to use a capacitor with a significantly higher voltage rating.

At elevated temperatures such as C609 experiences, electrolytics fail at much higher rates than they do at room temperature. One must always choose a cap that is rated for the temperature it will experience; however, capacitor life is still radically reduced at high temperature even if the capacitor's temperature rating is not
exceeded. Using a capacitor with a significantly higher voltage rating than the actual voltage on the cap helps to mitigates this.

Date: Mon, 4 Mar 2013 07:38:18 -0500
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] Capacitor replacement C609

I got nailed on that one during a design review.

It turns out that electrolytic caps are odd beasts. The do strange things when you run them well below their rated voltage. The chemistry that creates the insulation is the problem. It can "re grow' to the new voltage level. As it does this things can happen. Because of this, their reliability vs voltage looks more like a bathtub curve than the normal activation energy curve.

Bottom line - you don't get any benefit from running an electrolytic below 1/2 it's rated voltage. You should not run them below 1/4 their rated voltage.

Yes indeed I was more than a bit surprised when that was pointed out by the NASA guys. Turns out that it is true.

Date: Mon, 4 Mar 2013 15:29:12 +0000 (GMT)
From: chuck.rippel@cox.net
Subject: [R-390] Audio Deck Capacitor

Good on finding the exact value. In absence of that, an axial, 10UFD electrolytic @ 50V works just fine. BTW, Tisha, I have an E-Mail in my "DRAFTS" folder for you as a reply. Have been 2-blocked and have not had the chance to finish it. Have not
forgotten you.

Date: Mon, 4 Mar 2013 16:12:32 +0000 (GMT)
From: chuck.rippel@cox.net
Subject: [R-390] Capacitor Guide

Found this online guide. Makes a good read:
http://www.justradios.com/captips.html

Date: Fri, 29 Nov 2013 02:56:33 +0000 (UTC)

From: jeffhook@comcast.net
Subject: [R-390] Headphone recommendation

I'm looking for good headphones to use with the R390A. Anyone have any recommendations for me?

Date: Thu, 28 Nov 2013 22:17:10 -0500
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] Headphone recommendation

Do you want to be authentic or do you want to be comfortable? Modern “open” stereo headphones are way ahead of anything that was issued with the radio. They aren’t great in a noisy environment, but I find them a lot less tiring than the soundproof versions.

Date: Thu, 28 Nov 2013 23:11:49 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Headphone recommendation

Pick your self up a small (5watt) line voltage transformer for speakers. Radio Shack use to stock them. These will transform the 600 ohm local from the receiver to 8 ohms in todays head phones. The line out of the receiver is a 1/2 watt. Some what less at the front panel head phone jack. You can put the transformer on the back of the receiver or make up a small patch box on a cord with another jack in the patch box that matched the modern head sets of today.

You can run what ever you like in 8 ohm head sets that way. Many more options than good hi impedance head sets and better frequency response if you are going to listen to music of short wave AM.

A real op would never hang a phone over his ear.
And never imagine sticking a bud in his ear.
When the day is done you would still like to have your hearing intact.

I can not imagine wearing the muff style phones. while spinning the knobs on an R390 Just my choice. I like my 50's vintage high impedance head phones. My two sets are tight on my big head but I wear them on my temples and do OK.
Roger AI4NI

Date: Fri, 29 Nov 2013 08:56:41 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] Headphone recommendation

I bought a set of these, work great for all things radio, ect ... Tom, N3LLL
http://www.aliexpress.com/snapshot/221481734.html

Date: Fri, 29 Nov 2013 10:47:46 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Headphone recommendation

You can also use a small 120v to 12v power transformer. I've tested a great many of these, and they all have excellent fidelity at the 1/2 watt power level a 390 generates (way better than the radio itself).

A 120v to 13.85v transformer would match the 600 ohm output to 8 ohms -- perfect if what you are driving is an 8 ohm resistor. A 120v to

12v transformer matches the 600 ohm output to 6 ohms, excellent for a real-world 8 ohm speaker (an "8 ohm" speaker has peaks and valleys in its impedance curve, and generally drops as low as 3 or 4 ohms at some frequencies -- so matching to 6 ohms instead of 8 ohms makes life a little easier for the output tube than a "perfect" 8 ohm match would). Note that loading the radio output with an impedance greater than 600 ohms does not harm the radio, with the possible exception of leaving the output open circuit and hard clipping the amplifier for hours on end. (But I have not seen even that cause problems in a 390/390A.)

If you need more level (but be careful! old hams don't say, "Huh? could you repeat that?" for no reason), you may be able to use a transformer with a higher-voltage secondary, depending on the impedance of your phones. Few "low impedance" headphones are actually as low as 8 ohms (though some are). Most are in the 300 ohm range (per ear, so about 150 ohms when you parallel the two sides). If you absolutely need the extra level, you could use a transformer with a secondary voltage of, say, 36v, which would make the 600 ohm radio output "look like" 54 ohms to the headphones. But only do this if you absolutely need the extra level.

To get an approximation of the impedance of moving-coil headphones, measure their DC resistance with an ohmmeter. Because they are an inductive load, the audio-frequency impedance will be higher than the DC resistance you measure, not lower. True 8 ohm speakers and phones generally measure 6 ohms and below (per ear). "300 ohm" phones generally measure from 200-280 ohms (per ear). As a rule of thumb, any phone that measures 100 ohms or above (per ear) could safely be used with a 36v transformer (both ears in parallel). But again, only do this if you absolutely need the extra level. And if your phones measure less than 100 ohms (per ear), stick with a 12v secondary.

[Note that measuring the DC resistance will not give an approximation of the audio-frequency impedance of electrostatic headphones.] If you use a power transformer with a 240v primary, double all of the voltages given above.

Date: Fri, 29 Nov 2013 13:05:22 -0500 (EST)
From: djed1@aol.com
Subject: Re: [R-390] Headphone recommendation

As Roger noted, the R-390A was designed for 600 ohm headphones. If you want to use 8 ohm phones, you need a transformer- or do a simpler trick which I discovered. The phones are fed off the local audio line using a resistive divider (6.8K and 820 ohms). When you use low-Z phones in parallel with the 820 ohm resistor, you load the divider down and reduce the voltage by about a factor of 10. What I did was to add a resistor in parallel with the 6.8K to increase the voltage by about a factor of 10. Fortunately, both ends of the 6.8K resistor are brought out to the terminal strip. So I put about a 1K resistor across terminals 6 and 8. This resulted in good audio to my low-Z phones. This reduces the local audio a bit, but is not a problem (assuming you have a transformer on the speaker).

Date: Fri, 29 Nov 2013 14:55:15 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Headphone recommendation

Awesome solution to this problem.

Date: Sat, 30 Nov 2013 12:05:45 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: Re: [R-390] Headphone recommendation

If you can find them a 8:600 ohm audio transformer is a better match than a AC power transformer of the same ratio. What may be overlooked is that there is a frequency response to a transformer and that by taking a transformer that was intended for 60 Hz service and putting it to 300-3000 Hz audio service is not going to give you ideal results. Looking at it simplistically, the winding ratio may be right but the performance will be sub-par. They are really going to roll off at higher frequencies.

I have found external radio speakers that were intended for connection to a 300/600 ohm audio source. Hammarlund made some, some were made like the LS-474U were made for the US Navy (4 watt, 200-5000 Hz, 600 ohm input impedance). I really do like the LS-474/U, it is a very smart looking speaker in a grey metal case. There is even a blank knockout so you can install an audio level pot on the front of the speaker.

For headphones I bit the bullet and bought a set of "cans" an AKG K-240 "studio" headphones. You can get them for about $100. Be aware that there are different versions of the K-240 (studio, sextett, monitor, DF" and they have different impedances. Beyond those headphones would be something like the Sennheiser HD 25-13 II for around $300. These are all recording studio grade headphones but are available at 600 ohms.

If you do find a speaker like the Hammarlund or the LS-474/U you can add a jack after the transformer so you can plug in conventional 8 ohm headphones to the front of the speaker (another use for that blank knockout on the LS-474/U.

Date: Sat, 30 Nov 2013 14:24:39 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Headphone recommendation

I have measured many, many 12v power transformers and have yet to find one that does not respond within 3dB from 20 Hz to at least 12k Hz with ease at a 1 watt level (most go out to >20k Hz). They also have much lower distortion than the detector and output section of a 390 or 390A, as long as there is no DC in the windings (as there isn't in the application we are discussing).

There probably are 12v power transformers that do not exhibit audio fidelity (response and distortion) superior to that of the radio, but they must be rare -- I have yet to measure one.

Date: Sat, 7 Dec 2013 10:32:04 -0500 (EST)
From: bonddaleena@aol.com
Subject: Re: [R-390] R-390 Digest, Vol 116, Issue 4

Ed, you'll love the 591A. I bought one years ago and a spare last year.
Only 2 downsides:
1. The audio still needs an amp to boost the output and
2. the price: I have seen them for over $500....

Date: Sat, 7 Dec 2013 12:36:38 -0500 (EST)
From: djed1@aol.com

Subject: Re: [R-390] R-390 Digest, Vol 116, Issue 4

Ahhh- the old days. I bought four '591s from the Government for $35 each. I sold them all off for maybe $100 each because they didn't fit in well with my desk cabinet R-390A, and the performance wasn't that great. Sure sorry I didn't hang onto them to help fund my retirement. On the other hand, I still haven't broken even on my R-390A. In 1973 I paid $700, which might be equivalent to $3K today. It's still a keeper tho.

Date: Mon, 30 Dec 2013 11:03:55 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] Local & Line gain potentiometers R390/A

The question is what: What is the translation for RV4ATSA252D? Panel mount is a yes, 2W is a yes, ? X 7/8 inch shaft is a yes. Taper????? I?ll also dare to ask what is today?s replacement?

For a while I've been going through a too loud Amelco, 62 contract. Started out with a bunch of could-bees and no ain'ts. Now down to the point of a bunch of ain'ts and few could-bees. Swapped out AF & IF sections between a Motorola and the too loud Amelco. Still too loud with Motorola stuff. Just leaves the panel parts. Also rung out the wiring, nothing there.

Date: Mon, 30 Dec 2013 15:47:20 -0500
From: Nick England <navy.radio@gmail.com>
Subject: Re: [R-390] Local & Line gain potentiometers R390/A

R104
Resistor, Variable: 2500 ohm, 20%, 2 W, JAN type RV4ATSA252D
Log taper

I found a helpful datasheet at
http://www.potentiometers.com/SeriesRV4.cfm

RV4 - 2 Watts @ 70_C; Derate to 0 Watt @ 120_C
Bushing: N = Standard L = Locking S = Panel & Shaft Seal
Switch: A = Without Switch B = SPST Switch
Temperature and Moisture Characteristics: Y = as per MIL-R-94 T=
Shaft Style: S = Slotted F = Flatted
Shaft Length: B = 1/2" A = 5/8" D = 7/8" G = 1 1/4" J = 2" K = 2 1/2"

Resistance Value: Total Resistance Value in Ohms: First 2 numbers are signicant digits, 3rd number is the number of zeros.

Taper and Tolerance: A = Linear ?10% B = Linear ?20%
C = Log 10% D = Log 20% E = Rev. Log 10% F = Rev. Log ?20%

Date: Mon, 30 Dec 2013 16:11:37 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Local & Line gain potentiometers R390/A

"252D" means 2.5k ohms, log taper. Is the shaft really 7/8", or is it 5/8"? (If it really is 7/8", check to see where the setscrew divot is on the shaft -- if it is farther from the end than 1/4", a 5/8 will work in its place.)

I believe RV4 and the commercial equivalent, the "Series K," are still available.

You might try State Electronics or ETI Systems. Digi-Key has
RV4 pots, but not 2.5k log taper.

The pots in a 390A are hot-molded carbon, but you may also be able to get conductive plastic.

If you don't care about originality, any 2.5k log pot should work fine. Actually, any log pot from 2k to 10k should work fine. And there is no need for a 2W rating -- 1/4W is plenty.

This 5k audio taper Alpha part ($1.50) looks like it might have a form factor that will work:<http://www.mouser.com/ProductDetail/Alpha-Taiwan/RV16AF-20-15S1-C5K/?qs=sGAEpiMZZMtC25l1F4XBUxcT8FFa2pT4Cm7Y%252b7ehOxI%3d>

I'm sure other suppliers have similar parts with appropriate form factors.

Date: Mon, 30 Dec 2013 16:12:48 -0600
From: "Thomas Frobase" <tfrobase@gmail.com>
Subject: Re: [R-390] Local & Line gain potentiometers R390/A

I have NOS 2W linear 2.5K pots here if anyone needs them. ... tom, N3LLL

Date: Mon, 30 Dec 2013 14:55:53 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Local & Line potentiometers

A quick comment or two so far. The length of the exposed shaft is 5/8 of an inch, about 7/8 or so with the panel bushing included. Minor issue with the terminology. I've been through the pots, no cracks, one end is grounded, etc. Resistance wasn't quite up to snuff. Wires go to correct terminations, no shorts, no grounds, etc.

I'll add another symptom. Even with a speaker connected to the line terminals, seems to me, way too much audio. With a speaker connected to either audio circuit, knob at zero, at times the RF gain has to be decreased to save the ears. IF gain is set correct, -7volts @ 150 micro-volts. Transformer used to match impedance, speaker to receiver.

With that said, what if I add a little R to the circuit. Am I correct in seeing that R104 & R105 are in parallel? Could a person just add a resistor where the wire from S104 (connection 4) and the wire from P120 meet? If my memory is correct, this point is on the line gain pot and easy to access. Comments are welcome,

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Date: Mon, 30 Dec 2013 19:36:33 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Local & Line potentiometers

>Resistance wasn't quite up to snuff. Wires go to correct
>terminations, no shorts, no grounds, etc.

If the end-to-end resistance of each pot is between 1k and 10k, they should work fine. They do not appear to be your trouble.

>With a speaker connected to either audio circuit, knob at zero, at

>times the RF gain has to be decreased to save the ears. IF gain is
>set correct, -7volts @ 150 micro-volts. Transformer used to match
>impedance, speaker to receiver.

Either you have WAY too much audio at the CW ends of R104 and 105, or you have a ground problem at the pots (CCW ends not firmly grounded), or BOTH audio amps (V602A/V603 and V602B/V604) are broken. The chance of both audio amps being broken is slim, so that's the least likely. Using a scope, check for audio at the CCW ends of the pots (terminal 3 of R104 and R105) to rule that out. There should be no more than a millivolt or so of audio there.

If these check OK (and I expect they will), then you have WAY too much audio coming from the detector/limiter/first audio amp and follower. That would suggest an AGC problem.

>Could a person just add a resistor where the wire from S104
>(connection 4) and the wire from P120 meet? If my memory is correct,
>this point is on the line gain pot and easy to access.

There is something broken. Find out what it is, and fix it. Don't hide the problem by modifying the radio.

Date: Mon, 30 Dec 2013 20:51:33 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Local & Line potentiometers

A little time was spent on the beast this evening.

1: No ground problems at the end of the pots, even added a jumper once again. No change

2: Checking the audio at the CCW ends, less than 5 millivolts with the O'scope.

Going to check a few more items tomorrow; swap IF's between the Motorola and Amelco again. This should rule out AGC issues there. Then on to the RF section.

Thanks,
Craig

Date: Tue, 31 Dec 2013 01:38:21 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Local & Line potentiometers [NOW] AGC
troubleshooting

OK, then your problem is way too much audio, and the most likely suspect is the AGC. Before you swap modules, you will be well served by collecting some data.

First, make sure there is a jumper installed between TB102, Terminals 3 and 4. If not, install one and see how it works now. Assuming there is a jumper:

Set the AGC to "MED" and tune the radio to a good, strong, local signal (like a strong AM broadcast station). Measure the DC voltage at TB102, Terminals 3 and 4 with a high impedance meter (VTVM, DVM, or scope, with an input resistance of >= 1M ohm; not a VOM). It should be significantly negative, -10v

or more. If it is, you have no AGC problem and the fault lies elsewhere. But if the voltage is only weakly negative, or zero, you have an AGC problem. If so:

Turn off the radio, and pull the plug. Set the AGC time constant to "MED." Remove the jumper between TB102, Terminals 3 and 4. Measure the resistance to ground from each of these Terminals. Terminal 3 looks back into the AGC detector, and should read in the neighborhood of 500k ohm due to R545, R546, and R547. Terminal 4 is the AGC line feeding the RF and IF circuits and should read essentially infinite (>> 1M ohm). If you have gotten to this point, one or the other of these Terminals will probably show a much lower resistance to ground than this. Trace the circuit to find the leaky component(s). If Terminal 3 reads less than ~500k ohm, the usual suspects are C551, C548, C547, C545, and C544. If Terminal 4 reads less than 1M ohm, the usual suspects are any of the several dozen bypass caps on the AGC line in the IF and RF sections.

If, on the other hand, the resistance readings are OK, suspect V508, V509A, and associated circuitry (Z503 and C546, especially).

Date: Tue, 31 Dec 2013 07:58:18 -0500
From: Steve Hobensack <stevehobensack@hotmail.com>
Subject: Re: [R-390] Local and Line Gain Pots

I had this trouble once. Turned out it was a decoupling cap in the audio module. As I remember, one of the filter caps (that decouples) went bad and there was feed over between the screens of the 6ak6s in the line output local output. The only way to silence the unit was to have both gains turned back to minimum.

Date: Tue, 31 Dec 2013 09:53:10 -0500
From: "quartz55" <quartz55@hughes.net>
Subject: [R-390] Local and Line pots

Thanks Charles, how timely. I've been having issues with my AGC also on IF strips I have. Question: if the mechanical filters are leaky to ground, won't they also affect the resistance on the AGC line?

Date: Tue, 31 Dec 2013 07:24:50 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Local and Line pots

This is where having a 2nd R390/A comes in handy. Swap IF sections, of course that 2nd R390/A had better be working correctly.

Date: Tue, 31 Dec 2013 10:28:09 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Local and Line pots [NOW] AGC

>Question: if the mechanical filters are leaky to ground, won't they
>also affect the resistance on the AGC line?

Yes. I suppose that with advancing years "leaky filter(s)" is getting to be another of the "usual suspects," although I've always thought of that as one of the more remote possibilities.

Date: Tue, 31 Dec 2013 11:29:54 -0600
From: "Thomas Frobase" <tfrobase@gmail.com>

Subject: [R-390] Linear replacments for 2.5K pots

I checked my inventory today and I have a few more of the 2 Watt AB pot's that are a direct fit for the audio pot's. I you are interested send me a note off line . Pictures here NOS http://www.kitparts.com/R-390-pots/

Date: Tue, 31 Dec 2013 12:30:44 -0500
From: "quartz55" <quartz55@hughes.net>
Subject: [R-390] Local and Line pots plus AGC

Oh, I forgot, on pin 3 TB102 I measure 470K after the DVM settles down. on Pin 4 I measure around 1.8 Meg.

Date: Tue, 31 Dec 2013 12:31:57 -0500
From: "quartz55" <quartz55@hughes.net>
Subject: [R-390] Local and Line pots plus AGC

I have an IF module that had some really bad filters and the AGC in that is non functional, I'm in the process of repairing the filters now, but on the IF module that does work, here's what I get feeding the service minotor into the BNC (balanced) on the back of the 390A, measured at 16KHz BW.

-110dBm = -0.58VDC TB102, 3&4 = 0 on the carrier meter
-100 = -.6VDC = 0
-90 = 0.8VDC = ~2
-80 = -2.8VDC = 20
-70 = -3.6VDC = 40
-60 = -5.2VDC = 55
-50 = -6.6VDC = 70
-40 = -7.9VDC = 80
-30 = -9.0VDC = 90
-20 = 10.3VDC = 100
-10 = -11.7VDC = off scale
0 = -13VDC = o. s.

How do these numbers look as far as AGC goes? It sounds real good on the diode load through an LM amp. I haven't been through the book yet on setting up the IF gain, but RF, IF coils have all been aligned.

How much AC hum should I be seeing on the local and line output? There were also some strange wires and resistors in the IF not in the schematic I removed and the caps have mostly been replaced.

Date: Tue, 31 Dec 2013 12:21:39 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] Today's Local & Line experiments

With quartz55's (Dave) e-mail today, I'll follow his lead and my numbers.

One micro-volts resulted in or about -0.58VDC on TB102, 3&4

-110dBm = -0.58VDC TB102, 3&4 = 0 on the carrier meter
-100 = -.961 = 10
-90 = -2.29 = 20
-80 = -3.75 = 35
-70 = -5.12 = 45

-60 = -6.38 = 52
-50 = -7.74 = 62
-40 = -9.21 = 70
-30 = -10.66 = 80
-20 = -12.05 = 90
-10 = -13.29 = 95
0 = =14.77 = 100

Measurement were made with a HP 8640B & Fluke 27/FM. No fancy stickers traceable to NIST

With the jumper disconnected on TB102 3&4, the resistance to ground at 3 was 534K ohms, 4 was 1.82M ohms. Measurement made with Fluke 27.

Then for grins & giggles, the AGC voltage test on the grids of tubes connected to said line follows.

I used and old ratshack dual FET analog meter to monitor TB102 3&4 with the jumper in place. The Fluke 27 was used for the grid measurement.

The IF section; V501 thru V503 was consistent. The meter on 3&4 was at -6.3VDC using the above -60dBM setting. All the tubes in the IF section read at or very near -6.3VDC using a tube extender and checking the voltage at the grid with the Fluke 27.

The RF section might be the dirty fly in the ointment??? Once again the ratshack meter on 3&4 with the HP 8640B cranked up for a reading of about -6.3VDC. The Fluke was used to measure the grids. NOTE: both meters dipped to about the same voltage.

V201 E208 -3.47VDC
V202 E209 -5.68VDC
V203 E210 -2.6VDC
V204 E211 -2.6VDC

I need to check the above once again with the Function switch in Standby and check grid leak voltages: per Y2K section 5 pg 5-12.

Date: Tue, 31 Dec 2013 15:43:41 -0500
From: "quartz55" <quartz55@hughes.net>
Subject: [R-390] AGC

All my measurements were with Fluke 189, except the dBm from the service monitor Moto R2005D, it's fairly accurate. -110 dBm reads .7uV on the SM. Do the math if you want uV.

Date: Tue, 31 Dec 2013 16:22:30 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Linear replacments for 2.5K pots

Your original description indicated that these are linear pots (confirmed by the "A" suffix part number stamped on the part in the photo). Linear pots make extremely unsatisfactory volume controls, because all of the "action" occurs in the first quarter turn or less and the rest of the rotation does essentially nothing. So, they are fussy to adjust and are always down at the very bottom of their rotation in operation. Highly unrecommended.

Date: Tue, 31 Dec 2013 16:15:51 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: [R-390] R390A AGC troubleshooting procedure

I posted this on another thread yesterday -- I'm reposting with some additions and so it has the correct "Subject:" header.

R390A -- AGC troubleshooting procedure:

Throughout this entire procedure, the "FUNCTION" switch should be set to "AGC."

First, make sure there is a jumper installed between TB102, Terminals 3 and 4. If not, install one and see how the radio works now.

Set the AGC to "MED" and tune the radio to a good, strong, local signal (like a strong AM broadcast station). Measure the DC voltage at TB102, Terminals 3 and 4 with a high impedance meter (VTVM, DVM, or scope, with an input resistance of >= 1M ohm; not a VOM). It should be significantly negative, -10v or more. If it is, you have no gross AGC problem and the fault lies elsewhere. But if the voltage is only weakly negative, or zero, you have an AGC problem. If so:

Turn off the radio, and pull the plug. Set the AGC time constant to "MED." Remove the jumper between TB102, Terminals 3 and 4. Measure the resistance to ground from each of these Terminals. Terminal 3 looks back into the AGC detector, and should read in the neighborhood of 500k ohm due to R545, R546, and R547. Terminal 4 is the AGC line feeding the RF and IF circuits and should read essentially infinite (>> 1M ohm). If you have gotten to this point, one or the other of these Terminals will probably show a much lower resistance to ground than this. Trace the circuit to find the leaky component(s).

If Terminal 3 reads less than ~500k ohm, the usual suspects are C551, C548, C547, C545, and C544.

If Terminal 4 reads less than 1M ohm, the usual suspects are any of the several dozen bypass caps on the AGC line in the IF and RF sections, or possibly leakage to ground in one or more of the mechanical filters. It is also possible that the sector of the "FUNCTION" switch that shorts Terminal 4 to ground when the switch is set to "MGC" or "STAND BY" is mis-timed, broken, or dirty, but this is very unlikely.

If, on the other hand, the resistance readings are OK, suspect V508, V509A, and associated circuitry (Z503 and C546, especially).

The R390 is very similar, although the part numbers are different.

Date: Tue, 31 Dec 2013 16:54:11 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Local and Line pots plus AGC

The voltages look decent, but the 1.8M ohms on Terminal 4 seems low to me. Since the AGC detector already has to drive ~500k ohms on Terminal 3, the 1.8M in parallel is not a great additional burden. But I think you may have more than nominal leakage on Terminal 4 that could indicate future

AGC problems. (However, I wouldn't dig into it at this point -- I'd wait for it to get worse, measuring the Terminal 4 resistance every 6-12 months.)

>How much AC hum should I be seeing on the local and line output?

1 or 2 dB above the broadband noise of the audio stages. Enough so you think it should be lower, but not enough to seriously interfere with operating the radio. The most prominent cause of R390A hum is the fact that the designers used the chassis for the heater returns (unless you have a tube installed that suffers from heater to cathode leakage, in which case the hum will be distinctly audible, 3dB or more above the broadband noise of the audio stages).

Date: Tue, 31 Dec 2013 15:49:17 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] FW: Today's Local & Line experiments

Testing is done for the day. Checking the grid leak bias goes as follows:

E209 = -7.5VDC
E210 = -6.22VDC
E211 = -3.74VDC
E402 = -0.22VDC

Might add the signal generator had to be connected and was set @ -60dBM -6.38VDC for these readings. Checked at several input levels and not much change. Only item out of spec was E402. Don't think the audio issue is here.

BUT:

I ran through the AGC resistance check again with a twist. So with the function switch in AGC, line unplugged. Terminal #4 to ground on TB102, resistance is 1.8M ohms. Now with P112 unplugged (goes to IF) resistance stays the same. Put P112 back on and remove P208 (think that's correct) which goes to the RF section and carries the AGC line. Result is the resistance goes to infinity. There seems to be a string of 5000pf 1KV caps on that line to ground.

Date: Tue, 31 Dec 2013 19:16:06 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] After diner: More Local & Line stuff

Answered some of my own questions while viewing the schematics in the Y2K. The AGC line that goes to the 2nd mixer has a 270 ohm and a 1.5M ohm resistor in series going to ground. Close enough to my readings of 1.8M earlier today. Last post should of read P108 vs P208.

Then had to prove it out. Back out to the shack and removed the top of the Motorola R390/A and checked the resistance on those two same lines. Darned close to identical. The Motorola plays normal. Back to square one.
Sometime soon, it is time to add a little R to the Line & Local pots. Curious to see how much is needed.

Date: Wed, 1 Jan 2014 08:29:21 -0800 (PST)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] Local & Line potentiometers

I'm not convinced that it could be an AGC problem. In the couple of R-390A's

I've operated, the audio gain pots work normally even in MGC mode (which disables AGC), and with RF gain all the way up and the receiver overloading on a strong signal.

My vote goes for one section of the three section plug-in electrolytic cap being open with resultant loss of decoupling.

Date: Wed, 1 Jan 2014 08:58:11 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Local & Line potentiometers

The three section plug-in electrolytic cap is located in the AF module. The Motorola AF module works fine, audio normal, in the Motorola. When it is placed in the Amelco, the volume is still loud. Taking the IF section from the Motorola and placing it in the Amelco, the volume is still loud.

Volume is still loud with MGC mode, but with distortion if the RF gain is set too high.

Today, for grins & giggles resistance will be added to the Line & Local inputs. It will be interesting to see what it takes to calm the beast.

Date: Wed, 1 Jan 2014 09:12:17 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Local & Line potentiometers

I should also add: All the electrolytic caps in both the Amelco & Motorola have been replaced with new caps (not NOS junk). In trouble shooting the Amelco, the caps were double checked on a TO-6A cap analyzer at rated voltage, no leakage.

Date: Wed, 1 Jan 2014 17:43:26 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] Today's Line & Local experiment

Well, once again the Collins designed boombox has crushed its opponent, me! The too loud Amelco is still too loud. So with that, I did try adding some resistance to terminal #1 of the Local pot R105. As a matter of fact, up to 10K of resistance. Little change and nothing to write home to mama about But I do have more numbers to chew on for those that wish to partake. Might add at this point, the beast arrived in this condition. R105 was a 5K pot when I brought it home and started restoration. So, it has been too loud for some time for other owners. Numbers to chew on: All taken from terminal #1 of R104 & R105. They are the same values, so let's keep it simple....just terminal #1.

NO Signal (antenna disconnected)

Amelco	0.35VAC
Amelco	6.4VDC
Motorola	0.01VAC
Motorola	7.5VDC

Signal (neighborhood RFI, grow lights & plasma TV)

Amelco	4.5VAC
Amelco	6.7VDC

Motorola 2.6VAC
Motorola 7.6VDC

Signal = antennal connected to a full wave loop cut for the 75 meter band, receivers tuned to 3.880 with no stations on or nearby.

If there is time tomorrow the beast will be flipped belly side up and some of the cables will be checked again.

Date: Thu, 02 Jan 2014 00:23:24 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Today's Line & Local experiment

Changing R105 from 2.5k to 5k would not lower the volume, so it is unlikely that's why it was done. But since there is evidence that the pots have been monkeyed with, it is worth checking to make sure both of them are still log (audio) taper pots, not linear.

According to your data, with an antenna connected, the Amelco is less than 5 dB louder than the Motorola (4.5v vs. 2.6v). We would not expect a 5 dB difference to be characterized as unusually loud, or "blasting," or "have to turn the RF gain down even with the audio pot at zero." This suggests that the problem is after the volume control (i.e., V602/603/604 and associated circuitry).

At this point, I'm inclined to suspect a bad decoupling capacitor, as suggested previously by Steve and Drew. In particular, C603B. C603 is a plug-in cap, so you can easily swap in C603 from the other AF deck. That's the first thing I'd check at this point.

Date: Thu, 2 Jan 2014 08:44:30 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] FW: Today's Line & Local experiment

The Line pot is still a 2.5K log taper, 5K pot (Local) that was there when I brought it home was a log taper. The 5K has been replace since, with a 2.5K log taper from the junk pile. As of yesterday, both pots are good. Getting the Motorola & Amelco upside down at the same time is a pain in the backside! But been there before. I hate trying the same thing over and expecting different results, if you know what I mean. Next trip to the shack I'll lean towards a broken wire in either of the two plugs which connect to the AF module. Don't have a TM in front of me, but a shot in the dark.....P120 pin #15. Goes from the grid of V602 thru S104 to terminal #1 of both Line & Local pots? Checking the electrolytic caps in the Amelco AF module isn't too much of an issue. No extras on hand.

Date: Thu, 02 Jan 2014 13:38:57 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Today's Line & Local experiment

>Checking the electrolytic caps in the Amelco AF module isn't too
>much of an issue. No extras on hand.

Just swap in C603 from the other unit to see if that is the problem.

>P120 pin #15. Goes from the grid of V602 thru S104 to terminal #1 of
>both Line & Local pots

??? According to my schematics, the wire at P120/J620 pin 15 does not connect to either V602 or to the audio pots. It connects the grid of V601A, through R602, C601, and S104, to the cathode circuit of V601B when the AUDIO RESPONSE switch (S104) is in the WIDE position (but not when S104 is in the NARROW position).

This provides negative feedback around V601A and B and reduces the gain of V601A by about 10dB, to match the audio level in the WIDE position to the audio level in the NARROW position (i.e., to match the insertion loss through the NARROW filter, FL601). Even if it were not connecting, it would only raise the audio level by 10dB in the WIDE position (and not at all in the NARROW position) -- not enough to cause unbearably loud sound. You can check it by switching the AUDIO RESPONSE switch to the NARROW position. If the level sounds approximately the same when you do this, the NFB is connecting properly through S104 and P120/J620.

Or did you mean P120 pin 2? That connects the output of the cathode follower, V601B, to terminal 1 of both LINE and LOCAL pots (it also connects through R608 to the grid of V601B for biasing). That is definitely not your problem -- If it were not connecting, you wouldn't have any audio or DC on the LINE and LOCAL pots.

Date: Thu, 2 Jan 2014 11:36:54 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Today's Line & Local experiment

Yes V601!! I'll blame it on I can read my typo's, or morning coffee hadn't done it job, didn't put on my glasses yet. 10dB, I'll take that if it's the problem. Swapping C603 from the Motorola isn't going to happen anytime soon. It has been swapped by itself before and the entire AF module from the Motorola. Purchasing another set of new caps for grins & giggles might happen first.

Next step is to ring out all the wiring in and out of the AF module of the Amelco. The search will continue for shorts, grounds, opens, and who the heck wired this thing? Something is amiss? Might run through the Motorola and do that AGC thing with the HP 8640B and TB102. For others on this e-mail reflector it would be nice to have good numbers of the AGC line when all is right.

Date: Thu, 2 Jan 2014 17:38:16 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] Thursday's Line & Local report

<snip> The Amelco: About a half hour or so was spent measuring P120. In brief; no grounds, shorts, opens, & all wires were to spec. Pulled, twisted, yanked, and tortured P120 and couldn't find any faults. Next up was C603 and the TO-6A. All three sections measured around 30uF. Considering the dial and the age of the instrument, I'll call that good. Then all three sections were tested for leakage at rated voltage. At 300 volts, all three measured under 0.01mA of leakage. I could dig up the receipt for the replacement caps in C603, the voltage rating might be higher but what the heck. Tomorrow I want to look at the AGC line on the Motorola. O'beer thirty.....

Date: Fri, 3 Jan 2014 15:41:29 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] FW: Thursday's Line & Local report

Shortly there might be more hair on my arms than on my head! As to tubes: The correct tubes are in the correct sockets, checked all with a TV7DU, moved them around watching for a change, nada.

Friday's Line & Local Report

Made a trip early this morning to the shack and made progress, but no cigar. All the battle weapons are scattered in the shack and are being used. With that, on TB601 the resistor R608 was touching a jumper. Under TB601 the solder area of R608 had a slight contact with the jumper from Pin #5 of V605 that goes to E607. That jumper was of a generous length and had quite a curvature up towards the TB. Don't remember last time I've checked E607, but sometime in the past I'll guess the voltage was checked.

Now the voltages on terminal #1 of the Line & Local pots agree with the normal Motorola. The audio hasn't changed. A little dissertation is in order.

1. I have bad hearing, or so the audiologist said.
2. With the door of the shack open, I can follow QSO's outside in the backyard 20 feet away.
3. With the door of the shack closed, the voices are audible but not understandable.
4. This is with the Local gain at zero.

Considering the solder job of the 5K Local pot that came with this R390/A was first class, it is time to knuckle down and trace every wire & component. I might be dealing with someone's better idea. I will beat this receiver into submission!

-----Original Message-----
From: Bill Cotter [mailto:n4lg@qx.net]
Sent: Friday, January 03, 2014 7:40 AM
Subject: Re: [R-390] Thursday's Line & Local report

I'm sorry to see you tearing out your hair on this AF too-high problem. A customer brought me a Collins 51S-1 complaining of low audio, opposite of your issue. First thing I did was to check the tubes to get that out of the way before digging in. Low and behold, someone swapped a 12AU7 dual-triode for the 12AX7 in the audio chain. The audio came up 20-25dB at the AF Gain full-on position. Easy fix. Where I am going with this is have you checked all the tubes in the AF chain and made sure that the 12AU7's are really such? A wild card, but you never know.

Date: Fri, 03 Jan 2014 21:16:18 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] FW: Thursday's Line & Local report

>Now the voltages on terminal #1 of the Line & Local pots agree with the
>normal Motorola. The audio hasn't changed.

OK, so everything before the pots is OK. The problem must be from the wipers (terminal 2) of the pots forward.

Just as a sanity check, measure the audio on terminal 2 of the pots and verify

that it goes from 0 (just a few mV) to the same as terminal 1 as the pots are rotated from full CCW to full CW. (For example, if the carbon tracks were broken internally at terminal 3, the radio would be near full volume all the time. It's very unlikely this is the problem, but it needs to be ruled out.)

If that is OK (essentially no audio on terminal 2 of the pots when they are fully CCW), the question is how audio is getting to the amplifiers (V602A, 602B, 603, and 604) to be amplified when the pots are all the way CCW. A second question is whether the amplifiers are working properly. For example, if the NFB resistors R612 and R626 were missing or open circuit, the amplifiers would have too much gain. Still, if there were essentially no audio on terminal 2 of the pots (and, therefore, no audio on the grids of V602A and 602B (pins 2 and 7) with the pots fully CCW), even if the amps had too much gain there still should not be very much audio at the plates of V602A and B.

So, the task is to find out (i) how audio is getting into V602A, 602B, 603, and 604, and (ii) whether V602A, 602B, 603, and 604 are operating properly.

If the wipers of the pots have essentially no audio on them, the grids of V602A and 602B should have essentially no audio on them. The only other obvious way for audio to get from V601A or B into V602A, 602B, 603, and 604 is through R606, to the grids and screens of the 6AK6s (V603 and 604) -- but this would only occur if C603B were not bypassing the audio to ground. You say you have checked C603B, and that it is a new cap. How did you check it? Did you measure it in-circuit (at the junction of C603B and R606)? Again, as a sanity check it is probably worth looking at that junction with a scope to see if there is any audio on it. (There will be some 120 Hz hum, so a voltmeter reading could mislead
you.) Is it possible when the cap was rebuilt the + or - end was connected to the wrong terminal of the octal plug?

If all that checks out, is it possible someone rewired the audio deck for some unknown reason, and added another path for audio to get into V602A, 602B, 603, and 604?

Date: Fri, 3 Jan 2014 19:17:12 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] FW: Thursday's Line & Local report

Glad you chimed in! I've printed out your suggestions and will follow thru in the next couple of days, if not sooner. Lets rule out a few items.

1: I've disconnected every wire to the Local & Line pots, measured the resistance end to end. Neither has a broken track. Local measures about 2.55K, wiper is good. The Line pot measures about 2.18K, wiper is good. Both are log tapers. As already stated, I had a 2.5K log taper in the junk box to replace the as found 5K.

2: C603: As stated in an earlier post, all three sections were checked with a T0-6A. Values are about 30uF, leakage under 0.01mA @300VDC. Should be sort of easy to check in-circuit. Just have to remove the clamp screw, raise the can, & connect a clip lead. Last time I battled the Amelco, the caps were removed from the can, checked to make sure all wires were covered with tape, no shorts, polarity is correct. But could look again. At this point I'll paint my face blue and dance around a Christmas tree if it helps.

Charles & all; I believe in past topics the fact, radio is not my ball of wax, has been mentioned. Your help is greatly appreciated. At this point, my fingers are still crossed the issue isn't AGC.

As a reference point, I thought about checking the last tube output of the RF, last tube output of the IF, of both the Motorola vs the Amelco. Connect a sig-gen to the antenna input and record a no signal vs a couple micro volt signal for each section. Maybe toss in a AGC vs MGC to the mix also. Tube extenders and an O'scope should get this done.

Date: Sat, 4 Jan 2014 16:02:03 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] Saturday's Line & Local Report

To the faithful followers of the R-390 e-mail reflector:
The short version, gonna purchase some caps?

Long version: Several hours were spent tracing all the wiring, onnections, resistors that go to V601A/B. Nothing there except a small wire harness is pinched between TB601 and a stud from L603. No easy way to twist the harness and get a good look. Applied two layers of tape just in case. It was time to warm up the O'scope. Lucky the plugs going to the AF section are long enough to set it on its side and turn on the juice.

With no antenna connected the voltage at the junction of C603B & R606 stayed around 0.1VAC; Local gain adjusted from 0 to 10. Now, with an antenna connected there was about 1.0VAC with the Local gain set at 4. Then for grins & giggles, KKNX a local AM BC station was tuned in at 840KC. The Beavers basketball team from OSU was playing and I could watch the wave form on the O'scope bounce.

The Amelco (boombox) has been here around five years and I've been thinking maybe the magic smoke would escape. Then the problem might be easier to find. Might add, since the AF module from the Motorola has been placed in the boombox with no change. I'd say the Amelco is picky about its diet of capacitors. At present both R-390/A's have Xicon 33uF 350V caps in them. The Motorola is happy with its diet.

Yesterday evening C603 was examined every which way. It just isn't good enough. Maybe? Any recommendations of other caps???? Both sets have been ordered from Mouser, part # 140-XRL350V33. If you don't mind, I'll rebuild C603.

Date: Sat, 04 Jan 2014 20:07:39 -0500
From: <Jbrannig@verizon.net>
Subject: Re: [R-390] Saturday's Line & Local Report

Same here. I cut open the filter caps and cleaned them out, then drilled and tapped the aluminum and put in brass screws, soldered in the capacitors and closed the cans with JB Weld..... As they say "I done it" it was not worth the effort. Solder new capacitors to the lugs at the bottom of the sockets and be done with it.....

Date: Sat, 04 Jan 2014 20:09:53 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Saturday's Line & Local Report

>with an antenna connected there was about 1.0VAC with the Local gain
>set at 4.

The setting of the local gain pot will not affect the amount of audio
at the junction of C603B and R606.

>Then * * * a local AM BC station was tuned in * * * and I
>could watch the wave form on the O'scope bounce.

So, it appears that C603B is not doing its job. Since you have the AF deck out and can access the bottom of the chassis, you should try tacking in another cap below the chassis, directly at the junction of R606 and the AF B+ choke (L603) (positive end at that junction, negative end to a convenient ground). This bypasses the octal socket connection to the existing cap (C603B), just in case there is something amiss with the socket or inside the C603 can.

>since the AF module from the Motorola has been placed in the boombox
>with no change

"No change"?? Am I understanding you correctly -- neither AF module works correctly in the broken radio? I thought you said the Motorola AF deck worked correctly in the broken radio.

>I'd say the Amelco is picky about its diet of capacitors. At present
>both R-390/A's have Xicon 33uF 350V caps in them. The Motorola is
>happy with its diet.

Somehow, C603B is either not a properly working capacitor, or if it is, there is something wrong with the wiring at the octal socket or inside the C603 can and C603B is not really connected to the circuit as it is supposed to be.

The audio is coming from the plate of V601A, through R605 and 606 (a total of 58.2k ohms), and thence on to the grids (through R611 and 622) and screens of V603 and V604. C603B should be putting a reactance (think of reactance as AC resistance) of around 5 ohms to ground at audio frequencies. The voltage divider formed by R605+606 and C603B should reduce the audio voltage at the junction of R606 and C603B to about 1/10,000 of the audio voltage on the plate of V601A -- i.e., only millivolts or less. But according to your observations, it is not doing this.

It has nothing to do with the Amelco AF deck being "picky" or "needing" more or better capacitance than the Motorola AF deck. It just needs a properly working 30uF capacitor hooked up to the junction of L603 and R606, and for whatever reason, there isn't one. Maybe you got a bad cap (it happens). Maybe the crimp connection between the capacitor lead and the crimp terminal is flaky. Maybe the pin(s) of C603 aren't making good contact with the octal socket. Whatever the reason, C603B is either faulty or it isn't actually electrically connected where you think it is. (That is why I recommend tacking in a cap under the chassis as a test procedure, to eliminate the socket and internal can wiring from the equation.)

>Mouser, part # 140-XRL350V33.

When did you buy those? Mouser shows that part as obsolete, no longer stocked.

Date: Sat, 4 Jan 2014 17:53:27 -0800 (PST)
From: Steve Toth <stoth47@yahoo.com>
Subject: Re: [R-390] Saturday's Line & Local Report

I've used Xicon 33uf, 450v I bought at Fry's on a Saturday afternoon to restuff C603 on one R390A - a lot of work like others have said. Cheap, works fine, but takes a lot of time (FWIW: I ended up discarding the original C603 octal base after cutting the can off and used either an octal plug with a collar of PVC pipe epoxied to it, or a base from a 5Y3 I had laying around in the junk box. Soldering the leads into the pins is a breeze. The cap can fits snugly over both modified bases. Drill a hole through the can and base on opposite sides, tap for short 6-32 flat head screws, and bingo-bango-bongo, very sturdy cap rebuild with removable cans in case the internal caps need to be replaced in the future). And, it looks good.

I also have the plug-in electrolytic cap sets from Sigmapert in two other R390A's - on the other end of the price spectrum, but top notch quality and they work fine also.

Date: Sat, 4 Jan 2014 17:57:13 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Saturday's Line & Local Report

This has been fun, been chasing the loud audio for a while, since it was brought home in Feb. 2007. That when the caps were ordered. As stated before; moving either the IF or the AF module from the Motorola to the Amelco has had no effect on the audio. The caps in C603 have the leads crimped and soldered. Good connections to the pins, no resistance. Socket of C603 is good to go. Last night I even soldered the eyelets to the screws. I don't have any caps here that fit the bill to tack under the chassis. This evening I'll trace all the AF wiring again for the umpteenth time.

Tomorrow I want to compare IF output of the Motorola vs the Amelco. Yes, the IF gain of both receivers are set @ -7VDC 150 micro-volts 455KC.

Date: Sun, 05 Jan 2014 01:02:29 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Saturday's Line & Local Report

>As stated before; moving either the IF or the AF module from the
>Motorola to the Amelco has had no effect on the audio.

OK, I misunderstood what you said previously. If you can put the Motorola IF and AF modules in the Amelco radio and the Amelco radio still has the loud audio problem, it would appear that the problem is not in the Amelco IF or AF modules. I assume you have also put the Amelco IF and AF modules into the Motorola radio, and they work fine there? (If not, you should do that and note what happens.). If that is true -- the Motorola radio works fine with the Amelco IF and AF modules, and the Amelco radio has the loud audio problem with either the Amelco IF and AF modules or the Motorola IF and AF modules -- then the problem does not appear to be in the Amelco IF or AF modules. But then, it becomes very difficult to imagine where the problem could be.

Date: Sun, 5 Jan 2014 07:56:29 -0800
From: "Craig Heaton" <hamfish@efn.org>

Subject: Re: [R-390] Saturday's Line & Local Report
Message-ID: <002201cf0a2e$b3a0b1a0$1ae214e0$@org>

Sometime today the IF output of both receivers are going to be checked. Money says I'll order some new caps and see what happens. Every year for the last couple of years I've spent a week or so going thru the Amelco searching for the loud audio cause. If it were no audio, could be easier to find. Loud audio, just turn down the RF gain a tweak. If the caps don't fix it, the boombox goes back to its operating station for another year.

The AF section was checked last night again; wiring good, resistors good all but two caps have been replaced (C612,C601) C601 looks like a Vitamin Q, C612 is a silver mica. J619 & J620; terminal resistance checked per Y2K.

I'm tired of swapping modules. Where I can pick a point and check voltages, watch the O'scope, etc; much easier.

Several times the boombox has been mentioned here on the R-390 e-mail reflector. C603 is the leading cause in replies. At this point, caps are like tubes, check them in circuit. The values of all three are good to go, leakage is very low according to the TO-6A. If it should bypass all audio to ground, we have a suspect.

This week hasn't been a total loss. The jumper touching that resistor wasn't found before. I might add the positioning of the wiring harness in the Amelco lacks a little. There are two spots where the harness sits on mounting studs. Have to wonder how that got past a military inspection.

Date: Sun, 05 Jan 2014 11:33:34 -0500
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Saturday's Line & Local Report

Your previous comments regarding the jumper being discovered begs the following mental/physical exercise. The wiring harness itself. You have noted the "positioning of the wiring harness" in two places sitting on top of mounting studs. I might suggest looking at possible fraying of the harness, and a point where it "may" be causing two or more conductors to be bare and touching each other and/or the chassis itself. I might say that the harness is suspect, as you have found the jumper(s) and components touching a jumper.

In my mind, this gives the impression that it has been fiddled with "after" production. Does anyone else get this from all the posts? It is just a bit suspicious in my mind. Even those from St. J's don't have those type of issues.

Date: Sun, 5 Jan 2014 11:24:56 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Module swapping for troubleshooting

The modular design of the R-390A and the standardization across all of the manufacturers should make it possible to mix any manufacturers modules with any other manufacturers. That was the intent of a standardized design, so maintenance folks could swap modules to make working radios and to ease in troubleshooting down to the module level. Ideally, higher tiers of depot maintenance would chase problems down to the component level, bring the module back up to spec and then the module would be returned as a spare or put into stock in case another radio went down.

As with any sort of electronics assembly there will be some slight differences between modules due to component tolerances and how some of the alignment works across modules. This would be more apparent with the RF, IF, PTO and crystal decks where those sorts of interactions become more apparent.

Your problem with an excessively high audio level should follow the bad module. If you have an assortment of known-good modules you should be able to swap your way into isolating the problem to a bad module.

It sounds like you are finding all sorts of little, nagging problems with potential shorts between components, bad solder joints, possibly bad capacitors and who knows what you will find with out of spec resistors. This would not inspire any confidence that by going through a module that you will have something that is 100% known good. For module level troubleshooting you really do need pieces that you are absolutely certain that are good, otherwise you are doing nothing more than component level troubleshooting that requires a bit more skill and understanding of how of the elements of the radio circuitry work together.

My concern is that by undergoing a wholesale swap-out of capacitors really does not put you any closer to solving the problem. While you may eventually luck-out in replacing the bad part it may get pretty expensive and frustrating until you reach that point.

A number of years ago I was keeping my eye on a tech who was involved in a particularly puzzling problem with a power supply. The stock manager had called me to say "Todd seems to be having a problem with something, he has been in here four times today to get parts to repair a unit". For me that was a clue that either he had a unit that was beyond economical repair or he was "easter-egging" a problem. I stopped by his bench and he showed me where he had this supply that just had a terrible problem with AC ripple on the supply. On such a seemingly simple circuit he was pulling his hair out. After a day of him struggling with it I suggested that he turn it over to another tech to just check out. When the unit was moved to a different test bench they could not find the problem. The power supply worked perfectly, ripple was down in the low millivolts range. The problem was that Todd's oscilloscope had a bad ground connection on the probe. He was so focused on solving the problem that he never considered that maybe his test gear was at fault.

Date: Sun, 5 Jan 2014 10:21:51 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Saturday's Line & Local Report

With the ends of the wiring already soldered, moving the wire harness isn't going to happen. It could in the future cause other problems from tugg'en & pull'en. Last night I was able to get a small mirror under the harness and check for damage, couldn't see any. Just in case a layer of tape was added between the harness and studs. This one isn't going to be bouncing around in the back of a duce & a half.

After bringing the boombox home I was pleased with its physical condition. Very clean, no corrosion, no signs of being mounted in a rack, original tubes. The only mod found so far; the socket for the ballast tube was rewired for a 12BY7. Now the socket is wired for the proper tube, pins 2 & 7 have a jumper, 12BA6's in place of the two 6BA6's.

I'm sure one of the past owners pondered the audio. The 5K local gain pot wasn't put there by the Wizard of Oz. The speaker that was included had two (2) impedance transformers attached. One of each end of the speaker wire. Beats me?

Tisha,

What I can't remember doing is putting both IF & AF modules from the Motorola into the Amelco, "at the same time"..... So looking just at the physical condition, what did the manufacturers of R-390/A's do with some of the rejects? Some how, did I get a R-390/A with several modules with problems that no one was going to fix? As is, the boombox has good sensitivity, no distortion on strong stations using AGC. I don't have the option of placing it on the bench of another tech and I always question the test equipment and "me". This is the reason for only spending a week or so with the boombox. Another year, a fresh look might see the problem(s). Going to take a hard look at the Amelco IF today.

Date: Sun, 5 Jan 2014 14:24:00 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] Sunday's Line & Local Report

As the sweet young thing that delivers the mail would say, "The continuing saga of the boombox". Progress was made today, I hope. Never trust a Sprague TO-6A to determine if a capacitor is good enough for C603, new, used, NOS or otherwise. So much for the above, on to the results of the IF testing. Only a single description is needed, both the Amelco and Motorola were close enough. Carrier level meter varied slightly. The receivers & sig-gen (HP 8640B) were tuned to 3.800MHz and allowed to warm up for 1-1/2 hour or so. Pin #1 of V507A was the test target. I think this is far enough down the line to compare IF's. I don't do this every day, hope I've read the scales correctly on the test equipment.

O'scope with a probe was connected to pin #1, sig-gen cabled up straight into the balanced antenna input. Function switch was set at AGC. Then the sig-gen was cranked up to get a mid-scale reading on the carrier level meter, 50DB. This was @ 0.5mV RF output. Next the 400Hz audio output was selected and set for 100% modulation. The scope read about 3mV.

Then the output range switch on the sig-gen was rotated and output set around .15V, carrier level meter was near 100, and the scope read 5mV. (on both receivers)

If the above numbers look good, keep them for future use. Time to visit the neighborhood capacitor store. Whatever it is, clues point to the AF module.

Date: Sun, 05 Jan 2014 19:55:26 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Saturday's Line & Local Report

Like Bob and Tisha, I am concerned that you are not proceeding in an orderly, logical way and are not making use of all the data that you are collecting as you go. This can only lead to frustration and wasted effort. Module swapping is a way to EXCLUDE modules as the source of a problem as much as it is a way to identify bad modules. Some of the data you have collected seems to indicate

that the problem is NOT IN THE AMELCO IF OR AF MODULES AT ALL. Thus the suggestion to swap modules again, to be sure. Note that it is just as important to swap the questionable modules into the known good radio as it is to swap the known good modules into the radio with the problem.

If swapping the Moto AF module into the Amelco radio (which you say you have done) does not fix the problem (which you say it doesn't), it strongly suggests that the Amelco AF module is not the source of the problem, because if the problem is in a module, we expect it to follow that module. You would confirm the "Amelco AF module is not the source of the problem" hypothesis by installing it in the Moto radio (which you do not say you have done). If you do, and the Moto radio works fine with the Amelco AF module, then THE PROBLEM IS NOT INTERNAL TO THE AMELCO AF MODULE and you can stop looking for it there.

The same applies to IF modules. You say putting the Moto IF module into the Amelco radio does not fix the problem in the Amelco radio. You would confirm this by putting the Amelco IF module into the Moto radio. If it works fine there, THE PROBLEM IS NOT INTERNAL TO THE AMELCO IF MODULE and you can stop looking for it there.

Until you do the experiment and find otherwise, it appears from what you have said so far this would indeed be the case. So, the path to greatest information for the least work is: (1) swap the AF modules BOTH WAYS (Moto AF into Amelco radio, Amelco AF into Moto radio). If the Amelco radio still has the problem and the Moto radio still works fine, leave the AF modules where they are and (2) swap the IF modules both ways (Moto IF into Amelco radio, Amelco IF into Moto radio). If the Amelco radio still has the problem and the Moto radio still works fine, THE PROBLEM IS NOT INTERNAL TO THE AMELCO AF OR IF MODULES. Again, from what you have said so far (Moto AF module in the Amelco radio does not cure the Amelco radio, Moto IF module in the Amelco radio does not cure the Amelco radio), we expect that this will be the case.

That may be a fair amount of work, but if you do it and the results are as above, you can QUIT LOOKING FOR THE PROBLEM INSIDE THE AMELCO AF AND IF MODULES. Think how much work that would save you. (If you had done that first, and those were the results, you wouldn't have had to do any of the work you have done these past several years and could have concentrated your efforts on looking elsewhere for the problem.)

SO, if the problem is not internal to the Amelco AF or IF modules, where can it be?? The next most likely suspects would be grounding and the wiring harness. For example, if you have audio at the junction of of R606 and the AF B + choke (L603), yet the capacitors in C603 appear to be good, it could be because the negative end of C603 is not properly grounded due to a faulty ground to the main chassis. Since you have already found a number of issues with the harness, further problems in that area should not be a surprise.

Date: Sun, 5 Jan 2014 18:16:51 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Saturday's Line & Local Report

To all, once again I do appreciated the help and suggestions, really! roceeding in an orderly, logical way is only one point of view. Your suggestion of using a scope connected between pin 7 of C603 and a resistor (forget which one) is a great idea. We have valid data, there is audio there! Last night, once again the

wiring was checked. Starting from the cap C603, the connections thru pins 1,3,5,& 7 are good. They are connected to the correct spots. All the negative leads of the cap connect to pin one (1). There is a short wire directly from pin one (1) of the socket for C603 to the AF chassis. Either from P120 or P119, the AF chassis is grounded to the main chassis. So if C603 should bypass audio to ground at that spot, the path is there. Might add checked a lot of wire and components in the AF last night, didn't find anything. It's not going to get better this year.

Today's little test gives me confidence all is well in the IF, time to move on. Don't be like a deer froze by the headlights of a car. Do something.

So do I order a high temp cap or a general purpose cap????? Newark isn't stocking like they use to, I have an account with Mouser.....
647-UBT2V330MHD their part number for a Nichicon and will fit in the can. Not going to mount under the chassis, no air flow. Xicon is not a candidate.

Date: Sun, 5 Jan 2014 21:58:01 -0500
From: N4BE_Jim <N4BE_Jim@Yahoo.com>
Subject: Re: [R-390] Saturday's Line & Local Report

I would also suspect the wire harness. Check continuity between the pot pins at the front panel and their ends in the various modules. Are the pots grounded to front panel or through the harness?

One end of gain controls are typically grounded. If the grounds are lifted, the pot has little or no affect.

I once had an old SW 390a that would produce an awful popping noise on strong signals. After much hair pulling, it turned out to be the little shielded cables, particularly the one carrying diode load signal to the rear apron. Who would have thought? The dielectric was breaking down under "high" diode load voltage (if you consider 10 volts to be high). Took a good part of a day to thread new miniax through the harness.

Another thing to look at is AGC not being able to control some stages. It is conceivable that AGC is controlling early stages ok, but due to a bad bypass or agc cap in later stages, the IF is being over driven. That can make for high audio.

Another fun anomaly is oil or contact cleaner on the phenolic antenna tune shaft. Looks like a low impedance and will kill your AGC. Same for contact spray or lubricant used carelessly on band switches. High impedance tube circuits are such fun!

Date: Sun, 5 Jan 2014 19:20:33 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Saturday's Line & Local Report

There is continuity between the pot pins at the front panel, per the schematic. Pots at terminal three (3) are grounded at chassis, checked many times over. With today's little test, I'd say the AGC is working, had my doubts. Injecting the sig-gen into the antenna input and watching the results at the IF output, tells all. With the function switch set on AGC, Motorola & Amelco are the same at that stage. If the signal from the last tube in the IF of the Amelco had a greater output than the Motorola, it would be time to back up to either the IF or RF. I think?

Date: Sun, 5 Jan 2014 19:34:22 -0800
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] Saturday's Line & Local Report

You have my humble apologies, I don't mean to offend anyone. It should be clear, I can't & haven't found any wiring issues so far. Could keep on looking, but I'm going to purchase some caps and give it a go. Three caps isn't going to break the bank, the shipping & handling will cost more than the caps. Your help and knowledge is priceless to someone like me & others, radio is not my ball of wax.

Following a schematic with a VOM isn't a problem, just takes time (mine). Ok, I did point out short comings with the positioning of the wiring harness in the AF module. But with a VOM, there isn't a short, ground, or open that I could find. Let's not spend any more time on the AF until new caps are installed. We all have our favorite ways of doing things. I'll not fault you for yours, please don't fault me for mine.

Date: Wed, 29 Jan 2014 13:24:26 -0800 (PST)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] SS 6V6 Replacement

The previous posts of doing a SS FET replacement for the R392 audio output triggered thoughts from an old post I made years ago. I reproduced an article from an Electronics World (English magazine) years ago about using a cheap MOSFET's to replace a 6V6/6AQ5 and other power output tubes. Perhaps even 6AK6 tubes. If interested, please email me off line using a fresh email NOT the reply to on the reflector list as Yahoo mail combines all of those into one email conglomerate that is difficult for me to accurately reply.

Date: Thu, 30 Jan 2014 19:35:36 -0800 (PST)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] R390A P-P audio circuit

A while back I was working on a project that would put the two chokes from the R390a audio deck behind the power transformer and then re-build the AF deck to have a push-pull 6AQ5 output circuit with a quality audio transformer. This would also leave space for a MOSFET B+ regulator.

The audio circuit is based upon the Kleronomos audio mod. Mr. Kleronomos used to do this mod as a side job. Now he has become a SK so anyone building this circuit would not deprive him of any income. The mod I designed requires a total re-work the R-390 AF deck.

Like a few other of my projects I have run out of time to complete this. It is not a complete how to do it project. It is mostly done design wise. I had started to do the project but it is now in limbo. If anyone wants a copy of the project (8 pages with photos as a PDF) please do an original email off list and I'll email you a copy.

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Date: Sat, 1 Feb 2014 12:56:51 -0600
From: "Thomas Frobase" <tfrobase@gmail.com>
Subject: [R-390] 390A audio Deck

While you are contemplating a refresh on you audio deck, you might be interested in a NOS circuit board, contact me off list if interested .

http://www.kitparts.com/r-390/r-390-audio-pcb.jpg

Date: Fri, 7 Feb 2014 11:45:01 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: [R-390] Class D Amplifiers

A while back, there was some discussion on this list about outboard audio amplifiers. I don't recall whether these came up, but has anyone worked with Class D amplifiers? If so, are they troublesome - specifically with respect to noise?

>From what little I've read about them, there are some pretty rigorous constraints with grounding, filtering, etc., to keep them from sourcing too much noise back into the system where they're used.

Just looking at the one below and thinking that, at the price, it would make a decent amp for the R390.
http://www.parts-express.com/pam8610-2x10w-class-d-audio-amplifier-board--320-604 Bad idea?

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editor's note

The earlier discussion re Class D amps is to be found in the R-392 misc notes file

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Date: Fri, 07 Feb 2014 14:36:31 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Class D Amplifiers

I have considerable experience with Class D amplifiers that put out serious power -- from 500w to 4kw (our first test mules were in the 10-20w range). Switching noise can be a real problem, although that can be minimized with good design. However, even if you solve the switching noise problem, we still don't have fast enough switches to run the chopper as fast as you'd like, so the cutoff of the reconstruction filter is too close to the audio band and its poor group delay sounds awful compared to a linear amp.

>Just looking at the one below and thinking that, at the price, it would make a decent amp for the R390.

Looking at the picture, the amp does not appear to have a reconstruction filter at all. No surprise -- the PAM datasheet does not discuss reconstruction filters, and the application circuit (which I believe is copied by all of the board-level manufacturers) does not have them. The PAM datasheet does note that the amp fails to meet FCC Part 15 regulations with respect to noise output without additional filtering. So, I think you can assume that this thing creates lots of switching garbage and you would rather not have one within a few hundred yards of your radio or antenna.

Date: Fri, 7 Feb 2014 12:56:08 -0800
From: "Chris Kepus" <ckepus@comcast.net>
Subject: Re: [R-390] Class D Amplifiers

How could you go wrong at that price, Barry? If it didn't work out with the R-390A, it would make a nice little aux amp for the workbench and other projects. There's gotta be an early adopter! :-)

PS: Bought a lot of stuff from Parts Express and have been very happy with them.

Date: Fri, 7 Feb 2014 16:13:38 -0500
From: Roger Gibboni <rgibboni@dulye.com>
Subject: Re: [R-390] Class D Amplifiers

So I build Hi End Tube linear amps for Stereo nuts! You're right on with the Class D amp issues but for communications purposes, it should be fine. Usually they switch between 80 and 100 kHz and the LPF takes all of the junk out of the audio band. They're not my favorite for music but for the r-390a it should be fine. And at that price???? Roger WA3YTM

Date: Fri, 7 Feb 2014 19:53:55 -0500 (EST)
From: MillerKE6F@aol.com
Subject: Re: [R-390] Class D Amplifiers

Also look at some of the Chinese offerings on Ebay. I bought a nice little amplifier module for less than 10 bux with free shipping and it's well made and even has a volume control on the thing plus a dandy heat sink for the IC amp. Bob, KE6F

Date: Sat, 08 Feb 2014 08:58:06 -0500
From: Mark Richards <mark.richards@massmicro.com>
Subject: Re: [R-390] Class D Amplifiers

Your question prompted me to read a bit more into Class D (digital) amplifiers. Maxim semiconductor makes a line of these as modules and they stress the low EMI/RFI point. If this particular amplifier is one of the Maxim modules, you might not be stuck with a noisy unit, provided it's designed right.

However there are a number of manufacturers who specialize in Class D for high-end audio and here is where there's a sensitivity to performance and clean operation. A seemingly good outfit with a bunch of low-priced kits is here: classdaudio.com I've yet to buy from them, but plan to in near future for a simple powered speaker monitor project.

Date: Sat, 08 Feb 2014 09:00:25 -0500
From: Mark Richards <mark.richards@massmicro.com>
Subject: Re: [R-390] Class D Amplifiers

The output may switch at that frequency, but aren't there other techniques that use higher frequencies, like spread spectrum? And what of harmonics?

-
Date: Sat, 8 Feb 2014 10:39:41 -0500
From: John Wendler <wendlerjrv@gmail.com>
Subject: Re: [R-390] class d amplifiers

I worked with a TI class D amp about 4 years ago for a UHF radio product.

I cannot speak to the HF noise generated by the chip you identify, but I would certainly put any class D amp in a good shield with feed through filters as a precaution. Just because it meets FCC does not mean it won't cause you heartburn in proximity to your antenna.

Several of the reviews mention white noise when the volume is down – I might call apps engineers at several different class D manufacturers to see if that is characteristic of the class D or whether their product is better. Analog Devices and TI come to mind. You would need to buy one of their eval boards if you are unable to work with SMT - many of those chips heatsink through a ground paddle in the bottom of the chip.

The biggest problem I had was trying to measure the output with an oscilloscope. The output on my chip was full differential; hooking the ground lead to the chip blew the chip out. This chip is similar.

You have to use a differential probe or two probes with your scope channels in a differencing configuration. You cannot use a speaker where one terminal is grounded.

-
Date: Sat, 8 Feb 2014 10:54:42 -0500
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] class d amplifiers

Not to bash the R-390, but it's not as RF tight as it might be, at least not after you pull off the top and bottom covers etc. To really get the best out of it, you don't want a bunch of local RF right at the radio. I can fairly easily set up a signal generator and hear it on the 390 without any need to attach it to the antenna input.

Non-switching MOSFET based amps are pretty cheap. I'd stick with one of them. By the time you properly filter / shield / suppress the class D amp (if you can at all), you will have spent more money than you might have saved.

A 390 starts listening (very well) not to far above the frequencies these gizmos switch at. You don't have to get to a very high harmonic to have trouble. They very much need to be square out to the 5th or 7th harmonic to keep any sort of efficiency at all. That's at say 40 or 80 V p-p. You need to get that down by 120 db or more.

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Date: Sat, 8 Feb 2014 14:33:58 -0500
From: John Wendler <wendlerjrv@gmail.com>
Subject: Re: [R-390] class-d

The real space for class-D is where high efficiency is important. One such is portable applications where battery life and overall size rule. High power, where you don't want to pay for generating heat, may be another. The R-390A

is an 80 lb space heater... Regardless of which audio amp you use. If your desire is to experiment with class-D, then by all means go for it - I don't think you will find cheaper.

Date: Sat, 8 Feb 2014 14:38:05 -0500
From: "Bernie Doran" <qedconsultants@embarqmail.com>
Subject: Re: [R-390] Class D Amplifiers

As an example of the one of the current linear amps take a look at the LM1875. cheap as dirt, $2.80 and .06 THD when feeding 8 Ohms and can be used with single or double ended power supplies. about a dozen parts. Ebay and others sell PCBs for about 5$. how does it get any better than that.

Date: Sat, 08 Feb 2014 15:19:23 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Class D Amplifiers

>for communications purposes, it should be fine. Usually they switch
>between 80 and 100 kHz and the LPF takes all of the junk out of the
>audio band.

Two problems:

(i) Yes, they switch in the neighborhood of 100 kHz, and this is above the audio band. However, by pushing the switching garbage above the audio band, you've pushed it INTO the radio's receive bands. Remember, the calibration oscillator in a 390 is simply a 100 kHz square wave generator, coupled into the RF path by a tiny (1 pF) capacitor, and you can hear its harmonics loud and clear all the way to 30 MHz. Same with the PWM output of a Class D amp, but because the PWM pulses are all different widths, the harmonics are not confined to multiples of the switching frequency -- it generates hash all over the HF bands and beyond. The shielding and output filter would need to attenuate all of that by 120 dB or so for it not to be troublesome.

(ii) The amplifier module linked by the OP has NO output filter at all, and is open frame (no shielding at all). The chip manufacturer says in the datasheet that it will not meet FCC standards without additional filtering, but the application circuit in the datasheet shows no additional filtering and the board manufacturers do not add any.

Date: Sat, 15 Mar 2014 15:32:05 -0700 (PDT)
From: John Saxon <johnbsaxon@yahoo.com>
Subject: [R-390] R-390 Non-A...have a question

Having trouble getting audio out of the local speaker connected to TB102, pin 6.

1. Discovered that pin 7 of TB102, which is shown to go to ground, has been cut. ?Just a stub coming off?the pin on the back of TB102, definitely cut.

2. Also see that three white wires (look like about 20 ga, but not sure) that come out of the harness that goes to the oven switch have been soldered together and sealed off with some shrink wrap.

These look to me like a mod (or mods) of some sort was done. Does anybody recognize these mods? I think 1. addresses my "no audio out of the speaker" problem. Not sure what 2. is, may not be anything for me to be concerned about. Any info will be greatly appreciated.

Date: Sat, 15 Mar 2014 18:54:33 -0500
From: Cecil <chacuff@cableone.net>
Subject: Re: [R-390] R-390 Non-A...have a question

I agree with your assessment of your audio problem.

The oven switch wiring I would look at more closely. Are the wires soldered together for sure...all three..or two with one not connected but heat shrunk along with the other two.

The reason I ask is because you really don't want the ovens to be used. Not necessary in our use of the radios and in fact could cause harm to the radio if the temp ran away. If all three are soldered together the ovens are probably on.

None of what you have described are published mods...or military mods that I am aware of...just sounds like someone has been in there hacking around.

Should not be too difficult to put right.

Date: Sun, 16 Mar 2014 14:58:07 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390 Non-A...have a question

You have to remember the Audio out is 600 ohms and only a 1/2 watt at best.

There is no indication in your post that you have used a 600 ohm speaker or that you are running a transformer (70 volt speaker transformer) between the output and your speaker.

How much power out are you getting.

Your AC volt meter may have a DB scale on it or you can read AC volts and convert the value to watts. you are looking for about 15 to 17 volts AC across a 600 ohm resistor (two each 1200 ohm in parallel makes a nice 1/2 or 1 watt load resistor).

You may have poor audio output. But you only get a 1/2 watt and if you are not matching the 600 ohm output to the speakers the level will be very low.

Radio shack use to have matching transformers mostly used for tapping several speakers in an area to a single PA amplifier. they come under several names and in different power ratings. As you only have a 1/2 watt to work with any 4 or 5 watt size will work. Some pair of taps on the primary and some pair of taps on the secondary will match the 600 ohms to a 4 or 8 ohm speaker or set of head phones and provide good listening level audio. If you need more than the 1/2 watt then use the line out audio into a PA amplifier and speakers.

Date: Sun, 16 Mar 2014 16:39:54 -0400
From: "KR4HV" <kr4hv@numail.org>
Subject: Re: [R-390] R-390 Non-A...have a question

John & Roger, here is a link to my file on Box.com that may help someone. It is a chart that details some parameters of common public address line to voice coil transformers. They will work well in this application. If you are an audio purist you can even buy very high quality Hi-Fi ones for high $$ vs the $4-10 ones I use. Hi! Hi!

Copy and paste in browser(a .pdf file)
https://app.box.com/files/0/f/554495476/1/f_5314152110

Both this PDF and an Excel file are on box and open to all to download if you like. Enjoy your R390A!

Date: Sun, 16 Mar 2014 17:04:07 -0400
From: "KR4HV" <kr4hv@numail.org>
Subject: Re: [R-390] R-390 Non-A...have a question

Sorry group. Smoke in the cockpit I guess! Here is the link that I believe will work. If you still have problems and want the file9s0 let me know and I'LL SEND THEM DIRECT. https://app.box.com/kr4hv

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Date: Thu, 26 Jun 2014 13:46:29 -0700
From: "Craig Heaton" <hamfish@efn.org>
Subject: [R-390] Too Loud Amelco is Dead: Long Live the Amelco

It's time to report my findings. First a little flash back to refresh memories. I believe this R-390/A followed me home sometime in February 2007. It went thru the usual recap & etc. After a good alignment or two the loud audio from either the line or local gain became obvious. Loud audio is better than no audio, thus the issue was pushed down the list of thing to do. I'd get to it???.mostly on rainy days in Oregon.

In the past several years everything has been tried many if not dozens of times. Tubes were swapped, old tubes replaced with NOS tubes from the junk box, tube voltages measured & compared with a good (to me) Motorola R-390/A, IF decks swapped, AF decks swapped, C603's swapped, another set of caps for C603, different speakers, different matching transformers between the receiver & speakers. The wiring harness was checked for shorts, opens, and grounds. Every wire between the IF going to the AF deck was checked. All the plugs/ wiring coming or going to the AF deck was checked. Even back shells of the plugs were unfastened to look for issues, nada. At this point in time I can proudly say all was tried that I could think of, or read.

The problem, cause, or whatever was on the panel; front or back of the Amelco. Both R104 & R105 were good and within spec of 20%. I had a few more in the junk box. So I picked the two with the greatest resistance and tried them, nada once more.

Art Collins please forgive me, I have sinned. R-390/A lovers, you read it here first. Both 2.5K potentiometers for R104 & R105 have been replaced with 5K audio taper pots. Life is now good. When the phone rings, just turn down the local gain. Did I treat the symptoms or find the cause. Darned if I care, it works. At the min setting on local gain, audio from the speaker is almost gone. One has to listen closely to hear the little sound coming out. At a setting of 1 to 1-1/2 the audio is comfortable. Crank the local gain up and that ? watt of audio power rocks the speaker.

73's WD8KDG Craig

PS: By the way, the 5K RV4 pots were found on a new internet surplus website. Ten bucks a pop and they have 2.5K audio taper pots for that price!

Date: Thu, 26 Jun 2014 14:13:11 -0700
From: David Wise <David_Wise@Phoenix.com>
Subject: Re: [R-390] Intermittent problem.

My R-390A's intermittent deafness some years ago was a failing mica capacitor on one of the mechanical filters. The cap was not sensitive to heat or vibration. I isolated it to one bandwidth, i.e. switch contacts, wires, caps, and the filter itself. After jiggling the wires and cleaning the switch did nothing, I replaced the caps in the hope it was not the filter. Win!

Date: Thu, 26 Jun 2014 17:44:45 -0500
From: Raymond Cote <bluegrassdakine@hotmail.com>
Subject: Re: [R-390] Too Loud Amelco is Dead: Long Live the Amelco

Was that MCM?

Date: Thu, 26 Jun 2014 18:12:43 -0700
From: Larry H <dinlarh@att.net>
Subject: Re: [R-390] Too Loud Amelco is Dead: Long Live the Amelco

Hi Craig, I just went through this same problem and part of mine was as you determined - bad audio pots. I was able to find a good original and that fixed most of my problem. <snip>

Date: Sun, 20 Jul 2014 19:44:15 +1000
From: Ken Harpur <igloo99nz@yahoo.co.nz>
Subject: [R-390] R-390A Noisy Ant. Trim and Raspy Calibrator revisited

Firstly, I am sorry it's taken me a while to respond to all your suggestions.. it's been busy here and I haven't been working on the radios until this weekend.

As far as the noisy Antenna Trim on the Teledyne I haven't made any progress on this at all. No amount of exercising the trimmer seems to be cleaning up the scratchiness...so I think the next step is to have a look inside. Something completely unrelated came up on this radio though...While reassembling the front panel I noticed the Local Audio pot had been changed to 5k. I installed a correct value NOS 2.5k and now I have the "Too loud" audio problem that Craig had. So someone in the past had tried to fix the issue with a larger value pot. I have yet to try substituting AF decks...that is something I will try next time I am in the shack. <snip>

Date: Sun, 20 Jul 2014 21:00:01 -0700
From: "Craig Heaton" <hamfish@efn.org>
Subject: Re: [R-390] R-390A Noisy Ant. Trim and Raspy Calibrator revisited

If you have time try connecting a speaker to the line output. See if the audio is loud there also. I swapped IF's, AF's, etc between a Motorola and the Amelco, always had loud audio on both Line & Local audio.

By the way, if I didn't mention it before.....The original audio pot for the local gain on the Amelco had 2.5K on the cover of the pot! But when checking

the pot with a VOM, it was a 5K audio taper pot. The guts were switched, solder connections looked original. The acceptance seals were still on the top & bottom covers, stuck to the sides of the RX. Kinda makes you wonder.

Anyway, the Too Loud Amelco has been playing nice for the last couple of weeks. I have to ask the rest of the gang here on the R-390A e-mail reflector if the mil tech schools had booby trapped receivers for students to trouble shoot?

Date: Fri, 2 Jan 2015 13:13:05 -0800
From: Dennis Wade <sacramento.cyclist@gmail.com>
Subject: Re: [R-390] Audio HUM WAS: B+ short in RF deck

An update to the audio him issue. Received replacement caps for C603 and 606 and replaced the 20 year old caps on the headers I made back when I got the receiver. Audio hum remains at previous levels. Placing a 47 mf cap across the B+ reduces the hum drastically, as before, and another 47 mf cap in parallel drops the him down to about 160 mv on a 195 volt B+ line.

Obviously, something isn't working right. I did check the DC resistance of the inductors which is within spec. Nothing obviously over-heating. I am very tempted to wire in the additional C. Short of swapping in another inductor(s), anything else I can check? The rectifiers are good.

Date: Fri, 2 Jan 2015 13:14:18 -0800
From: Dennis Wade <sacramento.cyclist@gmail.com>
Subject: Re: [R-390] Audio HUM WAS: B+ short in RF deck

That should be drops the ripple on the B+ down to 160 mv.

Date: Fri, 2 Jan 2015 16:25:41 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Audio HUM WAS: B+ short in RF deck

Does this receiver have the fuse in the B+ line? If not, can you measure the load on the B+ supply to ensure it's not more than the rated load?

Date: Fri, 2 Jan 2015 13:58:07 -0800
From: Dennis Wade <sacramento.cyclist@gmail.com>
Subject: Re: [R-390] Audio HUM WAS: B+ short in RF deck

Barry, yes...it has both fuses on the B+ line..

Date: Fri, 02 Jan 2015 17:59:10 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Audio HUM WAS: B+ short in RF deck

>An update to the audio him issue……..

When you eliminate the impossible, whatever remains, however improbable.... It sounds like C606A/B are not actually in circuit due to a bad ground, broken wires, bad socket connections, bad solder joints, or whatever. If C606A/B are each ~45uF (per the schematic), then adding another 47uF should only drop the AC hum voltage 50%. Since it drops the hum drastically, one must conclude that C606A/B are not really connected. Are you sure you didn't get the header pins mixed up when you built your plug-in caps (sometimes people get confused with pin assignments as viewed from above vs. below)?

Here's a test -- pull C606 out. Does the hum get worse, or stay the same (as measured w/ an oscilloscope at the nodes where C606A and C606B should connect)? From what you said above, I'm guessing it stays the same. If all else fails, pull C606, throw it away, and replace it with two 47uF capacitors soldered in under the chassis. (I didn't mention C603, because it isn't contributing to THIS problem. But it may have the same problem as C606.)

Date: Sun, 4 Jan 2015 21:51:05 -0800
From: Dennis Wade <sacramento.cyclist@gmail.com>
Subject: [R-390] SOLVED - Audio Hum

Well, its fixed..at least the hum problem anyway. And Charles gets the prize. His advice was to check the improbable. And sure enough, the header was miswired. The caps were never in the circuit. Am I embarrassed? That's an understatement. It is amazing what filtering can do to a power supply. :) Thank you all for the kind advice. I learned/am learning a lot.

On to the alignment. See my next note.

Date: Thu, 26 Feb 2015 13:56:20 -0500
From: Bill Abate <wabate@verizon.net>
Subject: [R-390] This may be of help to someone

<snip> Thought I was done at this point but the audio did not sound right. It passed the tests for the AF module but it just wasn't right. Playing around with various settings I discovered that turning off the noise limiter made the audio louder and better. HUH? Found no B+ getting to the noise limiter tube plates. Pulled the AF module and the switched RF-IF B+ was there but the line to the noise limiter switch was grounded. Could not find anything bad in the module so I disconnected the multiconnector plug and the ground disappeared. So it was in the wiring harness. Figured the switch on the noise limiter was bad. But it was fine. YUK! How do I find a short in the fully laced harness? Well dumb luck prevailed. When I moved the harness in a certain location, the ground disappeared. Turns out it was right next to the PTO. Now this might help someone. Somebody put an extra long screw through the frame that holds the RF assembly in place at that location. The harness is on the other side of that screw. Sure enough the screw pierced the wire insulation at that point and shorted that wire to ground! Replaced the screw with a shorter one and added some electrical tape and all is well.

Date: Sat, 4 Apr 2015 11:33:35 -0400
From: Frank Hughes <fsh396ss@gmail.com>
Subject: R-392 audio improvement=super, can R-390 audio be improved?

Some months ago C. Steinmetz kindly sent me a schematic and some notes for a FET audio circuit for the R-392, replacing the 26A7. Schematic says "S. Johnson, 6/6/91" so although I'm sure many already know all about this, it was new to me.

Used current production FET "VISHAY IRF510".

The "FET-sicle" (Note the Popsicle stick) works GREAT.

http://i180.photobucket.com/albums/x257/fish1_07/R-392/DSC00004_zpsz46tzmo0.jpg

http://i180.photobucket.com/albums/x257/fish1_07/R-392/
DSC00003_zpshjyjqe4g.jpg
http://i180.photobucket.com/albums/x257/fish1_07/R-392/
DSC00002_zps5rfsedsw.jpg

Had an old Radio Shack "Optimus" bookshelf speaker, and one of the Hammond transformers we typically use with the R-390, R-390A audio. Sounds super on the R-392 w/ audio mod.

Is there any way to obtain a similar audio improvement for the R-390?

The R-390 I use for AM operating (w/ a 32V-2) sounds like crap via the rear terminal block/Hammond transformer/Radio Shack Optimus. Connecting some JRC headphones to the front panel jack of the R-390 sounds better, so I know the good audio is in there somewhere.

Or I have messed up connections/jumpers on TB101-TB102?
http://i180.photobucket.com/albums/x257/fish1_07/R-390/
DSC00005_zpsdb6vcztn.jpg
http://i180.photobucket.com/albums/x257/fish1_07/R-390/
DSC00007_zpsnxbu1qdp.jpg

The R-390 audio circuit components appear to be the original 1951 items. So possibly it is just time to refresh some aged components?

http://i180.photobucket.com/albums/x257/fish1_07/
R-390/82b182cb-1467-4431-a5d8-87ef79073daf_zpsqy8uk2bd.png
http://i180.photobucket.com/albums/x257/fish1_07/R-390/01f1395a-ef0b-447e-b2b2-f31616fd983c_zpsgoylonyu.png
http://i180.photobucket.com/albums/x257/fish1_07/
R-390/44e6b383-713c-419d-be37-fd66651a4ad4_zpskaw0t2rf.png
http://i180.photobucket.com/albums/x257/fish1_07/
R-390/4160e6ae-7693-4cbb-b945-d197a108ce8f_zpsakrrugjm.png

Date: Sat, 04 Apr 2015 12:52:09 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] R-392 audio improvement=super

As many listees know, so-called "ugly" construction can be a high art form. Frank, you have caught the spirit of the thing so perfectly I am awed. Congratulations, sir, for the moment you are the undisputed King of Ugly!! (For those who may be suspicious, the above is absolutely not sarcasm. It is genuine admiration for excellence -- nay, genius -- in putting together something that works, and works well, from what is readily to hand.)

Date: Sat, 4 Apr 2015 13:29:40 -0400
From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] R-392 audio improvement=super, can R-390 audio be improved?

> ? Is there any way to obtain a similar audio improvement for the R-390?

Yes, there are many ways. There seem to be two methods to get *greatly* improved audio from the R-390A and one also applies to the R-390/URR (the ? non-A?).

1) The Kleronomos Audio Mod:
This mod was published by Bill Kleronomos, KD0HG. It involves rebuilding the entire audio section of the receiver with new audio tubes (6DJ8 and 6360) and output transformer. The Line Audio output tube is changed to a 6AH6. The whole thing was published in Electric Radio - see references list below.

A packet of information that details the modification was made available by Thomas Bowes, KK8M entitled "To: All R390A Audio Modification Requestees?. It appears that Tom made this packet available for $3 for a time.

2) A no holes, no solder, no modification method is to couple the audio from the diode load terminal on the rear of the radio out to any suitable “hi-fi” amplifier and speaker. A modest capacitor to block the diode load DC from the amplifier and a bit of shielded wire is all you need. One Ham Radio magazine article (Nov, 1975, Collins R390A modifications) suggests .05 uF. You can just twist the wires together and never heat up a solder iron. This bypasses all the R390 audio section and gives you as much power and fidelity as your external system has. Volume control is at the external amplifier.

Other mods have been published. Here are some:

1) Jan Skirrow's Tek Talk 4 ?Improving the R-390A Audio Response??

http://www.skirrow.org/Boatanchors/TechTalk4.pdf

2) Here is a list of references I found posted to the R-390 list by Richared MC Clung:

Date: Thu, 28 Apr 2005 19:41:14 -0700 (PDT)
From: "Richard M. MC Clung" <wa6knw@sbcglobal.net>
Subject: Re: [R-390] Re: kleronomos audio mod
To: R-390 LIST <r-390@mailman.qth.net>

OK, here's some R-390A audio related ER articles.
ER 42 OCT 1992 Real Audio for the R-390A
ER 94 FEB 1997 PG34 Real Audio for the R-390A, Revisited
ER 181 JUN 2004 PG28 Simple audio for the R-390A
ER 181 JUN 2004 PG46 Audio Circuit Design in the R-390 Receiver Family
ER 183 AUG 2004 PG7 Cheaper and Simplier Upgrades for the R-390A
ER 186 NOV 2004 PG30 AN Audio Filter Modification for the R-390A
RICH WA6KNW

...The issues were: Real Audio for the R-390a Oct 1992
Real Audio for the R-390a Revisited Feb 1997
Simple Audio for the R-390a June 2004
If you're going to do the Kleronomos mod, you should have both of the first two articles. The Simple Audio article stands alone. Dan

3) Another post to the list tells of a simple change:

From: "Tony Casorso" <canthony15@msn.com>
Date: Sat, 16 Feb 2008 19:45:25 -0700
Subject: [R-390] R-390a Audio Improvement

Hi everyone,

I just wanted to my experience with the R-390a audio out here for informational purposes. I was unhappy with the audio. I had made the audio deck cap changes that Chuck Rippel recommends to improve audio and I was still unhappy. Finally I removed the diode load link from the back of the set and connected my audio generator to the inbound side of the link. Monitoring the line out with my scope I saw that the low end rolled off about 3db between 600 and 700 Hz. This is way higher than the published audio curve. I checked all caps and resistors in the audio deck and everything was fine. Finally I decided to replace C549 at the limiter output in the IF deck with a .1uf (it was .01). The audio improvement was dramatic. The .01 cap had already been replaced by me with a brand new mylar back when I got the receiver. The low end rolls off now between 100 and 200Hz.Tony

4) The Chuck Rippel changes he suggests are to change some of the capacitors in the audio deck. (Change C604 and C605 to 0.022 or larger.)

Date: Sun, 5 Apr 2015 14:52:05 -0400
From: Frank Hughes <fsh396ss@gmail.com>
Subject: [R-390] R-390 audio, part-2

Thanks for all the tips and advice on better audio for my ancient R-390! Found "ER 181 JUN 2004 PG46 Audio Circuit Design in the R-390 Receiver Family" in the piles. This article describes how the Signal Corps requirements for audio were done, and why it is not good for the way we want to use these receivers. Also found in ER #203 "Part -2 High Performance Audio for R-390 AM
reception" by Bill Feldman, N6PY No idea which issue has Part-1! (Asking Ray....)

Thanks Brian KA9EGW for reminding me about the Diode Load circuit from Chuck! I had built and tested long ago when I was using his video training for the R-390A. (Wish there were videos for the R-390..)

http://i180.photobucket.com/albums/x257/fish1_07/R-390/chuck_r_diode_load_circuit_zpsoamfqmmv.jpg

Will try it on 75M tonight, if the thunderstorms hold off.

Date: Wed, 24 Feb 2016 22:40:46 -0800
From: "Chris Kepus" <ckepus@comcast.net>
Subject: [R-390] Lost local audio - please help

Three nights ago, I was enjoying my Collins R-390A while tuning around on 20M and 40M listening to sideband and CW stations. Last night, however, I turned on the set (same control settings as the night before) and waited for it to warm up....and waited.... but no noise came from the speaker and there was no change by increasing the local audio control. It was late and I was tired so I turned it off.

Today, I pulled the block diagram (the set has worked perfectly for many years so I've never had the pleasure of opening it up for troubleshooting) and noted that the local audio amp and line audio amp are basically in parallel. Turned on the set.. waited, but the result was the same as the night before. Then turned up the line audio....and there is audio that sounds "good" and all other functions are working normally.

The problem is located in the Local Audio amp circuitry and / or one of the tubes in this section gave it up and failed suddenly.

Are there any components in this area that have a high failure rate? All comments and suggestions welcomed. It will be awhile before I get some help to pull it out of the rack (need assistance with the weight) so I can get into it.

Date: Thu, 25 Feb 2016 08:52:03 +0000 (UTC)
From: Larry H <dinlarh@att.net>
Subject: Re: [R-390] Lost local audio - please help

Hi Chris, There's a good chance it's V603, the local output tube, a 6AK6. There's a slim chance it's V602, it's driver. The audio is pretty solid except for a couple caps in the common section. Try swapping V603 and V604. I hope that's it as your next step would be to measure the resistance of the output transformer - it's easy to start with pin 6 on tb 102 to gnd.

Date: Tue, 8 Mar 2016 08:52:21 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: [R-390] Audio Gain Pots?

I don't know if the audio pots in the R390A are linear (I think they'd be audio taper?); however, if they're linear, here are some inexpensive replacements. Not sure if these are as high a quality as the originals but just throwing this out in case someone's looking: http://www.goldmine-elec-products.com/prodinfo.asp?number=G20638A&mc_cid=863e7e4ed8&mc_eid=fed8d67263

Date: Tue, 8 Mar 2016 07:59:02 -0800
From: "Craig" <hamfish@comcast.net>
Subject: Re: [R-390] Audio Gain Pots?

The line & local pots are both audio taper.

Date: Tue, 08 Mar 2016 11:26:27 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Audio Gain Pots?

>The line & local pots are both audio taper.

And you definitely do *not* want to replace them with linear pots, or you will be the next one asking why the audio is screaming loud even with the pot turned way down.

Date: Tue, 8 Mar 2016 11:55:50 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] Audio Gain Pots?

Sorry to rain on the parade, but I just checked the pots I kept from two R390A Moto "junk" units, and 2 are audio taper, the 2 others are linear. Could it be that the Local Audio ones are audio taper and the line output ones linear ? The linear ones have CTS P/N 318K146 and the audio taper ones have 380 0588 009. I have to check what's in my Motorola '56 now....

Date: Tue, 8 Mar 2016 09:20:14 -0800
From: "Craig" <hamfish@comcast.net>

Subject: Re: [R-390] Audio Gain Pots?

Looking at the parts list in the Y2K R3; both R104 & R105 are 2.5K pots 2500 ohm, 20%, 2 W, JAN type RV4ATSA252D. In my Motorola, both are 2.5K audio taper and the receivers works as advertised.

Now the "Too Loud Amelco" is a different animal for whatever reason (still unknown). It appeared to be quite untouched/virgin upon my purchase. But it had a 5K audio taper pot for the local gain & a 2.5K audio taper pot for the line gain. To add more mystery the local gain pot which measured 5K was/is audio taper; the case CTS was marked 2.5K!!!!!

Standing 20 feet outside the radio shack with the local gain at zero, QSO's could be heard very easily. Go figure? Swapped audio decks, IF deck's between Motorola & Amelco and I still had a "Too Loud Amelco". Checked wiring cables, etc for shorts, grounds, opens and all were to the wiring diagram.

Used my "A" to "B" logic modifier (short piece of wire with alligator clips) to make sure grounds were in fact grounded, Amelco was still too loud.

In short; is was just easier to install 5K audio taper pots for both line & local gain. The "Too Loud Amelco" now works as advertised. Gave up on the cure and treated the symptoms.

Date: Tue, 08 Mar 2016 12:21:30 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Audio Gain Pots?

>Sorry to rain on the parade, but I just checked the pots I kept from two >R390A Moto "junk" units, and 2 are audio taper, the 2 others are linear.

By design, the line and local pots are both audio taper. If you find a radio with one or both linear pots, it usually means those pots have been replaced somewhere along the way by someone who didn't know the difference. I have seen some radios with linear pots that looked like they might be original, leading me to speculate that a batch of linear pots snuck through into production from time to time. Or perhaps Motorola mistakenly made all of their radios with one linear pot??

In any case, both pots *should* be audio taper, and if you replace a pot you should use audio taper even if the pot you remove is linear.

Date: Tue, 8 Mar 2016 12:01:23 -0600
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] Audio Gain Pots?

I have NOS originals in stock if anyone is looking ... Tom / N3LLL

Date: Tue, 8 Mar 2016 14:07:52 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] Audio Gain Pots?

Thanks Charles, I will check what is in my R-390s ASAP. To Greg: just to remind you that the pots are a part of the V601B bias system, so changing the value of those (for two 5K, in your case) will change the tube operating conditions.,

despite this can be made to work as designed by using a 2.5K (2k49) resistor in parallel. I also believe that any audio taper pot (say 10K ones) can be fitted there this way. However, too high pot value can lead to high frequency loss due to the cabling, but this can be checked.

Date: Tue, 8 Mar 2016 12:04:57 -0800
From: "Craig" <hamfish@comcast.net>
Subject: [R-390] R104 R105 Local & Line Pots

Those audio taper pots aren't that hard to find. When I arrived at the point of trouble shooting the audio of the "Too Loud Amelco", flea-bay was offering pots for $35 or more plus shipping, etc. I had in the past purchased a grab-bag containing a dozen or more CTS 2.5K audio taper pots, switches, brackets, etc all for a few bucks. The pots were so-so but useable.

Here is one source of new Allen Bradley..Clarostat R4V pots R4VNAYSD252C log taper, should work? http://www.tedss.com/Potentiometers/Browse/rv4-rv4naysd-series?pageNumber=8

Ten bucks ain't bad if they fit the bill.

Date: Tue, 8 Mar 2016 15:16:13 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R104 R105 Local & Line Pots

I've bought from eBay seller K5SVC. He usually has good variety of things like this; however, I don't see a 2.5K audio taper at the moment.

Date: Tue, 8 Mar 2016 12:57:04 -0800
From: David Wise <David_Wise@Phoenix.com>
Subject: Re: [R-390] R104 R105 Local & Line Pots

Mark Oppat at "Playthings Of The Past" (www.oldradioparts.com) has zillions of pots.

Date: Thu, 17 Mar 2016 14:53:02 +1100
From: Pete Williams <jupete@internode.on.net>
Subject: [R-390] LINE /AUDIO POTS

Gary Schneider from 'Playthings Of the Past... have just told me that 2.5k pots only available in linear taper.

Date: Thu, 17 Mar 2016 05:29:59 +0000 (UTC)
From: Steve Toth <stoth47@yahoo.com>
Subject: Re: [R-390] LINE /AUDIO POTS

If you need log pot response from a linear pot, one method that works is connecting a resistor that's 20% of the value of the linear pot between the ground end solder lug and the center variable contact solder lug.

Date: Thu, 17 Mar 2016 07:44:12 +0000 (UTC)
From: Norman Ryan <nnryann@yahoo.com>
Subject: Re: [R-390] LINE /AUDIO POTS
Message-ID:

Great suggestion, Steve. So, with a 2.5k linear pot I just connect a 500 ohm

(20% of 2.5k) resistor as you describe -- or should the resistances of pot and resistor be proportionally higher so they add up to 2.5k?

Date: Thu, 17 Mar 2016 05:37:13 -0700
From: "Craig" <hamfish@comcast.net>
Subject: Re: [R-390] LINE /AUDIO POTS

Posted this info a short time back, http://www.tedss.com/Potentiometers/Browse/rv4-rv4naysd-series?resistance=2500.0&power=2.000&taper=logarithmic

This pots are available, just have to search. $10 US dollaretts.

Date: Thu, 17 Mar 2016 10:01:00 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] LINE /AUDIO POTS

Despite the trick presented by Steve works practically to "imitate" a log potentiometer from a linear one, it cannot be used on R-390/390A because the end to end value of both local and line potentiometers are a part of the follower tube bias system. So using a linear pot with the ~500 ohms resistor will change the bias of the tube with the sliders positions, except when both potentiometers are at zero, which is not very practical, listening wise...
Bottom line, log law potentiometers are needed there. The only other "trick" that will work is to use a higher value LOG potentiometer replacement with a fixed resistor in parallel to make the 2,5K value end to end. Example: you find a 5K LOG pot so you put a 5k (4K99) resistor in parallel to obtain 2.5K end-to-end and all will work OK.

BTW: who on this thread was complaining about potentiometers found in a R-390A that measured 5K LOG but were stamped 2500 on the cover ???
I just found two of those "anomalies" in my R-390 parts bin....

Date: Thu, 17 Mar 2016 07:37:27 -0700
From: "Craig" <hamfish@comcast.net>
Subject: Re: [R-390] LINE /AUDIO POTS

BTW: I'm guilty (not complaining) of noticing the difference between stated values vs measured values of the Line & Local gain pots. Yes, my "Too Loud Amelco" had that issue, sort of? 5K log for the Local gain pot & a 2.5K log pot for the Line gain. (going by memory, didn't write down notes)

Looking at the wiring & solder joins (condition & visual) it had to be from the factory. Or so it seems. The Amelco didn't have a scratch on the green head screws, original tubes, BBOD's, etc.

I've posted many replies here on the R-390 e-mail reflector.

#1: The belief here, there is a reason for those pots.
#2: How many others have measured what is in their R-390/A?

After several years of fooling around with it, (it ain't in the AF deck, ain't in the IF deck) I think the difference is somewhere in the wiring harness. Damned if I can find it. With 2.5K audio (log) pots in both the Line & Local locations, the volume is just fine 20 feet outside of the radio shack with the local gain at zero.

When the telephonium rings, I'd like to turn down the volume, not the RF gain. At this point in my life, lifting 75lbs of radio is getting old and 5K log pots work.

Date: Thu, 17 Mar 2016 14:49:54 +0000 (UTC)
From: Steve Toth <stoth47@yahoo.com>
Subject: Re: [R-390] LINE /AUDIO POTS
Message-ID:

You got it - the resistor should be 20% of the pot value - 500 ohm. Try a 470 or a 620, maybe even a 1k. From what I understand the effect of a higher proportional value is a flattening of the log curve.

Date: Thu, 17 Mar 2016 15:02:29 GMT
From: "fengjs@juno.com" <fengjs@juno.com>
Subject: Re: [R-390] LINE /AUDIO POTS

It seems to me that a well-placed capacitor could give the pseudo-log taper without upsetting the bias point.

Date: Thu, 17 Mar 2016 13:53:14 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] LINE /AUDIO POTS

I'm sorry but.... not sure of that !

Date: Thu, 17 Mar 2016 15:51:27 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: [R-390] RF GAIN pot ?

Is it possible that the RF GAIN pot (listed as a 5K) is a reverse log one? The one I have in my parts bin (came from a Moto 14-PH-56) measures 10k, despite it is identified as a 5K on the cover: 318K147 5K CTS650 and when the shaft is dead center, I got 8K between CCW contact and center, 2K between CW contact and center. Looks like a reverse log, right ?

Date: Thu, 17 Mar 2016 22:16:49 GMT
From: "fengjs@juno.com" <fengjs@juno.com>
Subject: Re: [R-390] LINE /AUDIO POTS

I thought it would be a simple exercise for the reader. Here is how I would do it: connect a 100uF/16V in series with the 510 and put this between the wiper and ground. You can connect C604/C607 either directly to the wiper (for a little LF boost) or to the junction between the R and the C (for a little more LF rolloff). If you use an electrolytic, the polarity is left as an exercise for the student. This capacitor value gives a LF corner about 10X lower than the one from C607/ R620.

From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] RF GAIN pot ?

Craig, RF GAIN I'm speaking about now...For your question: no, not really. A reverse log pot wired in reverse (as you suggest) will have the minimum volume at 10 and the maximum at 0. But at least the progression will be "normal" for a volume control. Good for the other side ?? 73 ! VE2JFE

-----Message d'origine-----

AND THE PLOT THICKENS

To Jacques & All, The 14-PH-56 rings a bell, got one of those also! It appears to be normal.....has CTS line & local pots 2.5K audio (log) taper. The Motorola supplied AF, IF decks, etc., while trying to make the "Too Loud Amelco" normal. The parts list, Y2K R3, calls for a RV4ATSA252D pot which is a normal log taper 2.5K 20% tolerance. Question: Ok, if it is reverse taper.....reverse the wires connecting to the ends of the pot and zero would be less (no) audio & ten would be loud audio????? Craig,

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Date: Thu, 17 Mar 2016 20:08:22 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] LINE /AUDIO POTS

I do not believe it is a good solution to fix the DC operating point problem by creating another one in the AC domain...Calculate what the stage gain will become when the pot will be set at 10....or both pots, as we are there... if you do not see the problem, too bad ! Personally, I believe that the best is to leave the design as it is.

Date: Thu, 17 Mar 2016 22:26:43 -0700
From: "Craig" <hamfish@comcast.net>
Subject: Re: [R-390] RF GAIN pot ?

Yes, I have audio pot on the brain! My mistake. So digging into the junk box..... found a CTS 5K pot from an R-390/A. It still has the jumper between lugs 2 & 3. Must be a RF gain pot. Removing the jumper and measuring shows this pot is a 5K ohm audio (log) reverse taper, I think?

Putting us on the same page. With the shaft facing me and turning the shaft fully counterclockwise lug #3 per the schematic is the counterclockwise lug (least resistance from wiper). End to end the pot measures about 4.63K ohms. Counterclockwise lug to the wiper with the shaft half rotation, is about 3.48K ohms.

I Googled the part number ((71450) type SW1376)) for the RF gain pot and got nowhere as to its specs. Hope this helps and makes sense.

Date: Fri, 18 Mar 2016 10:35:45 -0400
From: SHELLY199@aol.com
Subject: Re: [R-390] R-390 Digest, Vol 143, Issue 9

Many moons ago I had some strange things going on with some R390a pots. Measuring the resistance at various rotational positions made no sense nor did the end to end values. I took a 2.5k audio pot apart and found the carbon restive element was severely worn away from friction with the wiper contact. The wiper showed little signs of wear. My conclusion was the pots are shot. There's no log, linear or audio taper at this point in time as the element is shot from use. Also, measured the noise limiter pot and found the same thing. The spec. resistance is 0.5 MΩ ohms and found those pots typically anywhere from 2 to 11 MΩ. Gary, at Fair Radio was going to sell me a limiter pot and I asked him to check the resistance's of his stock. He finally found one out about ten that I would buy. Most were above 5 megs. Mt two cents worth. Your mileage may vary.

Date: Fri, 18 Mar 2016 10:55:01 -0400

From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] RF GAIN pot ?

So I am not crazy: the original RF GAIN pot on the R-390A is a REVERSE LOG one ! Meaning that it have less resistance variation at the end of the shaft rotation than at the beginning. So the reverse that the AF GAIN / LINE GAIN controls does. I never figured this before... CTS SW1376 also leads to NATO P/N 5905-01-148-3835, but even searching for this one does not provide more clues about the track taper. And the R-390 part is the same, btw, in the October 1953 Collins manual (first manual printed for the R-390, order 14214-P-51) on page 199. Wondering why it is that... to facilitate the squelch adjustment ? You know, the Squelch option (relay operated) that was never fitted in production for the 390A but being there in the 390. If someone can otherwise explain why a reverse-log pot was fitted there, please do !

Date: Fri, 18 Mar 2016 08:01:23 -0700
From: "Craig" <hamfish@comcast.net>
Subject: Re: [R-390] R-390 Digest, Vol 143, Issue 9

Agreed! This is why some of us are questioning as to what is under the hood. The parts list states one thing, I've found something else that appears to have been there since day one. The RF gain pot: I spent a little time searching the web using the description stated in the parts list & the data on the RF gain pot from my junk box. I drew a blank, nothing to write home to mama. Add to that wear & tear of an old receiver, things get interesting. Hope others don't mind, but I'm learning more about radio.

Date: Fri, 18 Mar 2016 10:03:46 -0700
From: David Wise <David_Wise@Phoenix.com>
Subject: Re: [R-390] RF GAIN pot ?

Reverse Log is the usual taper for a gain control that is wired as a cathode resistor. The taper cancels the tubes' bias-vs-gain curve, leaving you with a linear control action. It's reverse rather than forward because minimum resistance is maximum gain. You want resistance that changes rapidly at first, then slower and slower as it approaches zero - ideally, a constant percentage change per degree of rotation.

Any volume control that is wired as a voltage divider in the audio signal path should be audio taper. The taper cancels the human ear's logarithmic SPL-vs-perceived-loudness curve, leaving you with a linear control action. You want a divider ratio that increases slowly at first, then more and more rapidly as the ear compresses.

Date: Sat, 19 Mar 2016 00:25:55 +0000 (UTC)
From: Larry H <dinlarh@att.net>
Subject: Re: [R-390] LINE /AUDIO POTS

Hi all, I just measured these 2 in the 1960 Stewart Warner on my bench. They are both 2.5K audio taper.

Date: Fri, 18 Mar 2016 23:11:44 -0400
From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] RF GAIN pot ?

I have here (only) a beat up front panel from Motorola Contract 14-PH-56, and

measured the pots: Resistance numbers are at these knob dial positions 0 to 10, from the “0” terminal to the wiper:

0 2-1/2 5 7-1/2 10

RF Gain CTS Type 320 320 4PJ 565 5 k
0 2.5k 4.4 K (open open)*

Local Gain 318K146 CTS722 2500 ohms (Measured 6.4 k)
0 0.4k 0.8 k 3 k 6.4 k

Line Gain 318K146 CT 722 2500 ohms (measured 4.9 k)
0 0.2 k 0.5 k 3 K 5K

Limiter 318A145 500 K CTS717 (measured 470 k)
0 50 k 220 k 400 k 470 k

*I have to wonder if the whole radio was scrapped because the RF gain pot was open on one end! For reference, I measured an unused Ohmite type AB No. CU-1041 pot 0.1 megohm (measured 113K) (similar to the Allen Bradley Type J pots) This seems to be a linear pot.

0 30 k 60 k 90 k 113 k

Can anyone point to online graphs of pot tapers? I have seen graphs, but it might have been back when we had only paper.

Date: Fri, 18 Mar 2016 23:15:19 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] LINE /AUDIO POTS

>If you need log pot response from a linear pot one method that works is
>connecting a resistor that's 20% of the value of the linear pot between the
>ground end solder lug and the center variable contact solder lug.

Jacques responded:

>Despite the trick presented by Steve works practically to "imitate" a log
>potentiometer from a linear one, it cannot be used on R-390/390A because
>the end to end value of both local and line potentiometers are a part of the
>follower tube bias system.

The potential problem Jacques is alluding to is that when you add a low resistance (let's say, equal to or less than the end-to-end resistance of the pot) from the wiper to the CCW terminal, the total resistance from the CW terminal to the CCW terminal now changes quite a lot depending on where the pot is set. (Whereas, when the load on the wiper is just a grid resistor -- much larger than the end-to-end resistance of the pot -- the total resistance from the CW terminal to the CCW terminal remains very close to the pot's own end-to-end resistance, regardless of rotation.) For some hard numbers, two, 2.5k linear pots, each with a 500 ohm resistor from wiper to CCW (20% of the pot value), would present a load to the driving circuit of only ~208 ohms *if both pots were turned fully up*. (Of course, almost never would both pots be turned fully CW on an R390A. In practice, the load on the driving circuit would likely be no lower
than 1k or so.)

This same issue arises if one substitutes audio-taper pots with values other than 2.5k for R104 and/or R105. In this case, the load on the driving circuit would simply be the value of the two end-to-end resistances in parallel, and would not change significantly with pot rotation.

So -- what is the reality of changing the value of R104 and/or R105? I simulated the V601B circuit (please refer to the schematic below) to demonstrate the effect of various potentiometer values.

R607, R608, and R627 make V601B operate as an approximation of a current source with respect to its DC bias conditions (recall that cathode-biased triodes make pretty bad current sources). This means that R104 and R105 (the Line and Local Audio potentiometers) have relatively little effect on the bias of V601B.

The V601B plate voltage is approximately 200v. With R104 and R105 = 2.5k (net potentiometer resistance = 1.25k), the cathode voltage is ~ 10.5v. Increasing R104 and R105 to 10k each (net potentiometer resistance = 5k), the cathode voltage is ~ 17.7v. And decreasing R104 and R105 to 1k each (net potentiometer resistance = 500 ohms), the cathode voltage is ~ 8.6v. In all cases, V601B has from 180v to 195v of voltage headroom, and has plenty of operating current to drive the output amplifier grids. All of the coupling capacitors (C602, C604, and C607) are in high-impedance grid circuits, so the low frequency corner does not change.

For all practical purposes, changing R104 and R105 from 1k to 10k has no effect on the bias conditions of V601B.

There is one difference when you change the values of R104 and R105. The combined (net) load of R104 and R105 forms a voltage divider with cathode resistor R627 at audio frequencies as well as at DC. With R104 and R105 = 10k, the pots have about 5dB more audio voltage on them than with R104 and R105 = 2.5k, so you would need to use a slightly lower setting of the controls to get the same audio level. Conversely, with R104 and R105 = 1k, the pots have about 5dB less audio voltage on them than with R104 and R105 = 2.5k, so you would need to use a slightly higher setting of the controls to get the same audio level.

Note that the effect mentioned in the first paragraph above -- the load on the driving circuit changing with pot rotation if one uses a low-value resistor from wiper to CCW of a linear pot -- makes that trick work even *less* well than normal in the V601B circuit. As the pot rotation increases, just when you want the audio voltage on the wiper of the pot to start increasing faster and faster, the attenuation due to the reduced value of the pot load causes the audio voltage on the pot to *decrease* faster and faster.

All of that said, I'm astounded at the amount of effort people on this list devote to finding hacks to cobble up their radios in one butchery after another. Jeez, people, JUST GET THE RIGHT PART !! This whole discussion will have some meaning in a distant future when there are no longer ANY audio taper pots available, anywhere. But when that time arrives, I suspect that boatanchor radios will have long ago ceased to be useful for anything at all.

Date: Fri, 18 Mar 2016 21:16:50 -0700
From: "Craig" <hamfish@comcast.net>

Subject: Re: [R-390] RF GAIN pot ?

Thanks for chiming in. Here is one web site that has some graphs of those curves. Scroll down to the bottom of the page.

http://www.geofex.com/article_folders/potsecrets/potscret.htm

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Date: Fri, 18 Mar 2016 21:22:23 -0700
From: "Craig" <hamfish@comcast.net>
Subject: Re: [R-390] LINE /AUDIO POTS

Most excellent dissertation. Most of the time I do agree to use the correct part. Trust me on this Charles: If'en I ever find the issue/fix the "Too Loud Amelco", I still have a bag of 2.5K audio/log taper pots for R104 & R105.

Date: Sat, 19 Mar 2016 04:45:11 +0000 (UTC)
From: Larry H <dinlarh@att.net>
Subject: [R-390] Too loud Amelco

Hi Craig, I've worked on a couple A's that were too loud - 1 was the agc system and 1 was the local gain pot not going close enough 0 ohms when set to 0. Other possibilities are the audio gain is too high - maybe neg feedback R602 is in-op.

Date: Sat, 19 Mar 2016 08:45:13 -0700
From: "Craig" <hamfish@comcast.net>
Subject: Re: [R-390] Too loud Amelco

Let’s see if this can be wrapped up quickly. In any manufacturing process there are rejects. Some pieces are not up to snuff. At times I’m believing a person gathered all the rejects that were not going to be reworked, put them all together for a complete R-390/A????. Too Loud Amelco?.

Once again trust me: The help and suggestions here on this e-mail reflector are greatly appreciated, tried them all several times. In doing so, faults have been found. In some of the RF transformers, components were touching the metal can, think it was Z503 (IF area) a strand of Litz wire was touching the metal can, just about every resistor in the AF deck was way out of spec, the Local gain pot was marked 2.5K (inside was a 5K audio taper). All this and more besides the usual BBOD?s, etc.

The AGC system, been there done that t-shirt is in the closet????all caps replaced on the agc line. Local gain pot was a real eye opener????? R602?????..out of spec????replaced with every resistor in the AF deck (AF deck was a real piece of junk). Swapping decks between other R-390/A’s: The decks from the Amelco now work as advertised in other R-390/A’s. Moving decks, parts & pieces from other R-390/A?s to the Amelco.audio was loud until R104 & R105 were replaced with 5K audio taper pots.

All fingers point to wiring harness. I?ve searched for opens, grounds, shorts, etc., and don’t feel like dissecting the wiring harness.

At this time with 5K audio taper pots for R104 & R105, life is good. Signal/Noise ratio is near, at, or slightly above 20dB on all bands last time checked. Might add, it can hear every plasma TV in the neighborhood!

Not wanting to discuss all of life?s issues, there is a doctor in town that wishesI don’t lift over 25lbs. There is theory and there is real life. Sort of jokingly, Charles pointed out use the correct right parts. I can’t find any new BBOD?s. Guilty for using orange drops, hope it isn’t a felony. In the end, my kids will look at the “man cave” upon my demise. Chances are the old man’s junk will end up in the land fill. After all the kids have smartphones.

Date: Sat, 19 Mar 2016 13:22:26 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Too loud Amelco

>Sort of jokingly, Charles pointed out use the correct right part
>can't find any new BBOD's. Guilty for using orange drops

The correct part is not necessarily the part originally used by the manufacturer. That was true when these things were built, and it is more than ever true now, after decades of technological advances.

Date: Mon, 11 Apr 2016 06:58:38 -0400
From: "billriches" <bill.riches@verizon.net>
Subject: [R-390] Pot source

Good supply of boat anchor parts
Stewart-MacDonald News StewMac : The Place for Pots! 5:43 AM
48 KB

Date: Mon, 10 Oct 2016 09:26:17 -0700
From: Wayne Heil <wjheil@gmail.com>
Subject: [R-390] R-390a audio hum

My R390A has a developed a horrible hum in audio output. Could this be a short cathode to filament short Any suggestions

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Date: Mon, 10 Oct 2016 12:44:00 -0400
From: Guido Santacana <gsantacanav@gmail.com>
Subject: Re: [R-390] R-390a audio hum

Check the tantalum cap and multisection electrolytics in the audio deck.
The problem may be probably in one of these if they are the originals.

Date: Fri, 24 Mar 2017 20:24:26 +0000 (UTC)
From: Larry H <dinlarh@att.net>
Subject: Re: [R-390] R390-A

Hi Gerd, Australia, Austria, what's the difference? Hi, Hi. I hope you get it soon. As to no local audio, did you resistance check the output terminals on the back and the speaker you are hooking it up to? You should get about 50 ohms on the 390A terminals. If it's quite high, check the big P120 connector contacts on the audio deck. If it's shorted, the problem might be in the connector. The problem is localized to a very small area, V602 and V603. You might try swapping V603 and V604 or V602 and V601.

Date: Fri, 24 Mar 2017 23:46:19 +0000 (UTC)
From: Larry H <dinlarh@att.net>
Subject: Re: [R-390] R390-A local audio

Hi Gerd, I forgot to mention, If the V602A or V603 are shorted or damaged, you probably should not use them until you check them out. Let us know how you're doing.

Date: Sat, 8 Apr 2017 00:51:49 +0000 (UTC)
From: Larry H <dinlarh@att.net>
Subject: [R-390] R-390A audio enhancements, tone control and hi-fi

I've been an audio nut for about 55 years now. My first high end equipment was a pair of Acoustic Research AR-3 speakers I purchased in 1964, which I'm still using today. They're awesome, but then I like clear clean bass. Of course one must also have a good amp to go with them. That was in late 1968, a good friend sold me his McIntosh MA-230 amp. I use these today with my R-390A and for other stereo repairs I do. I had no idea the 390A was capable of such good sound. About 4 months ago a station in my area started broadcasting hi-fi music on the bcb. I stumbled across it in my car and it really sounded good. So I hooked up my 390A 'diode load' to my stereo (as I read here to do) and WOW, it sounded great. But, the highs were a little too high and the lows a little too low.

I got my first R-390A in late 1986 and knew what a great receiver it was (I serviced them in 1961 to 1963). However, after using it for a few months, I realized that the audio had a large drawback - some stations I'd listen to had way too much base and there was no easy way to compensate for it without using external audio. Some had so much that it was hard to understand. After considerable thought, in July 1987 I decided to detach the 800 cps filter and insert an R/C network that would just substantially reduce bass. That was a big help, but in July 1998 I decided that was not enough and decided to replace the 2 position 'sharp / wide' switch with a 5 position 2 pole. I found a thin one that would fit and implemented 5 different audio compensations for various levels of bass and treble. The emphasized treble was used mainly with the 2 kc and 4 kc bandwidths, and the base reduction on 8 kc and 16 kc. This made an immense improvement in voice intelligibility. I thought about using a rheostat tone control in its place, but that would not give me the control over the bass and treble at the same time that I was looking for.

Until four months ago I had no interest in listening to music with my R-390A. Then that station came on the air and I thought it would be nice to have another music station I liked to listen to in my shop. When I hooked it up to the diode load, I noticed 2 things, the audio level was too high and the highs were too high and lows too low. I decided to change my existing compensation network to make position 5 (wide) hi-fi and feed my stereo from the wiper on the line gain pot. I ran the audio coax with an RCA jack on it out an existing hole in the back and let it dangle. This provides the correct signal level to feed most stereos and I like using the volume control on the R-390A. Of course you know one more change was required to make it good - fix the lack of bass in the R-390A audio amp due to the coupling cap values. That was an easy fix. I increased the value of the 5 caps (C602, 4, 5, 7 and 8) to provide good bass (up to the output transformer).? Thank you Chuck Rippel for that info. The quality of the signal coming out of the line gain pot is now quite good. It's better than the AM tuner I have that is designed for hi-fi. Here's a link to the schematic changes I made:

https://s11.postimg.org/p3nw644fn/R390_A-_Aud_Mod6s.jpg

Since both audio 6AK6 output amps are seriously lacking in 2 areas (low fidelity output transformer and single ended design), I decided it was not worth it to me to pursue any farther improvements there. No matter what I did it would not come close to using my stereo. Even so, the audio is improved when I use my local speaker or phones. I'm very pleased with the results I have now.

Date: Fri, 9 Jun 2017 10:47:02 -0400
From: Roy Morgan <k1lky68@gmail.com>
Subject: [R-390] Mouser 600 Ohm to 8 Ohm transformer

(Subject changed from original thread.)

On Aug 4, 2014, at 4:35 PM, Richard Wojnar via R-390 <r-390@mailman.qth.net> wrote:

> On a separate note, has anyone tried the Mouser 600 Ohm to 8 Ohm transformer? I just required a very nice rebuilt R-390 from K1QAR and am getting ready to set it up.

Gary, I am not familiar with that particular transformer, but others of the sort, including line to voice coil transformers, all work well. Hammond makes the best one commonly available. Radio Shack and other sources also have ones likely to perform just as well for our uses, though with lesser actual specifications and performance. An ebay search with ?line matching transformer? brings many choices.

One reason these work well is that *most* such transformers are rated at 5 watts and up. The power output from your R-390x is on the order of half a watt max. So any such transformer will be loafing and not ever get near it?s power limit. Further, the line to voice coil transformers are meant to handle a moderately wide audio bandwidth. The R-390x actual bandwidth is quite a bit less by comparison.

Line transformers often show input (line) windings by power to be delivered to the speaker. Conversion from the normal 70 volt line voltage yields useful impedances. The 10 watt tap for 70 volt units (and the 1-watt tap for the less common 25 volt units) give nearly 600 ohms impedance (500 and 625 ohms respectively).

Note that an audio amplifier transformer from ages ago that has multiple output taps may have a 600 ohm tap along with a variety of voice coil taps. Used as an auto transformer with the primary open, these will do the job very well indeed.

I attempt to attach a page from the informative document:
https://adn.harmanpro.com/site.../Guide_to_constant_Voltage_systems_original.pdf
(The mail system may not forward it - I?m glad to send it to anyone in that case.)
Happy audio matching to all.

Date: Sat, 21 Oct 2017 16:53:09 -0700
From: "mparkinson" <mparkinson1@socal.rr.com>
Subject: [R-390] 4 R 390a with same issue

Strange I have checked the wiring and controls compared to a known working R 390a receiver still have this weird issue. The line level output control is turning the Local audio up and down. Now the strange part the Local audio control is adjusting the line output on the line level meter.
This should be straight forward trouble shooting Right.? This is the 4th receiver I have come across having the same issue audio deck has been swapped out no change the wiring harness looks ok compare to another known working radio. This one has me stumped for now.
Anyone with some good Ideas ? At first I thought is was some Military type mod maybe for the Navy on board ship deal.

Date: Sun, 22 Oct 2017 04:14:46 +0000 (UTC)
From: Larry H <dinlarh@att.net>

Subject: Re: [R-390] 4 R 390a with same issue - audio control swapped

Matt, You have a good one. Since you have swapped out the audio deck with a good one and the wiring harness looks good, the coax wires in the P120 plug have probably been swapped. They go to pins 1 and 3. This is not a mod I have heard of. Do you know if it every worked correctly

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Date: Sun, 22 Oct 2017 06:52:40 -0700
From: "Craig" <hamfish@comcast.net>
Subject: Re: [R-390] 4 R 390a with same issue

Those nasty R-390/A's! What will they do next? Anyway, I have the original, "Too Loud Amelco", and have treated some symptoms but not found the cure. Its audio issue could only be fixed by using 5K pots in both the line & local gain values.

So to your challenge. Do the already mentioned suggestions in previous threads. Check those carbon resistors, replace the electrolytic caps in the audio deck, recheck the wiring harness for correct pin outs, shorts, opens, & grounds for the umpteenth time. And so on.....

A month or two ago the "Too Loud Amelco" cried for more attention. Local & Line gain controls were affecting each other. Problems went away after replacing both of the 5814A tubes in the audio deck. My tube tester said good, but it only checks one triode section at a time. The tester would have to test both triodes at the same time in order to see how the sections affect each other. Hope you get it fixed.

Date: Mon, 23 Oct 2017 11:27:59 -0400
From: <wb3fau55@neo.rr.com>
Subject: [R-390] 390A audio

Matt, sure does seem impossible that the audio line/local would be crossed up in 4 mainframes? One may ask- are they all from the same contract? or did they all come from the same repair center and modified? or wired wrong from the start, and never corrected? Who is the builder? One thing for sure, enough hands get involved [repair centers], and you can get some very interesting incorrect repairs. I have asked before, how many spare modules were contracted? Russ.

Date: Fri, 12 Jan 2018 00:02:56 +0000 (UTC)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] Better BA sound

There are several ways to get much better sound fro the "A" and SP600.
If you D/L the SP600 anthology from the Hammarlund site the is a mod by Chuck Rippel. The "A" has few different chocies (it depends, as Bob would say) from audio chassis mods to full blown audio mod rebuilding. The simplest chassis mod is by Chuck Felton, found in the Y2KR3. It basically does some part changes

A more comles mod is the Kleronomous mod. This is a very clever mod using compoent changes and a dual tetrode tube in the output in a P-P circuit.

The las choice is one that I started on but never completed. It takes the thee chokes off of the audio module as well as the filter caps. The chokes are replaced with ones from Triode Electronics that easily mount behind the power transformer. Also the OEM caps are replaced by 390uF caps by the new chokes. Basically, this allows to 6AQ5's to be installed in place of the filter caps in a triode P-P circuit using a 8W Hammond

transformer (150 cps to 15K cps) at 1 db points. There is more to it and I have an uncopleted article that can walk a competent tech through the whole process. Please send me an ORIGINAL email if you want me to send the data for this. The two chokes and output transformer will set you back about $75.

Another experimental circuit uses one the National Semi LM series of audio chips.? They are cheap but one has to careful of how much current you pull from the 26 volt line. A SS audio output was listed on epay a while back. IIRC it was $225.

Now last but not least is getting an audio output module from China. Bang good is one supplier although it seems a whole bunch of sellers buy from the same factory. How good are they Don't know but they are so cheap it's not much of a loss if it doesn't work. Caveat: derate power output ratings by 4.

Date: Sat, 13 Jan 2018 12:58:51 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Better BA sound - CORRECTED line level tap schematic

I got my nanos and picos scrambled when I transcribed the schematic I posted for the Diode Load line-level audio tap. The shunt capacitor (C1) should be 10 NANOfarads (0.01uF), NOT 10 PICOfarads as I had drawn it. While I was at it, I made a few other clarifying edits. With 10nF, any residual 455kHz IF component is attenuated by ~60dB to prevent it causing any mischief in the external audio chain. IF harmonics are attenuated even more. As noted, the value of R1 is not at all critical -- anything from 10k to 100k should work fine. I tend to favor lower values because they reduce the susceptibility to noise (both thermal and induced).
