

The story on the 'R-390 COOKBOOK'
A link was at the bottom of the 'Army' section
Larry Haney, 5-23-2023

As I was reading through the 'Ballast' and other sections of the Pearls, I came across a couple of articles about the 'R-390 COOKBOOK' on our website (was at the bottom of the 'Army' section of the Reference page). Barry (in 2000) and Roy (in 2006) make good points, so I included their posts here. I decided to write this article because it has been so long since anyone commented on it, so newer folks may not be aware of the issues with it. My comments are at the end of this short document. Hopefully this document will save someone some time and agony.

I have removed the link to it on our website at the bottom of the Army section and added the link at the bottom of this article.

Regards, Larry

Date: Sun, 30 Apr 2000 06:54:55 -0400
From: Barry Hauser <barry 'at' hausernet.com>
Subject: Re: [R-390] THE R-390 COOKBOOK - Warning

It was called to our attention that one or two of the mods described in the "cookbook" may be incorrect. In particular, the 6080 replacement for 6082's was mentioned. The appropriate factor for the silicon rectifier might be closer to .707 rather than half of the 24 volts. (Wiring the 6080 filaments in series was supposed to bring the voltage down the rest of the way to 6.) Apparently, the resulting voltage also depends on the load, so an actual measurement should be taken, lest ye be operating the 6080 six volters at something more like 8 volts.

It was also pointed out that replacement of the 26Z5W's with ss rectifiers may call for a dropping resistor which is not mentioned in the cookbook, although I recall threads on this on the list.

Subbing out the ballast tube has always been grist for the discussion mill. While the "book" uses a tube rather than a resistor, I don't know whether this actually provides any regulation action similar to the ballast tube.

All of those may be further affected by running the receivers at 120-125 VAC, rather than the 115 for which they were designed.

What's left? Replacing the rear panel C connectors with SO-239's and pulling out the relay -- not exactly running to do that. SO-239'ing everything is pretty much an outdated fetish and it is still possible to find C-connectors at reasonable prices, and even twinax connectors as well.

Let's see ... that leaves the noise test, and there has been a question raised about the impedance matching network/voltage divider shown for that.

So, as it turns out, "The R-390 Cookbook" may serve more as a list of what not to do to your R-390(x). I was thinking of taking it down, but just added verbiage to the html page similar to the above as a

warning to visiting pilgrims. I guess it's nice for an historical perspective or piece of short term nostalgia.

Maybe it's time to update the cookbook?

It was suggested to me that the best way to determine the net voltage of the 6082/6080 mod was to try it and take an empirical reading (at 115 vac and 125, perhaps, AC supply voltage.) I think there has been some mention of appropriate starting values for the dropping resistor for the 26Z5W sub in the A's, not sure about the non-A's if there'd be a difference. We could discuss and resolve the other items as well.

What's nice about the Cookbook though is the format. It provides a consistent sequence with Purpose, Reason, Tools Required, Parts Required, and Procedure. I would modify the format so that Reason would be Rationale with two sub-sections -- "Pro" and "Con". Maybe some classification headings, such as A/Non-A/Both, Reversibility, and Version number of the piece.

While many of you would be opposed to practically all of them in principle, at least there'd be a place where the mod would be described accurately along with dissenting opinion and considerations. Then, when the subject comes up on the reflector again, as they're wont to do, there would be a handy, efficient and complete reference on it.

So, for openers, does anybody have a non-A where the 6080 sub has been done? Have you checked the actual filament voltage lately? For the time being, I prefer to stock up on some spare 6082's for about ten bucks a piece and use a muffin fan. But if they become @SCARCE@ or @RARE@, then my preference could change in a heartbeat. ;-)

Roy Morgan roy.morgan at nist.gov

Thu Sep 14 12:17:59 EDT 2006

Next message: [R-390] The R-390 Cookbook by A.J. Carmody: Beware!

R-390/URR Owners,

While finding the link to ST 32-152.pdf, "Visual Alignment..", I came across another one called R390_cookbook.pdf, by A.J. Carmody from the Army MARS program. It is intended for the R-390/URR ("Non-A") radio.

One of the mods he suggests replaces the two 6082 24 volt series regulator tubes with two of the more common and cheap 6080 6 volt ones. His method puts the two tube filaments in series with a diode to rectify the available filament supply to half wave.

THIS IS A BOGUS DESIGN. DO NOT DO IT.

It turns out that a half wave rectified 24 volt supply produces a LOT more heater power than a full wave voltage of 12 volts. The 6080 filaments will run way hotter than they should. They may overload the transformer filament winding, and likely both fail soon. This is a classic dead horse that has been revisited and beaten a number of times on the R-390 list.

His other mods don't contain such egregious engineering errors, but some are undesirable in a time when we are less apt to permanently modify our radios. (The parentheses below are mine.)

- 1) Power Supply Sub-Chassis Modification (the solid state diode mod for the B+ supply. He does not use a dropping resistor to lower the un-regulated B+ to normal levels.)
- 2) IF Sub-Chassis Modification (Replaces the ballast tube with a 12BH7 or 12BY7.)
- 3) AF Sub-Chassis Modification (The mod I complain about above - replaces the 6082's with 6080, and runs the new tube filaments way too hot.)
- 4) Low Impedance Speaker Connection (Uses external 600 to low impedance voice coil matching transformer.)
- 5) Antenna Input Conversion to 50 Ohms "To replace antenna input connectors with SO-239 Connectors that mate with standard ham equipment." (In this mod, he removes the "break-in relay" completely (I think he means the antenna relay actuator), solders jumpers to various parts of the antenna relay module and connectors, removes the two antenna connectors and replaces one of them with an SO-239 connector. SHUDDER!!)

The last section of this document is a two page procedure to test the radio for signal plus noise to noise ratio and test each RF front end range band for internal noise level at a standardized gain setting. This seems like a good procedure. It uses an audio output level meter, the TS-585, but an AC VTVM with DB scale and a load resistor would work just as well.

Roy
- Roy Morgan, K1LKY since 1959 - Keep 'em Glowing

My comments about the 'R-390 Cookbook' follow:

1. Solid state diode mod for the B+ supply

---> L Haney, A dropping resistor is required for the '390A' due to a high voltage issue on the 6AK6s audio output tubes. They both have the same audio output tube circuitry, but the 390 has B+ regulation eliminating that issue on the 390. I don't know if this will cause a problem for the 390 B+ regulator or not.

2. Replace the ballast tube with a 12BH7 or 12BY7

---> L Haney, Both a resistor or 12BH7 work well. The resistor (42 ohms @ 5 watts) provides a little benefit on cold power on as it's resistance does not change much, whereas the tube presents lower resistance at cold. But, the tube does provide a slight amount of regulation.

Another option is obtain an electronic current regulator that just plugs in.

Another option I've heard of is using a diode for voltage dropping. This does not appear to be a valid

method.

5. Antenna Input Conversion to 50 Ohms and replace antenna input connectors with SO-239

---> L Haney, both are not necessary or desired. The rx input is 50 to 200 ohms on both a 390 and 390A. The twinax connectors are very easy to find and not expensive. A 50 ohm coax can be connected directly to the balanced input without any issues.

AND now for the functional problems with the 'cookbook' in this area. The antenna relay is disconnected. It was designed to ground the antenna when the function switch is in the STAND BY or CAL position AND when the 'break in' function is activated. This change can allow serious damage to the rx front end.

And in reference to his suggestion to connect a second rx to the J107 Unbalanced Ant connector to share the antenna connected to J108 - it's not going to work very well. J107 is still the Unbalanced Ant input and the incoming signal from the antenna on J108 is seriously filtered at J107 (UNLESS the second rx is tuned to the same frequency). And remember, the J107 is a high impedance connection and will cause major signal loss in the 390 if a low impedance line is connected to J107.

x. Signal plus noise to noise ratio test

---> L Haney, The cookbook is correct in the idea of using an impedance adapter when doing measurements with a signal generator (as it usually requires it in order to give correct signal output readings on it's meter). The correct one to use on both the 390 and 390A is the DA-121, as the balanced input impedance on both is 50 to 200 ohms.

Here's the link to the 'R-390 COOKBOOK' on our website: [r-390_cookbook.pdf \(r-390a.net\)](http://r-390_cookbook.pdf(r-390a.net))