R-390 Reflector October ‘04 Edited

From drewmaster813 at hotmail.com Mon Oct 4 17:01:54 2004
Subject: [R-390] On 3TF7's...

Bob Camp wrote:

>The main issue with the 3TF7 is that is is designed to regulate around >a line voltage of about 108 VAC. With 122 VAC line power you are >getting close to the "unregulated" end of the 3TF7's range.

The 3TF7's voltage range is 8.6 to 16.6 volts; at 122 VAC line the 3TF7 would see about 16v. One could insert resistance in series with the 3TF7 to reduce voltage and lengthen that tube's life.

With 13 ohms in series the 3TF7 would see about 12v at 122 VAC line. If the line were to then drop to 110v the 3TF7 would see 8.6v; at any lower line voltage it would drop out of regulation. Most of us do not run our R-390x at less than 110VAC; series resistance might be a good option.

National issued a service bulletin instructing NC-300/303 users to insert resistance in series with the radio's unreliable 4H4C ballastube; R-390x owners are hardly alone in dealing with ballasfailures.

>It's not very clear exactly how important the inrush effect is on receiving >tubes. As far as I can see >tubes are pretty reliable as long as you don't >vibrate them. That makes it a bit tough to quantify an >improvement from >inrush limiting.

Good point. How many of our tubes fail from open heaters? I find relatively few.

>The whole issue of half wave rectification to run the tube filaments has as >you mention been >thrashed out at great length in the past. One idea that >has not been tossed around is to lift the >far end of the regulated filament string and then full wave rectify the AC.

The grounded far end is the PTO tube heater. That tube's hot side is filtered by an LC network. If the far end were lifted it would be necessary to add there another LC network to keep RF signals where they belong.

It would probably be easier to full wave rectify (bridge) right at the secondary terminals of the power transformer and use pulsating DC for the whole radio's 25.2 VAC needs (don't forget to add a hash suppression cap across each of the bridge's diodes). A solid state ballast replacement module would then have a diode at the input to isolate the module's filter capacitance from the rest of the 25v circuits. The other circuits would otherwise see about 35VDC filtered instead of the intended pulsating nominal 25VDC; the ovens (we all have those turned off, right?) would fry eggs and the antenna relay would pull in with a heated vengeance. Drew

From hankarn at pacbell.net Mon Oct 4 18:12:04 2004
Subject: [R-390] On 3TF7's...

I asked how many people had an actual 3TF7 failure that they knew of. Out of all of the considerable replies that came in the total was under 100. One person lost 3 in one unit due to a power supply problem. Hank KN6DI

From ka4prf at us-it.net Mon Oct 4 19:28:05 2004
Subject: [R-390] Humm problem,

Hi all, 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. Thanks Chuck

From ham at cq.nu Mon Oct 4 21:08:42 2004
Subject: [R-390] Humm problem,

Hi

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-caped the radio then disregard this ....

Best bet would be one of the tubes later in the IF strip. When you loose 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. Enjoy! Bob Camp KB8TQ

From roy.morgan at nist.gov Tue Oct 5 14:20:02 2004
Subject: [R-390] On 3TF7's...

wrote: >The 3TF7's voltage range is 8.6 to 16.6 volts; at 122 VAC line the 3TF7 >would see about 16v. ...13 ohms in series the 3TF7 would see about 12v >at 122 VAC line. If the line were to then drop to 110v the 3TF7 would >see 8.6v; at any lower line voltage it would drop out of regulation.

Drew,

Thanks for your sensible idea. I would add that the resistor will limit the inrush current to the ballast and the tubes, and presumably lengthen their lives.

The ballast would "drop" out of regulation fairly quickly on the low voltage side, not just quit like solly state or even hollow state regulators can. On the upper side of the voltage range, the degradation in performance is less sudden. There used to be a web link for a graph of the ballast characteristics with explanation of how they work, but I cannot find it today.. the page was ballasts.htm If anyone finds that,

please let me know. (I do have a copy of it here.)

>National issued a service bulletin instructing NC-300/303 users to insert >resistance in series with the radio's unreliable 4H4C ballastube; R-390x >owners are hardly alone in dealing with ballasfailures.

Hammarlund issued a bulletin to use a 6V6 instead of the 4H4C in the HRO-60 and other radios. One reported reason was the increasing difficulty in finding the ballast tube.

> The whole issue of half wave rectification to run the tube filaments has > as you mention been thrashed out at great length in the past. One idea > that has not been tossed around is to lift the far end of the regulated > filament string and then full wave rectify the AC....

While re-reading the article in HSN* on the VLF mod to the R-390A, I discovered a seldom-referred to Ballast replacement mod. (The 12 volt tubes with shorted ballast, and the 42 ohm 5 watt resistor mods are also mentioned.)

It is basically a triac acting as both rectifier and voltage adjust device. It requires connection to only the two pins used by the ballast tube, and ground. The ac filament supply is rectified, filtered by a 3000 uF cap and sent on to the two regulated filaments. A 14 -15 volt zener and pot allow for adjusting the output voltage.

*** "The R-390A on Longwave -- Cheaply" From Craig-Healy comes this article he originally wrote for "LOWDOWN"**

Published in the predecessor to Hollow State News: The R390 USERS GROUP A Newsletter for URR Users Vol 1 No. 2 a tradition since March

(My copy of this issue is not dated, but it mentions to expect the next issue in September 1983. The publisher, T.J. Skip Arey, WB2C (G??), says they had 70 members at that time.) Roy

From ka4prf at us-it.net Tue Oct 5 18:14:04 2004
Subject: [R-390] Audio Output Transformer

Hi all, 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? Thanks in advance Chuck

From ham at cq.nu Tue Oct 5 19:49:41 2004
Subject: [R-390] Audio Output Transformer

Hi, 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. Take Care! Bob Camp KB8TQ

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 Balck 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. Cheers John KB6SCO

From chejmw at acsu.buffalo.edu Wed Oct 6 10:47:27 2004
Subject: [R-390] Audio Output Transformer

Hi Group, 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. Jim WB2FCN http://eshop1.chem.buffalo.edu

From ham at cq.nu Wed Oct 6 20:49:22 2004
Subject: [R-390] Operating Hours / MTBF

Hi The list has been a bit quiet recently....

Obviously this could be an intro to dig up just about any of the dreaded old threads.

Here's my question - How much do you operate your R-390 and how long does it operate between maintenance "events"?

If I go back and look at the MTBF numbers that are tossed around on tube era radios you see numbers in the 50 to 150 hour range.

These numbers have always seemed a bit low to me. There is an awful lot of data on a variety of radios though that support those kind of numbers. The justification for most of the solid state radios was in part the reduction in maintenance from eliminating the tubes. The radios involved were from a range of applications. I suspect that an airborne radio was a bit lower reliability than a fixed base R-390.

Good old Mil-hbk-217 gives some factors for different enviroments. Even if we assume that the "inflation" factors for ground benign versus airborne apply it's hard to see how you get past about 1000 hours. Last time I checked that's about a month of 24/7 operation.

Since this is all based on averages you really can't figure them from the statistics of one radio. You need a fairly large group of radios to figure out what's going on.

Just to start the database off here's some more or less accurate data. I run a set of four radios and would *guess* that they are somewhere above the 200 hour mark.

I'm not sure what constitutes a maintenance event according to the military. I suspect it was a combination of routine alignments as well as fixing stuff that was broken. For our purposes I'll define an event as something that requires you to get into the radio. As long as you don't have to dig into the radio to teak something or to fix it then it's not an event. So any body want to contribute to the data base? Enjoy! Bob Camp KB8TQ

From rbethman at comcast.net Wed Oct 6 21:06:27 2004
Subject: [R-390] Operating Hours / MTBF
Bob,

I got 4 years without failure on my now traded '67 EAC R-390A. That's 24/7. It had one failure of of a shorted tube in the audio module just before that run. I agree - It has been TOO quiet. Maybe on Sunday, my next day off after three 13 hour days, we can stir up some thing.

How about gutting C603 and C606, and replacing the paper insides with new lytics? That ought to start the ball rolling. Just NO FISH! Still wish I had more info on the Northern Radio Modified SP-600J11..... Oh well Bob - N0DGN

From brookbank at triad.rr.com Wed Oct 6 21:20:47 2004
Subject: [R-390] Front Panel Restoration

What is the best method of painting the lettering (Not silk screened) after the front panel has been repainted? Pat

From ham at cq.nu Wed Oct 6 22:06:06 2004
Subject: [R-390] Front Panel Restoration

Hi

Common wisdom is that it is easiest to do the job with a white paint stick. The alternative is to use white paint, flood the letters and then wipe off the excess. Various recommendations have come up for the appropriate paint with white latex being the most common.

A lot depends on how well defined the engraving on the panel is after the paint job is done. The more empty the etching is the better the letters hold. Either way they seem to be a bit fragile. With the paint stick you go back and redo them from time to time. With the latex paint I suppose you go through some kind of strip process first.

If you don't mind the extra work a clear coat over the finished panel will protect the lettering. If you go crazy enough with the clear coat you can get a pretty amazing look to the panel. It also lets you build up enough paint to protect the paint job fairly well. Most of the paint we use these days seems to wear off a lot faster than the original paint did. Enjoy! Bob Camp KB8TQ

From polaraligned at optonline.net Thu Oct 7 07:40:49 2004
Subject: [R-390] Front Panel Restoration

Use a latex craft paint. Use a fine brush to get the paint in the letters. Wipe off excess with a damp paper towel/sponge using very light pressure. There is no need to coat over this. It will last the life of the panel. Try it on one letter. It is very easy. Paint sticks are a lot harder to use and to clean off the excess. Scott

From schluensen at freenet.de Wed Oct 6 22:09:13 2004
Subject: [R-390] MTBF

Hi Bob and the List, I have my 67EAC (Serial No.: 2283) since 1981. It cames from the German Navy in very good condition. I think it runs about 6 - 10 hours/week. One complete Alignment 1982. Every two or three years cleaning/oil/grease - thats all. Calibration is o.k., no broken tubes or something. It works perfectly! Frank. DK1LX

P.S.: Siemens E310 (Regenbogen) sold 1978 - only one bad capacitor in the Power Supply Siemens 311e2 sold also 1978 - 2 broken Scale Lamps in the Years These Receivers came in mint Condition from the "Ausw?rtiges Amt" - Foreign Office In February I bought an Rohde&Schwarz EK07D/3 - a special Version for the Deutsche Bundespost (PTT). It was the 500kc Guard Receiver at the German Coast Station Kiel-Radio DAO from 1971 to 1981. After Cleaning and complete Alignment (with change of 1 tube) this heavy thing (65kg) runs 4 weeks/24hours without problems. Very nice receiver - nice audio (LC-Filters...)

From lcval1 at netcon.net.au Mon Oct 4 04:00:22 2004
Subject: [R-390] IF module disassembly

I want to change C533 in the IF module but can't get at the base connection without removing H243 which is part of the BFO pitch assembly. Are there any problems associated with this?

Although the set is working fine (a Collins 1955 series), C533 is covered with a white powdery material so I would like to change it, and while I'm there the ones adjacent to it C534 & C538. 73 Damien VK3RX

None, so long as you keep track of which lead goes to which pin of the BFO assembly. Miles, K2CBY

It's been a while, but as I recall, I removed the BFO when recapping my first R390A for just the reasons you describe. Just solder the wires back to it as they were and you'll be fine. Barry(III) - N4BUQ

From face at netunltd.com.au Thu Oct 7 11:58:24 2004
Subject: [R-390] R390 Posts HT Dropper, HT AC regulator

Re 390 Posts: A better way to reduce HT on the 390A after Si diode replacement, an idea for a simple HT voltage regulator and an introduction ....

"Fresh Grist to the Mill" from Perth, Western Australia

Hi. I am new to the R390 chat scene and as this is my 1st post to anyone on the i/net... please bear with me if I don't seem very polished.

I bought my R390A around 1974 (Capehart S/N 1881) Although I have maintained and used many professional brands of radio gear since the days of valves, my R390A still amazes me with its depth of mechanical and radio engineering know-how as well as its fine performance My R390A came, I believe, from our NW Cape, U.S. submarine comms station ALONG WITH A BOX OF UNUSED, BRAND NEW SPARES , including all the ovened bits ! sadly, though the deal was ALL the spares, the set of boxed valves (tubes), spare XTALS and mech filters were missing after I paid my A$400 for it.. I am still waiting for them !!

Only other thing amiss was the dial lock mechanism and knob. My R390A had been in a rack with others and had stayed on one fixed frequency throughout its working life. The guy that sold it to me claimed it had frozen in position and he had to remove it to free the dial !

The unit had both the top and bottom covers missing, probably to keep it cooler in the rack with its hot brothers stashed top and bottom of it. My unit is still in its original condition, but hasnt been used since I changed location some 2 years ago. I Have obtained a 50 ft pole so hope to have another LW + Vertical antenna strung up soon and be back to marvelling at its performance.

I will take advantage of all the excellent knowledge you fine fellows have passed on and shall replace problem caps first as you suggest.

Now to the more interesting bits: So far all the mods I have seen to reduce too high an HT after replacing valve rectifier with Si diodes are as follows. 1. Put a buck transformer in series with the line 2. Put a drop resistor in the HT line, after the filter caps.

1. (bucking xformer) is the neatest approach, it needs no mods to the R390 proper. This is an excellent approach when the line voltage is too high (I used this in my own R390 as our line voltage in WA goes up to 275 Volt in places !!!).
BUT for simply reducing the effects of too high HT due to diode replacement, (when line voltage normal) it will also REDUCE THE FILAMENT VOLTAGES in the same ratio ! Not too good for maintaining valve life as it could wind up poisoning the filaments. It reduces the performance of the set by reducing tube gm as well.

2. (Series res in HT line.) Ok, but if placed after the HT filter cap, it adds to the internal resistance of the HT line and can affect performance on strong signals or high audio levels due to HT fluctuating with signal level.
Putting it before the filter cap is better and protects cap from excess surge current at switch on as well. Even better, put resistors, one each in series with diode anodes to HT wire ends of HT transformer, halfing power dissipation of each resistor. (saves money,too)

BUT you have to be careful installing the resistor(s) in this above situation as they are at full HT potential to chassis and add to the hazards of servicing.

A better way is to lift the centre tap (CT) of HT pwr transformer secondary winding from chassis, and place a power resistor between this CT wire and chassis.

The resistor now operates AT A LOW POTENTIAL to chassis and can be safely clamped down with an Al bracket (a square pwr resistor is handy for this) , helping to heat sink the resistor and keep the under chassis temperature down a bit.

You can pick off a useful dc voltage from the ungrounded end of the resistor using another diode.. useful for activating low voltage, current stuff such as solid state additions, provided you dont exceed the total HT transformer VA specs.

And if your finger accidently brushes against the exposed active end of the resistor, you wont notice it as its only at a few volts above ground ! (by the amount by which you want to reduce the HT). The value of resistance will vary according to the excess Ht voltage you wish to reduce, which itself depends on your local line voltage. Simple Ohms law applies here.

I have used this approach in West Aussie with complete success many times in the distant past.

I really have not seen this posted before anywhere, at any site, but if it has been I would not be surpised. The technique was quite common over here when we had our own radio industry in the vacuum days, and I am merely passing on what used to be common place. If it saves a shock or two, then maybe its worth passing on.

REGULATING THE HT LINE:

Since we are now operating, with the above mod, at a low voltage to chassis, its quite feasable to put an AC voltage regulator (possibly using a couple of Lm317 V regs) to keep the Ht constant between light and heavier Ht loadings. I have actually done this in the days of Ge transistors using a long tailed pair of transistors as the reference/control inputs, then driving a pair of cross inverted power transistors with isolating diodes. All this in series with the HT winding CT to ground. (Used in some tube fitted nucleonics counting gear... again to compensate for our high local West Aussie line voltages.. up to 270V AC here, remember!)

If there is any interest in the HT ac regulator, I might knock one up and fit it to my R390 when I get a chance, then pass on the circuit to others. Hope this note has been of some interest to other R390 admirers.
Addendum: Been observing feedback comment on running tubes on DC. Read an article in an old Wireless World once, (by 'Free Grid'), that valve radios which had been running prior on dc line supplies had a high failure rate (open filaments), when changeover to AC line occurred. (early 30's ??) It seemed that running heaters on Dc for a period crystalised the heater material and when put onto AC they didnt like it. John R. Byers (face@netunltd.com.au <mailto:face@netunltd.com.au>)

From bill at iaxs.net Fri Oct 8 02:35:01 2004
Subject: [R-390] R390 Posts HT Dropper, HT AC regulator

Polished? We don't care about your nationality! Grist? Illigitimus non carborundum! Don't let the baastards grind you down. Otherwise, no worries, mate.

(That's what the guy at the front desk said when we got back from visiting the return of the Fairy Penguins in a downpour and found that half the power in the room was out, including the bathroom. Healsville in a 60 MPH breeze made up for everything.)

Depth of mechanical and radio engineering know-how? Nay, it is the peak of that vacuum tube

knowledge that you behold.

The idea to put a dropping resistor between the HV CT and ground is interesting, but it does stress the HV insulation.

Concerning mod mania, consider that the Collins engineers were the best around at the time. See the Engineering Report. Tube design improved a bit after the R390 was engineered, but not a lot.

Do not assume that tighter regulation will make your set better. Go back and read Freud on the subject of anal-retentive control. What makes your set better is proper lubrication and alignment.

If you try to measure sensitivity, be sure that your signal generator is very well shielded. Your first clue that something is wrong is when lower steps on the attenuator don't seem to make any difference.

Smile, mate. Nothing serious here.

Best regards, Bill Hawkins, who will never forget our trip down under from Minneapolis, MN

From barry at hausernet.com Fri Oct 8 06:07:49 2004
Subject: [R-390] R390 Posts HT Dropper, HT AC regulator

Hi John & List:

Hmmmm .... It appears the inflationary trend in mains voltage is being perpetrated by a worldwide conspiracy. Oh yeah, they'll say they had to pump up the voltage to force the juice through the lines and reduce strain on old power lines due to increasing current draw downstream - or something like that. Anyway, I have observed the same "up over" as you have down under. I'm located about 30 miles East of Manhattan/NY.

At times of low usage -- spring and fall with moderate temperatures and low air conditioner up-time, the voltage can run as high as 127. During very hot days in the summer, I've monitored it as low as 95 V. I don't know what your "nominal voltage" is there. In the US, in the last 50 years or so, it is variously advertised at 110, 115, 120, rarely "125", and sometimes (as spec'd on the '390 I believe) the odd figure of "117", which, I suspect was a hedge, but became popular for a time.

If the ideal voltage for the '390 is truly 117, 10 volts extra may be a bit much -- as a regular diet.

One question is whether you are trying to adjust for sustained high or low voltage vs. momentary fluctuations including surges and dips due to on-site activity.

If it's the former, a Variac (autotransformer) can be a viable solution, providing you monitor it full time with an accurate voltmeter. For safety's sake, if the receiver is on, but not attended to, you can crank it down a bit below optimal, then tweak it when doing critical listening. Some are concerned that a slip of the wrist could sink your ship, uh , boatanchor.. The solution -- possibly chose one with a range switch -- for example, some nominal 120 vac units have range switches labeled 0-120 and 0-140. Of course, the labeling is "nominal" and is subject to the same inflation discrepancy, so the "120" may have been 120 when the supply voltage was 110 in days of yore. Now, 120 may be more like 130, but it won't be 140 plus 10-15%.

If it is a cabinet enclosed unit and does not have the switch, very often the autotransformer itself has the

extra taps about 20 degrees off the end taps and you can choose the appropriate one to add a switch. Another solution is to fashion a mechanical stop which can be defeated when necessary. The advantage to using an autotransformer is that you can also use it to step up the voltage during a sustained power sag, AKA "brownout". (Definite downside to a bucking transformer) Another advantage or disadvantage, depending on your persuasion, is that it provides yet another knob and meter to enjoy.

Alternate possible solution, but a reach would be a high quality external voltage regulator/filter as is typically used with computer equipment. There are separate regulators and those combined in with battery backup. There are a number of different combinations of those. Some of the battery backups are simple and just switch over from charging the battery to running off it with the transverter. Not much use for this application. There are others that add an integrated VR circuit, but still simplistic. I believe there are some that use the battery along with VR circuitry to regulat full time, as if the battery were a glompus storage/filter capacitor. However, some and perhaps all of these are too noisy. I have not tried them. The better ones have good filtering, but they are primarily designed for use feeding computers with switching power supplies, so I don't know -- anyone try any of these? Another consideration is that some are more "twitchy" than others and may introduce some transients of their own -- along with the noise.
As long as you don't develop a habit of nervously twiddle the variac knob, they're quiet. Now before this sets off a rant that the R-390's are robust and were designed to handled wide swings in line voltage, etc., I'm referring to conditions of sustained high voltage in excess of 125, and perhaps nearly equivalent to John's ~270 observations, which may put a strain on things long term. If your line voltage runs 115-122 or something, I'd then say, well ... fuhgeddabowdit. (30 miles East of NYC, remember? ;-) and barely a stone's throw from one of the most infamous power companies on the planet, including a nuke plant that was powered up just long enough to be contaminated, but never went on line. Yeah, it coulda' been woise. If there were a problem at that plant, it would have been almost impossible to get off "Lone Guylund". The evacuation plans were evaluated after they built the thing, in the aftermath of Three Mile Island. We should probably build all our nuke plants down under and pipe the juice in. The locals don't seem to mind the our subs -- or maybe they do. Are they stationed there for strategic reasons -- or where they exiled?) All that was OT, but safely isolated in parentheses. Which reminds me to remind you that autotransformers are not isolated which is not a problem driving transformered equipment, but bear in mind if you "borrow it" for some other project.

Well, I wrote way too much again, so will now submerge for another six month stealth tour. Barry

From anchor at ec.rr.com Fri Oct 8 09:58:32 2004
Subject: [R-390] Re: R-390 Digest, Vol 6, Issue 6

Hi folks,

I'm not sure where this thread started, but I use artist's acrylic (water soluble), and a small rubber squeegee. You can see my process abt half way down the page at:
<http://www.thecompendium.net/radio/sp600.htm> (the captions are above the pix)

That was my first attempt, didn't repaint the panel. I've done it a few times since, it's easier after some practice. 73, Al, W8UT New Bern, NC

From pomerol at mocha.ocn.ne.jp Sat Oct 9 00:59:46 2004
Subject: [R-390] Calligraphy Pen for Non-engraved Front Panel Lettering

Hello to the List,

Is there anyone who have succeeded to restore the rubed off lettrings on the Non- engraved front panel of the R-390A?

I used a lacquer stick with little success so far and I bought a calligraphy pen today. I tried some letters with a 0.5mm pen tip and had a better feeling with it. But I seemed to get a good ruler to get more solid lettering.

Do you guys think dry transfer letterings is better than hand writing? I didn't find a good source for the dry transfer lettering except AES. Your advice would be appreciated. Osamu Hazawa http://www4.ocn.ne.jp/~pomerol/MyPage/menu0.html

From K2CBY at aol.com Sat Oct 9 09:44:11 2004
Subject: [R-390] Calligraphy Pen for Non-engraved Front Panel Lettering

I had good luck restoring an early Motorola R-390A front panel on which the lettering had been silk screened.

I masked the lettering with Scotch Transparent Tape, used an Xacto knife to trim the mask as tight to the characters as possible, and peeled off the surplus tape.

I then repainted the panel with three coats of Ace Hardware gray spray enamel (an excellent color match), allowing a day between coats.

After the last coat had dried for a week, I peeled off the mask.

Finally, I sprayed the unmasked panel with several coats of Verithane satin finish clear acrylic varnish, sanding with #400 between coats. This "filled in" the masked areas.

The result was a beautiful job that has withstood a lot of rough handling. Miles, K2CBY

From ham at cq.nu Sat Oct 9 11:53:10 2004
Subject: [R-390] Calligraphy Pen for Non-engraved Front Panel Lettering

Hi, This is a little off topic but hey, why not.

I have one of the Motorola front panels that are kind of interesting. It obviously have been around for a while and they have worn paint. Nothing unusual so far.

What is unusual is that under the top coat of paint is a second coat of paint. The second coat of paint is complete with it's own set of screened on lettering. The second set of lettering is offset from the lettering on the top layer. I don't know enough about the history of these radios to know if the military repainted them or not. The other possibility is that the factory goofed and repainted them. Doing a over paint / repaint job on a screened panel obviously didn't bother the military inspectors.

I *assume* that the original lettering went on with a silk screen process. Having done it a number of times it's not as hard as you might think. They guys that do novelty tee shirts do it all the time and that's hardly a high tech industry. On electronic gear we normally do it with a wooden frame around the screen

and a hand squeegee moving the paint around. If you want to go crazy you can use stainless steel screens and a fancy printer but for panel marking a cheap screen and a wooden frame. Your local tee shirt factory probably can help out with a source for the screens if you have a scan of a good front panel.

At least in my experience, if we go back into the business of fabricating replacement front panels for the 390 the silk screen process is the way to go. If you are going to duplicate a real panel you will at least need to silk screen the back side anyway. Doing it on both sides isn't all that much harder. Take Care! Bob Camp KB8TQ

From barry at hausernet.com Sat Oct 9 12:51:36 2004
Subject: [R-390] Calligraphy Pen for Non-engraved Front Panel Lettering

Hi Osamu

The laquer stick is used only for the stamped ("engraved") panels by rubbing across the lettering and thereby filling it with the laquer.

Dry transfer letters would probably be easier than hand writing, but they are fragile -- easily rub off. If you use those, it's best to overspray with clear acrylic paint -- or some paint that will not damage the panel paint or lettering. Draftsmen once used something called a "lettering machine" which was like a small pantograph. The letters were engraved in a part that looked like a ruler. You traced the machine's letters wit a stlylus and the drew the characters.

Those and dry transfer letters in Roman/English may be difficult to find. The transfers used to be available in electronics parts shops and may still be found in some arts & crafts shops.

However, as someone else described, you could consider silk-screening. If I'm not mistaken, hand silk screening is a traditional art in Japan. There are various kits sold here and on the internet. I'm not familiar with them. It may be that you can find the materials locally. And that would be the same way as the non-engraved panels were originally lettered. Even so, an acrylic or compatible paint should be used so you can overspray a clear coat to protect the lettering and the panel from wear. regards, Barry

From hankarn at pacbell.net Sat Oct 9 13:16:05 2004
Subject: [R-390] Calligraphy Pen for Non-engraved Front Panel Lettering

> Those and dry transfer letters in Roman/English may be difficult to find. > The transfers used to be available in electronics parts shops and may still > be found in some arts & crafts shops.

Bob, I have both master silk screens for the R-390-A front and rear. I also refinish the panels by commercial stripping, cleaning, run through a time saver to eliminate surface scratches, powder coat and the silk screen. $150.00 exchange plus UPS. Hank KN6DI

The lettering machines were called "Leroy", and were quite nice if you could bear *hours* of tedium. They're still available from stores that cater to graphic artists and draftsmen, such as OKC's own Triangle A&E. I seem to recall that Keuffel & Esser made them, or maybe Dietzgen, and I certainly remember seeing quite excellent copies while I was living in Japan. -- Mike Andrews

From ham at cq.nu Sat Oct 9 18:14:21 2004

Subject: [R-390] Silk screen

Hi, Here's a basic explanation of the process. I'm sure others can elaborate further.

The basic equipment is pretty simple. You need:

1) A "nest" to hold the panel you are going to silk screen. Usually this is a piece of plywood with a couple of pegs in it to position the panel.

2) A screen to do all the work. Industrial screens are made out of wire, often stainless steel. For light weight work like panel screening you don't have to get very fancy. Local suppliers will probably have a range of screens for you to pick between. For this kind of work go with one that is not very expensive.

3) A negative to coat the screen with. The screen material is often coated with photographic emulsion. You scan the lettering on a good panel and use it to generate a graphics file with the data in it. The file goes out to the shop that generates the screen and they do the photographic process that converts the data in the file to a finished screen. They send you the finished screen in the mail.

4) A frame with the screen on it. The frame normally is attached to the nest board with some common hardware store hinges. The panel goes in the nest and the frame brings the screen down on top of the panel. The hinges and pegs on the nest are there to keep everything in good alignment.

5) Ink (paint) and something to push it around with (a squeegee). Normally on the stuff I do we use an epoxy ink that comes in two parts. You mix them up and screen them on. You then bake the finished part at 125C for about an hour to cure the ink. The ink that is left on the screen you clean up with normal solvents.

The odd thing about all of this is that the only thing that costs very much is the screen. Everything except the screen probably costs less than $25. The screens we use at work are a couple of hundred dollars, but they are pretty etched stainless steel screens.

The hard part in the whole process is coming up with the image of a good panel. Usually this involves doing a scan of the best panel you can find and then playing with a good graphics editor for quite a few hours to clean up the result.

FInding a good clean panel to scan can be tough. Simply doing a good scan of the panel is harder than it sounds. You may be better off just using the scan as a guide and generating new lettering from scratch. Matching the type face used is the main challenge. If you can get close enough the result will be much better done this way.

Once you have the stuff set up for your first panel you are also set up to do lots more of them. I suspect that the original panels were done almost exactly by the process described above. With a bit more work and a CNC machine you could turn out brand new panels from scratch this way.

The other way to do a panel is using lithography. This is a more precise process than silk screening and will give better detail on the finished product. In order for it to work properly the panel you are printing must be absolutely flat. It also takes more equipment to do. There may be some panels out there that were done this way but I doubt it. Take Care! Bob Camp KB8TQ

From hankarn at pacbell.net Sat Oct 9 18:48:48 2004

Subject: [R-390] Silk screen

Bob, that is a very good explanation for DYI.

I have a few master screens and about 200 films so when I need something we go through all of the bags of film to find what is needed and my screener makes a screen on a press board along with others, mask off or around and makes the tags or panels as required. by shooting several on a press screen saves him time and me money. We use 2 part inks and bake them. Hank KN6DI

From frledda at comcast.net Sat Oct 9 21:08:59 2004
Subject: [R-390] Silk screen

Bob, THANK YOU. Great explanation!

I think that I will have to get a gitila drawing, in my case. Where do you reccomend I get the screeb done? Regards, Francesco Ledda

From face at netunltd.com.au Sun Oct 10 05:50:35 2004
Subject: [R-390] R390 Posts: Excess line input voltage Noise Figures

First, thanks to Bill,Barry and Cecil for their replies and advice.. Its nice to feel wanted. Aint the net great!!

Aplogies too, for inadvertently replying to Barry alone and not via the administrator. In my inexperience I simply repied to Barries email, thinking it would also go to mailman. Wrong again, John!

So I shall reply to you all by re typing and re submitting this condensed version and sending it correctly ..... serves me right !

EXCESS LINE VOLTAGE TO R390A
Barry replied by suggesting I use a variac in front and twiddle the knob to maintain line constancy. (tongue in cheek, maybe?). I replied that I had solved this problem by (first) using a servo feedback motorised variac with a front panel screwdriver adj. When this broke down on me I used a constant voltage, ferroresonant transformer, (CVT) with sine wave output option (an Advance Model CVN230A) This gave a very well regulated, transient free 230v AC constant output to run my R390A and allowed me to remove the line bucking transformer previously installed..

Barrys reply was that he uses a similar CVT, but that it 'ran hot' and was noisy, which I take to be lamination buzz.

REPLY: Barry, if your CVT is not actually faulty, thats usually caused by not running the CVT at, or close to, its rated output current. These things are designed to run under a load close to the rated maximum output and literally shake themselves to bits when they arn't. ! Not only do the darn things then run hot, they add a whacking big amount on your electricity bill !!!!

Mine has a max rated output of 230W with a power factor of 1.0. The R390A is rated at 225W which matches it pretty well. My CVT then runs quiet and cool . You wouldnt know it was there. One of the big advantages of running a CVT in front of the R390 is its ability to suck out damaging line transients. I made up a box adding silicon carbide voltage supressors to go across inputs and outputs when I first

used this thing, but removed them as they wern't needed, even in the electrically noisy environment I was in before moving house (was on a main industrial line feed 50 ft behind a pole mounted line boost transformer). Also, they were only 275 v rated and was scared they would smoke out on the frequent high line peaks I had then (275v RMS measured when quiet !!!).

Barry also replied that servo controlled variacs often fail because of brush wear tracking carbon dust over a small segment of the winding due to motor hunt when stabilizing. A valid and sensible point , Barry! I will check mine out next time I find it. (Its buried neath a near ton of gear forced into a garden shed. Moving from a five bedroom house with three large rear sheds to a 2 bedroom plus garden shed forced the loss of a pile of good gear..but i'm sure thats still around. Methinks a servo'd Variac in front of my CVT would make a 'cool' combination for my R390A.

Not everyone out there's got that sort of gear to hand, though. Nor does it solve the over high HT when changing to Si diodes.

Bill suggested that high HT does not impact on R390 performance much.

REPLY: That may well be so. Probably because of the R390 remote cut of valves used in the RF/IF stages, necessary for AGC.

I remember, as a student, being given the task of designing a VTVM, though transistors were plentiful enough then, but expensive. If my memory is reliable on this, I found that the sharp cut off twin triode (12AX7) initially used, DC drifted a lot, but a wider grid base 12AU7 fixed the probem. (same pinout) Seems that sharp cut off types had a 'u' more dependant on small changes of anode current than the others. Could be that pentodes have the same characteristics and the remote cut off types used in the RF/IF stages of the R390 don't worry too much about stability of HT supplies. Bill could be quite right there.
BUT: ....they will run hotter !!! (as will all the dropping resistors in the HT chain)
We should be kind to our bottles and keep dissapation down. Hence I think keeping HT at the recommended level by Collins is probably a neat thing to do. Less stress on the filter caps too.

Bill suggested that my suggested mod of placing a resistor in the CT return of the HT transformer would increase stress on the (winding) insulation.

REPLY: The voltage across this resistor to chassis is going to be around 20 to 50 volt, at a guess. (depends on line voltage and R390 settings and condition). The transformer insulation is factory tested to some 2,000v, usually for one minute. An increase of 50v is not going to cause a surgeon generals health warning here. But, the measured voltage between the end of the resistor (chassis) and the outer end of each secondary winding is still the same. There's no algabraically added voltage between transformer winding and core.

All we have done is add a few ohms exrtra to the secondary winding resistance.

The ac voltage drop across it isnt added to the AC secondary voltage, it becomes part of it. There is still the same voltage as before across the secondary windings and between them and core. The stored charge on the capacitive input filter used on the R390 takes care of worsened transformer regulation due to increased resistive losses in the xformer winding.

Its the relatively low voltage across this proposed dropping resistor which seems so attractive to me for regulating the HT voltage to a fixed setting, independant of AC line and R390 load current (within reason, anyway).

If the needed voltage drop acroos this 'R' is more than , say . an LM317/337 max rating, we just add a couple of rated Zeners in series to drop it to a safer value to use

Further, with good, working vacuum bottles getting scarcer to get (certainly the case in Aussie) it does seem that preserving tube working life would be enhanced by ensuring operation inside specs.

So far as my R390 is concerened, all this is armchair theorising on my part. I havn't had to do a thing to it since buying it. So until I get my hands dirty and actually do the above mods, I will be taking all your advice thus far to heart and thank you all for contributing.

I end with a question.

Does any of you know if Collins specified a noise figure test on the R390 series ? Ie recommended test circuit.

I was going to use a carbon resistor across the co ax input (known noise voltage). to determine overall receiver noise floor. (when I get my hands on a replacement set of good bottles)

But I have seen 'dummy antenna' used to evaluate more realistic noise figures when connected to a 'real' antenna.
Example: LCR network used to evelaute noise performance of LF receivers... such as seen in Termans and Langsfords Smiths books) We used such LCR networks across antenna terminals years ago for lw/shop evaluating probable S/N floor under actual operations in remote, desert areas when using a resonant long wire.(2 harmonically related 'ops' frequencies)

I dont own an active, calibrated noise source and wondered whether the LCR dummy load would give a more realistic figure than just the resistor (The LCR circuit can be tuned to the resonace of the 'real' antenna, or to its receiver entry impedance at a working frequency and thus give a more realistic result than the broad banded carbon resistor approach.)

Regards to all , particularly the guy that got all this running on the net!!! John Byers

From barry at hausernet.com Sun Oct 10 11:18:23 2004
Subject: [R-390] R390 Posts: Excess line input voltage Noise Figures

Hi John & List

Excellent documentation .. just a bit of clarification on my input .. ("B:")

EXCESS LINE VOLTAGE TO R390A
Barry replied by suggesting I use a variac in front and twiddle the knob to maintain line constancy. (tongue in cheek, maybe?).

B: Yes 'n no. (no - not a flip-flopper ;-) Yes, when I mentioned that using a variac with a full time voltmeter would provide yet another knob (big one) to twiddle and meter to keep (a third) eye on. ;-) Seriously though, I suggested a variac for sustained high (or low) power line voltage. For example, during the cool months, we get 127 volts here fairly consistently. However, during summer, it can go as low as 97 volts during a brownout -- announced or otherwise. Many mounted variacs have a range switch, usually 0-120 and 0-140 or similar. Some don't, but I've found almost all of the actual

autotranformers inside the box have the addtional taps (usually choice of two) that would allow you to add a low range. As a safety, to protect agains a slip of the wrist, keep it on the lower setting. Also the "120" nominal or "115" can be higher than that as they were labeled assuming 115 or 120 going in.

I replied that I had solved this problem by (first) using a servo feedback motorised variac with a front panel screwdriver adj. When this broke down on me I used a constant voltage, ferroresonant transformer, (CVT) with sine wave output option (an Advance Model CVN230A) This gave a very well regulated, transient free 230v AC constant output to run my R390A and allowed me to remove the line bucking transformer previously installed..

Barrys reply was that he uses a similar CVT, but that it 'ran hot' and was noisy, which I take to be lamination buzz.

REPLY: Barry, if your CVT is not actually faulty, thats usually caused by not running the CVT at, or close to, its rated output current. These things are designed to run under a load close to the rated maximum output and literally shake themselves to bits when they arn't. ! Not only do the darn things then run hot, they add a whacking big amount on your electricity bill !!!!

B: Hmmm??!! Well, might not be so, or might be worse than I'd figured. See next comment.

Mine has a max rated output of 230W with a power factor of 1.0. The R390A is rated at 225W which matches it pretty well. My CVT then runs quiet and cool . You wouldnt know it was there. One of the big advantages of running a CVT in front of the R390 is its ability to suck out damaging line transients.

B: The unit I was referring to is a Solar 20 amp wall-mounted unit that I bought used and had installed by an electrician. It's hard wired off the CB panel in line with one 20 amp circuit, downstream of a 20 amp breaker. This is in the office and feeds three or four PC's with CRT monitors and a big old HP IIIsi laser printer. The PC's probably draw 2-3 amps each. The laser printer varies depending upon whether it's printing or idling, or the fuser and rollers are cycling at idle. (to keep dry and prevent flat-spotting.) I think it draws about 10 amps when running, so in combination, I'm probably running close to the capacity of the CVT. It was installed about 8 years ago -- no problems, but it has always run hot and buzzes loudly. Given the amount of heat and acoustic noise it generates, you have me thinking about the possible cost. Our utility bills run high around here. As I mentioned to John, we're still paying for the nuke power plant that wasn't (Shoreham). It was just brought up enough to contaminate itself during testing before it was cancelled to Three Mile Island, and no real way to evacuate Long Island.. The Sola CVT I have appears to be the same one that Fair Radio lists for about $250. Looks small in the photo -- they're big and heavy and boatanchors in their own right. <snipped>

Barry also replied that servo controlled variacs often fail because of brush wear tracking carbon dust over a small segment of the winding due to motor hunt when stabilizing. A valid and sensible point , Barry! I will check mine out next time I find it. (Its buried neath a near ton of gear forced into a garden shed.

B: Before applying power to a used or long-stored variac -- or one that may have been played with, new or used, check the wiper track and clean it off with a brush. The wiper fallout tends to pack in between the exposed windings. From what I learned (on this list), they can tolerate shorting between two, maybe three windings, but more that than can result in burnout. A motorized-servo-controlled unit might be especially prone as the unit "hunts" over the same small arc repeatedly. Even with a regular variac, you'll find the buildup is much greater in one small area - where most of the adjustments are done. The plating on the copper may also be worn off which makes the carbon stick even more. The brush straddles two windings a at time to prevent intermittents as you are adjusting the thing.) Once there is

smoke, it's probably too late for simply cleaning the track. Typically, a burnt out and permanently shorted unit will show a band of parallel windings with blackened insulation. Don't confuse this with the black potting material that goes all around 360 degrees where the unit was dipped.

All this depends on your line voltage and persuasion as to what degree of voltage control is needed for an R-390A. They were designed when mains voltage ran about 10 volts lower (in US), like 110 or 115. I'm looking at 126-7 most of the time. John is getting 270 vs 240 full time. He suspects a conspiracy with bulb manufacturers based on his illuminatatory experiences. I suspect a dastardly plot to make the little wheel in the watthour meter spin faster for the same amount of juice. Of course, they'll tell me this theory is at odds with Ohm's Law -- but when was the last time anyone dissected one of those things? Also, complicating matters, at the office I have what's called a "demand" meter. It's very demanding. The deal is you pay for the peak wattage draw per 15 minute time slice, or something like that. It's digital, therefore even more suspicious than just the spinning wheel dingus. Barry

From barry at hausernet.com Sun Oct 10 11:26:28 2004
Subject: [R-390] Silk screen

Hi Bob & List

Aren't there small arts 'n crafts silk screen kits or materials that can be used for spot replacement? We have a big store here, but I don't know what to look for. I've seen some websites with kits -- but not intended for our kind of application.

Some of the lettering is more prone to wear than others, and a detailing of a silk-screened panel might call for replacing only a few labels. The remains of the worn lettering could be rubbed off, the grey base compounded, and then the 2 or 3 that need be replaced could be done with small pieces of the screen.

Is there any home-brew way to do that? This might also well apply to restoring some other gear that doesn't have much labeling on it. Barry

Subject: [R-390] R390 Posts: Excess line input voltage Noise Figures

Hi

Rather than specifying the noise figure of the radio Collins (or more correctly the military) specified the sensitivity of the radio with specific IF bandwidths. For what ever reason this was the more common approach in that era. The "correct" approach to making the measurement uses a resistive pad between the generator output and the radio input. You measure a signal to noise ratio on the output of the radio. The net result can be loosely translated into noise figure since you know the impedance of the pad and the bandwidth of the filter.

The whole line voltage thing has been hashed over a number of times. The general conclusion is that the radio works a bit better with a higher line voltage. One of the several reasons we always see the radios beat the military sensitivity specifications is the higher line voltage. As long as you keep the ovens turned off the total amount of heat in the radio is well below what the military considered acceptable when the radio was designed.

Cooler is always better when it comes to reliability so more heat is never good by it's self. There does not seem to be any significant evidence of major heat issues on the R390A. There are some issues on the

R390 not an A in the vicinity of the high voltage regulators. That's a thread unto it's self and the short answer seems to be to use a fan on the 390 not an A.

The "normal" power line load from a R390A is quite a bit less than the rated 240 watts if you have the ovens turned off. Roughly half of the power into the radio goes into the ovens if they are turned on. There are some "interesting" ratings listed on the transformers that make this a bit hard to figure out. Like a lot of things on the 390 the origin of the transformer markings has had several threads devoted to it over the years.

A 10% change in line voltage should increase the power into the radio somewhere in the 10 to 20% range. Since most of the power is going into constant current loads or constant power loads (tubes) the number is a bit closer to 10% than it is to 20%. Net heat rise may be another 10 degrees or so. That's not insignificant, but you can get more change with mounting the radio tight in a case versus well spaced out in a rack.
The US government bought a *ton* of tubes for the 390 back in the 1980's. They then proceeded to take all of the radios out of service. The net result is that there are probably enough tubes out there to keep the R390's running for another hundred years or more. The only odd exception to this is the ballast tube. I have yet to see a reasonable explanation of why they didn't also buy a ton of these as well.

Most of the heat change in the radio when you change the line voltage shows up in the tubes themselves. Plate current does not go up a lot at the higher voltage so power in the dropping resistors does not go up very much. Obviously this does not apply to the dropping resistor in series with the voltage regulator tube or to the ballast tube. However most of the impact will be on the tubes. Since we are awash in tubes this probably is not a terribly bad thing if it makes the radio work better.

Higher voltage also puts more stress on the capacitors in the radio. The capacitors that we hit the hardest are the good old paper insulated parts and the electrolytics. I have yet to see anybody recommend keeping these in the radio. The obvious conclusion is that you should replace the caps with ones that have a higher voltage rating than the originals. The mica and ceramic parts all seem to be significantly over rated in terms of voltage so they do not appear to be an issue.

Running MOV's in front of the radio is not a bad idea at all. On a radio with solid state diodes in it there is a possibility of damage. This is especially true if you are running the original fuses. (With the ovens off you can run smaller fuses). The issue is that as you have observed you need a fairly low voltage rating on the MOV's to have them do any good. A 250 volt rated part on a 120 volt line does a nice job of protecting the diodes. It also will take a *lot* of hits on a typical power line. There is a significant body of evidence that running parts this way eventually causes them to fail. When they fail they pop open. You need to be sure they are mounted in a fashion that when they have enough room around them to explode. If they don't then you wind up with a fire ...

Depending on the brand of constant voltage transformer you have running hot may not be all that unusual. One of the basic regulation techniques is to saturate the core of the transformer. You then depend on the stability of the saturation loop in the core to give you the regulation. Regardless of the load this kind of transformer is always running the core in a "hot" state. That's not to say that there aren't problems that will make it hotter than it should be, only that they tend to be hotter and louder than a normal transformer.
One thing that we do not seem to have an infinite supply of is the micro switch based power switch on the radio. It obviously works a bit harder when you have a higher line voltage. The weird thing is that the switch seems to fail when you turn the radio off rather than when you turn the radio on. Some line regulators have a nasty habit of being a bit slow to react. They tend to boost the line voltage as you drop the load. This may not be a good thing as far as the micro switch is concerned. The fix is obvious, but

not terribly easy: Drop the front panel, pull the power switch and make sure the microswitch is nice and tight on the assembly. Nothing is ever simple .... Take Care! Bob Camp KB8TQ

From ham at cq.nu Sun Oct 10 11:54:14 2004
Subject: [R-390] Silk screen

Hi

I certainly have seen a lot of silk screen kits in craft stores. They seem to be a bit simple for a front panel project. The problem is that you need a fairly high resolution photo process to generate a nice sharp screen. Without a sharp screen the lettering is going to look a bit rough. I have not tried any of the kits so I really can't say what the result would be.

Doing a limited number of labels with a silk screen is easy. As a matter of fact it's probably easier than doing the whole panel.

To do a small area you just line up the screen over the right area on the panel and use tape or what ever to hold it in place. You then just rub the ink on the part of the screen you want to print through. Next you hit it with a hair dryer for a while and you're done. Take Care! Bob Camp KB8TQ

From ham at cq.nu Sun Oct 10 16:23:56 2004
Subject: [R-390] Silk screen

Hi

One thing I have never seen done is to make up dry transfers that directly do the marking. Obviously there is a process that generates them but I don't know what's involved in setting it up. It would be the perfect way to patch up marking on a panel without much effort. The down side would be that most of the ones I have seen are not very durable. Enjoy! Bob Camp KB8TQ

From vk2abn at batemansbay.com Sun Oct 10 20:00:34 2004
Subject: [R-390] constant voltage transformers

A reason that I have experienced for CVT s to run hot , these units are usually ferroresonant devices and if the capacitor that resonates the transformer goes open circuit they run hot and buzz, you can check the cap easily if you have a clamp meter and measure the cap ac current or you can disconnect the cap and put your ac amp meter in series , [SOLA units are particulaly prone to this problem] but I have never known a 390 or 390a power transformer to burn out and we run them on 240volts , in Australia our power is not balanced to earth as in the U.S. , our newtral is earthed at everyones power board and this has caused a lot of the line filters to fail due to the capacitors inside them not being desighned for this service, but i have never known anyone having trouble with the transformers . 51J rxs are a different story I have seen a number of these burn out also I have been using my recievers 390A for 25 years and I dont use the 3TF7 ,I have substituted 12BA6 tubes in VFO&BFO and used the 3TF7 socket as a double triode prod det as per Fundamentals of SSB handbook and a miniture relay to switch the audio lines fed from the bfo ht , so only the IF module is modded and when the BFO is switched off it reverts to the original circuit, also I bought some 51J4 audio output transformers from Fair Radio and they are the same package as 390A O/P transformers BUT they are for a 6AQ5 and they have a 3 ohm as well as 600 ohm windings so I have converted the audio modules and now have heaps of audio and at the right

impedence. sometimes I think people worry unnecessarily about 3TF7 s and other probs these recievers ran in service for over 20 years and I am a great believer in NOT reinventing the WHEEL HI best regards to everyone Bernie N PS Using a Hp5245 counter on the PTO I havnt been able to find any difference in rates of drift WITH OR WTHOUT the 3TF7 and in corrospondence with various retired Collins engineers they reckoned the regulator in the 390A was overkill.

From mahlonhaunschild at cox.net Mon Oct 11 09:54:51 2004
Subject: [R-390] Re: R-390 Digest, Vol 6, Issue 10

I am also surprised that no one has talked about using water-slide decals to restore a panel. A water-slide decal, properly applied, looks just like ink printing.

The tricks, of course, are matching fonts and actually making the decal.

Fonts are no big deal what with the wide selection that comes in Office these days, but there are certain exceptions. Two of us are working on a round-serif font made from a Leroy lettering instrument which should match R-390 and other Collins/military lettering.

As for the printer, you need a dye sublimation printer to make the decal; nothing else will work. And if you have white lettering, you need a printer that can print white. The older ALPS MD-1000, MD-1300, and MD-5000 printers are capable of all of this. Or I'm sure that there are commercial alternatives. Needless to say, I have such a printer.

We're working on an ART-13 decal sheet right now. Other possibilities include the TMC GPR-90 and, of course, the R-390A. Will write further if I have anything interesting. regards, Mahlon - K4OQ

From chacuff at cableone.net Tue Oct 12 18:59:12 2004
Subject: [R-390] R-390 alignment questions

Hey Folks,

I'm doing an alignment on an R-390\URR and I didn't follow the instructions in the manual as to inputting a signal for doing the RF alignment. The IF alignment went slick...no problems. (followed the book..HA!)

For the RF alignment I put a signal into the unbalanced BNC cable that attaches to the antenna relay directly to my 50 ohm input HP-8640B. Seemed the logical thing to do. The alignment went well and the radio turned out to be quite sensitive on all bands...around .2-.3 uv for 10db over noise. Performs excellently on the air as well.

I am aware of all the cable leakage problems and what not...but the final product turned out ok...

I thought I would go back and input a signal on the balanced input through two 68 ohm resistors and set the balance trimmer for each band only to find the radio pretty much deaf. Thought maybe the antenna switch was bad....and I still have to check that tonight but I believe now that it's more the way I aligned the RF deck.

My questions are this....what input do most of you use when operating the radio? I know that going into the unbalanced input bypasses part of the tracking preselector....but it sure is easier to get a signal into

the unbalanced input...especially since most of our antennas are unbalanced.

If I realign as per the manual am I going to be compromising performance on the unbalanced input to bring up the balanced input....or should I expect better performance by including the additional preselector stage.

Or maybe I have stumbled upon something....the radio seems to work really good the way it was aligned? Just can't use the balanced input.(no loss here)

I assume at this point the issues are the same...390/390A. This is the first time I have aligned the RF section of one of these radio's...(bet you couldn't guess)

I plan to go back and realign one band tonight and see what difference it makes.

I know using the 50 ohm generator is already a variance from the manual since it specifies using the URM/25 and it terminates differently.

Any suggestions are appreciated....R-1051's don't give me these kinda problems.... Cecil...

From ham at cq.nu Wed Oct 13 20:50:38 2004
Subject: [R-390] R-390 alignment questions

Hi

The unbalanced input bypasses part of the front end selectivity on the radio. The balanced input is the preferred input. Some of the coils are not aligned when you only do an alignment with an unbalanced input. That's probably what happened with your radio.

Most people run the radio with one side of the balanced input grounded. The antenna hooks to the other side of the balanced input.

No matter how you run the radio you need to align the radio the same way you use the radio. If you run a 50 ohm antenna then align the radio with a 50 ohm source. If you align with one impedance and then run with another the difference should not be dramatic, but it will be noticeable. Best guess is that you would see maybe a 30% change in sensitivity. Enjoy! Bob Camp KB8TQ

From tetrode at comcast.net Tue Oct 12 22:40:42 2004
Subject: [R-390] R-390 alignment questions

> I thought I would go back and input a signal on the balanced input through > two 68 ohm resistors and set the balance trimmer for each band only to find > the radio pretty much deaf.

Cecil,

for doing the balance adjustment that's perfectly normal. I've found that to get a hearable signal for nulling I need to set the generator output several orders of magnitude greater. (Think about it, if the input balance was perfect you'd never hear ANY common mode signal).

RF alignment is best done using the low-z balanced input with one side grounded (thus making it

unbalanced) and connected directly to the signal generator output. Connecting a 50 ohm sig gen output to the hi-z unbalanced input will work of course but you're *really* loading down the front end tuned circuit and probably getting a much broader peak during its alignment. John

From chacuff at cableone.net Tue Oct 12 23:18:02 2004
Subject: [R-390] R-390 alignment questions

Thanks John, Wally, Don and Bob...

I feel kinda silly....after coming back in from the shop a few minutes ago and finding out exactly what John has described while out there. I didn't read the book close enough and use my brain. I knew I was doing a balance adjustment and by inputting an in phase signal on both inputs it's going to take a lot more signal....I also didn't notice I was tuning for a "NULL"....

That's what happens when you stay in the shop till all hours of the night....hate to give it up knowing you have to go back to the real world in the morning...

Anyway...after inputting a signal into the balanced input with one side referenced to ground only minor alignment to the first set of coils and caps was required then the balancing was performed...

All is well now....sensitivity is still in the .3-.4 uv range overall...slightly down from before but there is another set of coils in the signal path...so selectivity should be better.

I spot checked the other stages but found everything on peak...so I am calling it done. Antenna trimmer now peaks at the center for the input impedance being used so it looks like it's right...
Thanks again for the help.... Gonna have to start giving it up a little earlier.... Cecil....

From K2CBY at aol.com Wed Oct 13 08:50:28 2004
Subject: [R-390] R-390 alignment questions

You may be deceiving yourself with respect to the sensitivity measurement.

You make no mention of terminating the 8640B signal generator.

To get an accurate reading, the output attenuator of the 8640B (and any other signal generator) has to be terminated with a specific load resistance -- in this case, 50 ohms. If it is terminated with a high impedance -- i.e., the unbalanced input of the R-390A -- less current is going to be pulled through the series element of the attenuator, and the "multiply by" marked on the skirt of the output attenuator dial isn't going to be correct. What appears to be 0.2 or 0.3 uV is actually going to be higher.

The BALANCED input is nominally rated at 125 ohms (though this is probably far from constant either from one band to another or across a signle band). A 50-ohm signal generator connected to the balanced input should therefore terminated by an 82 ohm resistor (with short leads) connected across the antenna input terminals.

The impedance of the UNBALANCED input is not indicated in any of the documentation I have, but it is supposed to be "high." I would therefore terminate the signal generator with a 51 ohm resistor so that it sees a proper load.

Only when the signal generator is properly terminated do the output signal readings shown by the panel meter and the switch attenuator correspond with reality. Miles, K2CBY

From lester.veenstra at lmco.com Wed Oct 13 09:07:34 2004
Subject: [R-390] R-390 alignment questions

Of course doing the balance nul adjustment assumes you are goung to feed your rhombics with long runns of latter line in a noisy environment HI Les K1YCM/3 (xCTM1)

From dhallam at rapidsys.com Wed Oct 13 10:02:38 2004
Subject: [R-390] WTB Gear Clamp

Does anyone have one of small gear clamps that is used on the Veeder Root counter to clamp the bevel gear on the dial shaft? One of mine is missing. My R-390 went dead yesterday so it's out of the rack and on to the bench. As long as it's on the bench, it's time to do all of the small things that need to be taken care of. David C. Hallam KC2JD

From ghayward at uoguelph.ca Wed Oct 13 11:48:25 2004
Subject: [R-390] R-390 alignment

One thing to note with the balanced input is that one side has a variable alignment cap to ground and the other a fixed cap. You need to make sure that if you ground one side and feed the other, you feed the side with the variable cap. The ground shorts the fixed cap. I did the balance adjustment to set these, but I wonder if running with an unbalanced input I should just peak the response with the variable cap to match the input better. What do you think?

On a similar topic, I get some crackle when I adjust the antenna trim. I think the rotor contact is a bit dirty but getting into the box will be a major pain. I plan to try some deoxit on the shaft when I next open the case, but is there any other accumulated lore on this subject. 73 de Gord, VE3EOS.

From K2CBY at aol.com Wed Oct 13 12:32:18 2004
Message-ID: <1e4.2cc542b7.2e9eb292@aol.com>

Accumulated lore says to check the fibre insulated shaft of the antenna trim capacitor for oil-borne contamination. Miles, K2CBY

From tetrode at comcast.net Wed Oct 13 14:28:27 2004
Subject: [R-390] R-390 alignment questions

Hi Miles, technically you are correct, and this is one of the several ways of measuring sensitivity that have been cussed and discussed here and on the different R390A web pages around.

-Some folks want to terminate the sig gen for 50 ohms -others want to terminate the sig gen AND match the RX antenna input for 120 ohms so they make a minimum loss matching pad, do the measurement, and then add in the loss factor for the pad. -others connect the 50 ohm sig gen directly to the RX.

I used to worry a lot about what is the proper "correct" method, but in reality a 390x balanced input is

anything but 120 ohms; I believe it actually rises to a few hundred ohms on some bands.

So now I just use the simplest method with a direct connection to the sig gen and be done with it, and BTW also use the sig gen Modulation on/off method when measuring the AM 10 db SN ratio. Both these are described in Para.166 of the TM-856A 1956 Army manual (my fave) and give me R-390A AM sensitivity values in the 0.4 to 0.5 uV range after a refurb and alignment. My feeling it this technique gives the most "honest" sensitivity measurement (or at least in the ballpark) and also aligns the receiver to a 50 ohm impedance which is a standard ham shack value.

I suppose it would be cool if everybody could get on the same page with these sensitivity measurements but I doubt that'll ever happen :^) John

From rbethman at comcast.net Wed Oct 13 14:38:16 2004
Subject: [R-390] Re: R-390 Digest, Vol 6, Issue 10

Mahlon,

Let us know IF you DO make set(s) for the R-390As. I'd definitely be interested! Bob - N0DGN

From ham at cq.nu Thu Oct 14 18:16:05 2004
Subject: [R-390] R-390 alignment questions

Hi

In just about every other measurement I know of what you say is exactly true.

For a variety of reasons receiver sensitivity is not measured that way. In the case of a receiver you do not know the impedance the receiver presents to the antenna. It may be high and it may be low, who knows. It is rarely 50 ohms.

One solution would be to measure the actual impedance that the radio presents to the antenna. With a reasonable amount of gear you could do that. Once you know the radio's impedance you could come up with a combination of coils, capacitors, and resistors that converted that impedance to 50 ohms. In doing that you would have to make some decisions about the impedance transform you applied in the process. Different individuals could make different assumptions and their data would be significantly different as a result.

Since that's more than anybody wants to go through they came up with a different approach to this particular measurement:

1) Make sure the *source* impedance of the generator is correct. The old Measurements generators came with an attenuator to do this. Most modern generators have a number of fancy attenuators in them that do this quite nicely.

2) Calibrate the generator into a 50 ohm load or into what ever impedance you are running.

3) Hook the generator straight into the receiver. Use the "calibrated" numbers on the generator to report the data.

Obviously this means that a radio *could* have twice the calibrated voltage at it's input. In fact this is exactly what most radios do. You could look at this as cheating but that's how it's done. Enjoy! Bob Camp KB8TQ

From craigmc at pacbell.net Wed Oct 13 21:39:54 2004
Subject: [R-390] R-390 alignment questions

Bob et al,

In some situations, like a large receive site, matching the impedance presented by the receiver to the antenna is not so important. The antennas all terminate in a set of distribution amplifiers. The output of these amps is what drives the receiver. The amps are nominally rated at "50 ohms" which typically means a low impedance cathode follower (or emitter follower depending on vintage) output with several 50 ohm resistors, one in series with each output connector. This is the setup at all the Globe Wireless and AIRINC HF sites (and also in my shack).

In this case I think it is best to align (and measure) the receivers on the bench with the 50 ohm termination or matching pad. Then they will be optimized for a 50 ohm system.

By the way, most antennas are not 50 ohms resistive over much of a frequency range (if any). Just some rambling thoughts. Craig

From face at netunltd.com.au Thu Oct 14 00:51:51 2004
Subject: [R-390] r-390 Army manual mods

"Hi everybody !" (a' la Dr Nick Riviera)

R-390A MANUAL:

A QUERY: My manual is the Army version TM 11-856A (stamped ME 147+ O2a inked in) Jan 1956. (odd that it came with a supposedly NAVY R-390A !) It has been much annotated and seems to have been used for shop maintenance work. There are inked in additions to the diagrams and some typed inserts replacing 'x' d out pictiures.

QUERY: I have a page (original page from a different manual) inserted between pages 108 and 109 (covers Fig 64 .. IF sub chassis, top view and Fig 65, bottom view.) The inserted page (is) pages 3 , obverse 4 , showing the same sub chassis, but with obvious photo differences. The inserted page has the reference 'TAGO 6903A ' on the bottom.

The photo references are TM856A-34 and TM856-35 (original manual) and on insert TM856A-C4-1 and TM856A-C4 ??? (final bit obliterated by cigarette burn... so used as maintenance manual for sure !)

The insert shows some major differences to the original layout..Example: It shows a bunch of 4 trimmers on FL502 marked C513,C358, C571, C512.

When I can get another more abled body body to help me take my R-390A oiut of its rack,(got no slides) I will then see if mine looks the same.

Until then, can anyone tell me the relevance of this , please ?. i.e. Are the added trimmers a later and

necessary mod ? Are there differing versions of the mech filters / and or tuning methods in these things? (I have an IF alignment sweeper somewhere that doesnt load things much when hooked up.. looks like I may have to use it .....is sweeping the IF the best way to align ? .. usually is) ADDENDUM: Seems its likely all this has been reviewed by you guru's before ... To save everyones time re cycling the wheel, if there's previous links to any of this, how do I get on to them? (I'me an internet novice).

Regards all John Byers

From face at netunltd.com.au Thu Oct 14 01:41:54 2004
Subject: [R-390] r390 Alignement: Tuning r390 to the antenna via sig gen.

Hello dere allbodies

Just a thought Try this systems aproach

With all the unknown variables we seem to have, perhaps quickest way to actually tune (unknown) antenna to Rx (unknown) impedance without use of fancy Z bridges, etc:

1. Make up a frame (lor simple loop aerial) to match your sig gen Zout n' frequencies of interest

2. Stck sig gen and loop outside at fixed point as far back from antenna as you can

3. Tune sig gen to centre of band of interest (or at where its quiet around there...
   like choose a daytime / nightime freq thats poor propagation wise)

4. Tune in rx to gen sig, then adjust its front end bits for best signal strength.

5. Check on band edges without touching anything for relative reading to band centre.

Now your rx is best matched to the antennna charecteristics and the rx Zin, no matter what it might happen to be, for that frequency.

Try out on differing frequencies, or the centres of the bands you want, to see how antenna characteristics and Rx Zin influence received signals. (The frame (loop) antenna output will change with frequency this way, as may the sig/gen, swr etc, but we are taking relative readings here for reference so doesnt matter so much.)

Make the frame on a marked baseboard so you can repeat future tests at same angle to antenna (same location in backyard), of course)

Record all readings for future reference

Its cheap and dirty, and needs a sunny day / dry night, but more certain this way as it considers most everything in the signal path without affecting results by tying stuff onto the front end.

Notes:
The magnetic field from the loop is more predictable and calculable than the electric field. (It is in fact, quite accurately calculable for emitted uV/m for a given, accurately made up loop) The antenna responds to both transmitted vectors anyhoo, so you are reading a fairly realistic result. This signal is more predictable than using standard frreq xmission and you have your choice of frrequencies,

It gives you some exercise lugging sig gens around.(turns pears into mars bars) Just a thought. Regards all John Byers Portland, OR

From dhallam at rapidsys.com Thu Oct 14 13:07:15 2004
Subject: [R-390] SS Rectifier Replacements

Has anyone had any experience with the Weber Copper Top solid state replacement rectifiers? I just ordered a pair to replace the 26Z5W diodes in my R-390. They are supposed to be plug in and have the same electrical drop characteristics as the vacuum tube. I was quoted a price of $10.00 each for them. That is a cheaper price than buying new tubes. The only tubes I have ever had fail in my R-390 are the 26Z5W and the 6082. David C. Hallam KC2JD

From w5or at comcast.net Thu Oct 14 13:32:44 2004
Subject: [R-390] List Administrivia (was Anybody there?)

This is essentially off topic, but does concern the mechanics of the list, and Mike is correct. In attempts to deal with spam many ISPs (your network provider) use aggressive filtering and sometimes mailing lists get mis-identified. The larger consumer type network providers (cable, DSL) and 'free' mail hosts frequently do that. You might have to check that the lists to which you have subscribed are not being dumped into a bulk mail or junk mail bin. If you need to specify a white list or an unblocked address, email from the R-390 list always broadcast from r-390-bounces@mailman.qth.net. This problem is seen more frequently now that newer email client programs attempt to provide additional spam filtering help.

Also, the mail server software will automatically unsubscribe a user if his mail bounces or is rejected too many times. Rejection occurs for many reasons but the most frequent are mailboxes over quota, and mail servers not responding. I see two or three automatic unsubs a week. If that happens to you, get the problems fixed and re-subscribe. As always, I can help with subscription problems. mailto:w5or@comcast.net Don R-390 list manager I've cc'd this note to Bob in case posts from the list are in fact being blocked.

From tetrode at comcast.net Thu Oct 14 13:35:34 2004
Subject: [R-390] Anybody there?

Sounds like a cool idea Bob, and it's a great conversation piece too.

However, depending on your actual work environment if I were you I'd keep mum on any mention of the friendly glowing meters, even if they are not of the original slightly radioactive variety. The reason I mention this is because of the inevitable presence of the "safety police". Not to demean actual trained safety personnel, I'm talking about the people are out there who are technophobes, germaphobes, scientifically challenged, non-commonsensical, or just plain negative-Nancy worriers that can make life miserable if they sense something they don't like.

Here's a non-radio example I have personal experience with..... I used to work at a small company that manufactured microwave radio communications gear where there were the standard light assembly and soldering operations taking place in a large high-ceilinged well ventilated factory room. We found we needed some compressed air for blowing debris out of small module assemblies and decided that the best option was to buy/rent 5 ft cylinders of compressed gas. (Our needs were small, only about a tank

per month).

After talking with the local industrial gas supplier about our needs I decided to purchase standard dry nitrogen because it was inert and a little cheaper than the "dry air" mix which is actually a manufactured blend of pure nitrogen, oxygen, and carbon-dioxide gasses. It was deemed perfectly safe as atmospheric breathing air is 78% nitrogen anyway, so a few more puffs of it in a big room makes NO difference.

All was well for a few weeks before one or more of the "ladies" started complaining of feeling light headed, dizzy, etc and decided to investigate the new nitrogen gas and read the MSDS (Material Safety Data Sheets) for it and also getting there non-employee husbands involved. Now if you've never seen one of these, an MSDS of even the most commonly used household compounds or chemicals can alarm or scare the crap out of someone. So when they saw the phrase "can cause unconsciousness or death" in the nitrogen MSDS that's all it took for some of them to begin complaining to management.

All attempts at reasoning with them failed, so in the end I was asked to buy the dry-air mix (which still is 78% nitrogen!) instead of the pure stuff and everyone became happy. John

From Llgpt at aol.com Thu Oct 14 14:16:33 2004
Subject: [R-390] SS Rectifier Replacements

I ordered a replacement for a 5U4 on a HQ-180 a couple of years ago, worked out very nicely. Well constructed etc. But, it was just as hot as the original tube was, so no relief from the approximately 15 watts of heat. Les Locklear

From dhallam at rapidsys.com Thu Oct 14 14:42:59 2004
Subject: [R-390] SS Rectifier Replacements

Losing any heat would be desirable, but my motivation was to get rid of the failure prone 26Z5W tubes without increasing the B+ voltage and the price was right. Thanks for your input. David

From multerj at bytehead.com Thu Oct 14 16:50:10 2004
Subject: [R-390] Receiver Comparison

I have seen comparisons on the list of the R-390 with R-1051 and Sp-600 and some others. I have never seen mention of the AN/WRR-2A of AN/FRR-59A. Has anyone had any experience with these and how they might compare with an R-390? For those who may be unfamiliar with these receivers, they are large two deck vacuum tube sets that were used by the Navy. They are synthesized and use different IF strips for AM, USB, and LSB.

From ham at cq.nu Fri Oct 15 19:33:09 2004
Subject: [R-390] R-390 alignment questions

Hi

If you have a receiver with a 50 ohm input impedance *and* a generator with a 50 ohm output impedance *and* a 50 ohm termination resistor then the impedance is equal to three 50 ohm resistors in

parallel. That gives you about a 16 ohm impedance at the junction.

I totally agree that the alignment needs to be done out of a well defined source impedance. If you don't do that then the resulting measurement has no meaning.

Depending on the antenna and on the transmission line between the antenna and the receiver you can have just about anything as a source impedance in the real world.

The more advanced radio designs have an antenna trim knob to help take care of this problem .... Enjoy! Bob Camp KB8TQ

From ham at cq.nu Fri Oct 15 19:59:17 2004
Subject: [R-390] SS Rectifier Replacements

Hi, Pretty much everybody has gone with common garden variety silicon diodes soldered to the back side of the tube sockets. If you want to go a little crazy you can put a resistor in-between the diodes and the input to the filter.

Two or three amp 1KV diodes are pretty darn cheap these days. The current in the radio is low enough that a two amp diode is way overrated for the application. Typical parts from Digikey are in the 20 to 30 cent region per diode.

About the wildest thing I can think of doing would be to put a couple of 1KV diodes in series with each other to improve the overload performance. Enjoy! Bob Camp KB8TQ

From dathegene at hotmail.com Fri Oct 15 13:58:16 2004
Subject: [R-390] Rhombics

All right; that's it--somebody said something about lurking so I guess I better speak up... Could someone give me some advice as to how to set up a rhombic into my R390A? I have the real estate, what do I need for poles, wire and feedline? If you could point me in the general direction..... Thanks!! NA0G

From jhhaynes at earthlink.net Fri Oct 15 15:04:11 2004
Subject: [R-390] Rhombics

You're just in time. The November 2004 issue of QST just came, and has an article on rhombics.

From tetrode at comcast.net Fri Oct 15 15:51:15 2004
Subject: [R-390] Rhombics

The feedline isn't critical, open-wire line or ladder line connected directly from the antenna to the balanced input of the 390 would be excellent. Never had the real estate for a rhombic myself but here's a few links to get you going.....

Rhombic Antenna Homepage http://www.mindspring.com/~cummings7/rhombic.html

also check out Cebik's excellent analysis of large wire loops, not rhombics but it may be to your liking

as well.....

Horizontally Oriented, Horizontally Polarized Large Wire Loop Antennas
http://www.cebik.com/atl1.html

And then of course is the classic 14 rhombic antenna farm of W6AM...
http://home.swipnet.se/dx/porthole/w6am1.htm#top

Tons more info on the web, just Google search for "rhombic antenna". 73, John

From davidmed82 at yahoo.com Fri Oct 15 16:29:02 2004
Subject: [r-390] For your R-390 notebook

I am working on what will be my second last R-390 restoration. I have worked for months on this radio and it is now almost like it came out of the factory. Problem was its sensitivity was just awful no matter what I did. Just this morning I discovered the problem was in the antenna relay, I believe faulty connectors. Replacing this whole assembly resulted in a very sensitive radio. Never struck this problem before. Dave

From ToddRoberts2001 at aol.com Fri Oct 15 19:29:46 2004
Subject: [r-390] For your R-390 notebook

writes: I am working on what will be my second last R-390 restoration. I have worked

Glad you found the problem Dave. Another related sensitivity problem I have seen once was a friend's R-390A that had very low sensitivity and the trouble turned out to be a bad UG-970/U antenna connector - the elbow style connector that adapts the twinax input to an SO-239. Somehow the center-conductor was open circuit. Replacing with another UG-970/U cured the problem. It pays to check the low-tech items first. 73 Todd Roberts WD4NGG.

From bill at iaxs.net Fri Oct 15 19:47:11 2004
Subject: [r-390] For your R-390 notebook

Interesting. Refurbishing is what you do to relay contacts to make them conduct again.

From jay_coward at agilent.com Fri Oct 15 20:00:45 2004
Subject: [r-390] For your R-390 notebook

I believe it is called "burnishing". Jay

From jamminpower at earthlink.net Sat Oct 16 07:59:14 2004
Subject: [R-390] Fwd: Has Andy Moorer's website moved ?

Not to worry - the server crashed again. Back soon (I think). James A. (Andy) Moorer
www.jamminpower.com

From rbethman at comcast.net Wed Oct 20 17:28:28 2004
Subject: [R-390] SP-600 - NRC Type 159 - Radio R-450/FRR-28

Gang,

You MAY remember the following: I've acquired a "peculiar" Hammarlund SP-600. It is a Model J-11, s/n 9758. [No "X"] Modified by Northern Radio Company for the Diversity Aspects. NRC Type 159, Model I, S/N 740.

Tagged Receiver, Radio R-450/FRR-28.

I have finally gotten hard copy documentation for this "animal".

If and when opportunity allows, plus permission from the supplier, a private individual, I hope to do what it takes to get a copy loaded on BAMA.

One item of note in the documentation. The antenna input is designed for 100 Ohm balanced line - in spite of the fact that it IS an SO-239 connector. -- Bob Bethman - N0DGN

From Llgpt at aol.com Wed Oct 20 21:31:33 2004
Subject: [R-390] SP-600 - NRC Type 159 - Radio R-450/FRR-28

Bob, "ALL" the SP-600's were designed for 100 ohm line RG-62A/U. Just align it using 50 ohm input and all will be ok. Les Locklear

From ham at cq.nu Wed Oct 20 21:38:34 2004
Subject: [R-390] SP-600 - NRC Type 159 - Radio R-450/FRR-28

Hi, So we now have more than one radio running off of a weird impedance balanced line. Again with my favorite nagging question: What the heck kind of gear drove these inputs ?? There must be some sort of record out there !! Take Care! Bob Camp KB8TQ

From rbethman at comcast.net Sun Oct 24 17:15:34 2004
Subject: [R-390] SP-600 - NRC Type 159 - Radio R-450/FRR-28

I agree! The use of "funny" feedlines and termination impedances makes for interesting discussion "fodder".

The diversity antenna requirements make this virtually impossible for current use UNLESS you have massive real estate. The space between antennae being rather ridiculous. Additionally it would require a fairly large contigent of personnel to erect and maintain.

I will be using this the same way I use all my HF receivers. Simply to receive the frequencies I use or monitor.

The information received was gleaned from a prior employee of Northern Radio. All prints are indeed Northern Radio prints, and the cover is DEFINITELY a Northern Radio Company cover, complete with

Logo. Bob - N0DGN

From ham at cq.nu Sun Oct 24 18:48:23 2004
Subject: [R-390] SP-600 - NRC Type 159 - Radio R-450/FRR-28

Hi, I have no doubt that the radios were deliberately designed for 100 or 120 ohm feed. I also have ample evidence that they work perfectly well when re-aligned for 50 ohm use. There is a ton of gear out there that hooks to these radios when run with 50 ohm feed. There is also a lot of evidence of these radios being used in 50 ohm setups.

Back to the original question - why go to all the trouble of designing them for 100 or 120 ohms and then use them at 50 ohms?

Most of the theory work on coax cables was done in the 1930's. The relative merits of 50 and 75 ohm lines had been figured out before the start of WW 2. The 50 ohm coax thing was not an invention that came up some time in the mid 1950's after the radios were designed. The basic impedance data on antennas dates back at least into the 1920's and in some cases long before that. Again it's not something people discovered in the mid 1950's.

Obviously there are antennas like rhombics that you can match with a 4:1 balun to 100 or 150 ohms and get a fairly good match. There are also things like a full wave loop that are a better match to a 100 or 150 ohm line. Obviously a number of radios were used with rombics. I have not seen a lot of data on full wave loops.

Was the whole balanced input, high impedance input driven by some kind of direction finding set? If so there must be data out there on them. Was there a standard wire antenna that worked into a 100 or 120 ohm impedance? Again there should be data on it.

If 100 or 120 ohms was important enough to design all the radios for that impedance there *should* be data to support the decision .... Confused .... Bob Camp KB8TQ

From rbethman at comcast.net Mon Oct 25 10:32:58 2004
Subject: [R-390] SP-600 - NRC Type 159 - Radio R-450/FRR-28

Perhaps the documentation makes more sense then. The diversity antenna system recommends the use of rhombics BEFORE talking about others. With what you've just written, that MAY be the reason. Bob - N0DGN

From Llgpt at aol.com Mon Oct 25 12:45:12 2004
Subject: [R-390] Trying to id a navy multicoupler

A friend recently acquired a couple of multicouplers. I'm unable to find any info on the Internet and was wondering if there are any more of these out there?

Here is the information on the nomenclature tag on the front panel.

Serial No. A4 28355 - 0135929 MF/HF MULTICOUPLER CU - 2279/BRC DES. ACT.: NAVALEX CTR,

It has 2 N connectors for inputs on the rear panel. Each input has 4 bnc outputs, plus a bnc test output for each channel. The front panel has a on-off power switch, a fuse and channel A and B buttons. It is rack mounted, and 3-1/2" high. Operates off of 120 volts.

Beautifully built, operates from 100 kc to about 12.8 ghz. no loss apparent when not turned on and approximately 6 db gain when on.

Any information out there? Les Locklear

From Llgpt at aol.com Mon Oct 25 13:38:20 2004
Subject: [R-390] Trying to id a navy multicoupler

A correction, it operates from 100 kc to 1.8 ghz. Les

From ham at cq.nu Mon Oct 25 18:17:45 2004
Subject: [R-390] SP-600 - NRC Type 159 - Radio R-450/FRR-28

> With what you've just written, that MAY be the reason.

Hi, So if this was all planned - are there any references to hooking up these radios to 120 ohm systems ? If they are out there I sure have not seen them. Take Care! Bob Camp KB8TQ

From ham at cq.nu Mon Oct 25 20:48:57 2004
Subject: [R-390] Tube Tester

Hi

One of the truly amazing things about the current surplus scene is that a reasonable military tube tester (say a TV-7) from the 1950's sells for almost as much as a reasonable military radio (say a R-390A) from the same era. By the time you buy a reasonable set of test gear you have invested as much or more than you put into the radio.

So here's the question: Is there any interest in a "R-390A only" tube tester? As far as i can see you could make one with a handful of parts that would test all the tubes in the R390A except the rectifiers. It should do as good a job as a TV-7 on the R390A tubes. One advantage would be that the number of switches involved would be small. The ease of use factor on the simple tester would be significant if you check a lot of tubes.

Is anybody interested in a gizmo like this? If there is then it's probably worth figuring out how to do it. A lot of us already have tube testers so it may not be worth doing.

This would be strictly a "here's the schematic go to it" type of thing. I have no intention of trying to sell them or build them. All the wiring would be point to point stuff. The parts except for the tube sockets would all be Radio Shack type stuff. The tester should be a reasonable weekend project with plenty of time taken off necessary distractions like *using* radios.

If you are interested let me know. The only thing I need to know is weather you already have a voltmeter / current meter. If so what is the lowest current range it will show? The gizmo can be designed for a "plug in" meter or a built in. The design will be a little different depending on which way we go.

Parts list (more or less):

one 9 pin tube socket
two 7 pin tube sockets
two 6 volt filament transformers
one push button
one dpdt switch
one 1N4007 diode
3 - 6 0.01 uf caps
some number of resistors a power cord, fuse and on/off switch. Depending on the voting either a couple of pin jacks or a meter So any takers? Enjoy! Bob Camp KB8TQ

From jhhaynes at earthlink.net Mon Oct 25 22:21:25 2004
Subject: [R-390] Tube tester

I have a friend with a couple of tube testers for sale. I mentioned it on several mailing lists, maybe not here, and he has got hardly a nibble of interest. The guy who has them is ozregl36@aol.com

From djmerz at 3-cities.com Tue Oct 26 10:15:04 2004
Subject: [R-390] Tube Tester

Bob, I would be interested in the circuit of what you propose. Not that I would likely end up building it but it would be "educational" to see how simply it might be done. There are other classes of tubes/older stuff that it might be useful for as well, best regards, Dan

From lester.veenstra at lmco.com Tue Oct 26 11:57:11 2004
Subject: [R-390] Tube Tester

However, to play devils advocate (and CTM) The best tube tester is the R-390 with a signal generator. Les K1YCM/3 www.r-390.com

From jpl15 at panix.com Tue Oct 26 12:51:09 2004
Subject: [R-390] Tube Tester

wrote: > However, to play devils advocate (and CTM) The best tube tester is the > R-390 with a signal generator. > Les K1YCM/3 www.r-390.com
>
With the possible caveat that one needs to be very sure of the 'goodness' state of all the other devices in the radio, else a complete, calibrated signal-trace is required to insure that all other stages, with the exception of the 'stage of interest', are of a known-on-spec condition.

Otherwise, you get into the -two and -three and -nnn unknown variable chaos.

That being said, using a "perfect" R390 for substitution testing of suspect tubes is fine, again with the caveat that you can meaningfully *and* accurately measure the change in the system caused by the substitution, and then relate that back to the Tube Under Test parameters.

This gets easier if the radio simply fails (or smokes...;{) when the substitution is made. On the whole, my own preference is to use a tube tester of some kind. Just my 200 millidollar on the Subject...
Cheers John KB6SCO

From lester.veenstra at lmco.com Tue Oct 26 13:02:21 2004
Subject: [R-390] Tube Tester

While tube testers are fine for gross checks, an evaluation of real goodness, that is, gain at RF, or at IF or at AF, or IF AGC Action, or, and particularly, front end noise, is best done by substitution in the receiver, finding better, best, or in many cases, does not make any difference, tubes.

The exercise of testing nominally good tubes in a tube tester and using that data as a predictor of which is the best in a critical spot in the receiver, is not one I would waste time with. Of course all the above is predicated having a receiver available that is in reasonable good condition. From that point, running substitution checks with the available stock, is a way to get reasonable condition up to really hot condition.
Still, would like to see design of the $1.95 do it yourself tube tester! IMHO Les K1YCM/3

From dougnhelen at moonlink.net Tue Oct 26 13:31:09 2004
Subject: [R-390] The Fine Points of Tube Testing

Dear All,

I found the article on tube testers. Very interesting: http://www.0wned.org/hstraub/testarticle.pdf
Doug K6JEY

From drewmaster813 at hotmail.com Tue Oct 26 15:25:06 2004
Subject: [R-390] Tube Tester

Bob Camp wrote: >Is there any interest in a "R-390A only" tube tester? As far as i can

Go to members.aol.com/sbench101 and you will find among other tube projects a design for a homebrew tube tester. It is a transconductance tester and incorporates adjustable DC power supplies to operate the tube under test at the same voltages used in an actual application.

It was primarily intended to characterize tubes to apply them in audio amplifiers but will test our R-390x tubes. For the type of test we would like to do some features could be easily added: grid emission, shorts, gas, "life test".

An adjustable constant current source in the cathode lead is used to set the tube current; that could be removed and the circuit simplified by grounding the cathode and using a bias pot in the grid circuit instead. (Caveat: makes it easier to over dissipate on small tubes.)

The unit could be simplified also by removing the sockets intended for audiophile type tubes, removing

facility for testing pentodes as triodes, removing triode mu testing capability. The power transformer/rectifier/filter could be eliminated and power "borrowed" from the R-390x by means of a tube socket plug or clip leads (fuse protected, of course).

The aforementioned site has settings/ readings for testing many tube types; more can be found at another audiophile site: triodeel.com Drew

From ham at cq.nu Tue Oct 26 21:14:15 2004
Subject: [R-390] Tube Tester

Hi, I certainly will not argue that a tube tester is a perfect gizmo. A working radio will always be a better way to check a tube than any tube tester made.

That said a tube tester does have it's place. If you have a dead IF strip on your only working radio you need to start with something. DC voltages are one way to go, a quick run through the tube tester to find a dead tube is another way to go.

Probably the most use I have ever gotten from a tube tester was on a piece of gear that had been run so long with the same set of tubes in it that they all were low gain. Not a single tube in the set made it above about 1/4 of the "minimum good" reading on the tester. Needless to say with every tube in there near dead troubleshooting the thing was a bit much ...

The thing that bothers me the most is that pretty much all of us spend a lot of money on tube testers that do so little for us ... Take Care! Bob Camp KB8TQ

From ham at cq.nu Tue Oct 26 21:59:19 2004
Subject: [R-390] Best R 390A Tube Tester

Hi, The reality of a tube tester is actually worse than it looks at first. Often they are set up to do a measurement that is affected by the DC current through the tube. A tube with high DC leakage will pass the test on a tester set up this way .... You can only do just so much with a simple tester ... Enjoy! Bob Camp KB8TQ

From ghayward at uoguelph.ca Wed Oct 27 08:19:07 2004
Subject: [R-390] Tube testers

> The reality of a tube tester is actually worse than it looks at first. > Often they are set up to do a measurement that is affected > by the DC current through the tube. A tube with high DC leakage will > pass the test on a tester set up this way ....

I agree in part. The tube tester didn't catch the small filament-cathode leakage that plagued my noise limiter. That being said, I get a lot of tubes at flea markets and the tester lets me cull the duds. Emission testers get some but then I acquired a transconductance tester and the end results got a lot better. Everything has its place. Cheers es 73 de Gord, VE3EOS

From brookbank at triad.rr.com Wed Oct 27 15:19:50 2004
Subject: [R-390] Sorry for the off topic request

Does anyone have a copy of or know where to get the manual for the BC-453-B and/or the BC-455-B Both are aircraft receivers, the first one 200 - 550 KC and the second 6 - 9.1 MC. Any help would be greatfuly appreciated. Thanks, Pat

From goode at tribeam.com Wed Oct 27 17:21:57 2004
Subject: [R-390] Sorry for the off topic request

What you want is the manual for a SCR-274N radio set which includes the 453 and 455 along with the 459 etc. I thought I download my copy from: http://www.kg7bz.com/Manuals.html but that site does not seem to come up now. If you cannot find a copy and can take a 25 M email I will send it to you. Steve Goode K9NG

From stevehobensack at hotmail.com Wed Oct 27 18:49:05 2004
Subject: [R-390] RE: tube testers

Hash: SHA1

The RCA Receiving Tube Manual has lots of good info on tube testers and tube tester circuits. There are simple schematic diagrams on tube tester circuits that can be set up on the bench using variable power supplies , variable rheostats, and ac/dc milliameters. These test jigs are good for testing a lot of the same kind of tube. I have several manuals dated from the forties to mid sixties and can be found on Ebay , hamfests , etc. 73....Steve...N8YE

From mjmurphy45 at comcast.net Wed Oct 27 20:53:06 2004
Subject: [R-390] RE: tube testers

Steve, We are not that interested in DC gain or even DC Transconductance I think. Lets talk AC and High frequency. There probably are only four tube types in the 390 worth testing if you are talking about sensitivity and signal handling (which seem to be the hot buttons). I think these could be handled with a high frequency bench generator at say 500 kHz and 10 MHz, a chassis with wired tube sockets and a high gain low noise amplifier and finally a Scope or high frequency AC meter to test high frequency gain and noise. This would not be the simplest way to find "Good" or "Bad" tubes but it would be a possible way to find "Better" tubes with good high frequency gain and low noise characteristics. Mike WB2UID

From ham at cq.nu Wed Oct 27 22:10:10 2004
Subject: [R-390] RE: tube testers

Hi, Pretty much what I am proposing is a simple transductance tester that , runs at 60 Hz just like the TV-7 and TV-10 testers did. That makes the circuit fairly easy to build and just about any reasonable AC voltmeter can be used as the "detector" in the plate circuit.

A quick scan of the tube tester schematics suggests that a fixed bias goes on the plate and screen. A variable dc bias goes on the control grid along with about a volt or so of AC. I suspect we would use something like a dozen or so resistors to set the whole thing up for the tubes in the R-390.

The advantage of doing it this way is that the data from the TV-7 or TV-10 can be directly compared to

our tester. This will give us a way to be sure that we got the design right.

I have never seen a frequency drop off in a tube. Certainly they do get noisy but they don't seem to get roll off problems. You can see capacitance variations but those are normally tuned out in the circuit. We could measure electrode capacitances and that would give us a pretty good idea of what is going on. I suspect that we wouldn't find out to much though ...

In order to measure high frequency gain on a tube we would need a tuned load to run into. The same thing would apply to the grid circuit. If you are going to do that we might as well just check them with a signal generator in the radio.

Noise figure would be a *very* interesting thing to measure on a tube by tube basis. The same issues about tuning the input and output circuits would apply but we might get some useful data. That project is a bit more involved than what I had in mind.

So I guess there's been enough interest. I'll go off and see what I can figure out for a circuit. When I do I'll let the group know. Thanks! Bob

From odyslim at comcast.net Thu Oct 28 11:18:25 2004
Subject: [R-390] Noise test

Well, since we are testing tubes this week, can somebody explain noise tests. I have the correct headphones which plug right into my TV-7. Now the question. Is there a specific test or does one just plug the phones in and tap on the tube and listen for microphonics? Scott

From ham at cq.nu Thu Oct 28 21:22:41 2004
Subject: [R-390] Noise test

Hi, You got the right idea. You can also catch odd clicks and pops this way. Enjoy! Bob Camp KB8TQ

From dhallam at rapidsys.com Sat Oct 30 14:07:55 2004
Subject: [R-390] R-390 Problems

I have a problem with my R-390 nonA and don't know exactly where to start. The radio went dead. I suspected a B+ problem and found that one of the 26Z5W rectifiers had gone bad. I replace both and now can measure 180 VDC at the test point for regulated B+. The radio still is dead.

Symptoms;

No movement in either the line audio or carrier level meters on any band with either manual or automatic gain No noise on the local audio output at any setting of the audio gain control 455 kHz signal from my URM-25D applied to test point E210 (grid of the 3rd mixer) produces the expected output measured with the 410B at the diode load terminal until the pass band is increased to 8 kHz or 16kHz. Then it's like something breaks into oscillation as the diode load voltage increases to something like 100 or more volts.
I guess the next step is to start checking the voltages at each tube, but I wondered if someone might have an idea as to a specific location to concentrate on. David C. Hallam KC2JD

From ham at cq.nu Sat Oct 30 14:50:16 2004
Subject: [R-390] R-390 Problems

Hi, Well the first thing to *always* be sure of any time you see IF filters involved is to be sure that the "magic" B+ blocking capacitor is in series with the filters. I see no reason why that would be your problem but it never hurts to be sure.

The 26ZW5 can get pretty dead and the radio will still work. I suspect yours has been dead for a while and you just found the problem when the second issue started up.

As you may have guessed the problem is likely to be an IF stage going into oscillation. Since it changes with the filters it probably is one of the stages ahead of the mechanical filters. I would also do a resistance check on the filters just to be sure the two wide band filters are still ok. Enjoy! Bob Camp KB8TQ

From dhallam at rapidsys.com Sun Oct 31 08:02:32 2004
Subject: [R-390] R-390 Problems Update

Thanks to all who replied to my request for help. The problem turned out to be a failed ballast tube. I changed the VFO and BFO tubes to 12BA6's and stuck the paper clip jumper in the ballast tube socket. All is working well again.

I don't know if the failure of one of the 26Z5W rectifier tubes precipitated the failure of the ballast tube or if they were two unrelated malfunctions. The rectifiers were replaced with a pair of Ted Weber's copper top silicon plug in's. David C. Hallam KC2JD

From dhallam at rapidsys.com Sun Oct 31 09:40:10 2004
Subject: [R-390] R-390 Problems Update

I replaced the 6BA6's in the VFO and BFO with 12BA6's, which eliminates the need for the resistor to replace the ballast tube.

There has been a recent discussion on this list about the ballast tube and ways to replace it. I think the general consensus is that the ballast tube really is not needed to stabilize the VFO unless you looking for the last little bit of stability. If so, you need to replace the ballast tube with something more sophisticated as given the relative "stability" of the AC line, the ballast tube doesn't do much in that regard.

Replacing the VFO and BFO with 12 V filament tubes is one of the suggested mods. David