R-390/URR

THE VOLTAGE REGULATOR FUN AND GAMES in R390/URR

by Dave Medley

Probably the most pesky part of the R-390 non-A radio is the audio chassis which also contains an elaborate voltage regulator. This latter is the source of a great deal of heat which in turn leads to the deterioration of adjacent components. Servicing this can be a bear so these notes are compiled from my recent experience with a dozen or more of these units. Most of the units I have seen have had faulty voltage regulators and a good number have had audio problems due to heat.

The VR symptoms are usually no regulation. Regulated B+ reads full B+, around 300 volts. This, if allowed to persist, can lead to other problems like weak or dead 6AJ5 tubes. I have also found the reverse symptom like low voltage around 130 volts or less.

The first thing to check is the 6082 regulator tubes. There have been several instances of them being replaced by 6080 tubes. These have 12v heaters compared with the 28v of the 6082 and surprisingly they will work for a time but failure is inevitable.

The next area to check out is the voltage reference tubes. When the unit is operating correctly these two tubes will glow quite brightly for a short period and then become somewhat dimmer as the regulation function starts to work. If they stay bright then check R625 (1k), R626(2.7k) R624 (520k) and especially C608. If this capacitor is leaky the voltage will be low.

Next check the components around V607. C606, R618 and R623 are the critical ones.If none of this works then you will just have to check all the other resistors in the circuit. Be sure the four 47 ohm cathode resistors for V605 and 606 are OK. I had one case where I had to replace all these.

Date: Sun, 30 Apr 2000 17:21:34 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] 6082 Alternatives

I'm making a separate thread/subject out of this because the "cookbook" one
covers about half dozen mods and is already becoming unwieldy. (BTW, Norm, thx for the compliment.)

I posted on this a month or two ago. I recently acquired an R-391 with several mods, one of which was a complete ss rework of the 6082 and

related circuits. (The R-391 is electronically and mechanically the same as a non-A except for the addition of the autotune components, which are purely electromechanical. All the modules are non-A, but there's a different casting traversing the mainframe and additions to the wiring harness for the 28VDC for the autotuner.)

It came with a copy of a non-A manual with handwritten notes and schematics. I can't fully describe the circuits just yet, but the rx seems to be working well. The "modder" also replaced the rectfier tubes with pair of SS rectifiers each, but I don't know that he put in any dropping resistor(s).

As for the 6082 etc. replacement, there's a piece of blue perfboard covering about half of that module, mounted on standoffs. The work was rather careful and professional looking, but this was an invasive mod -- there's only one tube socket left out of seven or so. There are several active devices including, as I recall -- it's not in front of me -- an IC and a tab mount VR or transistor. I hesitate to scan and relay the schematic because the mod shows signs of subsequent modding. For example, there's some heat sink grease on one of the baffles/shields adjoining that perfboard and a hole. I didn't clean it off intentionally, so I wouldn't loose track of it. It looks like something was originally heat-sunk to the baffle and subsequently removed. That tab mount is just sitting perpendicular to the board in the middle of it, nowhere near the baffle.

When I get around to it I plan to (1) check voltage on the thing (2) compare the handwritten schematic to the actual circuit and make any corrections and (3) post that plus photos on my site or email them to whomever is interested. It might be interesting to compare this working circuit to Dr. J's design.

The audio amp has been totally replaced with what looks like one of those big IC/module things they used to sell (and maybe still do) with some associated external components. That's under the deck on a smaller piece of the same blue perfboard. The output is low impedance and the terminals on the strip are marked "speaker". No matching xformer needed. Those modules were sort of oversized tab mount style with roughly a dozen solder connection terminals all on one side. As I recall, they put out a few watts directly. RS used to sell something like it, maybe still do. Sound quality is pretty good.

This radio has a power resistor stuck in the ballast tube socket -- nothing high tech there. Still has it's original C and twinax connectors, though. RF & IF decks appear to be stock.

Date: Wed, 06 Sep 2000 15:55:43 -0500
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>

Subject: Re: [R-390] It's "Rubinstein" Not "Rubenstein"

Barry has a 391 with solid state regulator that is simple, we've analyzed and tested it. Just want to compare its computed and analyzed performance with the original. Barry has another 391 and 390 but not immediately accessible and wishes a wider diversity of test results for better averaging. If the simple circuit does at least as good for line and load regulation and long term (hour or two) drift, there's no need to go off the deep end with a closed loop system using a band gap reference. I do have such a closed loop system sketched, but not proven.

It takes work to convince me that a high voltage zener diode is less noisy than a VR tube.

With class A audio stages, only the small current change of the AGC controlled stages would seem to change the power supply current. The bigger task of the regulator in the 390 is as an electronic ripple filter and regulation from line voltage changes. There is no L in the power supply, only a small C.

The 6082 in the R390 run about 125 volts differential. Between heaters and plates, they dissipate about 50 watts, a major part of the heat in the receiver and are located on the lower deck to thoroughly heat soak the rest of the radio.

My best solid state regulator designs need a minimum of 20 millivolts head room at the bottom of the ripple to retain regulation and ripple filtering.

The entire B+ supply in the none A is regulated, while only the critical oscillators in the 390A are regulated.

Date: Wed, 06 Sep 2000 17:04:56 -0700
From: Robert Tetrault <tetrault@teleport.com>
Subject: [R-390] Power supplies

> It takes work to convince me that a high voltage zener diode is less noisy than a VR tube.

It would take work to convince me of the same, Jerry. My earlier statements about SS references were never intended to be applied to HV Zeners, only to actual designed-for-the-purpose references using bandgaps or buried Zeners. Their advantages outweigh their low voltage handicap.

Furthermore, any comments that I've made about noise contributions from the 0A2 are entirely hypothetical. The 390 as-is will likely never be

substantially improved to the perception of any given operator by any reasonable low-noise power supply design. Noise modulation effects have been measured in other receivers and rigor has been established to mitigate those effects. State of the art receiver designs embody that rigor as part of what are now generally accepted design principles. Attempting to bring some of that rigor into the 390 is an interesting topic but of doubtful practical usefulness; it is already formidable. (But I can't help myself wondering. <grin>

> With class A audio stages, only the small current change of the AGC
> controlled stages would seem to change the power supply current.

Agreed. The charge pump current is objectively small (the AGC RC time constant) and therefore a small part of the total, however, I've seen (literally) a video display modulated by AGC that was powered by open loop supplies.

> The bigger task of the regulator in the 390 is as an electronic ripple
> filter and regulation from line voltage changes. There is no L in the
> power supply, only a small C.

Certainly, the gain of the 6082 serves well as a C multiplier in this app. No L in the supply represents one of those trade-offs dictated by space that are offset by the tubes' C multiplier function. I tend to forget the early breed of regulators that are open loop and essentially referenced pass-device C-multipliers.
>
> The 6082 in the R390 run about 125 volts differential. Between heaters
> and plates, they dissipate about 50 watts, a major part of the heat in
> the receiver and are located on the lower deck to thoroughly heat soak
> the rest of the radio.

Is it, do you think, a goal to heat soak the rest of the radio? A little may be good, enough to elevate the gear stably above ambient, but we all know that more is not better.

> My best solid state regulator designs need a minimum of 20 millivolts
> head room at the bottom of the ripple to retain regulation and ripple
> filtering.

Yes. The headroom is equal to the minimum ON resistance of a power FET with maximum gate drive and the specified load current. So, conservatively (not knowing the ripple voltage), the design could reduce the heat load on the rest of the receiver to a few Watts, augmented by the reduction in heat load afforded by SS rectifiers. To me, this is worth pursuing, as you have already done. And certainly for myself, penciling in

something feasible is the greater part of the satisfaction gained in the inquiry, though making a tube-type module that could plug-and-play would be an entirely different achievement. Reversible major improvement, anybody?
>
> The entire B+ supply in the none A is regulated, while only the critical
> oscillators in the 390A are regulated.

Yet another example of original design decisions made on the basis of absolute best practice that later engineering then finds to be unnecessary and hence revised out. Absolute best practice is great when it is actually superior to lesser alternatives in a particular application.The advantages of adequate staff to exhaustively test and prove successful alternatives is one of those intangibles overlooked by many engineering "managers" I've had to deal with. Another case in point is the exploitation of paper bypass caps' ESR to allow series resonance at 455kc or some other specific frequency. "If you can't fix a problem [poor ESR of then current component technology], feature it." Bravo! But now replace it with a good film or ceramic as the case may be. End of subject. I enjoy this gab immensely, as well as the 390 that sponsors it.

Date: Wed, 6 Sep 2000 21:20:12 -0400
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Power supplies

Dr. J. is well able to speak for himself, but on the off chance he misses this -- No, I'm sure he doesn't consider heat soaking the radio a plus -- just the opposite and the main reason for doing a reversable SS voltage regulator to put the 6082's aside. The 6082's are pretty, and a bit pricey, but the main purpose is heat reduction in the interest of the preservation of the rest of the radio. (and, ironically, existing stocks of 6082's) Some have reported long term heat damage of nearby components. The most frequent fix is to position a boxer fan on that side of the radio to draw the heat out the side rather than let it conduct through the baseplate and cook things. But, if a reversable and effective mod can be done ....

On the sample I have, the modifier chose to hack the audio module, clipping wires hither and yon, and pulling out every single tube socket except the 12AU7. He also yanked the audio amp and installed an inline style module
with associated components. The output on the rear panel terminal strip is
labeled "4 ohms". This receiver also has two ss rectifiers in each of the 26Z5W sockets and a resistor in place of the ballast. The modifier (some might call hacker) seemed to be hell bent to reduce heat and perhaps current

draw. He succeeded. This radio runs cool. Perhaps he wasn't a hack guy but used a spare, defective audio module and had an original on the shelf.

However, as you mention below, most would prefer a reversable plug 'n play
approach to the VR swap and Jerry, after looking at the design, has concluded that it can be done simply by pulling tubes and mounting most of the circuit on an octal base plugged into one of the 6082 sockets, if I'm paraphrasing correctly. Anything needing heat sinking could be mounted to the side of the module, possibly even using an existing screw hole. Also possible to use a second octal base for support to use a floating heat sink, i.e. not bolted to the chassis or module.

> Yes. The headroom is equal to the minimum ON resistance of a power FET
with maximum gate drive and the specified load current. So, conservatively (not knowing the ripple voltage), the design could reduce the heat load on the
> rest of the receiver to a few Watts, augmented by the reduction in heat
> load afforded by SS rectifiers. To me, this is worth pursuing, as you have
> already done. And certainly for myself, penciling in something feasible is
> the greater part of the satisfaction gained in the inquiry, though making a tube-type module that could plug-and-play would be an entirely different
> achievement. Reversible major improvement, anybody?

Yup -- that's the idea all right. I can't claim any credit -- others have pursued this before -- at least one I know of and others have expressed interest. Jerry has had an alternate design concept on paper for some time.

Date: Wed, 06 Sep 2000 19:34:40 -0500
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] Power supplies

At least bypassing the zener diode to lower the noise doesn't cause it to oscillate like the VR tube will. In the 390, there is substantial filtering after the power supply to lower the supply impedance that just incidentally helps reduce power supply noise. Fortunately the pentodes used nearly everywhere in the radio have a very good constant current characteristic and so reject noise from the power supply on the plates. Not so for the screens, but the RF bypassing necessary for maximum gain and stability helps reject power supply noise. Barry and I wonder how much regulation is necessary in order to evaluate an existing design and then to maybe create new if the existing isn't good enough.

While heat is good for removing moisture from the radio, too much heat

can cook it. There's 25 watts or so of heater power in the 6082 and about that in plate dissipation. The heater power is completely removed with the solid state regulator of any design, and the plate power can be remoted via a cable fairly easily. All the raw needs are at the 6082 sockets so a no modification plug in unit is possible. I think the heating of the audio stages and the IF stages is enough to keep the radio humidity down (except maybe in Nolan's Louisiana swamp location) without the power supply heat.

It's not so much the charge pump changes plate current load as that increased AGC voltage reduces the plate current in the controlled stages to reduce their gain and so the total plate current of the receiver changes some when going from no signal to maximum signal.

There is a capacitor to inject some of the ripple into the regulator to make it a more effect filter in the 390 regulator circuit. The regulator circuit is a classic feedback circuit with a pair of dual triode pass tubes with their control grids driven by a small pentode whose grid gets an error signal from the output through a couple VR tubes in series.

Without changing the power transformer its not possible to eliminate the regulator dissipation, only the heater power. Its probably practical to move some of the heat from the pass transistor to a series resistor in its collector circuit to make transistor heat sinking easier. Though choosing that resistor will depend on the actual current drawn by the radio.

Collins had the staff to prove the radio's design, but Art would have preferred a solid gold radio to a gold plated radio, and while the crystal mixers and tunable IF were old hat at Collins, the concept was foreign to the reigning military radios of the era, so excess regulation (and that goes for the ballast tube too, I think) was required to convince military radio selectors that the design was workable. The tunable and bandswitched HF oscillator of the era as used in the SP-600 and other brands of radios required every possible help to keep AM in the bandpass while the 390 class of receiver planned far better stability. I believe that a radio delivered to compete with the specs for an SP-600 or SX-88 was required to have everything regulated because those radios needed it for marginal stability and the general purpose receiver specifications reflected that regulation requirement. Even though the 390 didn't need the regulation to meet stability it had to include the regulation to be considered in the competitive bidding. Without lots of regulation, it would have been rejected without being tested. 1956 was not beyond the end of career of WW2 combat veterans where crystals were not commonly used for stability and the instability of some workhorse HF radios (not the ART-13) was still on their minds when selecting equipment for the next generation of military uses. They wanted better than

BC-191/375 and BC-342.

Date: Thu, 14 Jun 2001 16:48:00 -0600
From: barrie99@marsweb.com
Subject: Re: [R-390] Test

I hope the aliens are friendlier than the ones that control the "AMPS" reflector! I sent a status report, actually two, to the group. Must have water in my hardline. Don't seem to be getting out very well. Found both rectifiers without filaments, both in the '390 and the tube checker. Have replacements on the way. My concern is that it's unlikely that both 25Z's would choose to burn out at once. Something must have caused that to happen. If I plug in two new rectifiers without finding the cause, they may go away, as well. One possible/probable cause would be that one of the 6082's tested as having a short. So I've got two of those on the way. Keen observation: Tubes are costlier than they were 30 or 40 years ago. Do they work that much better now?

Date: Tue, 11 Dec 2001 11:33:34 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] R-390 Web Page up and running

> The P/S is the problem. The four 47 Ohm resistors in the cathodes of the 26Z5's are open and one of the 26Z5's filaments are open.

Look for shorts in the B+ system. Replace all EIGHT 47 ohm resistors in the radio.. with 5 watt ceramic ones. Then rig a fan to keep those 6082's cool. <snip>

From: Al Solway <beral@videotron.ca>
Subject: [R-390] [Fwd: R-390 Rplacing 6082 With Solid State]

I refer to The FAQs, Pearls Of Wisdom/Power Supply, compiled by Wei-Li. This is a compilation of information by subject that is easy to access. http://www.r-390a.net/pearls.htm

Within the power supply section, around the April 2000 time frame or about half way through the P/S section. Dr Gerald Johnson describes a solid state replacement that he has "scratched out on paper with components chosen. Its not been tested." Dr Jerry indicates that his circuit would use a couple of IRF820s three zeners and a TL431A1Z plus some resistors and caps. There is additional follow-up discussion from Barry Hauser where he describes a solid state replacement for 6082s in an 391 he had acquired.

I recall that within the past few months there has been some talk on this

topic but can't seem to find anything specific on the circuit. What I would like to know is where to get more info, a schematic and a list of parts. Also has any body tried Dr. Gerry's circuit. I am restoring an R-390 and have decided to go the solid state route for the 26Z5 and 6082 if I can get the above information. I have ordered 6080s to replace the 6082. I have selected a filament transformer, the Magnetek VPP12-4400 or the Hammond 183K12. If everything works out as planned all this will be reversible using plug and play modules. I know all this has been covered before but discussion would be appreciated.

Date: Tue, 05 Feb 2002 20:17:11 -0500
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] [Fwd: R-390 Replacing 6082 With Solid State]

The whole shebang is the subject of Issue #52 of The Hollow State Newsletter. Dr. Jerry had been working out a replacement (on paper), then I happened to acquire an R-391 (electronically the same as the non-A) which was heavily solid-stated, including a fairly simple replacement for the 6082's. This used a couple of zeners and a dual Darlington pair. A fed Dr. J. the info to sort of "reverse engineer" the circuit. He authored the article and included a list of suitable currently available transistors.

While the mods on this particular R-391 were not done reversably, the 6082 replacement circuit could be built on a small board that would fit right in the 6082s' "cubicle" with a single octal plug making the connections -- or a few hard wired leads..

You can get a copy from Ralph Sanserino for $2.
His email address is sanser@gte.net

Or, if you're in a hurry, being editor of HSN, I have an emailable copy on file right here I can shoot over to you. However, there's a catch -- an underhanded sleasy weasel deal of the kind the Fifth Estate may sometimes arrange. You have to build a reversible plug 'n play, then write it up (with my help) for a followup in a later issue. I'm making this big time $2 bribe because right now I need authors more than subscribers.

So Al, whaddya say, hmmmmm?

From: "Jim Temple" <jetemp@insightbb.com>
Date: Tue, 9 Apr 2002 14:28:37 -0400
Subject: [R-390] R-390 (non A) power plug.

My new r-390 acquisition came with a two wire power plug configuration. I have obtained a length of 3 wire and am installing it now. Two questions:

1. Does it matter which lead, hot or common, is attached to F101? Would it be best to wire the hot (black) wire to post "D", which is attached to F101, for purposes of efficient fuse protection?

2. Would the power plug ground (green) best be utilized by attaching it to:

a. Post "C"?
b. The housing ground post?
c. Both?

Yes, there is a ground post embedded in the interior of the connector housing. Sounds like a multiple choice test!?! Thanks for any views or insights.

From: "Scott, Barry (Clyde B)" <cbscott@ingr.com>
Subject: RE: [R-390] R-390 (non A) power plug.
Date: Tue, 9 Apr 2002 13:37:27 -0500

Jim, I don't have a non-A, but I'm pretty sure you want the hot lead connected to the fused side. When(if) the fuse blows, you don't have hot running all the way back through the radio to the other side of the fuse.

Date: Tue, 09 Apr 2002 15:30:40 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] R-390 (non A) power plug.

>I have obtained a length of 3 wire and am installing it now.

I assume you mean a three wire line cord with a grounded plug.

>1. Does it matter which lead, hot or common, is attached to F101?

YES, it matters.

> Would it be best to wire the hot (black) wire to post "D", which is attached to
>F101, for purposes of efficient fuse protection?

SAFE is the word not "efficient". The hot wire (black in US Standard cables) goes directly to the REAR terminal of the fuse holder (through the line filter in the case of R-39x radios). This does two things:

1) Reduces to the minimum the amount of line voltage exposure inside the radio after the fuse blows.
2) Protects you (to some degree) from contacting the line voltage as you

replace the fuse.

>2. Would the power plug ground (green) best be utilized by attaching it to:
> a. Post "C"?

Yes, (I assume contact C is the one going to ground..)

> b. The housing ground post?

Do you mean the threaded center mechanical clamping post? NO. Do not depend on that for grounding.. do not use it. Roy

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From: "Jim Temple" <jetemp@insightbb.com>
Subject: Re: [R-390] R-390 (non A) power plug.
Date: Tue, 9 Apr 2002 16:14:35 -0400

Thanks for the insights. The only unanswered question is the grounding. Within the cable housing that attaches to the radio are: (1) Post "C". This, according to the schematic, goes to the radio electrical ground. (2). Inside the connector housing, attached to the interior wall of the housing, is a post with nothing attached to it. I would assume that if this was attached to the outlet ground, it would provide a ground path to the radio frame. I have a curious mind, so I began thinking.....(watch out!!).

The power outlet ground, on a R-390A, is attached directly to the radio frame. At least with mine this is so. On the R-390, it seems that there are two paths to ground the radio. 1. Post "C" of the power connector, and 2. The radio frame.

I would assume that both are, practically speaking, the same. So attaching to one or the other would accomplish the same purpose. On the other hand, attaching to both, at the same time (within the housing), would probably accomplish the same chore, or could there be possible ground loops associated to grounding to both the radio electrical ground (power plug post C) and the frame ground at the same time?? Also, within the attaching housing, the ground could be put in series or parallel (One ground wire attaching both points, or one wire branched to each post separately. My experience says that multiple grounds can introduce unwanted feedback. Hence the importance of lead dress and routing. Am I being too persnikity here, or is this a valid question??

From: "Glenn Little" <glittle@awod.com>
Subject: RE: [R-390] R-390 (non A) power plug.
Date: Tue, 9 Apr 2002 17:05:56 -0400

In shipboard electronics, there is a chassis ground which is grounded to the hull of the ship. The AC is distributed without reference to ground. You will measure about 65 Volts each leg to ground on a ship. The reason for this is for battle damage. If the ship suffers battle damage and one leg of the single phase AC distribution becomes grounded, there is no harm done. The electrician will recognize this with their ground isolation checks and repair the damaged distribution circuit. The chassis ground is a safety ground. In shore based electronics, you could connect the non fused side of the power to ground without problem because neutral and ground are tied together at only one point (in the distribution panel). Again chassis ground is safety ground. Neutral and ground are two completely different legs at the equipment. You can cause some pretty dangerous situations by tying neutral and ground together at the equipment. I think that it is even against the electrical code.

I spent 22 years of my life in the Submarine Force protecting you from the evils of Communism.

Date: Tue, 09 Apr 2002 16:28:08 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] R-390 (non A) power plug.

Jim: The non-A is non-cost reduced version so came with a gen-u-wine, heavy duty, deluxe power connector setup, as opposed to the cheaper terminals and stamped cover of the Non-A, re-designed primarily to free up funds for hammers and coffee pots. (Naw, I like my A's and non-A's alike, as well as SP-600's and even a RAK 'n RAL, BC-312/342 or two. An equal opportunity boatanchorist.) Anyway, connect the green wire to the ground pin of the chassis plug. Do you have the correct connector?

Put the black hot wire to the fused/switched pin as recommended by others -- it's a safety requirement, and the neutral wire goes to the continiously connected pin. The 4th pin was for 28 volt accessories and is used in the '391 for the autotune. So forget about that one.

You can use the chassis ground terminal for earth ground, but earth grounding might be better done solely to the coax shield at the point of entry of the downlead. Any opinions on this? R-1051's have a similar 3-pin version of that power connector and some R-390A's are fitted with the Navy addon that converts fromt the raw terminals to the 3-pin Navy type. The 1051's also use the ground pin, and also have separate grounding terminals for the case.

I think most tie the chassis to earth ground in addition to the ground through the power connector. What say the group?

From: "Jim Temple" <jetemp@insightbb.com>
To: <r-390@mailman.qth.net>
Subject: Re: [R-390] R-390 (non A) power plug.
Date: Tue, 9 Apr 2002 20:48:46 -0400

Good explainations all. I have learned a lot about radio grounds. What I have done is to wire the cable to make the hot lead (black) connect to the fused pin "D", and the neutral lead (white) to connect to the non fused pin "A", and the ground lead (green) to connect to pin "C". The chassis will be grounded to earth when I permanently install it in it's operating location. Thanks, all, for your kind offers of knowledge. Regards, Jim

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From: "Jim Temple" <jetemp@insightbb.com>
Subject: Re: [R-390] R-390 (non A) power plug.
Date: Tue, 9 Apr 2002 20:54:01 -0400

Oh, power plug pin "B" is left unattached. Something to do with DC operation that is not normally used with an R-390.

Date: Tue, 09 Apr 2002 18:53:32 -0700
From: David Ross <ross@hypertools.com>
Subject: [R-390] Re: R-390 power plug.

390 folks - Jim Temple mentioned DC power operation with an R-390... There is a dynamotor power supply for the R-390 & R-391 - has anyone ever seen one? I'd sure like to find one...

Date: Wed, 10 Apr 2002 07:41:07 -0400
From: "Ray, W2EC" <w2ec@attglobal.net>
Subject: Re: [R-390] R-390 (non A) power plug.

Can't remember the pin letter, but Jim is correct, one terminal is for the external 24vdc supply used for the motor on the R-391.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Fw: 6082's Question
Date: Thu, 27 Jun 2002 08:42:35 -0400

There are a number of ways to solid state out the 6082's. One is described and discussed in Issue #52 of the Hollow State Newsletter -- article by Dr. Johnson based on what I found in an R-391 I acquired. The audio amp had also been subbed in mine -- only one tube left on the audio deck.

Date: Thu, 27 Jun 2002 09:41:03 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Fw: 6082's Question

Various folks have developed solid state replacements for the 6082 tubes. If there are no such tubes present in the radio, then most likely some previous owner has put in that kind of mod.

Date: Sun, 19 Dec 1999 10:59:12 -0500 (EST)
From: Norman Ryan <nryan@duke.edu>
Subject: Re: [R-390] R390 dial lights

That was me who posted that, but I goofed. The non-A dial bulb is 28 V., not 6.3 V. It's a type 327.

Date: Sun, 19 Dec 1999 08:25:18 -0800
From: Dan <hankarn@pacbell.net>
Subject: Re: [R-390] R390 dial lights

FYI: William Perry Company in Louisville, KY. has #327 bulbs for .35 each. Just got 10 from him.

Date: Mon, 03 Apr 2000 14:53:07 -0500
From: Randy Guttery <comcents@mississippi.net>
Subject: Re: [R-390] R-390A vs. R-390

> Is the biggest difference between the two is that the R-390A uses
> mechanical filters and the R-390 uses L/C filters? Thanks,Joe.

Biggest? That's something of how one would prioritize "difference"... IHMO, NO. (IMHO) Biggest single difference would be power / power distribution. The 390 is basically a 26V filament bus - with several "serial strings" on that bus (along with the 6082s , etc.) - while the "A" uses a basic 6.3V parallel bus. The 390 uses a very high voltage supply - with a brute-force regulator to pull it down to +180VDC - while the "A" uses a more traditional "designed" supply that sits pretty close (but not regulated to) the desired operating voltage. The next "biggest" would be in gain distribution - i.e. number and gain of RF / IF stages. Totally different (2 RF and 6 IF gain stages in the 390, 1 RF and 4 IF gain stages in the "A").

While the mechanical filters are certainly different than the LC stages they replace - they only represent one stage of the "A's" IF - or "effectively replacing" three LC stages of the IF in the 390s... really a pretty small difference. And you can't just "drop in" an "A" IF in a "non-A" (nor vice versa)... you have to accommodate the filaments - ---though that's not real hard - as noted before - my "other-half" keeps an "A" IF in her 391 most of the time - as she likes swling RTTY - and admittedly - those mechanical filters are really nice for picking FSK out of the crowd.

Date: Wed, 12 Jul 2000 00:12:40 -0700
From: "Wayne Rothermich" <rother@impulse.net>
Subject: Re: [R-390] Stager Tuning of IF Strips, R-390 Non-A

On the phase response part of your questions:

I don't have a specific procedure, but I believe that you can generally improve the phase response by tuning to round off the edges of the passband. In theory, the flattest phase response results when the passband has a shape similar to a bell (Gaussian) curve. Unfortunately, that shape has terrible selectivity.

Another possibility might be to find someone with an RF network analyzer that covers 455 kHz. This would allow you to display the phase response in real time and see the effect of different tunings. The HP 8407 network analyzer has been popular on the surplus market for some time now. The later HP analyzers can display group delay (the negative of the slope of the phase response) which makes it easier to tell when the phase slope is linear (the group delay becomes constant across the passband).

Information exists on how to design filters with various compromises between linear phase response and good selectivity. This can also be applied to the tuning of IF strips, but this is tough going, even for experienced filter design engineers. (The IF transformer couplings would need to be modified.) Circuits that improve the phase response of an existing filter (group delay equalizers) can be built, but they are also a significant undertakings. These possibilities are described in "Electronic Filter Design Handbook" by Arthur B. Williams (and in several other texts as well), but at an advanced (i.e. very mathematical) level. Maybe somebody with a black belt in filter theory and a lot of spare time could volunteer to tackle this.

Date: Tue, 06 Feb 2001 14:25:30 -0600
From: "Paul Staupe" <ptstaupe@comdisco.com>
Subject: [R-390] R-725 vs. R-390 (non-A)

This R-725 thread reminded me of one of those questions that's been lurking around my brain, but never brought to the surface until now... (a sure sign of improving mental health!) Other than a "cost reduced R-390 non-A" would there be any other advantage to the Arvin IF treatment in the R-725 such as improved IMD or 3rd order intercept performance? I'm a non-A fan, and am wondering if you actually get more bang for the buck with a good non-A....

Date: Tue, 6 Feb 2001 13:10:26 -0800 (PST)
From: "Tom M." <courir26@yahoo.com>

Subject: Re: [R-390] R-725 vs. R-390 (non-A)

Wouldn't be too tough measure the effects of the 390 IF deck. One would need my radio tricked out like mine. I can swap 390 and 390A IF decks in a couple of minutes. This would eliminate the question of the performance of the balance of the set. Not so easy to do with a 390 or 725. I've seen the reverse of my mod done also, a 390A IF deck in a 390. One might be able to make a conclusion by testing that radio with each deck.

Date: 06 Feb 01 15:25:48 -0800
From: "Richard McClung" <richard_mcclung@tcibr.com>
Subject: Re: [R-390] R-725 vs. R-390 (non-A)

For other than DF I prefer the R-390 with the R-390A IF strip. I modified about 25 receivers for use in the Army in that manner. We called them UNAUTHORIZED MWO'S. The IF strips were modified with the BFO tube replaced with the 6BE6 product detector/BFO circuit. All we cared about was their ability to do what we wanted in the manner we wanted it done without all the extra weight of the ancillary equipment. They were used for morse burst communications intercept and SSB/RATT comms.

Date: Tue, 06 Feb 2001 17:57:58 -0600
From: "Dr. Gerald N. Johnson, electrical engineer" <geraldj@ames.net>
Subject: Re: [R-390] R-725 vs. R-390 (non-A)

I think there's a chance of the 390 IF handling impulse noise better that otherwise tends to make the mechanical filters ring. That's a consequence of their poorer phase linearity. There'd be no difference in IMD or 3rd order intercept performance because those are determined by the dynamic range of the stages before the selectivity. There might be some difference in recovered audio distortion which might depend on the quality of IF alignment.

The official reason for mechanical filters was to reduce the skill required in manufacturing and maintenance to align the IF to specification (besides which Collins had the patents and the product line). I'm not sure of the dates, but I think Collins commercialized the mechanical filter between the design periods of the 390 and the 390A.

Date: Thu, 2 Aug 2001 21:28:28 -0400
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Ovens stay on with switch in off??

As covered way back several times, in addition to reducing heat and power consumption, it's safer to keep the ovens off in the event the thermostats fail closed and cook things, right?

> I soft start with a Variac and leave it set at just under 115 VAC (never
> below 110 VAC) to offset our rather high line voltage here-- 127 Volts.

Someone just mentioned that soft-starting with the non-A could be detrimental in view of the action of the 6082's. I'd imagine with the A's, if the 26Z5W's are still in place, they won't start going unitl about 90 volts -- do I have that right? Norman -- how quickly to you crank up the variac? Are your rectfiers solid-stated out? I've got about 126 VAC here. This might be a good time to reprise the bucking transformer/current inrush limiter alternative. Yeah, I know it's been covered before, but don't recall if it was all wrapped up into a complete package. If you're line voltage is fairly constant at 5-10 V. over optimum, what filament xformer would work? Did we ever resolve that the current inrush limiter was a good thing to do -- any downside to them? Which ones to use on an A -- non A too?

Date: Fri, 03 Aug 2001 14:31:42 -0400
From: "Bruce Ussery" <bruceussery@hotmail.com>
Subject: Re: [R-390] contact

Made a tiny bit of progress on my R-390 (non A). Given my limited hours to devote, I decided to start working on the little things. That way I get a little confidence boost even when I just fix something minor.

1. Xtal calibrator: Seemed quite dead except on the 0 Mhz band. Someone posted a similar problem- I think it was an open resistor in the buffer or something similar. Mine was different. As I removed the module, the output cable BNC fell off the cable. Being ever vigilant, I took this as a clue. A somewhat tedious repair, as the cable doesn't have much slack. I managed to
rescue the connector; getting the solder and the 3 strands of broken off wire out of the center pin was the toughest. I brought it to my workplace where I could use a microscope, and after heating the pin, blasted the solder/wire strands out with compressed air. Pretty subtle. After redressing the cable, only lost about 1/8" after reassembly. Nice tight cable connection now. Check all resistors- no problems. Installed module, and now I'm getting a nice strong Cal. signal on all but the highest bands. Is it normal/typical for the Cal. signal to get pretty weak on the high bands?

2. BALLAST tube... This radio still had one. I had noticed that on several occasions when I powered the radio up I got noise but no reception, even on the bands that work. Wiggling the ballast tube would bring it back to life, even though I had given all tube pins the De-Oxit treatment. Tiring of this intermittent action, I replaced the PTO and BFO tubes with 12BA6,

and jumpered the ballast tube out. No more intermittent action. But I would like to find a neater way to jumper pins 2 and 7 than using a piece of wire in the tube socket. I would expect it to eventually oxidize and become intermittent... Maybe make a dummy plug out of a dead tube? Maybe solder a small jumper across 2 and 7 of the ballast tube and stick it back in for looks?

Date: Sat, 04 Aug 2001 01:21:50 -0400
From: "Bruce Ussery" <bruceussery@hotmail.com>
Subject: Re: [R-390] contact

This puzzled me too Roger. The original 6BA6s tested good on the TV-7D, and the 3TF7 was still getting hot (at least when it was making good contact). I have no experience with this ballast tube, so I didn't know if maybe there was some other failure mode besides open or shorted. So why would the 12V tubes work with the 3TF7 jumpered out?

Well- 3 hours later I've found two reasons.

1. The ballast tube socket IS badly worn. Close inspection with bright lights shows that the socket receptacles are spread wide, hence the original intermittent problem. Maybe lots of past maintenance? Or lots of searching for an intermittent problem? Hard to say. When I'm less bleary-eyed I'll try to "reform" them with a sharp tool.

2. I was probably a little too paranoid about the AC input voltage with these solid state rectifiers. I've been running the radio on a Variac, usually at around 105 VAC or even less. Regulated B+ was right on the money, so I thought I was in Fat City. (I haven't done any recapping). Well, it seems this is a bit marginal. Marginal to the point where the VFO may or may not start up. At about 110 VAC or so, operation is much more consistent. Also, this may have been why I thought the cal. osc. was giving up on the higher bands. It seems fine now. (Now if I can just get bands 0-7 working.)

3. Yes, while I had wires hooked from the ballast tube socket to the tube laying on the bench where I could measure things, I tried a 12BH7A. It works fine, with almost the same voltage drop. But since its heater is pins 4 and 5, I assume this method would require a little socket rewiring?

Having acquired this education, I think I'll now go back to the 12V tubes and jumper the ballast. Maybe I'll save the 3TF7 for my retirement fund...

Date: Sat, 04 Aug 2001 05:58:49 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] contact

The VR circuit works harder to keep the B+ up when you run the R-390 nonA at low AC input. It's better to keep it between 110 and 115VAC. The 6082's last longer as a result.

While on the VR topic, how are the four 47 Ohm, 2 Watt, resistors underneath the 6082's? Ditto the ones underneath the PS's 26Z5W's? Frequently these are found to be out of spec due to the high heat in there. Five Watt WW ceramic resistors are acceptable replacements.

If you can't get the 3TF7 socket's pins tightened up or if you fear the temper may have gone out of the two pins for the ballast element, try removing them by squishing the barb and pushing contact up and out of the base. Then either swap with an unused contact or, better yet, get hold of a junker socket and mine its contacts.

Enjoy your little gem. I like this model receiver more and more. Nice audio and solid performance overall.

Date: Sat, 11 Aug 2001 00:35:17 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: [R-390] Non A Power Connector

I have in hand a power cord that I made up with the increasingly hard to find wind-on connector for the R-390 non-A's power input. I paid William Perry $25 (or was it $15?) for a brand new one at Dayton even before I got my very own R-390 thinking I might as well pick up one of these while I could. I also thought if anyone were going to nick me so much dough for one of these, the money might as well go to Mr. Perry because he's a very nice, helpful fellow.

<http://www.williamperrycompany.com>

I have in my other hand a power cord that I just now made up from a similar connector I got at Berryville last Sunday for the tidy sum of one (1) dollar. That was the asking price, too! I thought I had made a real coup. It was to go to another R-390. Yep, since that purchase from Mr. Perry, I now have TWO R-390 nonA's! It turns out the cheapie pretender connector was designed for a different piece of gear. But the thing looked like I might be able to adapt it, and I succeeded. Here's how:

First, a bit of background. The true R-390 connector has a cover over the innards where the wiring goes that is fastened with three slotted screws. The part number stamped on the winder is UW1320FA 17. The cheapie pretender has a threaded ring that's fastened down with a special tool. I was able to take a screwdriver and something to tap it with and undo the ring to get inside and make up the line cord connections. The part number

stamped on the winder is MW10M(M)A17. With me so far? The true connector has a MALE screw in the center that fits into the receiver's female stud for securing the connector. The pretender connector has a FEMALE stud on the winder stem. OK, no problem, I'll cut off about 5 mm and insert a 10-32 headless screw in there and all will be well.

Not so fast.

For a while I was baffled by the threading. It looked like 10-32 thread and the pitch measured out as such, but no tap, die, nor machine screw of that size would fit. However, the mating pieces from the respective connectors did fit, so none of the threads were boogered up. Finally figured out that the threads are different from the usual 10-32 in that the pitch is double wound, for lack of a better description, and makes winding the stem onto the socket go faster. In other words, the thread is different from your garden variety 10-32 in that respect only, but nevertheless is NOT compatible. I resigned to skipping this part of the adaptation and addressed a couple of other issues. One, the notch on the side for orienting the connector was too narrow. Out came the Dremel tool to grind it to suit and that was that. Two, the center hole in the green plastic piece was too small. OK, over to the drill press and drill to suit.

Bottom line is I got the thing to fit FB. There's enough friction to keep it attached without requiring the screw-in feature.

I wondered if it was worth all the trouble. "Sure," I thought, "I like challenges like this from time to time." After this close encounter, I'm sure to recognize the real thing should I stumble across one of the true R-390 connectors. :-)

Only thing is I hope I didn't alter a "l@@k" "R_A_R_E" connector that someone else could have used. Does anyone know what p/n MW10M(M)A17 was made for? Just wonderin' 73... Norman

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Date: Fri, 10 Aug 2001 22:31:11 -0700
From: Dan Arney <hankarn@pacbell.net>
Subject: Re: [R-390] Non A Power Connector

Gang, I would sure hope that no body betrays the trust Bill Perry has for Hams, he ships to you and asks for a check in return for goods shipped. What more can you ask for. That is the way it should be you get what you pay for and pay for it. Bill is very knowledgeable and above all a nice person to deal with. Hank KN6DI

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Date: Tue, 7 Aug 2001 10:06:26 -0400
From: "AI2Q Alex" <ai2q@adelphia.net>

Subject: RE: [R-390] R-391 questions

A basket case R-390 (non-A) just came to life here on my bench recently. It was badly damaged by smoke (a house fire) and saw service as a multi-family mouse nest in a shed outside for 25 years. Now it looks and plays like new! A few thoughts:

Hum that varies with the volume control setting typically, but not always, means that the problem is after the volume control, not before it. If you said that the hum didn't vary, then I would answer that typically, but not always, it would be due to excessive power supply ripple.

By the way, I also have an old Collins 51J-4 percolating on the bench right now. The level of ripple is 5-percent on the input of its power supply's filter cap, and 0.5 percent at its output. As for the filter caps in the power supply, I have replaced them with Nichicon-hoso-sayonara-miso critters lurking inside the old plug-in filter cap can. If you have a scope, you can measure hum levels and look at the hum's waveshape. If you do that, however, be sure to put a 0.1 uF 600-V cap in series with your scope probe. Some scopes, like my Tek 465B, won't like more than 250-V dc.

Anyway, the set started to hum as it warmed up, and after an hour there was a pronounced 60-cycle hum that was very annoying. I used an old but trusty Heathkit signal tracer to go from stage to stage, working my way from the detector back to the IF amplifiers, searching for the hum. I noticed that when I got to one of the first IF cans, the hum was apparent on a grounded terminal strip! If I poked my signal tracer probe onto the grounded chassis next to it, there was no hum, but if I put the probe on the ground lug of the terminal strip, there was hum! A quick reach for a 1/4-in. Spin-Tite, and a slight tightening of that ground screw and--poof! No more
hum.

By the way, that brings up another point. You should always try and determine if hum is at 60 Hz or 120 Hz. If the latter, it's power supply related. If it's 60 cycle hum, then usually it's a leakage path or bypassing fault of some type (such as a filament-to-cathode short inside a tube, or a loose grounding lug, eh?) The 51J-4 is "burning in" down in my shop right now, tuned to WWV and sounding like a champ. In fact, it sounds *incredibly* good, almost like the old AM car radios of yore, or big 1950s table radios in boom box wooden cabinets. It's the best sounding SSB I've ever heard. I was marveling at the hi-fi SSB last night with the 51J-4's 6 kc. mechanical filter cranked in. It's even better than the R-390, which is very good.

I have many other observations and troubleshooting tips I could pass along about the R-390, as well as the R-390A that I have here, so feel free to bounce any thoughts or problems off me. I don't know if I can help, but I can try. The other guys on this list have an incredible wealth of experience, so someone will be able to get you out of the mud, that's for sure.

Date: Tue, 07 Aug 2001 16:04:53 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] contact

Just got back from a successful R-390A search and rescue mission, so am responding a bit late. :-)

Those four measurements on the VR 47 Ohm resistors are good-- no need to replace them, IMO. Failure mode is usually an extra high resistance reading, say, well above 60 Ohms. I find low Ohm resistors to be close enough when they're within 20 % tolerance. Higher resistance units should be closer to within 10 % tolerance.

So, go ahead and retain those resistors. If they're doing this well after fifty years, they should be OK a good while longer. Keep the receiver running cool by:

1. not exceeding 115VAC input.

2. running a breeze across the 6082's. This can be a box fan from an old computer. Put a suitable size capacitor in series with its AC power input to achieve a tolerable noise level at a lower speed.

3. keeping the ovens switch turned "off."

4. soft starting with either (a) a Variac or (b) an inrush current limiter in combination with a suitable bucking transformer.

With solid state rectifiers, the DC output will be higher. The R-390 nonA PS unregulated output should be 300 VDC. (See TM 11-5820-357-35, page 30, top of para 31.) Can't blame you for being skittish. Sounds like a voltage dropping resistor is called for in your case as 350 VDC B+ @ 110VAC line voltage seems dangerously high and can't help your 6082's any. I don't know what the resistance should be, but trial and error should tell. Something like 10 Watt dissipation located where its heat won't be a problem?

Or replace the SS stuff with proper 26Z5W's? :-)

Dunno know about the audio squeal. Problem heard just in the line audio output? Clean R103 (Line Gain) with Caig stuff? Try a replacement C611? Swap tubes? Check resistor values? Replace C609 C610? Check VU resistor network? You're right, there's lots to do.

Date: Tue, 07 Aug 2001 16:44:09 -0400
From: Norman Ryan <nryan@intrex.net>
Subject: Re: [R-390] contact - 12BH7

5814's draw slightly higher filament current-- 175 and 350 mA. It's why they shouldn't be used in the R-390 nonA IF deck as they skew the filament voltage higher on the tubes in which they're in series. (OK to use them in the wee calibration-oscillator deck, though.) They wouldn't be an ideal ballast tube replacement either. You need current draw to be 300 mA @ 12.6 V. :-(Tom Warren is on the right track!

What about the 6189 as a 12AU7 replacement in the R-390 nonA IF deck? Is its filament current draw the same as the 12AU7-- 150 mA @ 12.6 V? I found one on-line source that says it's so. Anyone have an authoritative tube characteristics book to confirm this? If so, this should be a better replacement for those 12AU7's.

Date: Sat, 11 Aug 2001 01:50:38 -0400
From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Non A Power Connector

Norman wrote:

> Only thing is I hope I didn't alter a "l@@k" "R_A_R_E" connector that
> someone else could have used.

Ooooh noooo, Norman! According to the Radioman's Caballah, I think you're supposed be stoned or something -- but the meaning could be taken two ways. ;-)

Don't count on me to cast the first one, though -- yup -- did the same dam thing. Either great minds think alike, or they're gonna need more stones. Like you, I scored what I thought was a good deal -- and it would if I had 8 radios these cables would fit. Already wired with long, heavy four-conductor cables you could jumpstart a car with. But, -- like they say in the Hertz commercials -- "not EXACTLY". Sounds like the same connector as yours -- an "outie" insead of an "innie" on the key fastener. Weird screw size I thought might be 10-24, but no dice. Notch too narrow/shallow.

One difference though -- I used one to hook up an AN/GRR-5 -- that's the HF "gas radio" that became more of an entertainment set in Korea with

the multivoltage AC/DC power supply. I did the same thing you did -- took out the flip-down wing-screw thingy. As I recall though, I did find some screw that caught by a thread or two, with some "influence". Actually, I think I
used a nylon screw and rethreaded it "in situ". Not sure what these fit without abominating them. Does look better than some crimp-on connectors, and they're green for your green radios. I don't know if I'd do the same on an R-390, unless I could match up a headless screw to keep it more or less complete.

I bought a few of the incorrect kind that fit without mods from Fair. These are CARC finished, not round, but green house-shaped ones -- with a peaked "roof". Don't know if they have any more, but they were nowhere near $25. More like $8-12 at most. I think the "correct" ones are supposed to be round -- like the ones that don't fit.

Once again, another installment in the YMMV saga. I may put the other 7 up
for auction. Look for "MIL CONNECTOR SOOO @@RARE@@ IT WON'T @##&&!!! FIT ANYTHING YOU GOT!!!!" Barry

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Date: Thu, 16 Aug 2001 23:48:21 -0400
From: Bob Camp <bob@cq.nu>
Subject: Re: [R-390] New to the list and already needing help.

There are two audio channels on both the 390 and the 390A. One is for "local audio" (as in a speaker) and the other for "line audio" (as in audio out to a RTTY TU or phone patch). Each one has it's own audio amplifier and output transformer. Both are 600 ohms. You will need to do something to go from 600 ohms to 8 ohms on the output.

The first thing I would check on a 390 is the power supply. Since it's a regulated supply the thing could be doing odd stuff. If you have a scope that will speed things up some. If not then check it with a volt meter. Either way I would make sure the B+ was right before I got to much further. If it bounces with every tick then you may have narrowed down your search.

The most likely capacitors are the electrolytic, then the paper (black or brown plastic case) caps, and finally the mica and ceramic caps. Most people seem to replace all the electrolytic and paper caps. Sometimes it's overkill.
To pick up a manual try : http://www.logsa.army.mil/etms/find_etm.cfm; type in R-390 under the title text box. You can download what ever you need from the list that comes up next. One quick and dirty approach on the plug in capacitors is to wire some new ones to an old tube socket and

plug them in. If it solves the problem you can dress it up later. If the junk yard in KY has any more grab one for me :)

Date: Sat, 18 Aug 2001 18:14:02 -0400
From: "Tetrode" <tetrode@sprynet.com
Subject: [R-390] 390 nonA clutch assy question

Here's a question for anyone who's gone as far as disassembled the ZERO ADJ clutch assembly in a 390 or 391..... I'm doing an RF deck tear-down and refurb I'm doing in my Fair Radio 390 that I picked up a couple of years ago, and just put the clutch assembly back together and its working smooooth! :^) However, in the exploded gear train view in fig.73 in the depot manual it shows 4 spring friction washers (item 8), and my assembly had 5 of them. Not a problem until it came time to reassemble it and trying to compress all those innards together while installing the .395" retaining ring; it seemed to be taking way more force than reasonable.I was starting to think of using some kind of mechanical aid to compress the assembly and free up a hand when I remembered reading here how some folks have had a similar problem while re-installing the PTO shaft and needed to remove one of the compression washers in order to reduce the force necessary to compress them prior to installing the snap ring. So I decided to leave out the 5th spring washer in the clutch. Success! It went right together and the clutch operation is smooth and reliable.So my question is... how many spring washers have others come across in this assembly? My guess is 4, and that what I found in my unit was a manufacturing error (not uncommon). Of course the manual could also be in error (not uncommon either). What think?

Date: Mon, 10 Dec 2001 16:46:56 -0800
From: "Bill Smith" <billsmith@ispwest.com>
Subject: [R-390] Odd AVC effect or?

Here's a weird one (at least to me) in an R-390 (non-a). I was poking around in the IF section, mainly to free up the bandwidth switch mechanism. It looks like the 2.2k decoupling resistors were stressed a bit, likely from unregulated HV conditions, but still by in large seem ok. At any rate, discovered that C-526 was disconnected. It "looked" ok, but one of the wires was not connected to the capacitor.

It is now hooked up again, and adjusted to provide a BFO notch at 455Khz. Seems as if the Q is a bit high, but the strange thing is when I replaced the IF strip in the receiver, there is now a low frequency oscillation/variation that shows up in the AVC circuitry. On the AM band, with a signal at about 60db carrier strength, the carrier meter slowly builds, then drops rather suddenly about 10db over a period of an estimated 10 seconds. The AGC speed setting doesn't seem to affect this cyclic effect. Audio is also

affected to a slight amount, which is how I noticed the problem. The IF strip is not very well aligned (yet) because the passband centers at 8 and 16 KC settings are below the 0.1-4 KC settings.

Can't think a tube would cause the oscillation, but haven't attempted to chase it yet. Think the oscillation disappears after the set is run for a while. Has anyone run into this before?

Date: Tue, 11 Dec 2001 09:39:04 -0800
From: "Roger L Ruszkowski" <rlruszkowski@west.raytheon.com>
Subject: Re: [R-390] Odd AVC effect or?

If you do not hate leaky caps I think you will soon. Gee, a relaxation oscillator.

It looks as if the problem has been there a while, Opening C-526 allows the BFO to go un-neutralized. This swamped the symptom and it was left that way. Dig up those past threads from last two weeks on the AGC caps and how to find the leaky ones. I agree it does not sound like a tube problem. (therefore all tubes are now very suspect) As it goes away after the radio heats up I'll go with the caps. It gets tired of shorting the excess charge and reforms for you. Sure it quits oscillating after it heats up, But is the receiver operating at its best? I just suspect the receiver would be better off if you tracked the part down and replaced it. You may not be better off after the exercise. But the receiver would be.

Date: Wed, 12 Dec 2001 21:06:38 -0800
From: "Bill Smith" <billsmith@ispwest.com>
Subject: [R-390] The Plot Thickens (R-390)

Had a chance to poke around a bit to see if I could discover why the AGC in this set seems to oscillate with a sawtooth. Seems it is independent of input signal, and is apparent in the RF-Gain line as a pulse. But most strangely, appears prominently at the grid of the first mixer, at E-208. 1st Mixer (6C4) isn't controlled by the RF gain or AVC, yet the bias on the tube as measured at E-208 rises and falls at a ~5 - 10 second rate. Also, looks like there might be a little parasitic noise generated there. I unplugged the 1st crystal oscillator, did see a bit of jumping around in the signal from V401, but nothing to address the problem at hand. Then, I measured the dc resistance from E-208 to ground (power off). Here's what I have found:

Megacycle change:

00 - 3K-3500 ohms (varies)
01 - 1 meg

02 - 100-150 k (really jumpy)
03 - 100-150 k (same as 02)
04 - 1 meg
05 - 1 meg
06 - 1 meg
07 - 1 meg
08 - 27 ohms
above - 27 ohms

So apparently there is a problem in some of the coil assemblies, or possibly the capacitors in some of the coil assemblies. Have yet to figure out which coils are active on what bands (RTFM!). Still perplexed, though whether I have found the reason for the oscillations or just another problem. It may be a number of capacitors are rotten in this set. Next obvious step is to see whether the AVC oscillations occur on all bands, or whether the phenomenon is Megacycle-setting sensitive. And why reconnecting C-525 started this problem to begin with. Sounds like there are several issues here, and perhaps still not enough information. I can hear David's comments regarding his suggestion to feed the AVC circuit with a fixed DC voltage, but haven't had a chance to set it up yet.

Date: Thu, 13 Dec 2001 09:05:40 -0800
From: David Wise <David_Wise@phoenix.com>
Subject: RE: [R-390] The Plot Thickens (R-390)

The 08+ 27 ohm reading is right; the 1st mixer's grid is (almost) grounded when it's not in use. For 07 and down, I have a severe handicap. The only R-390 schematics I have are four GIFs (r390-n.gif, anybody have pointers to better ones?). I can't remember where I downloaded them, but the scans don't overlap, and the gap between 1 and 2 is EXACTLY on the 1st mixer grid coils! All I can tell is

00 is Z213
01 is Z214
02-03 are Z215
04-07 are Z216

I don't know whether these coils have a DC return or not. If they isolate the grid through mica caps, those caps are bad in Z213 and Z215. I suggest you remove Z213 and Z215 while watching the meter. The manual tells how, but I'll repeat it here: Remove the slug rack. (It's a good idea to keep the springs under tension; reattaching the bottom ends is a pain.) You'll find a #1 phillips screw at the bottom of the hole where the slug went. Once you unthread the screw, you can pull the can straight up. The main problem is getting a grip on it. Don't lose the screw; it's not captive. If this doesn't change the reading, at least you've eliminated a lot

of suspects. Divide and conquer. The next suspects are the coupling caps between 2nd RF and 1st mixer. I can't quite read the numbers, but they'll be connected between Z213/215 and Z207/209, respectively. If they're leaky, they'll shove a lot of positive DC at the 1st mixer.

> So apparently there is a problem in some of the coil assemblies, or possibly
> the capacitors in some of the coil assemblies. Have yet to...

[chorus] ...Read the manual! Looks like it; also, I suspect there are two or more problems interacting. The stuff I outlined above has nothing to do with AGC. A juicy one! Good luck, and enjoy.

Date: Wed, 27 Feb 2002 12:56:51 -0500
From: Al Solway <beral@videotron.ca>
Subject: Re: [R-390] R-391 restoration update

Thanks for the update. Very interesting comments and observations. I will keep this info in mind when I get to the "Power On" phase in the restoration of my R-390.

> Knowing what I know (or think I know) now, I do believe I'd just replace
> every cap and resistor in the AF deck .....

I completed an R-390A about a year ago. I did not apply power to this radio until out of spec resistors, paper/black beauty caps, visual defects and cleaning and lubrication was completed. At power on there were no electrical problems except for two mechanical alignment problems. I mention this because of the cumulative effects of the out of spec resistors and the known problems with the caps in the R-390A contribute to the initial electrical problems in restoration.

The R-390 I am working has 36 out of spec resistor, 20 in the IF module. I will not replace any caps because it is not necessary in the non-A because of the better quality caps used. This is not my observation but that of others who have made this recommendation on this reflector. All cleaning is complete. Waiting for spring so that the front panel can be stripped and painted. My paint shop is the balcony of the my apartment.

The experts recommend replacing all the 47 Ohm resistor. I replaced them in the 6082 cathodes although they were in spec. The ones in the 26Z5s were burnt completely open, charred to a crisp. I am using the white sand 5 watt resistors. They fit nicely in the original 47 Ohm location.

BTW Barry Hauser mentions replacing the 6082s with a solid state device in his response to this post. I have made an agreement with Barry to build

a solid state replacement for the 6082s and write an article on the construction for Hollow State News. The circuit is detailed by Dr. Gerald N. Johnson, K0CQ, in Hollow State News, Issue #52, Spring 2001. The article will be completed in the late summer after all testing is completed.

Barry if you read this everything is going well with the module. A PWB has been made, a heat sink selected. I have all components except for the 180 and 200 Volt Zeners. They are on order and should be here next week. The module will plug into the two 6082 sockets. No fan is contemplated at this time but I will be contacting Dr. Jerry with a couple of related technical questions. I am not an engineer but an aging tech with a bit of experience. Need good engineering input so that no mistakes are made.

Sorry Paul but I digress from the original topic. A final comment and I am sure that you are aware of it. Use heat sinks on good components when removing components that are tied to a common point. This will prevent damage to good components. Those carbon resistors are very susceptible to heat.

Good luck with the R-391.

Date: Wed, 27 Feb 2002 12:56:51 -0500
From: Al Solway <beral@videotron.ca>
Subject: Re: [R-390] R-391 restoration update

Thanks for the update. Very interesting comments and observations. I will keep this info in mind when I get to the "Power On" phase in the restoration of my R-390.

"Paul H. Anderson" wrote:

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Sorry Paul but I digress from the original topic. A final comment and I am sure that you are aware of it. Use heat sinks on good components when removing components that are tied to a common point. This will prevent damage to good components. Those carbon resistors are very susceptible to heat.

Good luck with the R-391.

Date: Wed, 27 Feb 2002 15:24:44 -0500 (EST)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: Re: [R-390] R-391 restoration update

> I completed an R-390A about a year ago. I did not apply power to this
> radio until out of spec resistors, paper/black beauty caps, visual
> defects and cleaning and lubrication was completed. At power on there
> were no electrical problems except for two mechanical alignment
> problems. I mention this because of the cumulative effects of the out of
> spec resistors and the known problems with the caps in the R-390A
> contribute to the initial electrical problems in restoration.
>
> The R-390 I am working has 36 out of spec resistor, 20 in the IF module.

> I will not replace any caps because it is not necessary in the none A
> because of the better quality caps used.

Hmm... I may need to beg to differ. At the least, in the AF deck, there perhaps 4 caps that get toasted enough to cause problems, and between the AF and IF deck, there are a number of electrolytic caps, some of which have been replaced in earlier lives, and some of which were leaking when I got them. One of my 390 IF decks has what looks to be leaking or corroded .01uF tubular caps - only a few, but some nonetheless. If I were replacing resistors down inside there (ow), I think I'd find nice fitting caps and replace them as well.

> This is not my observation but
> that of others who have made this recommendation on this reflector.
> The experts recommend replacing all the 47 Ohm resistor. I replaced them
> in the 6082 cathodes although they were in spec. The ones in the 26Z5s
> were burnt completely open, charred to a crisp. I am using the white
> sand 5 watt resistors. They fit nicely in the original 47 Ohm location.

Oops, I think I used 2W flame proof ones. They look to be holding up, but I haven't used it a lot yet, either. At any rate, yes, they get toasted everywhere I've seen (2 PS, 2 AF decks).

> .....Use heat sinks on good components when removing components.....

A welcome diversion, don't worry! This is a technique I haven't tried much of yet. I've been aware of it, and the need to do it, but the times when it was an issue, I felt I didn't even have enough dexterity to get another piece of metal down there in the morass of wires. Thanks, and likewise for your fine 390!

From: "Chuck Rippel" <R390A@R390A.com>
Date: Mon, 8 Jul 2002 17:42:29 -0400
Subject: [R-390] R390 non-A Restoration

I restored my Collins R390 over the long weekend. I had it traded to me on a "it worked the last time I tried it" basis. Basically, that means it was broken and the "seller" pretty much knew it. Very, very oblique problem. It would develop a 60 cycle hum as soon as a station was tuned in and superimpose that over the received audio. Tune away, it would "sound" fine. Although I have never operated one let alone repaired an R390, knowing the power supplies in those things are the source of 70% of the problems and basically cook themselves due to the heat generated by the 6082 regulator tubes, I went there first. As soon as I got the power supply

removed, I knew I was in the right neighborhood. There was plenty of nip and tuck work that had been done under the regulator module including some modifications. No cooked parts or wiring. The 47 ohm (?) resistors looked like new. Noted the hum balance pot so knew the supply had to be balanced out. Replaced some out of spec resistors but found the real problem to be a 100pf mica cap from one of the 6082's to ground that turned into about a 900K resistor. I will have to come up with some solution to the heat generated by that module though. A CPU fan over one of the holes in the side might go far to help.

My guess is that the leaking capacitor was pulling on the supply just hard enough that when a station was tuned in and the power supply subjected to further load, would add enough additional stress to overload the supply just enough to make not regulate and hum. That's my theory, anyway.

It is not a full restoration but was about 80% of what I imagine one would entail. Didn't pull the gear train and put it in carburator cleaner as I normally would and looking back, it really should be done. I have heard of a green gear that if you pull or move, thats pretty much it. I didn't see it and decided to leave that phase alone. Left the gears in the RF deck and scrubbed them down with a long bristle brush, a toothbrush and carburetor cleaner. Got probably 70% of
the old grease out, rinsed the carb cleaner out and followed that with a scrubbing with 50/50 Simple Green and water solution then a thorough rinse with hot water. Blew out the gear train with compressed air and let it sit in the 100 degree heat we had one day. Once dry, I re-lubricated everything, of course.

Pulled each slug rack out and dipped the bearing in the carb cleaner and gave them a twist. Cleaned everything but the actual slug with a toothbrush then submerged the bearing ends a final time and moved them. Gunk came out and the bearings on the racks move nicely now. Lubed the bearings and faces of the racks with 90W oil and placed them back in the radio.

No wholesale replacement of capacitors in the IF deck but noted there are certainly plenty of them. I imagine they could give you a fit if one started leaking.

Anyone out there in List Land have information on which ones commonly fail in this radio? Other common problems that I ought to chase down before they become serious issues?

Found the 1st RF tube replaced with a 6AK5 v/s a 6AJ5 as are all the oscillator tubes. Also, there is a 6BH6 as the last IF amp. I wonder if these are helpful mods AKA: W3HM and the 75A-4 mods or did someone

popped some tubes and just stuck those in 'cause they fit?

Repainted and re-lettered the front panel. Stripped and painted the knobs, cleaned all the sub-chassis, set the PTO length, balanced the upper and lower band end over-run and set up the mechanical alignment for the cams. Tied it all together by setting up the Cam Position/PTO length/electrical relationships, centered the Antenna Trimmer and then did a full IF and RF alignment.

To put it bluntly, the radios performance is impressive. I did not do a full sensitivity test but knew it was very hot. For some reason, I had it tuned to 15.400 and heard Radio Kuwait with no antenna connected other than the shielded BNC cable going to the HP-8640B generator. I did a spot check at the 3.8 mhz RF deck alignment point and was floored.

Ben Wallace and Mike Harris (just finished his) are currently tied for "most sensitive R390A's I have yet to restore." This one beats both by a hair but, keep in mind, its a different radio. Much higher build quality in the non "A" but I am not sure there are performance differences between the non "A" and the "A" that would justify what must have been the cost difference.

I'd like to find out the various problem caps and maybe pre-emptively replace them. Also, the filter caps seem to be either papers a-la the 32V-3 HV cap or are oil filled's. They could also probably stand to be replaced, again on a pre- emptive basis.

This does not make me an R390 expert and I have no plans at present to start restoring them. Having no real parts stock and little direct experience makes that idea one who's time has not yet come. However, its a start.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] R390 Restoration
Date: Mon, 8 Jul 2002 20:34:26 -0400

> I restored my Collins R390 over the long weekend.....

Not unfamiliar, but hey, I thought that wasn't supposed to happen to you ... You've probably already been in touch with Dave Medley. BTW, the old links to his site are wrong .. it's at http://www.davemed.info/ I have several non-A's/'391's and they all work fairly well, though not all of them are tweaked up. My impression so far is there aren't the numbers of problem components you find on the A, however the MTBF's may just be longer. The worst trouble-spot is the power supply, as you found, and usually due to the heat. I came across a

R-391 with a solid stated P/S and audio amp which runs cool. It was written up by Dr. Gerald Johnson in Issue #52 of HSN.

Some previous owner did the mod -- only one tube left on the audio deck. Al Solway has replicated it fairly closely and is busy tweaking it for closer regulation. While my '391 was not done reversably, his mod is a plug'n play.

<snipped> As soon as I got the power supply removed, ...

I used to think "mica was forever", but I guess not, and especially not when broiled.

<snipped>

>I have heard of a green gear .....

Not exactly. The green gear is as Dave Medley calls it "a do-nothing gear". That's its purpose -- to make sure nothing happens. There are three possible places where it might be. 1. Up high attached to the front frame of the RF deck with a screw, meshing with nothing. 2. In it's non-operating operating position on a short shaft down low on the front of the deck slightly to the right. The gear is cupped so the teeth are offset from its center. Some decks don't have the tapped hole for storage on top, so the gear is stored flipped over on it's regular shaft such that the teeth don't engage the two gears it's supposed to freeze when in use. 3. It's missing altogether. You'll see the drilled/tapped shaft down low with nothing on it. And maybe a drilled and tapped hole up high and a couple inches to the left of center on the front ot the deck.

When the non-A RF deck is lifted off the mainframe, the two "halves" of the geartrain are "unhinged" so to speak and can get out of synch. Before removing the deck, the procedure is to place the green gear in position on its shaft, green side facing out so that it engages and locks the two big gears together. As I recall, there's an eliptical hole in the center which mates to the shaft, but nontheless important to make sure it's seated and screwed down tight.

However, all that said, there are other ways to secure the gears .. and if they do get out of whack, it's not the end of the world. I forgot to put it in place once when I had to "double back" and remove the RF deck a second time. On top of that, I did some absent-mindedly twirling. It wasn't that big a deal to fix it -- the manual has the procedure for mechanical alignment (or "alinement") from the ground up.

There's another oddity with the RF deck to be aware of. Dangling

participiples, uh, no, but there is a dangle factor. One of the main drive shafts goes through what is really a slot, not a round hole in the front plate of the RF deck. There is some vertical wiggle room. If someone sets the deck down hard and the bushing is not completely tight, the thing can shift. Too high and the counter will turn, but the rest of the business won't. Too low and the counter won't turn, and the RF deck might not seat 100%. Something to watch out for.

> Left the gears in the RF deck and scrubbed .....

I dunno if that ionizing type cleaner scare is the real deal. Simple Green, 409, etc are ionizing cleaners which can saturate phenolic and unglazed ceramic leaving salts behind which can result in arcing -- so we have been warned. Dave Medley writes about flushing with distilled water.

> Pulled each slug rack out .....

Somebody recently wrote that there are R-390A's (Motorola's I think) that have non-rotatable cam follower bearings. Is that true? Or were some just staked too hard.

> No wholesale replacement of capacitors in the IF deck .....

I suppose, but this is one case where the older technology may have been better. It's funny, but a lot of my older vintage gear -- WWII and prior -- seems to work with a replacement cap here and there. OK, some might qualify for the oil depletion allowance ;-)
>
> Anyone out there in List Land have information on which ones commonly fail
> in this radio? Other common problems that I ought to chase down before
> they become serious issues?

Dave Medley mentions some components, but mostly in the power supply. I'm not aware of any capacitor "hit list".

> Found the 1st RF tube replaced with a 6AK5 v/s a 6AJ5 as are all the
> oscillator tubes. Also, there is a 6BH6 as the last IF amp. I wonder if these
> are helpful mods AKA: W3HM and the 75A-4 mods or did someone popped
> some tubes and just stuck those in 'cause they fit?

Sounds familiar. I've found some swapparoos too. Some I think are OK subs, however there is that thing about the PTO tube in the A's -- whereby

too strong is not desireable. The 6AK5 and 6AJ5 are not listed as subs for each other, so maybe some mods were done under the hood.

> Repainted and re-lettered the front panel. .....

That should be same-ol' same-ol' for you.

> To put it bluntly, the radios performance is impressive. .....

Well, we're going to need a full review on that cost reduction program fifty years after the fact. In the New World Order, everything is subject to investigation. ;-)

> Ben Wallace and Mike Harris (just finished his) are currently tied for "most
> sensitive R390A's I have yet to restore." This one beats both by a hair but,
> keep in mind, its a different radio. Much higher build quality in the non "A"
> but I am not sure there are performance differences between the non "A" and
> the "A" that would justify what must have been the cost difference.

Maybe not. While it was a cost reduction thing, there were some outright improvements. I would suspect mechanical filters were more expensive than LC circuits back then, but I guess refined selectivity was more important than smoothness in the audio. There is one weak spot in the gear train of the otherwise heaftier non-A version. One big gear in the middle is attached to the front plate with a cover with 2 or 3 screws. I've noticed in all of my samples -- that gear wobbles or wiggles -- you see it when you change directions. I've been tempted to pull them apart and put a real bearing in there.

> I'd like to find out the various problem caps and maybe pre-emptively replace
> them. Also, the filter caps seem to be either papers a-la the 32V-3 HV cap or
> are oil filled's. They could also probably stand to be replaced, again on a pre-
> emptive basis.

I dunno -- as I mentioned, I've got a lot of old gear with oil filled caps that still test good -- even ones that have started to seep because the rubber seals around the terminals have dried out. Might just need to be topped up and sealed with silicone. Reminds me, gotta go check the newspaper under my AR88LF. That's one heckuva oily radio. Maybe it's some kind of

rust prevention system. Quite aromatic, what with the PCB's -- a bit pungent, like an old-time garage.

> This does not make me an R390 expert and I have no plans at present to
> start restoring them. Having no real parts stock and little direct experience
> makes that idea one who's time has not yet come. However, its a start.

If nothing else, it's great as a perspective on the origins of the R-390A. Basically the same, only very different. One derived from the other, yet just a few years apart and so much is not the same. I'd think that's very unusual in the annals of product development and manufacturing -- of anything. Front panel-wise/application-wise, they're nearly the same device. And then, there's the R-392. When tweaked, the performance is very close -- allowing for limits (b/w selection, etc.) I recently took the time to align one of those fully and was amazed at the performance, including the sound quality when it isn't put through an LS-166.

Date: Mon, 8 Jul 2002 20:35:38 -0700 (PDT)
From: John Finigan <john_finigan@yahoo.com>
Subject: Re: [R-390] R390 Restoration

Admittantly I know almost nothing about the 390, but I happened to be reading the Collins engineering report tonight for grins and came across this table for the 1st RF tube:

Distortion at .7V input (30% mod.)
6AK5 16%
6AJ5 3%

In short, they found it possible to get remote-cutoff characteristics from the 6AJ5 by running it at high B+ but rated screen (I think??). I have one laying around and knew they were 6AK5's for 28V plate & screen, but never have heard an explanation before.

Date: Tue, 09 Jul 2002 12:59:08 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] R390 Restoration

Hooray. Glad to hear one more of them is back up running again. The below comments are based on modest experience with the "Non-A", and an R-389.

> It would develop a 60 cycle hum ... a 100pf mica cap from one of the
> 6082's to ground = 900K resistor. ...theory: the power supply subjected
> to further load, would add enough additional stress to overload the

> supply just enough to make it not regulate and hum.

A scope on the 180 volt test jack would reveal such garbage on the B+. Your theory sounds reasonable. That 100 pF cap keeps noise and garbage off the grids of the 6082 series regulator tubes. If it leaks it will upset the DC conditions in the regulator amplifier and the regulator might lose control of the output voltage and hum. Another cap, (C605, I think, 0.22uF) provides ac feedback to reduce B+ hum and if it leaks the system will not work right. I suggest replacing it if it is suspect. It's also possible that the 5651 voltage reference tubes are tired and not working well. The values of resistors in the voltage reference and dc feedback amplifier circuits should be checked. Replace any that have drifted. Work on these components is difficult due to cramped space.

> I will have to come up with some solution to the heat generated by that
> module though. A CPU fan over one of the holes in the side might go far
> to help.

Exactly. I strongly recommend a fan be run at all times on that audio/regulator deck. I have made up a plate that holds a muffin fan against the outside of the radio blowing in. The screws from the unused bottom plate and chassis frame hold it in place. Angle slots at each mounting hole allow the fan to be slid in place after the radio is put into a rack or cabinet. A better arrangement would be to mount a fan or fans inside the radio, along with a line bucking transformer to lower modern high line voltages. Such an added system could include turn-on surge suppression, a power relay to save the microswitch, line voltage bucking, and fans. The Non-A has a cast frame that offers places to mount such parts with a no-holes approach.

>Found the 1st RF tube replaced with a 6AK5 v/s a 6AJ5 as are all the
>oscillator tubes. Also, there is a 6BH6 as the last IF amp.

Possibly another case of mis-guided tube substitution.

>... the filter caps seem to be either papers a-la the 32V-3 HV cap or are oil filled's.

The first and only filter cap in the B+ system is a round oil-paper unit mounted near the front panel on the audio deck side (C10, I think). It almost never fails. It is at the output of the rectifier stage prior to the regulator stage. The 180 volt output from the 6082 regulator tubes feeds the whole B+ of the radio. Other than bypass caps such as 0.1 and 0.01 uF, I don't see any other filter caps in the schematic.

NOTE: The DC amplifier tube filament (V607 - 6BH6) is part of a series

string. If that tube is not operating the B+ regulator output will rise to the full unregulated value. This is bad.

Be careful to NOT pull any of these tubes during operation:

V603	V604	V607	V509
6AK6	6AK6	6BH6	6BJ6

(Thanks to Norman Ryan for his list of the Non-A tubes and filament strings.)

I seem to remember that in the R-389 VLF receiver this dc amplifier tube is fed by the Ballast tube, but I don't have the details at hand, and could be mistaken.

A further note, on the Non-A IF alignment: I remember doing a staggered alignment on the main IF strip in one of these radios. I cannot now find the reference to that procedure. It might have come from a preliminary R-389 manual, or from the manual for a radio used in direction finding applications. If anyone knows where that is located, I'd appreciate hearing about it. The goal is to do an alignment for best IF passband flatness to enhance AM listening fidelity.

Happy listening with the Non-A.

From: "Chuck Rippel" <R390A@R390A.com>
Date: Tue, 9 Jul 2002 14:33:56 -0400
Subject: [R-390] Re: R390 Restoration

If there are any thoughts on this or, if you come up with anyting, let me know please.

Subject: Re: [R-390] Re: R390 Restoration
From: Richard.McClung@Dielectric.spx.com
Date: Tue, 9 Jul 2002 15:07:03 -0400

I think the USASA Visual Alignment Procedures for the R-390/URR has the necessary alignment instructions for the IF deck.

From: "scott" <polaraligned@earthlink.net>
Subject: Re: [R-390] Some interesting info.
Date: Thu, 11 Jul 2002 19:49:21 -0400

Hey Norm, I want to thank you for your 390 non-a tube list that you posted May 30. I printed it out this morning. I was going to compile the list myself but you saved me the work. :-) Thanks!! I am particularly interested in the subbing of 5814a's for 12AU7's. I get the 5814a's for $3.50 (NOS) from my dealer but the damn 12AU7's are going for $12.00

each. That is a LOT of money for an inferior tube!! Oh, there I go again. I am going to have my mailbox jambed 'cause I called a 12AU7 inferior. I have not looked into it, but I would guess all 12AU7's could be subbed with 5814a's if equalizing resistors were used to balance the current properly through each tube in the string. This would be a BIG $$$$ savings in tubes. What do you think??

From: "scott" <polaraligned@earthlink.net>
Subject: Re: [R-390] R-390A Y2K-Release 2
Date: Sun, 14 Jul 2002 06:45:09 -0400

Thanks to you and everyone who helped in this great effort. I just wish I could find a readable schematic for my non-A!

Date: Sun, 14 Jul 2002 06:42:06 -0500 (CDT)
From: Dave Merrill <r390a@enteract.com>
Subject: Re: [R-390] R-390A Y2K-Release 2

What's wrong with the ones in TM 11-5820-357-35 at
http://www.logsa.army.mil/etms/find_etm.cfm ?

From: "scott" <polaraligned@earthlink.net>
Subject: Re: [R-390] R-390A Y2K-Release 2
Date: Sun, 14 Jul 2002 13:06:32 -0400

Thanks Dave but I have downloaded this PDF version and it is just not very clear. I printed the schematic pages in 11x17 with a photo quality inkjet and the diagrams are just unreadable. The drawing is way too small and text is unreadable. Acrobat does not allow you to zoom in and print. Any Ideas?

Date: Sun, 14 Jul 2002 19:53:31 -0500
Subject: Re: [R-390] R-390A Y2K-Release 2
From: blw <ba.williams@charter.net>

If somebody lets me know the exact problems and file formats I'll get right on the problem.

From: "Wayne Hertel" <whertel@onemain.com>
Subject: RE: [R-390] R-390A Y2K-Release 2
Date: Sun, 14 Jul 2002 20:10:40 -0500

I just printed the first schematic page (Figure 5-11) and it came out excellent. Using Adobe Reader V5.0.5 and Lexmark Optra N240 printer set to Postscript, 11 x 17, fit to page. This is an HP 5SI clone (same laser engine).

From: "scott" <polaraligned@earthlink.net>
Subject: Re: [R-390] R-390A Y2K-Release 2
Date: Sun, 14 Jul 2002 21:36:40 -0400

We were talking about the non-A schematic which is online. I am having problems getting a clear copy. The Y2K manual has excellent re-drawings. Sorry guys, it just got caught under this thread.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] R-390A Y2K-Release 2
Date: Sun, 14 Jul 2002 21:46:49 -0400

There's some confusion ... I think Scott is referring to a PDF of the non-A manual. Most of that manual is pretty readable, though some of the OCR'ing on the Logsa site was not thoroughly proofed. You can read the schematics on screen with zoom, but I don't know of an easy way to print them zoomed up -- maybe you can export the page and print with some other software. I suppose one approach is to zoom up sections on screen, then to an alt-printscreen and paste to wordpad or something. Not to be confused with the Y2K R-390A manual, Release 1 or 2. Pete Wokoun recreated most all of the line drawings and schematics and they're all crystal clear on screen and printed. I'm pretty sure Wayne is referring to that one.

Date: Sun, 14 Jul 2002 21:44:20 -0500
Subject: Re: [R-390] R-390A Y2K-Release 2
From: blw <ba.williams@charter.net>

> I think Scott is referring to a PDF of the non-A manual. .....

I got it straight now. Acrobat is the standard now, but once something goes in you can't get it out. That is the only thing I have against the format. I prefer to extract graphics most of the time if I'm going to print. Still, Acrobat is probably the only way to go with all of the Windows and Mac packages out there. I'm certainly not complaining about it.

From: "scott" <polaraligned@earthlink.net>
Subject: Re: [R-390] R-390 Manual
Date: Wed, 17 Jul 2002 06:04:49 -0400

Paul Anderson has nearly the entire TM 11-5820-357-35 manual done up in a typesetting language, so it can be laid out in various ways, and the encapsulated postscript images can be included. I am trying to buy or borrow some original manuals so I can make high quality schematic scans and re-format and edit them to fit smaller, easily printable page

sizes. The ultimate goal, (what a GREAT idea Paul), would be to re-enter the schematic in an ECAD system. Then be able to do analog simulations using spice, to see what the various test points of the radio should look like on a scope with some known setting and input signal. Problem may be that there are not too many non-a guru's out there and free time is hard for many to come by. Everyone wants to use and restore the simplified version of this receiver. What's the matter. Is it too complex for ya? There we are.That should get you all fired up!! Now do we have volunteers for the schematic and circuit simulation?

From: "Jim Tovet" <jtovet@attbi.com>
Date: Wed, 17 Jul 2002 06:30:46 -0400
Subject: [R-390] pdf for the R390A

I'd sure love to see a pdf file for the R390 like that one for the "A". Does anyone know of one?

Date: Wed, 17 Jul 2002 07:24:01 -0700
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: Re: [R-390] pdf for the R390A

There are two. One from logsa It is a copy of TM 11-5820-357-35 at
http://www.logsa.army.mil/etms/find_etm.cfm
This one has searchable text, but I find the schematics illegible. There is another scan of the same manual floating around. I stuck it on my web site so you can download it if you like (big!). It is not linked up to the web site yet, but you can get at it directly:
www.jamminpower.com/jam/pdf/TM11-5820-357-35.pdf
This one is a more funky scan, but the schematics are excellent. MUCH better than the ones from logsa. The schematics are broken up into 8.5x11 pages. There are two more I am uploading right now that were produced from that one:
www.jamminpower.com/jam/pdf/TM11-5820-357-35.schematics.pdf
www.jamminpower.com/jam/pdf/TM11-5820-357-35.schematics.11x17.pdf

Yes, the extracted schematics are as big as the original manual. I probably engaged in overkill on the resolution. I will see if I can reduce the data some more. Also, I will link them into my R-390 page. The first one has just the two schematics pages - 45 inches across. The second one has them broken up into 3 11x17 sheets each. At Kinko's, set the printer to landscape mode and 11x17 paper.

Date: Wed, 17 Jul 2002 08:11:34 -0700
From: Dan <hankarn@pacbell.net>
Subject: [R-390] REF: R-390 non A Green gear.

I am exploring the possibility of making the GREEN GEAR. I need a good feel for number that would be ordered which would determine the final pricing. Thanks and please reply direct.

Date: Wed, 24 Jul 2002 05:04:49 -0700
From: Dan Arney <hankarn@pacbell.net>
Subject: [R-390] REF: FS R-390 non A GREEN GEAR

I need confirmed commitments to place an order for making new Green gears for the R-390. The pricing is based on quantities, higher the number the lower the price. Price includes gear, and mailing by First class.

30 @ $45.00 40 @ $40.00 50 @ $35.00 60 @ $30.00

Start at $40.00 per gear. if I get more orders I will refund the difference. All firm orders received (money in my hand) by August 6, 2002 will be based on the sliding scale. Any money received after 8-6-2002 will be a flat $40.00. If orders for 30 gears are not received then all monies will be returned. Payment by Pay Pal, USPS money order preferred, Personal check by previous customers other checks to clear prior to shipping. I have to pay for programming/tooling. Delivery should be two weeks after placing order for tooling, production and powder coating. I will be leaving for Ft. Tuthill @ 3:00 AM on 8-25 and return on 8-29.

From: "wb5hak" <wb5hak@prodigy.net>
Subject: Re: [R-390] 390 NON-A HELP
Date: Sat, 3 Aug 2002 09:19:51 -0500

Scott, I have an excellent copy of TM 11-856, with the companion schematic package that I would be happy to send to you for scanning, if I could get a copy of the scanned files when you are through, hi hi. I am good on the QRZ database, but send your address on private email and I'll get it out to you.

Date: Sat, 3 Aug 2002 14:32:41 -0700 (PDT)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] 390 NON-A HELP

I have a -35 manual with the staples already pulled if it'll help anyone.

From: "AI2Q Alex" <ai2q@adelphia.net>
Date: Tue, 6 Aug 2002 10:01:00 -0400
Subject: [R-390] Green gear redux

Hi Scott: My R-390-non-A was missing the coveted green gear, so I

disregarded it entirely as I went about the task of degreasing and degunking this grand old radio. I didn't disassemble the geartrain. I soaked it, cleaned it, and lubed it, but didn't loosen or move any gears, clamps, or shafts after pulling the RF deck. By the way, to get it back in sync after the big cleanup, first I set the RF deck racks to the appropriate settings (rear cam line markings) as per the TM photo, for what they should be at 02 000 (though the Veeder-Root counter was not connected yet). I did that by manually turning the big split gear, moving the cams around and around until they lined up.

I visually checked to see that the bandswitch contacts aligned properly by poking my beady eyes under the chassis. I then placed the RF deck on the chassis, loaded the brass split gear, and dropped the assembly onto the gearset, with the counter set at 02 000. Then I raised the right-hand front side of the RF chassis (as you face the set) using the screwdriver technique described in the TM, not dis-engaging the gears already set in the previous step, and turned the MEGACYCLE CHANGE shaft a few turns clockwise.

I then dropped the right-hand side onto the loaded gear, and used the knob to turn the shaft and entire engaged gearset down to the 0.5 MC band. I then raised the chassis again, and turned the MEGACYCLE CHANGE shaft and gear fully CCW again, and then placed the loaded gear in place, dropping the chassis on the gears. Turning the shafts through the range of 00 to 31 and the full 000 to 999 range on the VFO shaft (plus over-run) moves the cams through their positions properly. The small subchassis moves up and down as well. The ol' 390 aligned beautifully. Dave Medley provided encouragement.

From: "Charles and Sandi Hugg" <chashugg@earthlink.net>
Date: Thu, 8 Aug 2002 11:19:23 -0500
Subject: [R-390] R-390A Knobs FS

I have for sale 15 knobs the fit a R-390 or R-390A including the two large tuning and band change knobs. The knobs that are missing are the little ones that go across the top. Four of these are missing, but I have 2 extra of the bigger knobs that could be used for trading to get a complete set. I am asking $20 for the lot. They all need be repainted, but all are in good condition and complete with screws and clamps. Thanks, Charlie Hugg, K5MBX

Date: Thu, 08 Aug 2002 09:23:30 -0700
From: Dan <hankarn@pacbell.net>
Subject: [R-390] Re: [Collins] REF: FS R-390 non A GREEN GEAR

Well the Green gear deal is a little short in total required orders. I am going to order them and the extras will have to go to the bay joint. I would

prefer USPS MO or good personal check for those that have not paid. Pay pal is taking just under $2.00 to use them. Any orders after today will be firm $45.00 plus $2.00 S&H. Please remit the money ASAP, like yesterday. Hi
My address is:
Dan Arney
c/o Global Pack & Mail
21315 Saticoy St. Unit R
Canoga Park, CA 91304-5685

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] R-390 restoration
Date: Thu, 8 Aug 2002 21:09:12 -0400

<snipped> >The 6082 is another matter end I would love to see a thread develop towards replacing them with >something readily available. I think there have been thoughts given to solid stateing the VR circuitry but >that would be a major departure from the original and spoil the radio as an item I believe.

Not really Dave, not all that difficult or a major departure ... Issue #52 of the Hollow State Newsletter has an article by Dr. Jerry analyzing a solid stated VR circuit I stumbled upon in an R-391. This had apparently been done years ago, and it has been operating well since then from what I can determine. Among other things, we compared the regulation performance over a range of AC supply voltages from 95 to 125 and the 180 B+ was comparable to most of the stock non-A's we polled -- and was also in spec. Only a few components -- two transistors, one or two zeners and a few other parts can replace the 6082's. This is one partial solid state conversion that's worthwhile in view of the declining availability of 6082's -- though some are still out there -- and the damaging heat they generate. So, in an odd sense, it's in the best interest of preserving the non-A -- so it can continue to operate on tubes dammit. (oooops) Also, I might add, the mod is reversable. Someone has replicated the circuit as a plug 'n play as recommended in the article. Piece of perfboard with one or two octal sockets that just plugs into the spot where the two 6082's normally reside. He's done this with currently available solid state components. (To be reported as an update in a later HSN.) The '391 this was derived from was converted some years ago and has old part numbers that may not be available as such anymore. This raises another issue about solid state stuff which I will rail about in another post.

Subject: RE: [R-390] R-390 restoration
Date: Fri, 9 Aug 2002 07:31:16 -0400
From: "Veenstra, Lester B." <Lester.Veenstra@lmco.com>

I lean toward the use of an external 300 VDC lab supply rather than trying to modify the internal regulator. Keep in mind no matter what you do internally, you still have to get rid of the IR drop heat. Instead, present the regulated bus with the right voltage from an external unit that can be disconnected to restore to the OEM design.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] R-390 restoration
Date: Fri, 9 Aug 2002 08:10:33 -0400

.....external 300 VDC lab supply .....

That sounds like a good idea -- with the reg. supply set to 180 vdc. If you need the P/S for other work, just won't be able to listen to your non-A at the same time. However, the heat dissipated by the SS VR circuit is much lower than what is given off by the 6082 pair and Dr. J. offers some heatsinking suggestions in the HSN article which get the heat out of the chassis altogether -- e.g., by mounting the heatsink on the outside of the chassis using existing holes alongside the audio deck area. Warning on that -- the transistor that needs the heat sink will probably have a "hot" case or tab, so needs a mica insulator and heat sink grease -- plus an insulated cover over the transistor itself so as not to have a very oversized, external and dangerous B+ "test point". If you don't like the idea of an outboard heat sink, one can be positioned inside and a small fan can be used to draw the heat out through a nearby "porthole". BTW -- this is a good idea when running the 6082's. The heat buildup is aggravated by the fact that they are upside down and the heat otherwise rises to cook the deck and warm up the whole chassis on that side.

However #2: The '391 I have (that sparked the article) has no heat sink. A tab mount style transistor is just "floating" on the perfboard. It looks like the guy originally had it mounted to the shield that encloses the 6082 area, as there is a small hole and a residue of heat sink grease there. Maybe he had trouble isolating the tab, I don't know. But it's the coolest spot in the rig and the mod was probably done over 15 years ago, judging from some of the components used. I should point out that this was done irreversibly and the audio was solid stated out using one of those handy dandy ECC modules. There is only one tube remaining on that audio deck. The rest of the radio is stock "tubular" and the solid state VR is supplying B+ to all of that. Yet, no heatsinking and not much heat. So ... I dunno.

Subject: RE: [R-390] R-390 restoration
Date: Fri, 9 Aug 2002 09:01:06 -0400
From: "Veenstra, Lester B." <Lester.Veenstra@lmco.com>

Yes, of course, a regulated external 180 VDC supply is what I meant to

say. Brain drifted out of phase lock. sorry! I have been accumulating these at the local fests, to be dedicated to the (non As in the) receiver rack. Some day real soon I will actually get it done along with the general overhaul of the receivers now backed up waiting my attention.

Date: Tue, 20 Aug 2002 19:40:07 -0400
From: Andy Williams <andywilliams@pobox.com>
Subject: [R-390] RF deck questions

I finally had time to start work on the R-390 I bought last year. Last weekend, I discovered that the RF deck will not mechanically tune past the 25 MC band. Since this unit has had some bad repairs done in the past, I was wondering if this could be the result of installing the RF deck without the green gear? Or is this likely to be a mechanical failure? Which brings up another question: What do I use to clean and lubricate the gear train? Will SuperTech General Purpose Lithium grease work? So far I replaced 1 tube socket in the power supply, the 4 47 ohm resistors in the power supply and half the power supply wiring harness. In the audio module I replaced C607 as a precaution, the 4 47 ohm resistors, fixed several bad solder connections and replaced some of the wires. The B+ regulates at 190v after replacing R626.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] RF deck questions
Date: Tue, 20 Aug 2002 20:55:05 -0400

The thing to do is a full mechanical alignment/synchronization which is spelled out in the manual. (Or at least walk through it.) The green gear, when used properly, avoids the need for this when the RF deck is removed for service or swapping between radios. It could have been that, or some clamp came loose and was tightened with things in the wrong position. May just be that the MC section is not synched right with the 10-turn stop.

> Which brings up another question: What do I use to clean and
> lubricate the gear train? Will SuperTech General Purpose Lithium grease work?

Are you kidding? There are those on the list who would shudder at the thought of another lube thread. Just in case you're serious, a good grade of motor oil, particularly Mobil One, is popular. Don't use lithium grease. After cleaning the gears, cams, cam followers (make sure they turn freely), etc. apply very little oil to the gear teeth with an artists brush. Use a bent paper clip to apply a drop to each bearing. Wipe away any excess. One quart of Mobil One will be sufficient for 500-1000 radios, or one R-390 until the year 12002. This mostly benefits future owners as it shouldn't

solidify and gunk up the works. Shows concern and compassion for generations to come so the archeologists of the future will look favorably on our culture and not write us off as a bunch of glorphomorphs. ("Hmmm .. they had the technological prowess to design such a thing, but look how they lubricated it. I give 21st century man a C minus.")

> So far I replaced 1 tube socket in the power supply, the 4 47 ohm
> resistors in the power supply and half the power supply wiring
> harness. In the audio module I replaced C607 as a precaution, the 4
> 47 ohm resistors, fixed several bad solder connections and replaced
> some of the wires. The B+ regulates at 190v after replacing R626.

Sounds like your B+ is running high. As part of an analysis about a year ago, I polled some R-390/391 owners on the list asking them to check the B+ while varing AC supply voltage from 95 to 125 with a variac. As I recall, the B+ held to within +/- one or two volts from 180. For some reason, one Motorola was virtually dead on over that range, out-performing the Collins units. So, even if your line voltage runs high, the B+ should be in range -- maybe 182 tops.

From: "scott" <polaraligned@earthlink.net>
Subject: Re: [R-390] RF deck questions
Date: Tue, 20 Aug 2002 21:08:42 -0400

Does the radio work below 25 MC?? If it doesn't it is time for a full mechanical sync.

Date: Tue, 20 Aug 2002 21:43:12 -0400
From: Andy Williams <andywilliams@pobox.com>
Subject: Re: [R-390] RF deck questions

I'll pickup some Mobil One next weekend. What type of grease, if any, should I use? The gears need a good cleaning, what do I use to clean them? I may hold off on that job until the green gear shows up. I'll take another look at the B+ this weekend. I just got the regulator working last weekend, maybe I missed another out of tolerance resistor. Scott jogged my memory on another RF deck problem: it doesn't work on all bands. I'll check the synchronization before taking the deck apart.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] RF deck questions
Date: Tue, 20 Aug 2002 22:46:06 -0400

> What type of grease, if any, should I use?

You shouldn't need any. Just wet the gear teeth with the oil, after

cleaning. Maybe a dab of grease on the detent spring, if even that.

> The gears need a good cleaning, what do I use to clean
> them? I may hold off on that job until the green gear shows up.

Denatured alcohol, carb cleaner (like Gumout), or chorethene, but I doubt if you'll find it. I assume you don't plan to tear down, soak-clean and reassemble the gear train. I use flux brushes -- the ones plumbers use -- available at most hardware stores for 10-15 cents apiece. On some, I cut the bristles down so they'll be a bit stiffer and good for cleaning the gear teeth in place. Be sure not to spatter any solvent where it shouldn't go.

Date: Tue, 20 Aug 2002 22:50:30 -0400 (EDT)
From: "Paul H. Anderson" <pha@pdq.com>
Subject: Re: [R-390] RF deck questions

> .....the RF deck will not mechanically tune past the 25 MC
band.....

One of the cams in the 390/391 RF deck will reach a mechanical limit if the unit is not aligned properly. On one of my R-391's, this means that a motor can drive the cam to the point of failure (clamp or gear on that camshaft).

> .....clean and lubricate the gear train? .....

As Barry mentioned, a synthetic oil won't dry out quite so quickly. I have used Mobil-1 to good success. Someone here was suggesting Mobil-1 90W gear oil, which I think is a good suggestion, too, but I haven't tried it. This may be heresy, but I used a dishwasher to clean several of my RF decks (391 and 390A). If that amount of water is going to cause problems, they were about to break anyway. I'd rather spend time fixing what the water broke that trying to clean the damn thing as well as the dishwasher can do. I do carefully rinse with distilled water and alcohol afterwards, followed by air hose and dessicant drying.

> So far I replaced 1 tube socket in the power supply, the 4 47 ohm
> resistors in the power supply and half the power supply wiring
> harness. In the audio module I replaced C607 as a precaution, the 4
> 47 ohm resistors, fixed several bad solder connections and replaced
> some of the wires. The B+ regulates at 190v after replacing R626.

I recently worked on an AF deck that I had to replace all components in the VR portion of the circuit. There are a couple of caps (maybe C607 is one), but also a mica cap, I think, that seem to give problems simply from exposure to heat. I think you should aim to do better than 190V, simply

because if the components are to correct value, and the tubes are ok, you should get 180V. Better to fix now than fix later, in my opinion. Good luck - it is a great radio to work on!

From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] Broke 390 latest
Date: Fri, 23 Aug 2002 16:50:56 -0400

<snip> Now there you go trying to start some trouble. Now everyone will pitch in with their opinion of the R-390 versus R-390A. You'll hear opinions from both sides, probably, so here's mine: I've worked on a LOT more R-390A receivers than R-390. I know a lot more about how to tweak and tune and fix the A model. I feel like I can do a good job on just about any R-390A, but don't have that same level of confidence (yet) on the non-A. BUT, here's the kicker. I have one non-A that I've worked with, and it has BETTER performance than my best A model in both SENSITIVITY and AUDIO QUALITY. Get in a tight band listening to AM with some SSB signals nearby, and the mechanical filters in the A model will put it a step ahead. But on a normal night, the non-A wins in my book EVERY time. I especially love the MED (medium) "audio response" position on the non-A, which the "cost-cutting" A model left out. OK. I'll crawl back in my hole now, but you got me stirred up.

From: Llgpt@aol.com
Date: Fri, 23 Aug 2002 18:40:55 EDT
Subject: Re: [R-390] Broke 390 latest

.....Would it be possible to modify the R-390A <snip> to incorporate <snip> "audio response" position on the non-A, which the "cost-cutting" A model left out."?

Of course, purchase a R-725/URR.....or do what Tom Marcotte N5OFF did, modify a R-390/URR ID chassis to fit a R-390A/URR.

From: "Tom Bridgers" <tarheel6@msn.com>
Date: Fri, 23 Aug 2002 23:47:31 -0400
Subject: [R-390] R-390 vs R-390A

In my experience most 390's will run circles around your typical 390A ... in other words generally the 390 is more sensitive than a 390A. And a 390 should be; it has a 2nd RF Amp stage. I have several Motorola and Collins 390s that will reach out and grab stations that I can just barely hear on my 390A's.

On the other hand, when a ham band gets crowded (and most of the hams today are running at least a kilowatt!), the 390A, with its mechanical

filters, lets you slice out adjacent stations, and hear the one you want. Far better than a 390. But then again, if you listen to foreign broadcast stations or you're listening to clear frequency SSB, a 390 will give you better audio over a 390A.

So I use a 390 or a 390A depending on the frequency and type of station I'm listening to. Each shines well in its niche.

The only 390A's that come close to matching the sensitivity of a 390 are a couple of Collins and Motorola R-390A radios that I have. The Imperials and Teledynes are next (for me). Then EAC's. Though I'm told that some of the EAC's and Capeharts refurbished by people on this list (and those by Rick Mish) are hot as a pistol ... meaning matching that of any Collins or Motorola. I've just not personally seen an EAC or Capehart from those sources. The S-W's are good receivers, but none I have seem to reach out and grab stations as well a radios from the other manufacturers. The above is my experience; your mileage may vary.

Date: Thu, 5 Sep 2002 16:15:31 -0400
From: Andy Williams <andywilliams@pobox.com>
Subject: [R-390] regulated B+ update

If anyone is interested, I fixed the problem with the regulated B+ in my R390. As you may recall, the B+ in this receiver was 190 volts rather than 180 volts. The solution was rather easy, it turned out to be a pair of mismatched 5651 voltage reference tubes. One was a 5651A, the other a 5651. I replaced both with NOS 5651As and brought the B+ down to 182 volts. If anyone is interested, Murray Pasternak is selling used 5651s and 5651As for $0.35 each, or $2.50 for 10. His email is w6krc@arrl.net

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Date: Fri, 06 Sep 2002 15:52:16 -0700
From: Dan Arney <hankarn@pacbell.net>
Subject: [R-390] REF: INFO onGreen Gear and Oldham coupler

I am getting a lot of email as to what is a green gear and old coupler. Green gear is NOT used the R-390-A only used on the R-390 non A and 391 that I am aware of. It is only used during maintenance on the RF deck when removed to keep the gear train in sync. When not in use it is attached to the sub panel. for storage. They were made without legs, it appears that the gears learned how to walk away in most cases. Hi. The Oldham coupler disc is to act as universal between the PTO and gear train matching parts with springs crossed over in two places to help reduce backlash in the tuning. It is in about all series of radios using PTO's. The name is a standard in industry for all types and sizes of couplings that need transitional alignment for smooth application of adjustment or power.

Date: Wed, 18 Sep 2002 15:05:32 -0400
From: Albert Solway <asolway@sympatico.ca>
Subject: [R-390] None A P/S Current

I am doing initial tests on my first R-390(none A). There are no problems, as yet, other than a complete a complete alignment that is needed. The radio seems to be working. Band 0 operates. Local radio stations are heard but off frequency. As part of an experiment with a solid state replacement for the 26Z5s and the 6082s I need to know the actual current for the +180VDC for a properly operating radio. I realize that the original design documentation indicate that the P/S was designed for 200 MA. Any help would be much appreciated. I have started initial tests on the radio with the solid state replacement. The PTO end points adjustments are going very well. Barry H. This is the beginning of article that I committed to last winter.

Subject: RE: [R-390] None A P/S Current
Date: Wed, 18 Sep 2002 13:01:11 -0700
From: "David Wise" <David_Wise@Phoenix.com>

That's all you're likely to find. Measure yours, treat it as "typical", and call it good. A few other 390 owners might get interested enough to measure theirs. Good luck on your project.

From: "David Faria" <dave_faria@hotmail.com>
Date: Sat, 12 Oct 2002 17:13:53 -0700
Subject: [R-390] R-390 NON A Problem

GE List. I'm playing with one of the nicest 390's I've seen in a long time and its got a rather irritating problem. It has what I would call a static crash ever so often and I was curious if anyone else has had this problem. I think its a leaky cap. on the RF Deck. I have by-passed the tube stages one at a time on the deck using a tube extender with a filament resistor to to maintain the remaining tubes on the deck. The filaments r in series. I seem to have narrowed it down to the last mixer in the series(V205) using a scope and bypassing. I am seeing fluxuations in both the grid and plate voltage when the crash occurs. (Pins 1 and 6). My guess is c-325 off the plate circuit of that tube. Any speculation would be appreciated. Is it typically the plate cap. leaking to ground that would do this? Would a capacitor checker be able to determine if this cap is bad? What is the reason the cap will just not fail? I've checked all the tubes on a TV2 and thumped em trying to create the problem. I have replaced all the modules except the RF deck and the problem is still there. Sometimes it will run for 30 minutes without a problem and then start. This is a very nice unit and I don't want to recap. unless its necessary. Thanks for your responses...

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] R-390 NON A Problem
Date: Sat, 12 Oct 2002 15:29:15 -0700

Temporarily remove T207 and watch pin 5 of that transformer. Also watch the B+. If pin 5 fluxuates with the static, or if there is any voltage drop between B+ and that pin (across R220), then you have verified a defective C325. If the B+ and pin 5 fluxuate together, then you need to look elsewhere. In fact, C325 should smooth any fluxuation if the problem is elsewhere. Depending on the quality of the caps in the RF deck, you may only need to replace the one capacitor. Are you having problems on all bands? I have had to replace mica caps, even very small values, in the R-390 grid circuits in mine. They were leaky and readily detected using a Simpson 260.

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] R-390 NON A Problem
Date: Sun, 13 Oct 2002 00:47:35 -0700

I believe you can remove the coil by first removing the two screws on the top of the can. I haven't tried it, but believe all the cans in the RF section are plug-in, and you can simply lift the can after removing the mounting screws.

If not, you can make the same test from the plate pin of the 6C4.

No, don't have any extender cables. You can test quite a bit in the receiver by making use of tube pins and the test points that are available from the top of the chassis.

Of course the radio will not operate correctly with either the tube removed or the transformer out, but if the cap you suspect is bad, it shouldn't matter. I am assuming you will be looking at the circuitry with a scope or at least an analog voltmeter.

I don't think there is any problem removing V205. A number of other tubes are in series, but they will simply not light. They won't have an impact in observing leakage or intermittent noise in C325. If it is bad, it will merrily raise hell all by its lonesome. Of course if it is really intermittent, it will probably notice you are trying to find it and work perfectly while you are testing.

From: "David Faria" <dave_faria@hotmail.com>
Date: Thu, 24 Oct 2002 20:55:45 -0700
Subject: [R-390] Mixer Coil substitute For R-390 Non A

For those who are intrested I substituted a R390A mixer coil "T208" for the "T207" in the R390 non A. The radio lined up and seems to be working just fine. I have seen 3 non-A RF Decks in the last 4 years with the "T207" coil bad.

From: "Scott Seickel" <polaraligned@earthlink.net>
Subject: Re: [R-390] 6082 tubes...
Date: Wed, 1 Jan 2003 12:55:01 -0500

look here: http://www.r-390a.net/faq-refs.htm
for a document in PDF format which describes all the cost reduction changes. It is a Collins document. Interesting reading if you want more info on the changes from 390 to 390a

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Date: Wed, 1 Jan 2003 17:22:21 -0800 (PST)
From: Rodney Bunt <rodney_bunt@yahoo.com>
Subject: Re: [R-390] 6082 tubes...Are used as series regulators

The 6082s are a series regulator for the B+, the typical VR regulator is a shunt regulator.

Subject: RE: [R-390] 6082 tubes...
Date: Thu, 2 Jan 2003 10:24:06 -0800
From: "David Wise" <David_Wise@Phoenix.com>

In the R-390, they took the brute-force approach and regulated all B+. During the Cost Reduction project, they found that the only really sensitive spots are the conversion oscillator screen grids. In the R-390A, that's all that is regulated. It's feasible to regulate this small load current with a VR tube. With proper selection of circuit constants, this was found to be Good Enough. They didn't even have to regulate the BFO screen. The Final Engineering Report (available on the FAQ page) goes into some detail on this, and it's a fascinating read anyway.

Subject: RE: [R-390] 6082 tubes...
Date: Thu, 2 Jan 2003 11:01:59 -0800
From: "David Wise" <David_Wise@Phoenix.com>

Sorry, I gave the wrong doc name. I meant the Cost Reduction Report. The Final Engineering Report documents the design choices leading up to the R-389 and R-390. In my opinion, both are riveting must-reads. Check out how many tries it took to get the R-389 frequency-changer topology.

From: R390rcvr@aol.com
Date: Thu, 13 Feb 2003 09:45:40 EST

Subject: [R-390] Cosmos in R-390(non A)

Hello all: I just acquired a non A with a Cosmos PTO. I have only seen Motorola or Collins PTOs on the non As before. The wiring to the plugs has been spliced, so I have to think it wasn't an original fittment. Has anyone seen this mod before? It is only about 1.5 KC long, with good linearity, so won't change out for now, but am curious.
Thanks Randy Stout

Date: Thu, 13 Feb 2003 07:51:05 -0700
From: Jordan Arndt <jordana@nucleus.com>
Subject: Re: [R-390] Cosmos in R-390(non A)

Yes, the PTO's can be interchanged with some re-wiring, and a change to BNC cable output... if I recall, the rear offset mount also needs to be replaced as well....73 de Jordan...

From: R390rcvr@aol.com
Date: Thu, 13 Feb 2003 23:06:21 EST
Subject: [R-390] cyclic reception, 0-8MC, non A

Good evening: Interesting behavior from my 'new' non A. When listening to it tonight, on 0-7MC, the reception would abruptly go in and out on approx 5 sec cycle. On for 5, off for 5 sec. Dropped out completely when off. The cycling varied a bit, not absolutely regular, but fairly close. Was fine on 8 meg and above. I replaced both V203, 1st mixer, used only on 0-8MC, and V401, the first crystal oscillator, which operates only on 0-8MC. I varied the line voltage, didn't seem to effect cycle speed.

No control settings seemed to make any difference. When it was 'on', the reception seemed just fine. It seems unlikely that some thermally induced problem could be so regular. I would certainely be interested in any ideas that might steer me in the right direction.

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Fw: [R-390] cyclic reception, 0-8MC, non A
Date: Thu, 13 Feb 2003 20:26:21 -0800

By the way, avoid running the receiver in that condition. As I (further) recall, the output from the regulated power supply voltage oscillated somewhere between 180 volts (correct) and full output (above 400 volts - not good). The 'voltage pin' mentioned below is a test plug.

Caution - the test plug is connected directly to the regulated B+ voltage output of the power supply. You can find at least 180 volts, and may find more than 400 volts at the test point if the regulator circuitry is not

operating correctly. Note there are also voltage and hum adjustment pots located below the test point. I found several off-value resistors in the power supply module in the receiver I have. You might consider checking the regulator out thoroughly before placing the receiver in service.

From: "James Bischof" <jbischof@nycap.rr.com>
Date: Thu, 13 Feb 2003 23:28:40 -0500
Subject: [R-390] Re: R-390 digest, Vol 1 #580 - 13 msgs

Up date on my, r390 non a. My audio problem was a .047 capacitor C527. I also replaced C551, 100 Pico farad cap. Thanks to every one for there input. My radio is working excellent on all bands now.

From: R390rcvr@aol.com
Date: Thu, 13 Feb 2003 23:31:05 EST
Subject: [R-390] B+ reading on cycling non A

B+ 176 volts, solid, during both on and off phases. When I restarted the rig after 10 minutes off, it took ~2 minutes before the signal started cycling.

Date: Fri, 14 Feb 2003 10:15:46 -0700 (MST)
From: Richard Loken <richardlo@admin.athabascau.ca>
Subject: [R-390] what is the value of a R390 (note the lack of an A)

I find myself broke and contemplating selling my R390 that has been sleeping in shack for over five years waiting to be restored. So whats it worth? This is a Fair radio used, repairable unit in good physical condition with a quite nice engraved front panel that I bought when Fair still had lots of R390's circa 1996. I also have a very good manual photocopy, both proper meters, and spare rectifier and regulator tubes but all three covers are missing. What would be the price range of such a package these days?

Date: Fri, 14 Feb 2003 14:23:42 -0500
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: Re: [R-390] what is the value of a R390 (note the lack of an A)

The good news is that it's an actual radio, not one of the imaginary 'non-A' types. Sounds like it's pretty complete, I think Hank has repro covers (or maybe those are just for the A model?).

Not sure if you've tested or used the radio at all, so a lot would depend on that. But my guess is somewhere between $200-$400. The R390 is a much nicer radio than the cost-reduced A model IMHO. It's also a lot heavier, so shipping will be a consideration. They are not as plentiful as

the later A either. Just having the meters installed is a big plus these days. The missing covers are certainly a lot less important. If you can find any possible way, keep it.

This is *the* receiver to have for long-term listening. The A is nice as well, but the R-390 from which it came is truly a marvelous radio. If you have several A models, I'd suggest moving one of those since it will be much easier to replace. I'm in the process of "culling the herd" as well, but my remaining R-390 is going nowhere. It's one project I won't minding getting to later. I sold my duplicate R-390 to Sir George in 1998 for over $300, if that's any hint. It was as complete as yours with the Utah cover on top, but missing the other two. Both meters, all knobs, working but needing restoration and a power cord. No manual either. Hope this helps, and I hope you find a way to keep it. If you do decide to move it, you shouldn't have any problems finding a buyer. I won't quote the words of Les Locklear (who I think quoted someone else?) about these radios, as tempting as it is....

From: Llgpt@aol.com
Date: Fri, 14 Feb 2003 15:19:59 EST
Subject: Re: [R-390] what is the value of a R390 (note the lack of an A)

A now famous quote from Neil Clyne G8LIU.....
"The R-390 is a mans radio; the R-390A is a boys radio"

Date: Thu, 06 Mar 2003 08:34:49 -0700
From: Jordan Arndt <jordana@nucleus.com>
Subject: Re: [R-390] wanted r390 (nonA) if

I am also looking for an R-390 Non "A", perferably from someone here in Canada... I thought I had found one, but the seller decided to keep it ... As long as it is complete, and at least capable of receiving something, I'd be interested... I have a small stock of original meters , so it isn't necessary that they be present... As an aside, did all the 390 non "A" receivers have etched or engraved panels..? I can refinish front panels also as long as they are of the engraved type...

From: R390rcvr@aol.com
Date: Thu, 6 Mar 2003 12:29:56 EST
Subject: [R-390] Engraved front panels on R-390(non A)

Dear Jordan: All the R-390 non A panels were engraved, to the best of my knowledge. I have handled units from about all the contracts, and so far, have never seen a silk screened panel.

I must say I continue to be amazed by the R-390 non A. Mainly about its

incredible durability and built quality. I have had a number of A's, and invariably find the non A's have held up better over the years. I am not qualified to really comment on performance numbers, but it sure sounds nice, and its nice not to have to worry about the mechanical filters dying. Randy Stout

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From: "federico" <l.baldi@www.dottorbaldi.it>
Subject: Re: [R-390] Engraved front panels on R-390(non A)
Date: Thu, 6 Mar 2003 22:19:49 +0100

My R-390 non-A have a silk-screened front panel (and is the same on the R-390 non-A of my radio friend) instead of my other two R-390-A's that have an engraved front panel. What do you think about? Federico IZ1FID

From: Aidehua@aol.com
Date: Thu, 6 Mar 2003 22:19:52 EST
Subject: Re: [R-390] Engraved front panels on R-390(non A)

To my knowledge all of the R-390's were silk-screened (Collins/Motorola). Even the early R390A's were silk-screened (Collins/Motorola).

I think the engraving started with Capehart, Imperial or Stewart Warner in the late 50's. Hence forth, they were all engraved.... That's my story and I'm sticking to it...

From: "Don and Diana Cunningham" <wb5hak@sirinet.net>
Subject: Re: [R-390] Engraved front panels on R-390(non A)
Date: Thu, 6 Mar 2003 21:49:05 -0600

But both of my "non A's" (1 Collins, 1 Motorola) are engraved.
They are at least "original Depot Dogs", hi hi.

From: "Jim Simmons" <jimsim@adelphia.net>
Subject: Re: [R-390] antenna trim red dot
Date: Sat, 8 Mar 2003 07:53:44 -0500

----- Original Message -----
I have a r390, non A. There is a red dot on the shaft that is part of the antenna trim capacitor. Where should the red dot be when aligning the radio? James Bischof

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Date: Sat, 08 Mar 2003 05:45:32 -0500
From: K2CBY@aol.com
Subject: [R-390] Re: antenna trim red dot

Per the tech manual -- with the red dot at the 3 o'clock position when the shaft is viewed from the top with the front panel forward, set the ANT TRIM knob to "0"

From: "John KA1XC" <tetrode@worldnet.att.net>
Subject: Re: [R-390] antenna trim red dot
Date: Sat, 8 Mar 2003 11:51:19 -0500

On the R-390 and R-391, the red dot should be pointing straight up (12 o'clock) with the antenna trim control set to 0.

If I go "in" to a radio I usually freshen the dot with a dab of Testors model paint to make it more visible. I saw another post stating different, but that procedure is for the R-390A which has a totally different mechanical connection to the antenna trimmer cap.

From: "Scott Seickel" <polaraligned@earthlink.net>
Subject: Re: [R-390] Engraved front panels on R-390(non A)
Date: Fri, 7 Mar 2003 06:54:52 -0500

Ditto here for my 2 390's. I think Silk Screening was a money saving thing with very early R390A's.

From: "Barry Hauser" <barry@hausernet.com>
Subject: Re: [R-390] Engraved front panels on R-390(non A)
Date: Fri, 7 Mar 2003 09:54:24 -0500

More ditto's -- 2 non-A's, 2 R-391's and spare panels I've had -- all "engraved". I suspect you're right -- tried silk screening early R-390A's, then realized it would be more costly in the long run when the lettering rubbed off to repaint AND then re-silk-screen panels vs. refilling the stampings.

Somewhere along the line, some people must have got the notion that these receivers would be in use for a very long time, long enough to be overhauled several times over a couple of decades or more. That's not true of most equipment.

From: Aidehua@aol.com
Date: Fri, 7 Mar 2003 10:12:33 EST
Subject: Re: [R-390] Engraved front panels on R-390(non A)

Boy, I luv this group!!! The synopsis is that the R390's (non A) were engraved and that the early R390A's were not (Motorola/Collins). Don't own an R390 (yet), so I wasn't exactly sure on that....Thanks for the feedback.

From: "Michael Tallent" <mtallent@highstream.net>
Subject: Re: [R-390] Engraved front panels on R-390(non A)
Date: Fri, 7 Mar 2003 11:31:03 -0500

My R390 has an engraved (stamped) front panel. It is--- Serial 1693
Order# 14214-PH-51-93 Collins Radio

Date: Mon, 02 Jun 2003 10:44:31 -0700
From: David Medley <davemed@davemed.com>
Subject: Re: [R-390] Cover plates

Assuming this is an R-390 (non A) there are a number of cover plates which are frequently missing. These are:

1.RF deck cover. This is NOT the so called UTAH plate which belongs to the R390A. Available from Fair or Hank Arney.

2. Cover over the xtal osc. No known source.

3. Cover over the adjustment caps on rear panel. No known source.

4. Top and bottom covers interchangeable with R-390A. Available from Fair.

The radio will work fine without any of the above but you will have to be careful with dust and dirt. After all they are dust covers. If you want any help with this radio I am at your service. Don't forget my web site davidmed@davemed.com

If you have an R-390A ignore all of the above.

Date: Sun, 08 Jun 2003 17:58:31 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Where to find the Tube list for my R-390/URR

I assume you're asking about the NON-A which is the original, non-cost-reduced model, AKA " a man's radio", etc. While most of the information was declassified some time ago, the tube list itself, remains TOP SECRET and remains on a need-to-know basis. However, you can look in the parts lists or, after signing the proper authorization forms, take the top and bottom covers off and look inside. (If you have one of these radios, you are required to look inside --frequently.) Y'see, they printed the tube numbers right by the sockets they go into. See, that's why they kept it Top Secret. They figured if you didn't have an R-390, AKA NON-A, you don't need to know, but if you have one, you can just look inside, so then you don't need

it anyway. And -- if you've managed to get hold of the manuals and can't find the tubes in them, you probably don't represent a serious security risk. It's a DC bureaucratic spook thing. So much for the tomfoolery, or, in this case, barryfoolery, perhaps. I think someone has a tube compliment list on a web page somewhere. One must visit is Dave Medley's web pages -- http://www.davemed.com/

Here's another must-see http://www.r-390a.net/Pearls/edited-R-390-non-A.pdf

This one includes tube layouts of the top and bottom
http://asa.npoint.net/35720-3.pdf

To my knowledge, there were no changes in the tube lineup for the R-390 (non-A) and it was also the same for the R-391 -- the autotune version, which is electronically identical. Some previous owner may have made subtitutions, I suppose. You might find that the two 26Z5W's have been replaced by silicon diodes and/or the 3TF7 ballast tube has been subbed out with a resistor or something or other. It's a good idea to pull all the tubes and check them on a tester. While the final test is performance in the receiver, it's best not to use the receiver to test for shorted tubes which can cause collateral damage. At the same time, you can check what tubes are actually in the sockets, and clean the pins and socket contacts with DeOxit. You should also check the mechanical alignment/synchronization. But here's the most important issue of all: Does it have the "green gear" or was it purloined by an enemy agent posing as a tech pretending to be forgetful? This will either be up high on the front of the RF deck hanging on a screw a bit toward the left or hidden down below as if it's part of the gearworks, but not meshing with any other gear (if it's in the proper storage position.) If you do not have the green gear, you should now be obsessed with acquring one. This is a tradition. We'll expect a complete report.
Barry

----- Original Message -----
From: "Ron H" <rnharsh@attbi.com>
To: <R-390@mailman.qth.net>
Sent: Sunday, June 08, 2003 4:36 PM
Subject: [R-390] Where to find the Tube list for my R-390/URR

I am now the proud owner of a new/old R-390/URR and have downloaded hundreds of megabytes of manuals but haven't been able to find a list of the tubes used. Is this because there were many variations? I would have thought that since all of the particular model were manufactured to a milspec the tube complement would have been the same.

From: "Ron H" <rnharsh@attbi.com>
Subject: Re: [R-390] (got it!)Where to find the Tube list for my R-390/URR
Date: Sun, 8 Jun 2003 19:16:11 -0500

Thanks Greg and all who responded! Found it on TM -11-5820-357-10? Page 5 & 6. Page 6 is the pictorial version for those who have trouble with tables of data... Hi Hi

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From: "Jim Miller" <jamesmiller20@worldnet.att.net>
Subject: Re: [R-390] R-390A Cost Reduction and Improvements
Date: Mon, 9 Jun 2003 23:15:45 -0400

For what it's worth, the Collins Cost Reduction Project Document available at
http://www.r-390a.net/faq-refs.htm identifies the following apparent "improvements" investigated for the R390A "A model" as compared to its predecessor (R-390). With these improvements, which model would you want?

- ** B+ filter improvement - Reduction of receiver temperature caused by location of the type 6082 tubes, reducing the cost of the B+ filter.

- ** Added a VR tube to get the required stability from the VFO and crystal oscillators.

- ** Mechanical filter designs incorporated for improved selectivity - although phase nonlinearities did impact DF performance;

- ** Improvements in accessibility, reliability and performance;

- ** Savings resulting from elimination of the squelch facility and remote control;

- ** Repackaged power line filter;

- ** Tuning control stops of improved design;

- ** Crystal oscillator redesign to reduce/consolidate crystals - A new frequency scheme permitted a greatly simplified mechanical construction and gearing,
- ** RF and variable IF coil redesign to improve tracking;

• ** Savings resulting from elimination of the 3500 cps low pass AF filter,
retaining the narrowband filter.

• ** Mainframe redesign for cost and weight reduction.

• ** Eliminated need for hum balance control;

• ** VFO end point adjustment was made more accessible. In the R-390A;

• ** Holes were provided in the gear plate so that this adjustment could be
made without removing the VFO or RF units.

• ** Simplified design and improved the performance of the gear train and slug racks;

• ** Redesigned RF module to remove an RF amplifier stage (for cost savings), put mixers on AGC control, use 6DC6 tube for RF amplifier, etc. – probably the most controversial change, next to mechanical filters.

• ** Calibrator using a 200 kc crystal was built and tested. In comparison to
the former model using a 1 mc crystal, reliability was improved and harmonic output increased.

• ** Where possible tubes were replaced by more rugged equivalents.

• ** Improved antenna relay provided to overcome poor attenuation in original;

• ** Changes in mechanical construction were also made, such as the closer
attention paid to electrolytic corrosion, the new means for chassis mtg. and
the radical power supply unit redesign.

Personally I'll take a 390A any day. Go to http://www.r-390a.net/faq-refs.htm

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Date: Tue, 10 Jun 2003 08:39:57 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] R-390A Cost Reduction and Improvements

Well, Jim, there's more than one way to read the product brochure. As far as beating dead horses is concerned -- preferred here as beating live ones would be cruelty to animals. ;-)Let's review, maybe one last time ... (right)

>For what it's worth, the Collins Cost Reduction Project Document available
>at http://www.r-390a.net/faq-refs.htm identifies the following apparent
>"improvements" investigated for the R390A "A model" as compared to its
> predecessor (R-390). With these improvements, which model would you
>want?

Well, let's see ...
>
> * * B+ filter improvement - Reduction of receiver temperature caused by
> location of the type 6082 tubes, reducing the cost of the B+ filter.

Getting that heat out of there was worthwhile. Can be done with a muffin fan or the 6082's can be reversibly solid stated out.

> * * Added a VR tube to get the required stability from the VFO and crystal oscillators.

That was necessary because regulation was inadequate without it, so tossed in a common VR tube as used in SP-600's and many commercial rx's. Not an enhancement, but a "fix" to a "mod".

> * * Mechanical filter designs incorporated for improved selectivity -
> although phase nonlinearities did impact DF performance;

Latter day evaluation -- yes, better selectivity for SSB, but introduced ringing, and more important, apparently prone to wear out and break down after 40-50 years. Expensive to replace.

> * * Improvements in accessibility, reliability and performance;

That's a broadside -- yes & no. Helps if you ignore introduction of Sprague's latest wonder "Black Beauty" line of molded paper caps, hermetically sealed to last forever. Original "non-A" seems to have less in the way of cap failures 50 yrs out, and the failures on the BBOD's probably started much earlier, but still after the warranties expired. Mixed bag.

> * * Savings resulting from elimination of the squelch facility and remote control;

That's not an improvement. Space was reserved for a retro-fit squelch under principles of CYA, blowing $4 of the $14 savings.

> * * Repackaged power line filter;

Again, a simpler one and there was a tradeoff. Also the power connection arrangement is sub-par compared with many mil sets and downright unacceptable. Ambigous hookup of AC ground wire with grounded cordset, risk of shock/shorting out of power if cover left off or bent, no integral strain relief, allows for improper hookup of hot vs neutral. Should have retained
3 pin round connector. "Improved" version probably wouldn't qualify for UL approval.

> * * Tuning control stops of improved design;

Part was retrofitted to production non-A's.
Correction of defect with better 10-turn stop.

>* * Crystal oscillator redesign to reduce/consolidate crystals - A new frequency >scheme permitted a greatly simplified mechanical construction and gearing,

Not so great: Overuse of smaller number of crystals. While "a diamond is forever", an oscillating piece of quartz is not. Original design distributed use over more xtals, and consequence of a crystal failure would take out fewer bands. Also, crystal mounts/contacts are inferior in "improved" set. Contact area is not as solid, prone to mild oxidation, intermittents, etc. (40 yrs out, anyway.) That and gear train = mostly cost reduction, not much improvement, if any.

> * * RF and variable IF coil redesign to improve tracking;

Maybe, but cheaper mounts and connectors. Thin pins vs. substantial "mini-banana". However, standardization on a common ferrite core rather that custom matched powdered iron IS an advantage to the "A". (Color coded, hand tweaked iron powder slugs were apparently the means of handling tracking problems in the non-A.)

> * * Savings resulting from elimination of the 3500 cps low pass AF filter, >retaining the narrowband filter.

No AF filter switch.

> * * Mainframe redesign for cost and weight reduction.

I dunno -- gotta go weigh a couple of samples. What's weight difference - -a couple of pounds at best? Again -- cost reduction. The laminated side

panels of the original were not worth the expense and flexed more than the heavy aluminum ones on the A. The ability to drop the front panel without removing the handles (on the A) is also nice.

> * * Eliminated need for hum balance control;

Fell out of dropping electronic regulation.
What's a pot cost? Less "tinker value"

> * * VFO end point adjustment was made more accessible. In the R-390A;

Seems most PTO's have to be pulled to take off a winding or do some other internal work anyway.

> * * Holes were provided in the gear plate so that this adjustment could be
> made without removing the VFO or RF units.

Probably one of the reasons that guy dubbed the R-390 NON-A "a man's radio".
Not for lazy wuzzes.

> * * Simplified design and improved the performance of the gear train and slug >racks;

Original, though more expensive, was more substantial. I suspect the real reason that there was no autotune version of the "A" model is that the gear train was not up to the additional stress of motor drive. They did introduce lateral adjusters for slug mounts on slug racks - maybe to accommodate wider manufacturing tolerances.

> * * Redesigned RF module to remove an RF amplifier stage (for cost >savings),
>put mixers on AGC control, use 6DC6 tube for RF amplifier, etc. - probably
>the most controversial change, next to mechanical filters.

Secton on RF module changes is difficult to follow. Seemed to be a lot of fixing and patching to compensate for dropping one stage.

> * * Calibrator using a 200 kc crystal was built and tested. In comparison to the >former model using a 1 mc crystal, reliability was improved and harmonic >output increased.

Also mentioned difficulty of getting suitable 85 C degree xtal -- "solution appears in sight".

> * * Where possible tubes were replaced by more rugged equivalents.

I suppose, but I think you can retrofit most of the better version if you want. You skipped the part about "VFO stability". Sounds like they had to make the endpoint adjustment more accessible due to difficulties.

> * * Improved antenna relay provided to overcome poor attenuation in original;

Some unclarity on this re: attentuation at higher frequencies. I forgot -- do non-A's have the selenium rectifier -- added to run the relay on DC?

> * * Changes in mechanical construction were also made, such as the closer >attention paid to electrolytic corrosion, the new means for chassis mtg. and >the radical power supply unit redesign.

Fair dose of smoke & mirrors here. I see a great deal more electrolytic corrosion on R-390A's than the predecessor. Don't see where mini-coax and MB connectors are an improvement over beefy standard BNC's and good thick coax cable. Most of the mini-coax has deteriorated except maybe the teflon covered type of the '67 EAC's. MB connectors complicate test hookups
requiring adapters.

Finally ... You have to read the whole thing -- between the lines as well. The main benefit to us now is that they found a way to "cost reduce" the R-390, paving the way for much higher production of the R-390A so many survive. However, just looking at the construction design differences, the full amount of cost savings is not all that apparent -- the R-390A was still very mechanically complex. Some cost reduction elements were really minor -- like dropping the squelch and making it optional. After allowing for the squelch mounting plate in the "A", the net reduction was placed at $10. Saved some change by eliminating tools, tube pullers and pin straighteners off the back panel, etc. I suspect most of the cost savings was achieved through pencil sharpening and more aggressive RFB's for components and manufacturing over a wider group of prospects, not just Motorola and Collins plants.

Don't forget, the cost reducing elements had to overcome the fixed re-engineering and retooling costs -- "We'll make it back on volume." There is one other "business thing" I will share with you. If you've been selling an item to a client for, say $100 a pop and the client comes back to you and says "Can you do any better? We'd like to order more of these, but they're too costly." Unless you're an idiot, you do not come back and say "OK, how about $75?" for the same item. You have to change it and take some things away or find some way to rationalize the price break ... or, what

does that imply about your prevous price-points if you don't? I have no doubt that was part of (not all of) the re-design process, but it's a part that does not get documented, much less discussed out of school by anyone intending to remain employed in a particular industry. It's business, it's only business.

Fortunately, and to the Collins group's credit, they managed not to screw up the radio in the process. A lot of products don't survive "cost reduction" and re-bidding very well, let alone design by commitee. As for which version is a better one now -- 40-50 years later? It depends more on condition of the individual unit, including any restoration/recapping that's been done as well as personal preferences -- not to mention pot luck of what you come across at what price. Gotta go put the dead horse back in the freezer. Barry

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Date: Tue, 10 Jun 2003 11:00:50 -0400
From: tbigelow@pop.state.vt.us (Todd Bigelow - PS)
Subject: Re: [R-390] R-390A Cost Reduction and Improvements

This is more accurately what determines the 'best' radio to an individual. After all, if you 'cost-reduce' a viable product into something less, is it not 'cheaper' by intent? When writing it all up, you pretty much have to justify your decisions to change this or remove that, in a positive light (of course).

Otherwise, who'd agree to the program/plan? They knew they had a winner with the R-390, so it makes some sense that they'd want to strip it down a bit or 'streamline' the process with the thought of mass production. Adding mechanical filters wasn't cheap either.The "A" model is certainly more plentiful and therefore, more popular. Familiarity has alot to do with it, but it's just a great radio none-the-less.

Still, you cannot beat its namesake, the good ol' R-390, for overall performance and construction. Comparing the "A" to the R-390 is a lot like comparing a Bentley to a Rolls Royce. It's not a case of comparing a Toyota to a Rolls or even a Lincoln (I feel a car thread approaching!).

Date: Tue, 10 Jun 2003 10:11:47 -0500
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] R-390A Cost Reduction and Improvements

[snip Barry Hauser's good stuff on cost-reduction]
> This is more accurately what determines the 'best' radio to an
> individual. After all, if you 'cost-reduce' a viable product into
> something less, is it not 'cheaper' by intent? When writing it all up,
> you pretty much have to justify your decisions to change this or remove

> that, in a positive light (of course). Otherwise, who'd agree to the
> program/plan?

Not always. I've seen cases where the thought that went into knocking the cost down also resulted in a better product. Admittedly, the product wasn't a radio, but I think that it *could* happen there, too. "Cheaper" and "less costly to manufacture" don't always go together. And there is the old software writer's caution to the boss: "Smaller, faster, more reliable: Choose any two."

> The "A" model is certainly more plentiful and therefore, more popular.
> Familiarity has alot to do with it, but it's just a great radio
> none-the-less. Still, you cannot beat its namesake, the good ol' R-390,
> for overall performance and construction. Comparing the "A" to the R-390
> is a lot like comparing a Bentley to a Rolls Royce. It's not a case of
> comparing a Toyota to a Rolls or even a Lincoln (I feel a car thread
> approaching!). Solve the great debate of R-390 vs. A - drive both!! (o:

I do. And I like 'em both. Got four of the newer ones, and one great example (All-Collins, from Rick Mish) of the older.

From: "Dulaff, Paul" <PDulaff@dpconline.com>
Date: Tue, 10 Jun 2003 08:27:50 -0700
Subject: [R-390] R-390A Cost Reduction and Improvements

Everyone: Something to consider also is that when the R390 was developed, the mechanical filter development project(s) Collins was not yet complete. The use of L/C networks for selectivity was the current approach during the R390 development. Had the mechanical filter project(s) been complete, the R390 would have had them from the beginning.

From: "Ron H" <rnharsh@attbi.com>
Date: Tue, 10 Jun 2003 15:26:44 -0500
Subject: [R-390] Gear Train in R-390/URR

Are there any significant differences in the gear trains on the R-390 and the
R-390A?

From: "Walter Wilson" <wewilson@knology.net>
Subject: Re: [R-390] Gear Train in R-390/URR
Date: Tue, 10 Jun 2003 17:36:00 -0400

Here are some of the more significant differences:

1) Remove the R-390 gear train without the green gear in place, and you'll
easily get it out of sync
2) The R-390 slug racks do not go in order by frequency
3) The slugs are different type/diameter for different bands
4) The zero cal functions differently
5) The alignment of the R-390 gear train is done at 2 000 KC, and is aligned from marks on the back of the RF deck, which are impossible to see with the xtal oscillator installed. The R-390A gear train is aligned at 7+000 KC with alignment marks on the front, and the alignments can be made without removing anything except the covers and front panel.

Date: Thu, 31 Jul 2003 13:21:54 -0700 (PDT)
From: <jlap1939@yahoo.com>
Subject: [R-390] Gain Problem

Will stay as short as I can...Must enter defense first..!! This however will not be short... When I received my 390 back from David, I hooked it up to the reciever monitor, and set it for SSB on the ham bands..As a result I don't know when the problem developed, or why it did..as I was hearing all at 6 local, 6 to 8 rf, by adj. of the monitor vol. I never touched the local. I use headphones for SWL on the 600, as a rule. The monitor is a very good amp and runs at a low level whatever you put into it... (This is my defense for not having noticed anything wrong...)
Decided to chase a little SWL that I was not getting clearly enough on the 600, and guess what?My 390 Local Gain is running wide open all the time...Have to use rf gain to set a listening level, which means I am getting noise in the system I would not normally have it seems.(By the way, Phils' stuff was great reading for a change..I think it is reasonable material for this forum, and checked out the stations myself, (But not with total sucess...but thats another story...)) Questions? YES: Likely the pot, or might I look at something else ..(Either sooner or later), as the cause..?? and having only partial schematic and little knowledge of 390 , how do I start? How do I use the line output, and would that be a temp. remedy? Funny, having bought and worked on a blue striper, I can do much on the 390a,inc a good align, due to THE 21ST CENTURY R-390A/URR REFERENCE. But I like and own the 390...Wish there was a way to learn the more complex 390 that would help me...or maybe I may yet just get and KEEP a 390a...?? I covet your help and sympathy..Regards, John (JLAP)

From: "Bill Smith" <billsmith@ispwest.com>
Subject: Re: [R-390] Gain Problem
Date: Thu, 31 Jul 2003 16:49:29 -0700

Aside from the frustration implied by the poster, there is not a little

frustration in this reader. Rant deleted. Several things to check jlap, they shouldn't be difficult.

(1) Complete R-390 documentation is on-line. I downloaded and printed it. It was difficult to line up the pages so that it could be printed front and back, but I took the effort and have a good manual as a result. Yes, I searched to find a utility to print the schematics, but free IrfanView has turned out to be invaluable for a number of other needs here also. Yes, I later found an original manual, but it is an earlier edition. Both, together are sound documentation for the receiver. Either are more than enough information to answer your question re the Local Gain pot.

(2) The 390/390a have similar, if not identical audio circuits. Seems the only thing that could cause loss of gain control would be a defective pot or bad ground connections to the pot. You will observe the Local Gain pot is located at the bottom of the receiver front panel. Have you examined the connections to make sure they haven't been phycically bumped by moving the receiver around? The ground wire(s) to the pot may have broken.

(3) R-104, the 2500-ohm Local Gain pot may be defective. R-105, a 1200 ohm resistor is connected across the outside terminals.

(4) The wiring to the audio module may be damaged. You may have a broken ground wire inside a plug.

(5) A quick look at the circuit will show that there are no sneak paths around the Local Gain volume control. Audio from the receiver is wired directly to both the Line Gain and Local Gain pots.

The R-390/R-390a receivers may easily be classified as high-maintenance equipment, the best and most sophisticated of their age. They were also designed to be servicable according to the technology of their age.

Date: Wed, 20 Aug 2003 16:37:31 -0700 (PDT)
From: David Medley <davidmed82@yahoo.com>
Subject: [R-390] Another Conundrum

In the R-390 regulated power supply is a single 6BH6 tube. This is a pentode used as a DC amplifier. It is becoming expensive and difficult to find sometimes. The other day I found some on ebay NOS Amperex brand. The price was great. They duly arrived and the boxes were in great shape. Looked like new.

So I plugged one in to the R-390 I was working on and to my surprise the 180v soared to 300v!! So I assumed that this was just a bad tube so I plugged another one in. Same result. So I looked carefully at the tube.

Stamped 6BH6 like on the box but the tube was obviously not a 6BH6. Looked like some kind of dual triode. No resemblance whatsoever to the real thing. Made in Japan. So guys if you need a 6BH6 for your R-390 look carefully at the tube before you plug it in especially if it is Amperex made in Japan. 300v is very bad for your radio's health. Dave

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From: ToddRoberts2001@aol.com
Date: Wed, 20 Aug 2003 19:47:54 EDT
Subject: Fwd: [R-390] Another Conundrum

Hi Dave, thanks for the warning about the 6BH6 tubes. Antique Electronic Supply (www.tubesandmore.com) currently have the 6BH6 tubes on sale for $2.30 each. It pays to check their sales flyers from time to time as they may have many of the tube types we are looking for on sale.

Date: Wed, 12 May 2004 22:08:36 +0200
From: "Claudio Spiritelli" <oldradio@tin.it>
Subject: [R-390] Green wheel on 390

After several 390A's, I decide to restore a 390(non A). I was not aware of the Green wheel and on mine it did not to exist at all. Only after I realize that the mechanics was going out of sync, I went into Internet and I start to look and I was made aware of the Green wheel. TOO LATE..... My question: is it sufficient to move the MC shaft to 2 and then move the KC shaft until all the cams align perfectly with the lines (including the one controlled only by the MC shaft that is already aligned since I have MC on 2)? Then I can move the dial to the appropriate reading 2. 000. It appears to me to simple of a solution, do I miss something? Is here a different procedure to align once the Green wheel is not installed and mechanical alignment is lost?

Date: Wed, 12 May 2004 16:30:29 -0400
From: "AI2Q" <ai2q@adelphia.net>
Subject: [R-390] Who needs a green wheel?

As I described previously on this list, my R-390-non-A was missing the coveted green gear, too, so I disregarded it entirely as I went about the task of degreasing and degunking this grand old radio. I didn't disassemble the geartrain. I soaked it, cleaned it, and lubed it, but didn't loosen or move any gears, clamps, or shafts after pulling the RF deck.

To get it back in sync after the big cleanup, first I set the RF deck racks to the appropriate settings (rear cam line markings) as per the TM photo, for what they should be at 02 000 (though the Veeder-Root counter was not connected yet). I did that by manually turning the big split gear, moving the cams around and around until they lined up. I visually checked to see

that the bandswitch contacts aligned properly by poking my beady eyes under the chassis.

I then placed the RF deck on the chassis, loaded the brass split gear, and dropped the assembly onto the gearset, with the counter set at 02 000. Then I raised the right-hand front side of the RF chassis (as you face the set) using the screwdriver technique described in the TM, not dis-engaging the gears already set in the previous step, and turned the MEGACYCLE CHANGE shaft a few turns clockwise. I then dropped the right-hand side onto the loaded gear, and used the knob to turn the shaft and entire engaged gearset down to the 0.5 MC band.

I then raised the chassis again, and turned the MEGACYCLE CHANGE shaft and gear fully CCW again, and then placed the loaded gear in place, dropping the chassis on the gears. Turning the shafts through the range of 00 to 31 and the full 000 to 999 range on the VFO shaft (plus over-run) moves the cams through their positions properly. The small subchassis moves up and down as well.

Date: Wed, 12 May 2004 17:16:11 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] Green wheel on 390

I'm going from memory, but, yes, it is not that difficult to re-synch the the two "halves" of the RF deck. Don't ask me how I know this -- Oh, well, I'll tell you anyway -- even though I have the green gear, I had to remove and reinstall the RF deck once and forgot to install it. Got it right the first time around, but when I had to re-do something, I forgot all about it.

How much re-synching is necessary depends on what else, if anything, you did to the the RF deck.

Some things to watch out for in re-installing the deck: There are (I believe) three split gear sets that need to have the backlash set by off-setting by one, two or three teeth - your choice and depends on any wear and the springs. I use a toothpick or similar to hold them in position. Also, the KC shaft goes through a bushing that mounts to the front plate in a slotted hole. If the nut on the bushing was not fully tight and the deck is set down a bit hard on the bench, the position of the bushing and shaft can shift upward. There is little room for error. If the shaft is too high or too low, either the counter will turn and nothing else, or the gear train will turn, but the counter won't, etc. If it is set too low, for example, the RF deck will appear to be fully seated on the chassis, but not actually so- the front will be up slightly, resting on the gears.

It's not a bad idea to at least walk through the full mechanical synch after

removing and replacing the RF deck. The green gear is a convenience to reduce the amount of work if everything was properly set to start and the service that was done did not otherwise affect any of the mechanics. It does not allow the deck to be mechanically operated off the chassis -- it is intended to lock everything up in position. I'm not sure that I'm explaining this very well, but the point is that, even with the green gear, things can get out of sorts, so it makes sense to check.

Date: Mon, 27 Sep 2004 19:24:40 -0400
From: Al <alsolway@videotron.ca>
Subject: Re: [R-390] Resistor value verification r-390 non-A

R538 in my IF Deck, S/N 2571, measured 1024 Ohms. Used a Fluke 87 DMM. R390 S/N is 2113. If you need more info like this I have original actual values recorded for just about every resistor in the radio. Started restoration Oct 2001 and finished Oct 2002.

Date: Thu, 04 Nov 2004 13:32:45 +0000
From: Charles B <ka4prf@us-it.net>
Subject: [R-390] J104

Is there anywhere in the world where I can get the connector for J104 - either the UG-421/U or UG-969/U? Please advise

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Date: Thu, 4 Nov 2004 08:43:33 -0600
From: mikea <mikea@mikea.ath.cx>
Subject: Re: [R-390] J104

If you're talking about the (non-A) R-390 power connector, they are pretty scarce. You might look for the entire power cable, CX-1358/U, as an alternative search key. Also call Rick Mish in Toledo (he's in the phone book, or was), or try E-mail to him at radiomon@accesstoledo.com

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Date: Thu, 4 Nov 2004 10:16:15 -0500
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] J104

Try Bill Perry at William Perry Co. 502 893-8724. They have all kinds of surplus military connectors among other things. The power cords also show up on eBay occasionally

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Date: Thu, 4 Nov 2004 10:17:05 -0500
From: "Patrick" <brookbank@triad.rr.com>
Subject: Re: [R-390] J104

I got one last year at Fair Radio....

Date: Thu, 4 Nov 2004 08:40:19 -0800
From: "ELDIM" <eldim@att.net>
Subject: Re: [R-390] J104

Okay, talking on the subject of the R-390. Can anyone tell me if the two wire tube pullers on the rear accessory rack have Part Numbers, Stock Numbers, and oif they are listed in the R-390 Manual which I donot have a copy of? I saw a picture in one of the Operators TM. What exactly is the UG-421/U? I found it listed in the FEDLOG ,but did not find the UG-969/U listed. I thought that these were RF Connectors. Is that the funny screw-on POWER CONNECTOR? If so, then I stand corrected.

Date: Thu, 4 Nov 2004 12:21:32 -0500
From: "Patrick" <brookbank@triad.rr.com>
Subject: Re: [R-390] J104 and tube pullers

On the subject of tube pullers, talk to your local chiropractic and/or orthopedic doctor, the use them to place fingers in traction. They work great on tubes also.

Date: Thu, 4 Nov 2004 19:42:47 GMT
From: "dps4@juno.com" <dps4@juno.com>
Subject: Re: [R-390] J104

I bought the tube pullers from Fair Radio a couple of years ago. They called them military tube pullers, small and large. As I remember, they were reasonable, $2.00 each.

Date: Sat, 15 Jan 2005 07:45:36 -0500
From: Dave or Debbie Metz <dmetz@ntelos.net>
Subject: Re: [R-390] 6082 Question/posting in my sleep

There is an article in Hollow State Newsletter within the last couple of years detailing a conversion that eliminates them and the huge heat they create. By Dr. Jerry

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Date: Sat, 15 Jan 2005 10:40:02 -0500
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] 6082 Question

The substitution of 6080's for 6082's is a standard modification for the R-390.
Details are explained in A. J. Carmody's R-390 Cookbook.

Date: Sat, 15 Jan 2005 12:36:18 -0500

From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] 6082 Question

Hi Dave, well I wouldn't go so far as to say that it is a "standard mod" just because old A.J.C. wrote up his mods on MARS letterhead, and I haven't seen any of his mods done (fortunately) to any 390s or 391s to cross my path, even my latest 390 that has a colorful MARS decal on the front panel. This mod was not authorized by Collins or the Military, and he even included the disclaimer " The Author, however,assumes no responsibility for the operation of these circuits." My beef is that his 6082 conversion method is seriously flawed. He substitutes a pair of 6080s with series connected filaments (fine) but then attempts to derive the required 12 V RMS for the filaments by half-wave rectifying the 25 VAC (incorrect). This is a common error in electronics thinking which actually puts about 50% more RMS volts (emphasis on the RMS) on the filament string. Yes, they will work like this for a time but the 6080 filaments are getting *seriously* cooked. As usual this topic has been cussed and discussed here before, just poke around the archives for any posts on relating to 6080, 6082, or ballast tube voltage conversions, same problem applies to them as well. I just hate to see any R-390s abused by a bad mod and wish that this particular one would stop propagating through cyberspace ;^) R-390 Archives => http://mailman.qth.net/pipermail/r-390/

Date: Sat, 15 Jan 2005 12:59:16 -0500
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] 6082 Question

Well, let's put it this way. It won't harm the radio any, it's easily reversible, and if you want to improve on it, I guess you could substitute a 3 terminal 12 volt regulator for the diode.

Date: Sat, 15 Jan 2005 13:21:07 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] 6082 Question

One of the recurring threads on the 390(not an A) is the power that goes into the regulators. The power can warm up the radio. Things can get pretty warm in a restricted airflow situation. Dropping from 24 to 12 volts with a linear regulator will dump more power into the radio. It will also pull more current out of the filament transformer. You need the same filament power at 24 or at 12 volts. That makes for 2X the current at 12 volts as at 24 volts. Needless to say there are a variety of odd thing done to try to address the 6082 situation. I guess I'd rather mail out a couple 6082's than get into more off the wall mods to these radios right now. Every so often 6082's show up at auction for reasonable prices. I totally agree that the "normal" asking price for these parts is a bit more than I

think it is reasonable to pay.

Date: Sat, 15 Jan 2005 12:06:12 -0800
From: "Kenneth G. Gordon" <kgordon@moscow.com>
Subject: Re: [R-390] 6082 Question

Sigh...I sure wish I had known that when I still owned an R-390/URR, serial number 21. I had to replace two charred sockets once. I was amazed at the heat those things put out, especially when they were gassy.

Date: Sat, 15 Jan 2005 21:05:22 -0600
From: "Paul Staupe" <pstaupe@qwest.net>
Subject: [R-390] Black tube shields

I'm the new custodian of two non-As... as Rick Mish told me... we're not owners... we're custodians of these gems. Since my new non-As are all original... including the original chrome tube shields.... is there anyone out there who would be willing to part with two sets of IERC black tube shields? I'm hoping that someone out there has some extras that they're willing to send to a good home...

Date: Sat, 15 Jan 2005 23:11:00 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] 6082 Question

Well the main way you get the power out is to use regulating devices that do not have filaments in them. That puts it more in the category of redesign rather than modification. I hope that doesn't stir anything more up.

Date: Mon, 17 Jan 2005 11:51:42 -0500
From: Dave or Debbie Metz <dmetz@ntelos.net>
Subject: Re: [R-390] 6082 another question

I guess I'll float another question on the 6082 thread. Would it be so simple as to use another transformer to give either 12v series or 6V parallel filament voltage to use the plentiful 6080 6V tubes? While not ideal, I would think one could just hang it on the back panel under a convenient screw to avoid any drilling.

Date: Mon, 17 Jan 2005 12:39:10 -0500
From: "John KA1XC" <tetrode@comcast.net>
Subject: Re: [R-390] 6082 another question

Yup, that would work well Dave. Unfortunately the 390 is so crammed with modules that there's not much room left inside. But there is some

room behind the front panel, so if you had a compact enough transformer and were clever with some mounting hardware it might be possible to attach it to the X-frame between the KC and MC shafts.

Another no-holes 6080 mod which I've thought of is to mount them on a small outboard chassis along with their own filament transformer, and connect them back to the audio deck via the side vent hole with a foot or two of cable and an 8 pin octal plug (just need one plug and it moves all the heat outside the radio). It's really the same thing as tube socket adapter except that it's outboard because of the space requirements. Before anyone dismisses this as too bizzare take a look at the CV-157, it's got seven tubes (including a 6080) in a separate power supply tube chassis which is then connected to the main chassis below via a cable. I just wish they would have connectorized it as it would make servicing easier.

Date: Mon, 17 Jan 2005 13:28:28 -0500
From: Dave or Debbie Metz <dmetz@ntelos.net>
Subject: Re: [R-390] 6082 another question

That sounds like a great idea to move the tubes outboard too. . I have a pretty good supply of 6082's but will file that tip away.! thanks

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Date: Fri, 21 Jan 2005 15:13:48 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] 6082 another question

>I guess I'll float another question on the 6082 thread. Would it be so
>simple as to use another transformer to give either 12v series or 6V
>parallel filament voltage to use the plentiful 6080 6V tubes?

I did that by running a couple thick wires out the side of the frame to a loose transformer while testing an R-390?URR. The tubes melted the insulation on the wires. Now I use a fan with the original 6082's (and I can touch the tubes with my fingers without getting burned.)

Date: Mon, 31 Jan 2005 15:16:35 -0500
From: "Al Parker" <anchor@ec.rr.com>
Subject: [R-390] R-390(/URR) ID

I have 2 R-390's that came with no tags. For a long time I thought that Collins built them all, but know that's not right. I have a Motorola tag (thanks Boomer, it's finally done). I know modules in the "A's" are pretty well marked, but haven't noticed any mfg info on these. Is it correct, or just presumptuous, to assume that without other info that they were mfg'd by Collins? Or, how do you tell?

Date: Mon, 31 Jan 2005 13:40:23 -0700 (MST)
From: Richard Loken <richardlo@admin.athabascau.ca>
Subject: Re: [R-390] R-390(/URR) ID

It is my understanding that there were only two manufacturers: Collins and Motorola and Motorola was a subcontractor to Collins.

Date: Mon, 31 Jan 2005 16:01:25 EST
From: R390rcvr@aol.com
Subject: [R-390] R-390 ID

Some modules are pretty easy. The power supply has a small metal tag riveted to it, which will have the name on it. The others aren't as clear cut. I have three apart on the bench right now, and so far most of the modules don't have a manufacturer listed. I suspect they are Collins units, and that probably the Motorola units will have the Mfg. on them. The three rigs I have all have Collins front tags, but as we know they can be switched around.

According to Tom Marcotte, N50FF, there were 17011 R-390s made, based on high serial numbers. 6364 were made by Collins, 8401 were made by Motorola for Collins, and 2246 were pure Motorola. I believe all of them used Collins PTOs, but I could be wrong. The module swapping doesn't seem to be quite as rampant in the 390 compared with the 390A. If you have more questions, lets hear them.

Date: Mon, 31 Jan 2005 16:14:31 EST
From: R390rcvr@aol.com
Subject: [R-390] Any non Collins PTOs on R-390?

The ongoing discussion makes me curious if anyone has ever seen a non Collins PTO on a R-390? I am excluding the conversion to the A style PTO, which I have seen several of. Seems to work OK, but sure is ugly.

Date: Mon, 31 Jan 2005 17:06:31 -0500
From: "Jim Temple" <jetemp@insightbb.com>
Subject: RE: [R-390] Any non Collins PTOs on R-390?

I have a Collins manufacured R-390 that has a Cosmos PTO, Type 136\283, S/N 10766. This PTO doesn't appear to be modified from a R-390A PTO and all the hardware and connectors appear original. I am curious about this issue, because the type numbers do not match any R-390A PTO's that I have.

Date: Mon, 31 Jan 2005 19:58:11 -0500

From: Andy Williams <andywilliams@pobox.com>
Subject: Re: [R-390] R-390(/URR) ID

The modules in my Collins tagged R-390 are all labeled Collins, except for the Motorola IF unit. Most modules have to be removed to see manufacturer, but the one on the IF is on the side, directly below the multi-pin connector.

BTW, I recently rebuilt the line filter in this receiver and it no longer trips the GFI. I replaced the 4 paper dielectric caps with 4 line rated .01 uF caps. For the record, I replaced the caps because I had to, not because I wanted to.

Date: Mon, 7 Feb 2005 15:45:18 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: [R-390] New toy.

The 5814's near the PTO are very weak, the two 6082's are weak, one will work the other is too weak. Found a gear rubbing on a wire on the front panel, otherwise very neat wiring. Charring under the 6082's, well, not really charring, just black heat-type dirt. I guess you could call it smoke marks.

Checking the resistors now. Is that first band supposed to be yellow? Or what? I measure the four at 41.8 for R615, 44.0 for R620, 40.8 for R621, and 50.8 for the last one I can't see the number on. Most tubes tested good.

Date: Mon, 07 Feb 2005 20:21:51 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] New toy.

Based on previous posts rather than direct experiance the 6082's are a tube that wears on in the not an A radios. The resistors sound a lot like perfectly good / in tolerance 47 / 20% ohm resistors.

Date: Mon, 7 Feb 2005 20:29:46 EST
From: Llgpt@aol.com
Subject: Re: [R-390] New toy.

47 Ohms Joe, replace ALL of them. Les

Date: Mon, 07 Feb 2005 20:49:48 -0500
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] New toy.

If you do decide to replace them I would recommend using 5 watt

wirewound resistors. They are small enough to fit and they will pretty much last forever. The only real issue is if the resistors are imbalanced. That will put an unequal load on the 6082's. Unequal load burns out the tubes a bit faster. Of course without matched pairs of tubes I doubt the currents are balanced to anything better than 10 or 20% even with exact resistors. The whole issue of tolerance on carbon comp resistors has kept a number of threads going here for quite a while. Needless to say it's a "hot" topic. A lot of the parts were 20% when new. There is more than a little data that even when new they spread out over the entire range

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Date: Mon, 09 May 2005 12:33:41 +1000
From: Lionel Sharp <vk4ns599@optusnet.com.au>
Subject: [R-390] R390 Front Panel Information

I have a R390 with the following information on the ident plate

RADIO RECEIVER R-390/URR
SIGNAL CORPS US ARMY
SERIAL NO 2306 ORDER NO.14214-PH-51-93
COLLINS RADIO COMPANY
500KC TO 32 MHZ

Stencilled above the ID Plate is the following in white paint

MWO-11-5820-294-35/1 MWO-11-5820-294-35/2
Does anyone know if this is of any significance????

Date: Mon, 09 May 2005 00:19:02 -0400
From: Glenn Little WB4UIV <glennmaillist@bellsouth.net>
Subject: Re: [R-390] R390 Front Panel Information

These should be Modification Work Orders that are completed on this receiver.
IIRC TM11-5830-294-35 is the reference maintenance manual for the MWO and these would have been the first two modifications to the receiver. I do not know what these mods did.

Date: Mon, 09 May 2005 07:30:27 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] R390 Front Panel Information

This is a clear indication that the radio should be disposed of immediately. The only way to do this correctly is to forward the radio to me for appropriate disposal .... (let's see, 120 pounds over night air shipped from Oz comes to ...). At least from the front panel what you have is a Collins radio manufactured on the 1951 contract. Two of the field mods have

been done on the radio. My guess would be that all of the field mods have been done and that only two of them have been noted on the front panel. Collins and Motorola were the two contractors on these radios. Of the two I would say that Collins is the preferred "flavor". That's not because they work any better, the name is just cooler. Of course the modules in the radio may be a mix and match by now. No matter who made it, they are great radios. In many ways they are a better radio than the R390A. Parts are a bit harder to find than for the 390A, but they still are around. They *definitely* are worth restoring. Enjoy yours !

Date: Mon, 09 May 2005 14:13:15 -0700
From: "Ed" <ca.urso2@verizon.net>
Subject: [R-390] R-390/URR MWO's

Change 4 of TM 11-856, TO 31R1-2URR-154, dated 22 Dec 1958, indicated that " In receivers modified by MWO 11-5820-294-35/1, the wires connected to B+ 3/8A Fuse F102 are removed and tied together, and the ground connection on transformer T801 is removed. There is no connection between the DC 20A Fuse F103 and P118-15 (not applicable to Fig 53 of TM), and Terminal 6 of T801 is connected through the contacts of J818-15 and P118-15 and B+ 3/8A Fuse F102 to ground. The B+ 3/8A Fuse is called the HV 3/8A Fuse.

Power Supplies PP-621/URR modified in accordance with MWO 11-5820-294-35/1 are NOT interchangeable with power supplies that are not so marked because of wiring changes in the B+ 3/8A Fuse F102 circuit.

R-390/URR Receivers modified by MWO -35/1 above have the former B+ 3/8A Fuse F102 in the ground lead of power transformer T801 and the name of the fuse is changed to HV 3/8A. The MWO -35/1 supersedes MWO SIG 191 dated 20 July 1955 and contractor changes on Power Supplies PP-621/URR identified as MOD 1 and above. These changes restore interchangeability between Power Supplies PP-621/URR and permit their being used in all Radio Receivers R-389/URR, R-390/URR, and R-391/URR so modified.

In receivers modified by MWO -35/1 above the B+ 3/8A Fuse F102 is NOT connected between P120-5 and +300V Unregulated.

In power supplies modified by MWO -35/1 above there is NO connection between Terminals 10 (Ten) and 6 (Six) of T801; There is a wire connected between Terminal 6 of T801 and Terminal 15 of J818.

On Receiver Main Frames modified by MWO -35/1 above, (TM Fig.106) Station 35 Wire 1-33 is 7-40, Wire 5-41 is 15-41 and B+ is HV . At Station 37 there is NO Wire 15-41. At Station 41 there is a wire added

between the cable and Terminal 1 of C101 labeled 5-41, change Wire 35-1 to 42-2, and Wire 37-2 to 35-1. At Station 40, add a wire between Terminal 7 and the cable labeled 35-2."

Perhaps some other group member might bring up details for other R-390/URR MWO's, such as: 11-5820-294-35/2, 11-5820-294-35/3, 32-5820-134/2, 32-5820-134/3 and any other pertinent MWO's.

Date: Sun, 18 Sep 2005 16:42:15 -0500
From: "Paul Staupe" <pstaupe@qwest.net>
Subject: [R-390] R-391 help

Just fired up a beautiful R-391 from a local friend who kept his radios in immaculate condition. I carefully brought it up with a variac power supply that had a voltmeter and an ammeter. I was wondering why the ammeter kept bouncing from 1.4 to over 2A until I realized that the crystal ovens switch was ON. That's a bad thing... keep the ovens off folks.... Now the next challenge is to get the tuning mechanism operational. Anybody out there have a connector for the 24V tuning side of this beast?

Date: Sun, 18 Sep 2005 20:12:26 -0400
From: Barry Hauser <barry@hausernet.com>
Subject: Re: [R-390] R-391 help

Yup keep those ovens off. The '391 uses the same round connector as the R-390/URR (notice I went out of my way not to write "non-A"). I don't remember the pinout -- it's in the manual, but the 4 pins are 2 for AC, one for ground and one for 24 vdc. The ground is common I think. The autotune 24 vdc should be supplied with "amp-le" current -- at least 5A, maybe 7A due to the surge factor.

Also, you should pre-check the autotune mechanism as much as you can without powering it up. If it looks as though it's gunked up with dried out/hardened lube -- don't bother, it won't work and could cause damage to apply power to it. Also check under the lower part of the front panel -- as I recall, you can see without removing the panel. In particular, look at the full length of the worm drive shaft which traverses about 2/3rd's the width of the receiver. Look for bronze shavings or powder where the shaft passes through 4 or five bosses in the "spider" -- cast metal frame. There are "oilite" bearings (sintered porous bronze "permanently lubricated" bushings" at each point. The shaft should rotate when the mechanism is turned (locking keys tight on both KC and MC knobs), but there should be no lateral play. If there is, that means the bearings are shot. If the mechanism binds up when power is applied it may then grind up the bearings if they aren't already worn. (Don't ask me how I know this

;-) ... or should I say ;-(

Be sure you go through the synchronization procedure in the manual that involves turning the worm drive with a bristol wrench through a hole on the right side (when you are facing the receiver, not "left" as it says in some manuals). There are also two adjustments -- one on each autotune head. It's explained in the manual.

Also, to avoid a heart attack or close simulation thereof, when you apply the 24 vdc, first make sure the locking keys on the tuning knobs are loose and the channel selector is on the same channel as the number showing in the little window, otherwise it will immediately actuate. (A difference or "not equal" condition is what triggers the sequence.)

If you're game, then tighten down the two keys -- not too tight, but snug -- and change channels but brace yourself and be ready to cut DC power from the source -- e.g. switch on the DC supply. Even when it works right, it makes a loud racket -- basically driven by geared down Hamilton Beach motor (and many have Hamilton Beach tag on the motors) -- basically same as the motor used in a blender or mixmaster on steroids.

Again, be ready to pull the plug on the DC. Most of these need overhaul -- complete disassembly, cleaning and relubing. The two control units -- one on each of the MC and KC controls -- contain pawls -- stacks of metal pieces with hook ends which engage notches in disks which are also stacked on common shafts. The metal pieces have to slide freely against each other for the whole thing to work. That's easily defeated by hardened, sticky lube and unless someone has already overhauled the thing and operated it recently, it's a virtual certainty that it won't work. However, it may well power up -- and try to self-destruct.

Common failure mode - starts up with a loud whine and a clatter (normal) and the knobs and counter start turning. Comes to the end of the travel of one or both ranges (KC and/or MC) but tries to keep on going, banging up against the end of the 10-turn stops. It is conceivable that it can do damage or partially de-synch an RF deck.

I have two of them. First one - loaded with grease as if someone thought they were topping up the rear end of a half ton truck. Second one -- bronze bearings shot. I think the second one started to work, nearly doing two cycles, before the two bearings nearest the motor ground up and the gear at the end of the shaft that mates with the motor or nearest intermediate gear, kicked out of mesh and started grinding. Would go in one direction, but not the other.

The general problem is that many of the autotuners on the '391's have not

been in use in a long time. Many previous owners just operated them as a "non-391" and let the autotune mechanics languish. Or ran it once and didn't care for the noise and clatter. The vibration also runs against the grain -- wear and tear on tubes (and 3TF7) as well as on fine mechanical and electronic alignment work. Shakes everything up. Interesting to watch though -- once or twice.

Paul Anderson overhauled one of these a couple of years ago and was writing an article for the Hollow State Newsletter. We hope to pick it up again, finish it and publish on the HSN website. He had the procedure all written up, but the stumbling block was the photos needed to get it across. The web site venue should help with that.

Date: Wed, 4 Jan 2006 18:53:10 +1100
From: "bernie nicholson" <vk2abn@bigpond.net.au>
Subject: [R-390] 390A versus 390

Hello Bob my preference is for the 390A for the following reasons: the 390 is in concept a much earlier design ,It uses older noisier tubes ie. 6AJ5 , 6BJ6 etc. it has 2 RF stages and an extra IF. stage to achieve the same result as a 390A the 6082 regulator tubes are very difficult to source and VERY expensive it uses more power and gets quiet HOT, on the plus side it has lovely audio if you are into AM listening, The 390A was initially a money saving exercise, but coming later a NEW generation of tubes had arrived on the scene NOT to mention Mechanical Filters, I am into SSB and the combination of stopband attenuation and shape factor of the 2KHZ filter are second to none as far as the signal to noise on SSB are concerned, I have product detectors in all my receivers fitted where the 3TF7 used to be, If you are running either of these receivers from a stable mains supply the current regulator is totally unnecessary , and the resistor substitution or in my case the use of 12BA6 tubes in the BFO&PTO is fine after the set has been on for about 40 mins. it is very very stable , on the subject of Vfo s the best one by far is the COSMOS as you can linearize it every 25KHZ and WITHOUT DISASSEMBLY , My experience with Progesteron /Collins /Motorola, Have been successful but at enormous cost in time and effort , making a ten turn jig and using reams of graph paper , the COSMOS took less than an hour and maintains its cal within 200Hz across the 10 turns , Regarding the 391 This rx is electrically the same as a 390 but can be remotely controlled with the 10 position autotune mechanism that's the only difference. On one of my receivers I have replaced the 2&4 KHZ filters with separate USB&LSB filters and using a 455KHZ crystal in place of the BFO stolen from inside Z5 coil can . It works superbly. SSB signals just demodulate beautifully , I obtained my first 390A in 1978
so my experience with these radios goes back a way !! But I am still learning -

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Date: Tue, 24 Jan 2006 18:03:19 -0700 (MST)
From: Richard Loken <richardlo@admin.athabascau.ca>
Subject: Re: [R-390]R-390/URR Questions

> It is missing 1 small and 1 medium knob along with the rack handles. I see
> that Fair Radio has these items for the R-390A and was wondering, are they
> interchangeable?

yes they are.

> It also seems to be missing the "green gear". As I am planning on completely
> tearing down and cleaning the gear train is the green gear necessary at all?

It is nice but you can get by without it.

> The power cord is missing and I have been studying Roy Morgan's diatribe >on power cords and bypassing and am leaning towards replacing the
> connector/filter with a modern computer connector and line filter. Any
> comments?

Well I wouldn't, I would get the appropriate connector and put a 3 wire cord on it. Fair used to sell some wierd cable that had the correct connect which you then remove and use with the line cord of your choice.

> I have copies of a couple of R-390 FAQs and the -10 -20, and -35 TMs. Are
> there any R-390/URR specific web sites? I have found several for the
> R-390A/URR, but none for the R-390/URR. Is there an R-390 FAQ?

Date: Wed, 25 Jan 2006 07:58:16 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390]R-390/URR Questions

Great news on the R-390. I have restored two or three but don't own one myself. I hope to at some point. I have found them easier to work on than the "A" variant and they sound nice. On the dreaded "Green Gear".....I can find no use for it except to keep the frequency counter display in sync with the gear train if one was to be removing the RF deck to do some minor work on the bottom side and then reassemble. If you are going to disassemble the thing for a good cleaning you will probably want to pull

the veeder root counter anyway. The rack handles and the knobs are interchangeable no problem there.

The only site I am aware of on the R-390/URR is the works of Dave Medley. www.r-390.com Be aware that Dave has retired from doing 390 work his works are kept alive on the web by others. Any method of powering the radio that grounds the chassis is acceptable....your choice. Good luck and let us know of any questions or of your progress....

Date: Wed, 25 Jan 2006 10:08:49 -0800
From: "Mike Crawford" <mcraw@mashell.com>
Subject: Re: [R-390]R-390/URR Questions

WOW! What a great response. Just like being in a room full of experts. You guys have given me enough information to keep me busy for a while. A couple of things I have noticed about the radio which you might enlighten me on. The front panel, which doesn't seem to have been refinished, is an unusual, at least to me, very pale pastel green color not OD at all. Anyone have any idea where it may have spent its active duty life?

It also has what appear to be thin transparent plastic discs extending out from under the KC and MC change knobs to protect the panel from being worn by the operator's fingers. Is this a common feature?

For you guys who maintained these things in the military. It has a dymo label on one of the inner covers which says "WASHED 9 AUG 67". What would that have entailed? Thanks again for all your help. Mike

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Date: Wed, 25 Jan 2006 13:19:37 EST
From: R390rcvr@aol.com
Subject: [R-390] R-390 questions

I have seen a few dozen 390s, and hundreds of R-390As, never a green one. There does tend to be slight variations in the hue of the gray, but I don't believe there were any green ones originally. The Racal RA17 has the plastic discs behind the main knobs, and I have seen one or two people modify the R-390 main knobs to have the same look. Again, I don't believe that was ever a factory mod. I would say this one has been carefully redone, between the paint and knobs, not original. Is it a stamped or silk screened panel? Is the back of the panel the same green, or is it gray?

Date: Wed, 25 Jan 2006 12:11:07 -0800
From: "Mike Crawford" <mcraw@mashell.com>
Subject: Re: [R-390]R-390/URR Questions (Green R_290)

The plot thickens. Upon close examination it appears the front panel has

been refinished. Where the sickly green paint has been chipped you can see gray paint behind it. Also the rear of the panel is the usual gray. It is an etched panel and the engraving has been filled very nicely. It does, however, have stickers on the panel which were applied after the refinishing that indicate it was still in govt service. On the rear panel are dymo labels which state the following:

MB.4.3.1
MB.4.4.2
31R1.2URR.154
31R1.2URR.506
31R1.2URR.507

I assume these refer to approved modifications which have been applied to the radio. I know that TO 31R1.2URR.154 is one of the Air Force tech manuals for the radio but have no idea about 506 and 507. Can someone translate? I do have changes 1,2,3 for the 154. For those who are interested it is a Collins, Order Number 14214-PH-51-93 SN: 1974. I did notice it has a Motorola power supply.

Date: Tue, 28 Feb 2006 09:00:53 -0800
From: "Dan Merz" <mdmerz@verizon.net>
Subject: [R-390] 6BJ6/6BH6 sub on R-390 non-A

Hi, sometimes luck is the right kind. After being on for a few hours, my 390 suddenly went dead, no signals and little indication that it was still on. I just didn't feel like moving it and groaned a bit at the prospect. I pulled the top cover, and the tubes appeared lit and I fingered a few tubes with high hopes that it would show some response. The i.f. tubes seemed warm but I could touch them. I pulled a 6BJ6 i.f. tube out thinking I would put a tube extender in and see if there was hv. Without the extender, I measured the filament voltage on socket pins 3/4.... Nothing. As I recall, with the tube pulled it should have been 26 volts ac. I pulled the tube next to it and put one of the tubes back in the first socket I pulled. The voltage on pins 3/4 there was well over 20 volts ac. I measured the resistance between pins 3/4 on the pulled 6BJ6 and it was open, a dead tube. I couldn't find a spare 6BJ6 so I stuck a 6BH6 in per my Rider's sub book. The set came to life and operated much as before. My good luck was: the first tube I pulled was a good one and the series filament string was still affected by the bad one that was still in the radio. And then by dumb luck, the second tube I pulled out was the bad one. And then of the two tubes I had out, I by chance put the good tube back in before I thought to measure the pins on both tubes I had out. This made my day. In hindsight, I should have just measured pins 3/4 on the tubes themselves as I pulled them out since I had a pretty good idea one of them in that filament string was dead.

I surmise the radio will not operate with good response to strong signals if 6BH6's are sub'd for all the i.f. 6BJ6's, since a 6BJ6 is remote cutoff and the 6BH6 is sharp cutoff. But will one replacement as I have done really matter much? I'll do one more search for a 6BJ6 today and can probably get some at a hamfest in a couple of weeks. I seem to recall depleting my supply when I rejuvenated the 390 about a year ago and I seem to have a lot of 6BH6's. Dan.

Date: Tue, 28 Feb 2006 13:45:20 -0500
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] 6BJ6/6BH6 sub

In both the R-390 and 390A, there are so many stages of conversion and IF gain that in general the properties of any one stage don't dominate the whole gain factor. Compare with much thriftier designs where there's a RF amp, a mixer, then two or maybe three stages of IF gain. Depending on what stage you subbed your 6BH6 into you might see some distortion especially as AGC action kicks in and it gets driven to cutoff.

> I'll do one more search for a 6BJ6 today .....

A previous posting by Dave Wise talked about subs for 6DC6, which has the same pinout as the 6BJ6. By the tabulation it looks like 6BH6 for 6BJ6 is a pretty good match except for cutoff characteristic. The tabulation was:

7CM pinout (same as 6DC6):

6AS6 (way over max ratings) 6BH6 (low gm, too sharp)
6BJ6 (low gm, too remote) 6CB6 (8000, 6.5V=3D20uA)
6BZ6 (8000, 19V=3D50umho. Runner-up to 6DC6 in Cost Reduction Report.)
6CF6 same as 6CB6 6DE6 (8000, 9V=3D20uA)
6DK6 (9800, 6.5V=3D20uA. Used in large numbers in Tek 500-series scopes.)
8136 same as 6DK6 6EW6 (14000, 3.5V=3D20uA)
6GM6 (13000, 15V=3D60umho) 6JH6 (8000, 19V=3D50umho)
6JK6 (15000)

7EN pinout (same except internal shield connected to cathode instead of G3):
6DT6 6GX6 6GY6 6HZ6

These tubes are designed so G3 can be used as a second control grid. All have lower gm than the 6DC6. I didn't write down their cutoffs. I think

they're all sharp.

Date: 28 Feb 2006 19:04:28 -0000
From: "n4buq@knology.net" <n4buq@knology.net>
Subject: Re: [R-390] 6BJ6/6BH6 sub

Okay, now it's time to educate me on this issue. If the 6BH6 is a remote cutoff tube, then it won't go into cutoff as "early" as the sharp cutoff 6BJ6, right? If that's the case, then why will you see distortion on strong signals with the remote cutoff tube? Barry - N4BUQ

Date: Tue, 28 Feb 2006 14:23:37 -0500
From: "Tim Shoppa" <tshoppa@wmata.com>
Subject: Re: [R-390] 6BJ6/6BH6 sub

Other way around: 6BJ6 is remote cutoff, 6BH6 is sharp cutoff. The 6BJ6 was the original IF tube. 6BH6 is the sub.

>.....why will you see distortion on strong signals.....

Actually either will distort with very strong signals. And when you're subbing around it's likely that biases etc will be quite unoptimal for critical use.

Date: 28 Feb 2006 19:52:17 -0000
From: "n4buq@knology.net" <n4buq@knology.net>
Subject: Re: [R-390] 6BJ6/6BH6 sub

Okay. I had them reversed. I thought that didn't make sense, but now it does. Thanks!

Date: Wed, 1 Mar 2006 07:38:51 -0800 (PST)
From: Michael Melland <w9wis@yahoo.com>
Subject: [R-390] R-390 Questions - Comments

Well my beloved Motorola R-390A station now has a mate. I traded an amplifier I had for a nice Motorola R-390 from the 1951 contract. The tag indicates it was a "Motorola Made For Collins Radio" and the s/n is 4449.

It works fine as it is but I'll have some cosmetic work that needs doing and an alignment to fully restore it. The previous owner said the audio was a bit low but I have it hooked through a Hammond audio 600/8 transformer and it sounds fine to me.... wonder if he hooked it direct to an 8 ohm speaker and had low audio due to that... It is sans a number of tube shields and the top and bottom covers. Does the R-390 use the same top and

bottom covers as the R-390A ? Who sells R-390 covers if not... the tube shield cans I can find. Also... any source for the tube pullers or tools ? The pin straighteners are present. And, the proper power cord is provided... 3 wire ? The only damage to speak of is a "dent" in the right rear corner that bent the square bracket like piece on the corner.... the side panel is only slightly bent and I can repair that... the square piece on the rear appears to be replacable... anyone have a spare ? I had my choice of another R-390A or this R-390 and wanted one of each ... I'm glad I chose the R-390. While it sure is "similar" to my R-390A and the lineage is unmistakable... it's really quite different. Any suggestions or restoration tips are appreciated

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Date: Wed, 01 Mar 2006 10:57:46 -0800
From: "Dan Merz" <mdmerz@verizon.net>
Subject: RE: [R-390] R-390 Questions - Comments

Mike, I put a small fan on the left side of mine near the regulator tubes, to get rid of some of the heat, mounted on a plate externally so easily removed and with no permanent mod to receiver. This was ala design of Roy Morgan. Like you, I used a small external transformer to match speaker to the 600 ohm output impedance. I use 12BW4's in place of 26Z5 rectifiers (slight mod required),and I used 12BH7 in place of the ballast tube (1 innocuous jumper required). These last two tube subs were done because I didn't have the original tubes and couldn't find them at reasonable price. The other addition I made was an outboard product detector, easily removed with no receiver mod and the set can be operated per original setup with single switch on the outboard unit. This makes for better ssb agc performance, but is a refinement that satisfied my curiousity about such things. I almost always use it however because it does improve intelligibility somewhat on ssb. I too could not resist having the 390 when I encountered the set at a hamfest about a year ago at a reasonable price, even though I already had a nice 390a that I'd put a 390 i.f. into, happy listening, Dan.

Date: Wed, 01 Mar 2006 14:28:38 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: RE: [R-390] R-390 Questions - Comments

That fan plate is shown at:
<http://home.comcast.net/~roysmorgan/ba/FanPlate.html>

One picture includes a ruler so you can make one yourself easily. As my notes tell, the tubes melted speaker wire insulation with no fan, but I could put my fingers on the tubes with the fan. I have yet to work on a fan inside the radio. I think there is room to put a possibly smaller fan fastened to the front frame near the B+ filter cap with no holed drilled. It would be

powered from inside the radio and not need separate turn on/off.

Date: Wed, 1 Mar 2006 15:23:38 EST
From: Bonddaleena@aol.com
Subject: Re: [R-390] R-390 fans

I was fortunate to find 2 miniature muffin fans that run on 24 VDC. I installed one on each side of my 390A. When they are tun on 12 VDC, they are inaudible, but as Roy has mentioned, it really makes for a dramatic reduction in internal temperatures.

Date: Fri, 6 Oct 2006 16:18:25 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] 6082

They get HOT. I can't tell you a temperature but they do get hot. Lots of owners including me keep a small blower directing a stream of air on them. If you are operating with the bottom cover on the receiver, remove it.

Date: Fri, 6 Oct 2006 15:20:39 -0500
From: "Bill Hawkins" <bill@iaxs.net>
Subject: RE: [R-390] 6082

As I recall, hot enough to burn the resistor color code from the 2 watt resistors mounted to the socket. Time to restart the fan thread.

Date: Fri, 06 Oct 2006 16:22:44 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] 6082

Yes, they get hot too hot. Way too hot. Put a fan against the holes in the side panel of the radio. If all you do is hook a cord to a 4 inch square muffin fan and put it next to the radio on the bench or shelf, that will help a LOT.

My website that had pictures of the fanplate I made is now gone, (but I can email off-list the one picture that shows it and a ruler so you can make one.) It fastens under the frame screws and bottom cover screws, and has odd shaped slots so you can put the fan into place with the radio installed in a rack or cabinet. You REALLY need to cool those tubes. Really.

Date: Fri, 06 Oct 2006 16:08:54 -0500
From: Rick Brashear <rickbras@airmail.net>
Subject: Re: [R-390] 6082

Thanks so much for the great response from everyone! I now know they run HOT and should have some cooling on them. Roy, thanks for the picture of your cooling scheme, it looks like it should do the trick.

Date: Sat, 7 Oct 2006 08:10:28 +0100
From: "Lester Veenstra M0YCM" <m0ycm@veenstras.com>
Subject: RE: [R-390] 6082

That is why I advocate an external HV DC supply to run these receivers with the tubes pulled, ready for restoration. But no need to let that heat get generated and cook the internals when it is not necessary

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Date: Sat, 7 Oct 2006 07:11:54 -0400
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] 6082

You might want to consider replacing the 47 ohm 2W composition cathode resistors on the 6082 with more rugged ones. I have had to replace the ones in mine twice over the years. After the second time, I replaced them with small 5W power resistors. That's also when I installed the fan.

Date: Sat, 7 Oct 2006 14:50:34 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] 6082

Old war stories of the Marines at Phu Bia setting the R390's up on end and heating ration can on them when we locked down in bad weather or just plain rainy nights. They be hot. Do the math on just the filament current and see how many watts of heater you have operating. The guys are right, get the fan on them. It really does help.

Date: Mon, 09 Oct 2006 09:29:46 -0500
From: Rick Brashear <rickbras@airmail.net>
Subject: [R-390] Sensitivity Test

Does anyone have a quick and easy way to test the sensitivity of an R-390, no "A"? I see the setup in the TM, but was wondering if there is a better method?

Date: Mon, 9 Oct 2006 18:57:46 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Sensitivity Test

The TM procedure has been the way since day one.
Nothing faster nothin better.

A frequency counter sure helps.

Date: Mon, 09 Oct 2006 19:28:32 -0400
From: "Drew Papanek" <drewmaster813@hotmail.com>
Subject: [R-390] Re:6082

Damn hot. List member James Bischof reported that the 6082's in his non-A set fire to newspaper covering his workbench.

Date: Mon, 9 Oct 2006 19:38:16 EDT
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Re:6082

If you solid state the 6082's the first thing that goes away is the heat from those tube filaments. The heat you then have left to deal with is the B+ voltage drop. A large part of that can be radiated from some big sand block power resistors. The remaining power to be regulated then can be handled on a good size heat sink. Some octal relay socket bases make a good point to start from. Regulation may not be critical and just four power resistors soldered into some octal sockets could be good enough.

Date: Mon, 9 Oct 2006 18:48:16 -0500
From: "Les Locklear" <leslocklear@cableone.net>
Subject: Re: [R-390] Re:6082

Look here for mods to the R-390/URR rectifier tube mods:
http://www.hollowstatenews.com/archives/HSN-Issue52.pdf

Date: Mon, 09 Oct 2006 20:58:05 -0500
From: Rick Brashear <rickbras@airmail.net>
Subject: [R-390] Calibration revisited

Well, I have the R-390/URR in pretty good shape, I think. Even though the calibration signal is considerably stronger than before I still thought it was stronger. Maybe I am just not remembering right. That would not be a first! I guess this is kind of hard to describe, but how strong or loud is the calibration signal supposed to be? I was thinking it really moved the carrier level meter toward mid scale on 75 meters. However, I am not getting near that now. Am I just remembering wrong or do I still have a problem? The sensitivity of the receiver is good and everything seems to be working as it should. Maybe I'm remembering another radio.....? Any advice as to how strong is strong would be greatly appreciated.

Date: Wed, 20 Dec 2006 21:17:37 -0500
From: "Ian Gallimore" <iangallimore@rogers.com>
Subject: [R-390] Dial lights, 6082 tubes

Can it really be necessary to remove the front panel of a 390 or 390A in order to change the dial lights??? Surely not! The rest of these sets is so impressively designed that it's hard to believe such a huge hassle would be required for a simple lamp change. Also, does anyone know of a source for 6082 voltage regulator pass-element tubes? I think availability these is going to be the Achilles heel of our 390/URR operability!

Date: Wed, 20 Dec 2006 20:39:57 -0600
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] Dial lights, 6082 tubes

You only have to remove the escutcheon (4 x 6-32 screws) to access the dial lamps. Of course, who'd want to pass up a chance to drop the front panel.

Date: Wed, 20 Dec 2006 21:45:29 -0500
From: "David C. Hallam" <dhallam@rapidsys.com>
Subject: RE: [R-390] Dial lights, 6082 tubes

The dial lights are inside the cover of the veeder root counter. Just remove the 4 screws holding the cover and you can access the bulbs. The 6082's are available from several sources. An internet search will reveal some. They show up on eBay with some frequency. You won't like the price though. Be sure you have some type of a fan or blower directed at these tube to carry away some of the heat. Everything will last longer.

Date: Wed, 20 Dec 2006 21:53:56 -0600
From: "Barry" <n4buq@knology.net>
Subject: Re: [R-390] Dial lights, 6082 tubes

Well, I only said you can access the lamps by removing the escutcheon. We all know that to "properly" replace them, a complete rebuild of all six decks is truly the only way to do the job right. ;-)

Date: Wed, 20 Dec 2006 23:34:23 -0500
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: Re: [R-390] Dial lights, 6082 tubes

I have as many 6082 tubes as you like for $12 each (tested). I have a lifetime stash of them. (I am out of town until 12/28, so don't expect a reply until then)

Date: Thu, 21 Dec 2006 09:15:16 -0500
From: Roy Morgan <roy.morgan@nist.gov>
Subject: RE: [R-390] Dial lights, 6082 tubes

>Be sure you have some type of a fan or blower directed at these tubes to
>carry away some of the heat. Everything will last longer.

My web site that had pictures of the fan plate I made is now gone, but I'll send a picture to anyone who wants it. The photo included a ruler so you can approximate the dimensions I used. The plate fastens under two frame screws and two bottom cover screws, and in my case holds a 4-inch computer fan. With that size fan, you can't get the radio into a rack or cabinet with the fan mounted, so I made slotted screw holes so you can slide the thing into place under the backed-out screws once the radio is mounted.

Date: Sat, 6 Jan 2007 13:36:52 -0500 (EST)
From: <daveaust@pol.net>
Subject: [R-390] r-390 neon reference tube question

I just replaced the 47-ohm resistors (they were old, oxidized and reading over 100+ ohms) under the 6082's and replaced the C608 coupling cap in my R390 because I was only reading 130 volts with huge hum. I now have 181 volts with no audible ripple that I can tell in my quick preliminary testing. The 5651 neon voltage reference tubes now glow pretty well but I am wondering how much of a glow they should emit. I checked all resistors around them and they looked to be close to spec. I assume since the B+ is on target and not really humming, thing are probably OK but just wondering. Thanks for any input on the power supply subject. 73, dave austerman

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Date: Sun, 07 Jan 2007 05:31:20 +0000
From: eldim@att.net
Subject: Re: [R-390] r-390 neon reference tube question

A Good STEADY Orange glow on the 5651 is a GOOD SIGN. Pulsating, or erratic glow can indicate time to replace tube or maybe some other problem. Sounds like a good time to close the Troubleshooting & Repair Logbook and get to listening for those awesome DX stations.
73, Glen Galati, KA7BOJ, Tacoma, WA

Date: Thu, 29 Mar 2007 22:29:40 +1000
From: "pete williams" <jupete@bigpond.net.au>
Subject: [R-390] Tech Query R-390 power supply

The Power supply in the R-390 has 47 ohm current limiting resistors in the cathodes of the 26Z5W rectifiers. Being forced to rewire sockets to take12BW4 tubes one asks how necessary-apart from tube life - is it advisable to include a current limiting resistor. I am aware of the lower

impedance of the alternate tube which, on the face of it seems to imply a R of 50 - 100 ohms might be necessary.

Date: Thu, 29 Mar 2007 09:21:12 -0400
From: Roy Morgan <roy.morgan@nist.gov>
Subject: Re: [R-390] Tech Query R-390 power supply

I trust you mean the R-390/URR ("non-A") radio. This radio has four more of those 47 ohm resistors under the 6082 series regulators. In that case their purpose is not current limiting but rather current equalization. These 2-watt carbon resistors are often found drifted high, and more importantly, drifted to differing values. SOOoo... replace them all! With the 47 ohms in the cathodes, the effect of variation in gain among the four sections of tube are reduced. Differences in the values of those resistors will cause unbalance in the cathode currents. With 6082's more expensive than we'd like, running them with over-taxed sections is not a good idea. I have used 47 ohm 7-watt square cross section ceramic cased wire wound resistors in my R-390/URR with good results. The cost was very modest. Teflon tubing on the leads may be a good idea.

While you have the audio module out, I suggest testing the capacitor in the regulator circuit that goes from the 180 volt output back to the regulator amplifier tube grid. If this cap leaks, it will drive the output voltage down. It's purpose is to add gain to the regulator circuit for AC, particularly hum.

I also strongly recommend a FAN at the side of any of these radios with the
6082 series rectifiers (the R-390/URR, the R-389 and the R-391/URR). I have a photo of my fan plate that can be used to duplicate it for anyone interested. Even a small sized fan blowing in on the regulators will keep them MUCH cooler than otherwise. At the very least, find a 4-inch muffin fan and just put it next to the regulator tubes, no mounting really needed.

It *seems* to me that the original value for the 47 ohm resistors in the rectifier circuit would be fine, but only a rather careful analysis of the surge current pulses would tell you much with authority. A first approximation might be to figure the difference in forward resistance value between the two tube types and add that value to the 47 ohms. Maybe that's just what you did. It could be that data sheets from the RCH HB-3 manual would indicate design values for those rectifiers. There are sections of the HB-3 that deal with power supply design guidelines. Look that up if you can. (If you can't let me know, I may be able to find/produce it in digital form.)

Date: Tue, 5 Jun 2007 16:28:16 -0500
From: "Grant Youngman" <nq5t@tx.rr.com>

Subject: [R-390] Question about R-390 Calibration Osc

Simple question. Is it normal for the multivibrator in the cal oscillator to require the radio to warm up well before synchronizing with the 1 Mhz oscillator? Calibrator operation has been iffy at best, so since I had the radio out of the case to replace a bad 6082, I decided to tackle the calibration oscillator issue. It's basically hard to keep the 100Kc multi synced to the master oscillator. If I set the sync adjustment when the radio is cold to sort of warm, it loses sync as it gets hot. If I wait until it's hot to adjust it, it won't sync until the cold radio has been on for 15-20 minutes. And then it will occasionally lose sync for a while, then resync -- always out of sync seemingly when I want to change bands and reset the dial :-)

The 1 Mhz oscillator appears to be ok. New tubes (which seemed to help somewhat at first, but ultimately not so much) Is this normal? Or is it reasonable that something in there that has possibly degenerated and become temperature sensitive (such as C-909 or C908)? Any suggestions on what to poke at first? -- it's a tight spot to work in there.

Date: Tue, 5 Jun 2007 22:17:59 -0400
From: Bob Camp <ham@cq.nu>
Subject: Re: [R-390] Question about R-390 Calibration Osc

For the multi-vibrator to work correctly, it needs to be a bit *low* in frequency. It sounds like yours is simply running a bit to high.

Date: Wed, 7 Jan 2009 16:48:31 -0800 (PST)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] R-390 C101 and C103 Caps

> I am working on a R-390 and C101 (10uf 600VDC B+ filter) and C103
> (10uf 300VDC audio decoupler) are both are leaky --- both are paper
> in metal cans.

I don't see any problem using an electrolytic for the audio decoupling capacitor. An electrolytic might cause problems if used for the main B+ filter, however. The R-390/URR (non-A) has just that one capacitor for B+ filtering before the electronic voltage regulator circuit. That cap sees a high ripple (not to be confused with Chuck) current and an electrolytic as small as 10uF might heat up excessively. I've also wondered about the outcome of using an electrolytic here. You might try one and see if it gets hot and report to us your findings.

Years ago I worked on improvements to a machine control system which used small solenoids powered by full wave rectified 120 VAC and small

electrolytic filter caps of about 5uF. These caps exploded quite regularly from ripple current induced heating. IIRC, the solenoids drew about 400 mA each. Methinks the B+ drain of a non-A to be considerably less but still reasonably sizeable.

If the electrolytic warms up, then replacement with a cap having a lower loss (than electrolytic) would be in order. Distributors such as Mouser sell poly dielectric caps that would work - you might need to parallel a few to get the value you need. Alternatively, you could use a motor run capacitor. These in small applications are often poly dielectric these days. Ceiling fans use caps of this sort in about the value you would need. Check your local Home Despot for these or salvage one from a junk unit. These are AC rated - the DC rating would be 1.4 times the AC voltage rating or possibly somewhat more.

Another possibility would be to use an electrolytic of greater than 10uF. The ripple current handling ability would be higher. You would get lower ripple, higher average voltage into the voltage regulator circuit, higher peak rectifier and power transformer currents which would cause all to run hotter. In reasonable proportions, the added heat might not be too objectionable (but don't forget to put a cooling fan on the regulator's 6082 pass tubes - these run hot as it is).

Date: Wed, 7 Jan 2009 20:17:38 -0500
From: "Al Parker" <anchor@ec.rr.com>
Subject: Re: [R-390] R-390 C101 and C103 Caps

I'd think that using a modern electrolytic that's rated as "Low ESR" would cover the worries. ESR is the Equivalent Series Resistance and is mesaured at a low AC (e.g. 100 kc) freq. and indicates the cap's resistance at that freq. Low ESR would indicate low heating by ripple current, it"ll be less than an ohm, usually measured in hundredths of an ohm, but varies with capacitance and voltage rating.

Date: Fri, 6 Nov 2009 15:44:01 -0600
From: "Gary Harmon" <gharmon@idworld.net>
Subject: [R-390] Brought Home a R-390 Today (along With a Viking I)

R-390/URR
Collins s/n 2941
Order 14214-PH-51-93
MWO 11-5820-294-35/1
MFP Nov 1956 ?

Homemade top cover, no bottom cover, has meters and AC cable, R-390A manual copy Note on PS says, "Remove tubes, modified for solid state

rectifiers"

Note on top cover says, " PS problems - need tubes; 6082 (2), 5651 (2), maybe 26Z5W (2). The 26Z5Ws were modified for solid state diodes. Need to remove tubes if using the diodes."

Radio is blowing the 3/8 HV fuse. This action probably accounts for the PS problem note.

Receiver is in excellent condition. No scratches or mars on the front panel but several knobs could use redoing. Gears look clean, no gook.

Things to look for? Leave solid state modification? Other mods to do or look for? Site for R-390 restoration?

Date: Fri, 6 Nov 2009 16:40:28 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Brought Home a R-390 Today

Selenium rectifier (square finned thing on the inside of the rear panel) might be blown causing the fuse to go... Just a shot in the dark though without looking at the schematic for an R-390/URR "A" manual won't be good for much...

Date: Fri, 6 Nov 2009 17:49:11 -0500
From: Paul Anderson <paul@pdq.com>
Subject: Re: [R-390] Brought Home a R-390 Today

Put a meter on the HV side. Pull the plugs for each module until the short goes away. Then fix that module. For the R-390, the most likely cause of shorts is a shorted tube, followed by a short in the wiring harness (IMHO).

Date: Sat, 7 Nov 2009 00:29:00 +0100
From: sigmapert <sigmapert@gmx.de>
Subject: Re: [R-390] Brought Home a R-390 Today

In the R-390A this will work and you can locate the faulty module. This is not possible in the R-390 NON A. If you operate the R-390 when modules are unplugged it can destroy your radio.

Date: Fri, 6 Nov 2009 20:15:08 -0500
From: Paul Anderson <paul@pdq.com>
Subject: Re: [R-390] Brought Home a R-390 Today (along With a Viking

> This is not possible in the R-390 NON A. If you operate the R-390 when
> modules are unplugged it can destroy your radio.

You want to use a meter to check resistance from B+ to ground. You have to do that with the radio off. You are correct about hurting the radio with the radio powered on ... B+ can go very high if operated while the VR tubes are disconnected.

Date: Fri, 6 Nov 2009 19:00:59 -0800 (PST)
From: Joe Foley <redmenaced@yahoo.com>
Subject: Re: [R-390] Brought Home a R-390 Today

Don't put power to it again until you find the short! Pull the covers and do a very careful visual examination, clean while you're at it, then clean some more. Use your nose you might find a burnt smell near the culprit. GET THE MANUAL!! Do the resistance tests listed for the whole radio. These two procedures will also let you get familiar with the radio. check, clean, and tighten ALL grounding points, even the bolts that hold the tube sockets. Check all solder connections you can see,... it won't take that long.

Read the -10 and -20 manuals there is an unpacking procedure there that will take you through a basic knob twisting routine, good for an unknown radio. Take the covers from all of the module plugs and check for broken wires and tight bolts.

Yes, check for foreign modifications, document them, and post them for discussion here. Even if it is something that just doesn't "look" right, someone may have seen it before,.... we've seen lots of such things.

Check for broken gear clamps, check the ten-turn stops on the KC and MC CHANGE knobs. Turn these two knobs carefully toward the stops in case the stops don't stop! The PTO may be out of adjustment and you may stop against something that will break!

Check for any broken slugs in the RF deck.

Check for bent racks or slug springs in the RF deck.

Check carefully that all racks actually move properly.

Marvel at the gear train while checking for proper operation and any binding. Observe the Geneva drive for same. Ask.

Check that the knobs aren't pushed back tight to the panel. Check the bellows coupler on the BFO for cracks and that it is working right. Check the clamps on the BFO and BANDWIDTH shafts. Check that the shaft on the KC CHANGE knob is true, loosen the bushing nut just behind the knob, there are three bushings on that shaft, they tend to bind easily. That

shaft being an easy target for sideways bashing causes the shaft to bens slightly. A scraping noise there will be the brake disc.

That's enough to start with,

Date: Fri, 6 Nov 2009 23:08:45 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] Brought Home a R-390 Today

> Radio is blowing the 3/8 HV fuse. ...

There are a couple of points in the radio that have not been mentioned so far:

- There are equalizing resistors in each of the cathodes of the 6082 series regulator tubes (4) and in the cathodes of the rectifier tubes (4 more). These are 47 ohm two watt carbon units and are most likely drifted high and differently in value now. They are easy to measure with no module removal. The ones at the 6082's can be measured from tube socket pin to 180 volt test jack. The ones in the power supply can be measured from the B+ filter cap (10 uF round paper/oil unit near front panel bottom) to rectifier tube socket pins. I suggest they all be replaced by 47 ohm square power resistors of 5 or 7 watt rating. These cost little and will give peace of mind. In either the rectifier or series regulator circuit, their job is to equalize tube cathode current. If one or more are high, that tube section will "loaf" while others are working too hard. Both of these tube types are expensive now.

Your radio has solid state diodes in there, and should also have a B+ dropping resistor installed. (Do I remember 220 ohms at 10 or 25 watts?)

- The voltage regulator circuit includes a path to reduce AC hum in the B+: there is a capacitor from the regulated B+ point back to the grid of the DC amplifier tube, C608. If this thing leaks, your regulated B+ will be thrown way off. (C606 is screen bypass and needs to be good, also) Also, there's a 1 K resistor (R625) in the voltage divider in the DC amp that can be off in value and throw off the regulated B+ level. (of course you need to find the short first) Note: the B+ regulator DC amplifier tube (6BH6) appears to be similar to a number of other tubes with the same pinout, but it's electrical characteristics are different. So make sure the correct tube type is installed.

- Any misguided attempts to make the radio "hotter" by putting in a high gain tube in the first RF amp or IF amps should be reversed.

- If you have trouble with the calibrator, note that the crystal operates at one mc and the 100 kc multivibrator divides by 10 by being synchronized to that signal. It's possible for the multivibrator to divide by 9 or 11 instead, and give strange results as you try to calibrate the radio.

- PUT A FAN IN (or next to) YOUR RADIO. I'll send to you separately the picture of a fan plate I made. It lest you attach a fan to the side of the radio next to the blistering hot 6082 tubes with existing screws. A common PC power supply fan will make your whole radio run cooler, especially the voltage regulator section.

- The original power cord plug/socket has a ground pin and will easily accept a three wire grounded power cord. DO put such a cord in there. If that trips ground fault interruptors, don't be surprised and do NOT assume that the power line filter caps are defective.

- If your radio has no "green gear" do not be alarmed. You can live without it.

Date: Sat, 7 Nov 2009 05:46:33 +0000 (UTC)
From: odyslim@comcast.net
Subject: Re: [R-390] Brought Home a R-390 Today

To comment on Roy's very well written note. Sometimes the older R-390's green gear is stored way down by the veeder root counter and was originally stored there. It stays in place and when needed, it is simply flipped over. It is offset.

Fans? Yes! I picked up 10 micro fans 12 volt dc. I used a piece of double sided tape to secure it. The difference is so great, one can actually hold a finger on the 6082's without a burn. I found my fans on eBay. 10 for $10.00 Good Read Roy!

Date: Sat, 7 Nov 2009 08:41:27 -0600
From: "Gary Harmon" <gharmon@idworld.net>
Subject: [R-390] R-390 update

First, thanks to all who responded with recommendations. Thanks to my friend Don Reeves for the manuals link.

PS had diodes installed to replace the 26Z5Ws, Removed them. Checked the four 47 ohm/2w resistors and all 4 were consistently OK. Two had been previously replaced. Found a cold solder joint on one of the tube pins. Found a broken stand-off that had been previously repaired. I repaired it again and the J-B Weld is curing as we speak. The bridge diode has been replaced with a later version. Both 26Z5Ws are bad.....no filaments.

Hopefully the attic tube cave will pay off. The flexible wire tube pullers are very cool.

More info later.

Date: Sun, 8 Nov 2009 13:20:15 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Brought Home a R-390 Today

The R390 TM is TM 11-5820-357-35 It is on-line at
http://www.militaryradio.com/manuals

R390 Name Last modified Size Description

TM11-5820-357-10.pdf 21-Dec-2005 16:48 32M Installation
TM11-5820-357-20.pdf 21-Dec-2005 16:38 7.9M Operators guide (front
panel knobs)
TM11-5820-357-35.pdf 21-Dec-2005 16:29 18M Maintenance manual
TM11-5820-357-35P.pdf 22-Dec-2005 21:46 3.3M Parts manual

http://www.militaryradio.com/manuals

As you are going to own this receiver for a while you may want to download these PDF files. Someday we fellows need to get the R390 Manuals on the r390/a.net page. Dave Medley is not going to be able to support the R390 forever and it's time we picked out some of R390 history and documents on the R390/A pages.

Date: Fri, 13 Nov 2009 14:03:37 -0600
From: "Gary Harmon" <gharmon@idworld.net>
Subject: [R-390] Update and Questions

Is it normal for a R-390 to take a minute or more to work after turning on?

It's working fine, I believe, but I was curious about the signal. It has static after normal warm up but it take another minute or so before the broadcast band is heard. I replaced all the power supply and regulator circuit tubes and found one tube in the receiver circuit that was flaky. All controls are working as expected. Both meters work. Replaced both dial lights, three resistors and two caps in the regulator circuit and removed diodes in the power supply.

Should the oven be on or off?

Should the ballast tube run hot?

Date: Fri, 13 Nov 2009 16:02:16 -0500
From: <b_hagen@sbcglobal.net>
Subject: Re: [R-390] Update and Questions

My 390 had been off for about 2 hours so I just flipped it on and it was 23 seconds to signal.

Date: Fri, 13 Nov 2009 15:17:58 -0600
From: Grant Youngman <nq5t@tx.rr.com>
Subject: Re: [R-390] Update and Questions

> Is it normal for a R-390 to take a minute or more to work after turning on?

Normal

>Should the oven be on or off?
Off. Don't waste the power - unless you live in the Arctic, and like leaving the windows open
:-)

> Should the ballast tube run hot?
Hmmm ... never checked it. The R-390 (vs R-390A) is my favorite SW radio. Love mine. I use a Sherwood detector with it, which is great for both AM and SSB. Just super!

Date: Fri, 13 Nov 2009 20:45:10 -0600
From: "Gary Harmon" <gharmon@idworld.net>
Subject: [R-390] Intermittent

My R-390 has intermittent signals. Sometimes broadcast will come on in about a minute and then operate for hours before the signal drops out. It may come back or it may not. When it drops out or comes on it does it slowly like something turning on or off. When the signal drops out, audio hiss remains. All tubes have been checked but not lengthy tests. Suggestions anyone??

Date: Fri, 13 Nov 2009 20:53:38 -0600
From: "LEE BAHR" <pulsarxp@embarqmail.com>
Subject: Re: [R-390] Intermittent

I have no idea what "broadcast" means. If you mean AM broadcast stations are coming in on frequencies other then their assigned frequency, I would suspect you have a poor grounding somewhere in the radio or in

the antenna that is acting as a diode and rectifying the AM broadcast station. All radio transmitters "broadcast" so your terminology is too vague to define
your problem.

Date: Fri, 13 Nov 2009 21:09:47 -0600
From: "Gary Harmon" <gharmon@idworld.net>
Subject: Re: [R-390] Intermittent

Sorry for the confusion. By "broadcast" I meant to say I was listening to the broadcast band for reference. Specifically the local blowtorch, WOAI. During an outage I have tapped on all the tubes, connectors, chassis, etc. When I tested the tubes I cleaned the pins and sockets before re-installing the tubes after testing.

Date: Sat, 14 Nov 2009 03:32:43 -0800 (PST)
From: "KC8OPP Roger S." <kc8opp@yahoo.com>
Subject: Re: [R-390] Intermittent

When this happens, rock the MHz control back and forth one or two MHz. This will wipe the contacts on the band switch, no change then the band switch is good. Signal comes back, then it is time to yank the RF deck and clean and adjust the band switch. Good Luck, and keep us posted.

Date: Sat, 14 Nov 2009 06:44:17 -0600
From: "Gary Harmon" <gharmon@idworld.net>
Subject: Re: [R-390] Intermittent

Tried that first thing Roger. Didn't make any difference. Not that I look forward to yanking the RF deck or anything, but proof of the solution would be nice. Thanks for responding.

Date: Sat, 14 Nov 2009 10:18:05 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] Intermittent

The RF deck has test points that let you inject signals (from a generator, or just from a wire or antenna) at a number of points along the way. If you dope out the signal path and frequencies, you can figure out what stage is quitting.

I think that in the manual there is a table of signal levels (approximate) that are at each stage. The test points are tip jacks and accept the tip of a test probe or something similar.

Date: Sat, 14 Nov 2009 11:42:15 -0600 (CST)

From: Jim Haynes <jhhaynes@earthlink.net>
Subject: Re: [R-390] Intermittent

The way you say it drops out or comes in slowly suggests there might be a tube with the heater circuit going out. So when the signal fades away look at all the tubes to see if any are unlit.

Date: Sat, 14 Nov 2009 18:50:55 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] Intermittent

Remember, these receiver have worked for over 50 years. There is nothing that can go wrong with these receivers that has not gone wrong for someone before. Any problem can be found and fixed. Any problem can be found with a signal generator and volt meter. Its been done this way by thousands of GI's for the last 50 years. You can do it also. If need be these receivers can be diagnosed one stage at a time and restored no matter how many problems have moved into the receiver.

Roy has put you on the right path.

Having got past the easy things like dirty switches connectors and tube filaments, it is time to get serious and do some signal injection to isolate the problem area.

Does the receiver do this in both MGC mode and AGC mode? If only in AGC mode, you know its an AGC circuit problem (common).

You have to ask your self a question here. Do I have a signal generator that puts out 455 Khz or not? This is a yes or no question. Either answer is correct either answer will still let you get find the problem in your receiver and fix it. But a yes answer is much easier. Signal generator may be defined as any oscillator you can park on the bench next to your receiver. It need not have any real pedigreed.

If the answer is no signal generator worry not. I can still send you enough mail to get you through the problem. And believe their will be plenty of other support.

Turn the receiver up on its side and watch the gas regulator tube (R390 has 2, R390/A has one). see if the tube goes out when the signal dies. It is just a clue that something is leaking enough to pull the regulated B+ line down below the regulation voltage.

If you have a real R390 (you lucky Fellow) pull the Audio deck.

Turn the receiver up on end (audio deck end down) so you can swing the deck out on the bench and do some voltage checks on the filter caps in the audio deck. Measure the unregulated B+ and regulated B+ while the receiver works and again when the receiver quits. You may get some clues. But likely not. IF you have an R390 check the 47 Ohm resistors (4 ea) under the audio deck in the 6080 regulator tubes. Also look under the power supply deck for 4ea more 47 ohm resistors. These things get burn and not fixed when a tube goes bad. Then some time later (like now) they start going open enough to drop the B+ out of range.

Real most likely problem is a leaky cap. Think that what was once a nice stable circuit has had a component that has taken on a second nature. Haunted if you will. Defective for those of scientific bent. The bad parts reaches a critical voltage / temperature / state and then either charges to a higher than expected value or discharges to a lower than expected value and thus drives its related circuit out of proper conduction. I hate these problems. These type problems have driven some to shotgun whole decks and replace every suspect cap in sight. Other good decks have been parted into oblivion for acting this way.

The solution is to divide and conquer. Using an isolation cap (.1, .01,001 what ever ceramic cap is on hand) between the generator and receiver, inject about 150 uv of 455Khz CW into E210 of your R390. E211 of your R390/A. This will be the grid of the third mixer on the RF deck. Set the function switch to MGC. RF gain to MAX. BFO off. Hang a DC volt meter on the diode load. Adjust the generator for about minus 7 volts on the diode load. Remove the meter or set it to accept more than -30 volts DC. Remove your ear from the audio output. Turn the BFO on. Adjust the BFO for a reasonable tone. Set the IF band width to 8 or 16 Set the audio response to wide. Adjust the audio output for a reasonable level. Things will drift around. Decide if the generator or receiver band pass drifted apart or the receiver lost its signal.

Go make a pot of coffee and enjoy a cup. It could be the last time you will enjoy a beverage for several days. Then come back to the receiver.

With the AGC grounded in the MGC mode, you will find the IF and Audio deck will either work as expected and out put a stable signal or the receiver looses it.

If the receiver looses it with this test (likely), you can start looking in the IF and audio deck. Big black plastic capacitors are suspect by association and age.

You can pick your way through the deck by injection and stage gain (best) Or by a ohmmeter and capacitor checker.

Please report back on the following. Toss in any thing else you find of interest and we can direct you down the path to a good solution. If things look not good get verbose. Some of the fellows like to read the gritty ugly stuff. They may even ask you for private pictures.

1. Real R390 or Real R390/A if you say non A and Les reads about it, you are on your own.

2. Things under the power supply deck look good (an easy eyeball inspection).

3. Things under the Audio deck look good (an easy eyeball inspection)

4. B+ looks to be holding up OK and the gas tubes stay lit when the receiver looses its signals or they are going out.

5. The receiver does this in both AGC and MGC or only AGC or only MGC.

6. You have a pretty good to excellent signal generator on hand (you were able to do the test above) (yes or no)?

7. You have a DC volt meter on hand?

8 You have an AC volt meter on Hand (may be the same meter)?

9. Your luck and the AC volt meter has a DB scale? (not necessary) or you have a power meter (again not necessary).

10. You got a signal into the IF deck and it was stable or it did the same thing the receiver does when you put an antenna on the input?

Have fun with this.
Enjoy your self.
We can take it, one on one if you want.
Stay with it, it may take weeks depending on how much time you have and the
mail exchange.
But worry not this problem can be found and fixed.

Roger Ruszkowski AI4NI

(Flowertime is the other hobby growing in the back yard under the

antennas.)

Date: Fri, 13 Nov 2009 21:50:08 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Intermittent

Sounds like the ballast tube has a broken filament that is just touching or one of the tubes in that series string. I'd have to look at the schematic.

The fact that it fades in and out slowly indicates a tube filament heating and cooling causing the tube emissions to go up and down. Just a gut guess though...

Date: Tue, 2 Feb 2010 12:42:40 -0500
From: Norm Drechsel <norm@wa3key.com>
Subject: [R-390] R-390 Non-A module interchangeability

I have two R-390 Non-A's, one of which I'm in the process of restoring. My question concerns the interchangability of modules in the Non-A. I'm used to the R-390A, where all makes and contracts seem compatible - but even though my two radios are both Motorolas from the same 14214-PH-51-93 contract (s/n 4127 & 4895) I've discovered major differences in the power supply module connector. Among others I've yet to trace is the B+ center-tap that goes to ground via the 3/8A fuse is on pin 12 in s/n 4127 and pin 15 on 4895. I have three power supplies, only one of which is compatible with the radio I'm restoring.

Has anyone documented these differences? And if so, are other modules involved besides the power supply? The last thing I want is to smoke a module when testing. I receive these posts in digest form, so there may be a delay in my response.

Date: Thu, 4 Feb 2010 13:19:01 -0500
From: Paul Anderson <paul@pdq.com>
Subject: Re: [R-390] R-390 Non-A module interchangeability

>From what I understand, the IF and AF strips in R-389/R-390/R-391 are all interchangeable. Power supplies, although the same part # and external appearance are the same from R-390/R-391 but different in the R-389. I have one such power supply (R-389 wiring), but I don't recall the exact differences - they do sound like what you describe from hazy memory. It tests as a non-working PS in my R-390 as you discovered. This can be confirmed by checking the first chapter of the R-389 manual, I believe, where they list module compatibility with the others in the series. As far as I recall, there is no external means of checking the difference - no MOD code, no nothing... you have to know what the wiring is, and

check it. My guess is that the wiring change you have reflects this variation, and that at some point one of your R-390's got modified to accept an R-389 power supply (which you appear to have one of on hand). It is also possible some production R-390 units were originally wired that way, but that is a pure guess.

Date: Thu, 4 Feb 2010 13:11:36 -0600
From: "Bill Hawkins" <bill@iaxs.net>
Subject: Re: [R-390] R-390 Non-A module interchangeability

Don't think the power supplies are different. There was an early field change that modified the power supply, and made unmodified power supplies incompatible. IIRC, the mod brought out the B+ return (lifting it from ground in the PS) using the wire for 24 VDC that was used for the really rare 24 volt power supplies. Rare because the dynamotor or thyratrons made too much noise, reducing sensitivity. The mod also involved the B+ fuse on the chassis somehow.

Date: Thu, 4 Feb 2010 19:06:21 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] R-390 Non-A module interchangeability

Nice timing on this question. I think I may have one in the basement. The one I am looking at has no wire on one end of the 20 Amp, DC fuse. I have a wire taped off in the harness. I have not had time to look at the problem as I am still washing out the stuff left by last residents. I am working on the digital camera and will take photos of what I have. I hope you Fellows can get some photos of your versions and we can get all the flavors on a web site or CD version.

Date: Thu, 11 Feb 2010 23:12:04 -0600
From: Don Reaves <donreaves@gmail.com>
Subject: [R-390] Posting from WA3KEY

We are having trouble getting a message through from Norm, and I'm reposting it to see if I can detect a problem. So, this is Norm's radio, not mine!

Norm - WA3KEY (Original message:)

Thank you to all who responded to my post last week about R-390 module compatibility, with special thanks to Don - WC4N, who solved the mystery of my incompatible power supplies. Many on this list will recall when I posted photos of an exceptionally clean, all original, 1968 EAC R-390A in November 2008. Those photos are still on-line at http://www.wa3key.com/r390a

This time I've posted photos of an R-390 Non-A that I just completed this past weekend. It was listed on eBay as "old" and "as-is" but looked promising, so I took a chance. What greeted me when I opened the box exceeded all expectation... an all original R390 in reasonable working order with no signs of heavy use. Photos are posted at http://www.wa3key.com/r390 if you'd like to see what an exceptionally clean, all original (except for the meters) 1955 Motorola R-390 looks like. It came with meters, but they didn't match and with radium paint that was severely discolored. Photos 01-31 are of the frame and modules while 32-42 are of the assembled receiver. The only parts needed to restore this beauty were; bridge rectifier CR-801 in the power supply, a new fuse holder for the B+, and transformer Z206 from a parts RF deck. The paint is original (even the odometer cover), but unlike the '68 EAC, knobs refinished by Howard - W3HM were installed. Performance is phenomenal. I have restored eight R-390A's and none equal the sensitivity of this radio.

Date: Sun, 7 Mar 2010 14:21:48 -0500
From: "Bernie Doran" <qedconsultants@embarqmail.com>
Subject: [R-390] r390

I have decided that I " need" an r-390 (non A) , they seem to be getting scarce, I realize that comparativly few were made. probably that is as much of a reason that I want one. I do not trust the E place for these, anyone know a good source or know of a nice one available, Rick Mish does not seem to have any more access to them and seems to believe that they are not a reliable as the A. would be nice to foind one in Ohio or nearby state so I could see it. Thanks Bernie

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Date: Sun, 7 Mar 2010 18:17:32 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] r390

I disagree with Mr. Mish. The R-390/URR is more reliable than the R-390A in its as delivered form. Even after an overhaul you still have the mechanical filters that age and fail. I would guess his reasoning to be more a one of him having access to the "A" and wanting to make a sale. I also don't believe the "E" place to be a bad choice...it's more one of being careful of the seller. I've sold two there that I have restored and the buyers had no problems at all. I currently have one pulled apart for restoration that is to be sold but it will probably be a few months before it's ready due to all the other work that's piled up in the shop right now. If you could find one on the list it would probably be the best of choices...

Date: Sun, 7 Mar 2010 18:26:47 -0600

From: <wb5uom@hughes.net>
Subject: Re: [R-390] r390

I dont see Rick as that sort of person. I see him as an honest upfront kind of guy. Thats my opinion in my dealings and the many conversations he and I have had.

Date: Fri, 2 Apr 2010 16:36:48 EDT
From: Flowertime01@wmconnect.com
Subject: [R-390] Cooking Kielbasa 1 of 2

Installing diodes for 26Z5's in an R390. This yielded the following results from testing. With 26Z5's in the circuit, B+ was 320 volts on the plate of the 6082's. The cathodes of the 6082's were at 220 volts. We expect 180 volts at this point and accept the difference as being meter error. The voltage drop across the 47-ohm resistors was 2.5 volts or .053 amps. This is .212 amps for all four resistors. This is in line with the expected .200 amps of B+ for the receivers.

When the diodes were installed for the 26Z5's, the plate voltage of the 6082's went up to 380 volts. The cathode voltage was unchanged and the voltage drop across the 47-ohm resistors was unchanged as expected. This is a 60-volt increase at .053 amps for 3.18 watts in each half of each 6082. The drop across one triode of a 6082 is now 150 volts at .053 amp. I take this as 7.95 watts.

As we expect the cathode of the 6082's to be close to 180 volts, I believe my meter is reading high and the values are in fact somewhat lower than my measurements. A 150 volts at .053 amp and 7.95 watts is about half the tubes ratings of 250 volts, .125 amp and 13 watts. In conclusion we save 26.5 volts at .20 amps 5.3 watts of filament heat in each 25Z5 and move 6.36 watts of plate heat from the 26Z5's to each 6082 as plate heat. We move some plate heat (voltage drop across the tube at its operating current) and save about 10.6 watts of filament heat.

Date: Tue, 4 May 2010 10:08:25 -0400
From: "James Young" <YoungFamily@glwb.net>
Subject: [R-390] Green gear

When I install the green gear on the shaft of my R-390 (Motorola 1951) it doesn't seem to lock the mechanism or inhibit the gear train. What am I doing wrong? I want to remove the RF assembly for cleaning.

Date: Tue, 04 May 2010 12:57:06 -0400
From: Al Parker <anchor@ec.rr.com>
Subject: Re: [R-390] Green gear

IIRC, the green gear is dished, is it possible that you have it on backwards?

Date: Tue, 4 May 2010 11:29:39 -0600
From: Patrick Nelson <aaptmf@onepost.net>
Subject: [R-390] Green gear

The green gear doesn't lock the mechanism. It keeps the "kilocycle change" gear train in alignment with the Veeder-Root counter. I was confused by some of the web descriptions also until I saw the real thing.

Make sure the oblong center hole in the green gear locks into same shape protrusion on the shaft it connects to and you should be good to go.

Date: Sun, 30 May 2010 00:09:18 -0400
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] R-390 (non-"A") production data?

> I have been Googling around looking for production data on the
> R-390, no luck at all.

From NJ7P?s MilList

contract	year	manufacturer	quantity
14214-PH-51-93	1951	Collins Radio	4952
14226-PH-51-93	1951	Collins Radio	1412
14214-PH-51-93	1951	Motorola for Collins	4864
14241-PH-51-93	1951	Motorola for Collins	3449
90-PH-52	1952	Motorola	219
26579-PH-52	1952	Motorola	892
13602-PH-53	1953	Motorola	979

I collected this table some time ago,
The NJ7P MilList is at: http://www.nj7p.org/index.htm

And now, In 2010, NJ7P's mil list has only this entry for the manufacturers of the R-390/URR

contract	year	manufacturer	quantity
14214-PH-51	1951	Collins Radio	unknown
26579-PH-52	1952	Motorola	unknown

The long direct link to the MilList is:
<http://www.ibiblio.org/pub/academic/agriculture/agronomy/ham/BOATANCHORS/millist.txt
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Date: Tue, 21 Dec 2010 18:10:01 -0600
From: Dan Osborne <wb5afy@wb5afy.net>
Subject: [R-390] R-390 Manual

Anyone have a copy of the Navy TO 31R1-2URR-412 manual that I can download ? Have 1ea Collins and 2ea Motorola Non-A's sitting here that need my attention.

Date: Tue, 21 Dec 2010 16:42:45 -0800 (PST)
From: Mack Rogers <n4vgb@yahoo.com>
Subject: Re: [R-390] R-390 Manual

TM 11-5820-357-35P is supposedly identical to TO 31R1-2URR-414 and is available all over the net.
http://bama.edebris.com/manuals/military/r390/

Is there anything different about the info contained in TO 31R1-2URR-412 that makes it more desirable to own?

Date: Tue, 21 Dec 2010 18:51:29 -0600
From: Dan Osborne <wb5afy@wb5afy.net>
Subject: Re: [R-390] R-390 Manual

My notes from A.B. Bonds (1999) specify the Navy version !!

Date: Tue, 21 Dec 2010 19:59:54 -0800 (PST)
From: Mack Rogers <n4vgb@yahoo.com>
Subject: Re: [R-390] R-390 Manual

OK Dan. My PC that has the bulk of my R-390 and R-390A info on it has gone dead on me. I also have tons of hard copy material,?including?the R-390 and R-390A info, that has been in storage because of a move for 2 years now.?It's possible that I have the particular TO that you're looking for on that?dead PC?but I won't know until I find a spare 'roundtuit' and bring it back to life or perhaps get a pocket full of 'roundtuits' and start unpacking the hard copy material.

Date: Wed, 22 Dec 2010 01:23:58 -0600
From: Don Reaves <donreaves@gmail.com>
Subject: Re: [R-390] R-390 Manual

Dan, T.O. 31R1-2URR-412 is the same as TM 11-5820-357-35 Oct. 1962,

which includes change 1.

I have a pdf copy - its too large (16MB) to email to you so I uploaded it to my web site for your download. <http://militaryradio.com/manuals/R-390/TO%2031R1-2URR-412%20TM%2011-5820-357-35%20Field%20&%20Depot%20Maint%20Manual%20R-390%20Oct.%201962.pdf>

That link may be too long for some browsers. If so, just go to http://militaryradio.com/manuals/R-390/; and you will see the T.O. listed.

Date: Sat, 25 Dec 2010 14:16:28 EST
From: Flowertime01@wmconnect.com
Subject: Re: [R-390] R-390 Manual

Also try TM 11-5820-357-35 as the Army R390 TM. -358 is the R390/A TM.
If you need some specific circuit help post a question here.

Date: Sun, 9 Jan 2011 04:13:55 -0600 (CST)
From: nryan@mchsi.com
Subject: [R-390] R-390 (non-A) Audio Hum

An annoying hum, audible especially with strong signals, had bugged me for some time, so tonight I took action to resolve it. Tweaking the hum balance control R-614 did not help. Swapping with a known good audio/voltage regulator deck narrowed the problem to that module.

Tubes on the faulty module were good, but 180 V B+ was low at around 125 V. Some time ago I had replaced out of spec resistors, so I turned to checking capacitors.

C-607, a leaky mica 100 pF cap was at fault. Who knew it would come down to a seemingly minor component like that? I adjusted the hum balance with a sensitive AC meter to get the reading close to zero.

The R-390 sounds great now with no hum.

Date: Sun, 09 Jan 2011 12:06:29 -0500
From: "Dennis Gibbs" <R390A@verizon.net>
Subject: Re: [R-390] R-390 Digest, Vol 81, Issue 10

Congratulations on correcting this problem. I have run into this many times on R-390 (non-'A') models. I have also found the cause to be a leaky C-608 as well, with the same exact symptoms.

Date: Mon, 7 Mar 2011 14:33:39 -0800 (PST)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] Call For Information

I?m in the process of assembling an anthology for the R390/URR as grumpy old men like Less L. call it or AKA Non-A or the-high-priced almost-unknown-to most other receiver. My reason for doing this is I just got one in a trade and saw, as described by Roger R., the poor excuse of a service manual that was issued.

Its premier performance is obtained at the cost of complexity. Attempting to maintain or repair it without a good fundamental background is a recipe for disaster. Since there are no courses available and those that were trained or repaired it are fading away with time, I?d like to leave a proper legacy publication. This would allow someone with interest to learn how to maintain these jewels for as far into the future as possible. The goal for producing this is to benefit two groups. Those that have one or are want/going to get one. The other is for the future. I want to follow the basic concept of the Y2K-R3 manual by reorganizing and re-paginating the original manual plus adding all the improvements, tricks-of-the-trade and helpful hints that exist. I would also like to have information and or articles on what one might have tried and DID NOT WORK or the return-on-investment wasn?t worth the effort. Any contribution will be gratefully appreciated and acknowledged. Please reply off list.

Date: Mon, 07 Mar 2011 17:49:25 -0600
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] Call For Information

> Its premier performance is obtained at the cost of complexity. Attempting to
> maintain or repair it without a good fundamental background is a recipe for disaster.

Initial thoughts:

There is only one really *absolute* (use it) / *no excuses* (find one) / *don't do it* (try working on the gear train without it) item with the 390/1 that is completely unheard of with the 390A: and that's the "Green Gear". Since there
is no counterpart on the "A"s - if it's missing from a 0/1 - many people don't have a clue. In fact I've had to help put a 390 back together that had a green gear (still in it's storage spot) - as the owner didn't have a clue what it was. OK - yes - it's not that hard to re-sync a geartrain... but it's a heck of a lot easier to not have to. So it's one item that needs the "hey

newbie - it's there (or supposed to be there) for a reason!" treatment.

The only other thing that is totally different is the alignment of the IF - since it is both variable band width and all LC (vs mechanical filters). (OK I'm glossing over the power supply - but really - if someone can handle double/triple hetrodyne - a series pass regulator - even with quad plates - shouldn't be much of a challenge).

Regarding manuals - I've never seen an "official" R-390 manual - not that I recall. Sherry managed to snag an original Collins R-391/URR instruction book stamped "NAVSHIPS 93766" with a rubber stamp. I had "assumed" (there's that dangerous word!) that it was basically the same as the R-390/URR manuals - just with the addition of the auto-tune "stuff" - particularly since many of the diagrams are marked TM 856-xx except for the autotune related illustrations - which bear TM 863-xx (which is the primary reason behind my "assumption" that the TM 856 was for the R-390/URR and TM 863 being an "ammended" version of same for the R-391/URR). I've always thought the 856 / 863 better than the original TM 856A for the R-390A/URR - as it seemed to go to great lengths to explain many things. It seemed that the 390A was the "new improved economy version" of the 390 - and it's manual was equally an "economy version". For instance - the function switch in the R390/1 S107. There is a page where each of it's four poles are shown through all six positions(TM 856-96)... I'm not aware of that for the 390A. The 856 also spends a good deal of time describing the IF... and how each stage works in the "grand scheme" of things... While the 390A manual is heavy on the mechanical filters... not on "each stage"... Yes, I'm being picky here - but my point is - I think the original 856 was pretty good - judging by the (apparently preliminary) 863 I have. Sure - there are some "nice to know" things about the 390/1 that would benefit from similar thorough treatment as the 390A Y2K(R3) manual - but considering the much less "economical" design of the 390/1 - most of the work needed in restoring one is pretty "straight forward".

One issue with the 863 version (and likely the 856) - who has a printer large enough to print that large master schematic / wiring digram (Figure 116 TM 863-106(1) and TM 863-106(2)). I don't recall exactly - but they are something like 21 X 36 inches each ??? Wonderful for working on the radios - everything "at hand" in one place (they fold out opposite each other to take up a table top or such - but as noted - everything in one "view"...

So Perry - I think it's good that you've called for "input" - I'd assumed the 863 was pretty much "it" for the 391 (and by default it's older sibling) - but there may well be some "gems" that would be interesting.

Date: Mon, 7 Mar 2011 19:00:14 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Call For Information

I have three different versions of the original manuals for the R390 if that's any help.

Date: Mon, 7 Mar 2011 18:08:33 -0600
From: "Les Locklear" <leslocklear@cableone.net>
Subject: Re: [R-390] Call For Information

R-390/URR is the official designation, I just didn't make that up. <snip>

Date: Mon, 7 Mar 2011 18:54:50 -0600
From: "Bill Hawkins" <bill@iaxs.net>
Subject: Re: [R-390] Call For Information

Here's another obscurity for the real 390: There was a MWO to add a B+ fuse to the set. It lifted the transformer center tap from ground in the PS module and brought it out to the chassis using the wire for a + 28 VDC dynamotor supply. The dynamotor wasn't used in the field because it was electrically noisy. Then the +28 wire was clipped from the chassis power connector and returned to ground through a fuse holder with a 3/8 A fuse. What happened was that a modified PS module wouldn't work in an unmodified receiver. Some radios were scrapped because they wouldn't work, because of this modification. That's how I got my 390. Bill Hawkins P.S. There was also a thyratron DC/DC converter for 120 VDC supply, but that one was also too noisy.

Date: Mon, 7 Mar 2011 20:16:17 -0600
From: "Cecil Acuff" <chacuff@cableone.net>
Subject: Re: [R-390] Call For Information

I imagine Arney has one of those laying around. He still has EK-07's for sale...last I heard. I still can't afford one...:-(

Date: Mon, 7 Mar 2011 22:33:30 -0500
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R390/URR manuals

For the R-390/URR, I have the following originals:

TM 11-5820-357-10 - Army - Operator's Manual - 29 December 1960

TM 11-5820-357-20 - Army - Organizational Maintenance Manual - 23 March 1961

TM 11-5820-357-35 - Army - Field and Depot Maintenance Manual - 9 March 1962

For the R-390A/URR, I have the following originals:

TM 11-5820-358-10 - Army - Operator's Manual - 16 January 1961

TM 11-5820-358-20 - Army - Organizational Maintenance Manual - 10 February 1961

TM 11-5820-358-20P - Army - Organizational Maintenance Repair Parts and Special Tools Lists - December 1977

TM 11-5820-358-34P - Army - Direct Support and General Support Maintenance Repair Parts and Special Tools Lists - February 1972

TM 11-5820-358-35 - Army - Field and Depot Maintenance Manual - 8 December 1961

Date: Mon, 7 Mar 2011 21:58:57 -0600
From: "William J. Neill" <wjneill@consolidated.net>
Subject: Re: [R-390] R390/URR manuals

And I've got originals of:

TM 11-5820-359-12P Power Supply PP-621/URR Repair Parts & Spcl Tools List
TM 11-5820-359-35P Power Supply PP-621/URR Field & Depot Maintenance Parts & Tools
Both are dated December 18, 1959.

TB SIG 322-303 Fixed SigComm Facility: Basic HF Radio Receiver (R-390/URR)
This is dated April 15, 1969.

Date: Mon, 07 Mar 2011 21:59:10 -0600
From: Randy and Sherry Guttery <comcents@bellsouth.net>
Subject: Re: [R-390] R390/URR manuals

So far - that leaves Sherry's as the oldest - Collins Radio Company Order No 14214-P-51 Manual Date 23 October 1953

I know there are lists of contract dates for the 390As - anyone have the dates for the 390? Sherry's 391 tag has Order No. 14214 -P-51-93 - S/N 70 -- so her's is from that order - there is an "MFP 1960" stamp on the front panel - and a date stamped inside of 10-23-1953. BTW - Sherry's

"issue date" is 10/23/53 as well... which might well explain the zero.zero chance of getting it away from her... The S/N of the 391 I had was 356 - but unfortunately I didn't note the contract number (it was sold to Trans World Radio on Guam in 1975 - along with quite a bit of Teletype gear It might still be on the Island - though I doubt it's still in use as a RTTY receiver).

Date: Mon, 07 Mar 2011 22:03:40 -0600
From: Mahlon Haunschild <mahlonhaunschild@cox.net>
Subject: Re: [R-390] Call For Information

I have a complete set of R-390 TO figure fold-outs (the TM 11-856/TO 31R1-2URR-154 set) plus a copy of MWO 11-5820-294-35/1. How you would
scan the fold-outs is up to you.

Date: Tue, 08 Mar 2011 00:03:51 -0500
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: Re: [R-390] Call For Information

My R-390 web page has free (but slow) downloadable PDF files for TM 11-856 and TM 11-856A. The first one does include the really, really big fold-out pages.
http://www.jamminpower.com/main/r390.html

Plus I have all these PDF files and a lot more on a DVD-ROM collection - $25 for 3 DVD-ROMs with >60 vintage scanned military radio manuals.

Date: Tue, 8 Mar 2011 06:40:31 -0600
From: "Les Locklear" <leslocklear@cableone.net>
Subject: Re: [R-390] R390/URR manuals

Here is the list of Contract Numbers for the R-390/URR and the R-391/URR. This is from older correspondence with Tom Marcotte, and might not be up to date on some information, such as high serial number reported.

R-390/URR	Year	Contract Number	Highest s/n
Collins	1951	14214-PH-51-93	4952
Collins	1951	14226-PH-51-93	1412
Motorola	1951	14214-PH-51-93	4864
Motorola	1951	14241-PH-51-93	3449
Motorola	1952	90-PH-52	219
Motorola	1952	26579-PH-52	872
Motorola	1953	13602-PH-53	979

R-391/URR

Collins	1951	14214-PH-51-93	753
Collins	1951	11424-PH-51-53	no serial number reported
Collins	1950	21852-PH-50-93	169
Collins	1952	26575-PH-52-93	316

Note: The 14214-PH-51-93 was, according to sources, a "cover all" contract that was let while the R-389. R-390, R-390A and R-391 were in development.

Date: Tue, 08 Mar 2011 08:49:35 -0500
From: "Michael, W1RC" <subs@w1rc.net>
Subject: Re: [R-390] R390/URR manuals

There was also a manual that Collins Radio produced an Instruction Book for Radio Receiver R-390/URR23 October 1953 14214-P-51 about 220 pages. This was renamed TM11-856. It contains the three manuals that were published subsequently.

As timing would have it right now I am working on an R-390 and need to know if anyone has the Field Change Orders. Specifically I need some information contained in both C1 and C3. There is a "Zero Adjustment" caution that I would like to see. I am just about to remove the front panel and there is a handwritten notation in my TM11-5820-357-35 that I should see these items.

If anyone has C1 and/or C3 would you be so kind as to post these cautions. I haven't played much with these radios for about 13 years and I don't want to damage anything by virtue of forgetfulness.

Date: Tue, 8 Mar 2011 16:24:30 +0100
From: "Henry Mei'l's" <meils@get2net.dk>
Subject: [R-390] Fw: Best manual for R-390A? (YK2 ... YK3?)

I recall reading some comments about the best, most updated and most usable version(s) of the R390-A manuals on the list . Which one(s)? Available as internet downloads? -- how many MB? I'm thinking in terms of alignment and possible future repairs, componenent replacements, AND possible retroing of the AGC and detector system. I know I'd better replace the cap. leading to the mechanical filters.

I have no real problems with my R-390A at the moment -- did retro the audio stage two years ago. Last owner changed the AGC system and added

product detection - seems to function quite well, but I know many on this list aren't too happy about mods -- I'm not a purist, but do like to keep my gear as original as possible. (I don't want to get involved in the debate about pure originality vs. mods, etc. -- if you please.)

This is my 2nd R-390A. My first unit was original, in unmodified condition - except for my replacing the tube rectifiers with diodes and a series dropping resistor + utilizing the 12 vac tap when my ballast tube gave up the ghost. Changes were done in a way that allowed rapid retroing -- with regard to collector value. I do have the following partially complete manuals as photo copies, i.e. TM 11- 856A & TM 11- 5820-358-10 & 35. (The op. manual, ... 358-10 is complete).

My present R-390A: Teledyne Systems CORP
35064-PC-62
(Serial number is in the high 3000's)

Date: Tue, 08 Mar 2011 07:28:59 -0800
From: Dan Rae <danrae@verizon.net>
Subject: Re: [R-390] R390/URR manuals

As luck would have it the first thing I consulted the other day in my 1955 TM11-856 before starting a complete re-alignment, (or should that be alinement?) was the section on aligning the 455 Kc/s crystal filter and this is complete nonsense in that edition. Does the later TM 11-5820-357-35 from 1962 have a valid section for this procedure? Is it available anywhere as a pdf?

Date: Tue, 8 Mar 2011 11:45:29 -0500
From: "Todd, KA1KAQ" <ka1kaq@gmail.com>
Subject: Re: [R-390] R390/URR manuals

I don't have those Mike, but here's the later 1962 TM info I have saved for my ex-ASA 390 (both changes are stenciled on front):

MWO-11-5820-294-35/1

>From Change 4 of TM 11-856, TO 31R1-2URR-154, dated 22 Dec 1958:

" In receivers modified by MWO 11-5820-294-35/1, the wires connected to B+ 3/8A Fuse F102 are removed and tied together, and the ground connection on transformer T801 is removed. There is no connection between the DC 20A Fuse F103 and P118-15 (not applicable to Fig 53 of TM), and Terminal 6 of T801 is connected through the contacts of J818-15 and P118-15 and B+ 3/8A Fuse F102 to ground. The B+ 3/8A Fuse is called the HV 3/8A Fuse.

Power Supplies PP-621/URR modified in accordance with MWO 11-5820-294-35/1 are NOT interchangeable with power supplies that are not so marked because of wiring changes in the B+ 3/8A Fuse F102 circuit.

R-390/URR Receivers modified by MWO -35/1 above have the former B+ 3/8A Fuse F102 in the ground lead of power transformer T801 and the name of the fuse is changed to HV 3/8A.

The MWO -53 35/1 supersedes MWO SIG 191 dated 20 July 1955 and contractor changes on Power Supplies PP- 621/URR identified as MOD 1 and above.

These changes restore interchangeability between Power Supplies PP-621/URR and permit their being used in all Radio Receivers R-389/URR, R-390/URR, and R-391/URR so modified.

In receivers modified by MWO -35/1 above the B+ 3/8A Fuse F102 is NOT connected between P120-5 and +300V Unregulated.

In power supplies modified by MWO -35/1 above there is NO connection between Terminals 10 (Ten) and 6 (Six) of T801; There is a wire connected between Terminal 6 of T801 and Terminal 15 of J818. On Receiver Main Frames modified by MWO -35/1 above, (TM Fig.106) Station 35 Wire 1-33 is 7-40, Wire 5-41 is 15-41 and B+ is HV . At Station 37 there is NO Wire 15-41. At Station 41 there is a wire added between the cable and Terminal 1 of C101 labeled 5-41, change Wire 35-1 to 42-2, and Wire 37-2 to 35-1. At Station 40, add a wire between Terminal 7 and the cable labeled 35-2."

MWO-11-5820-294-35/2
URGENT: MWO 11-5820-294-35/2

DEPARTMENT OF THE ARMY MODIFICATION WORK ORDER
MODIFICATION OF RADIO RECEIVERS R-390/URR AND R-390A/URR TO ELIMINATE SPURIOUS RADIATION.

PARAGRAPH 1. Application.

a. Applied to. All Radio Receivers R-390/URR and R-390A/URR bearing orders no. 14225-P-51, 14214-P-51, 90-P-52, 26579-P-52, 13602-P-53, 363-P-54, 375-P-54, 08719-P-55, 0014-P-56, R56-881- 67058, or 14385-PC-68.

b. Category of maintenance.

(1) Field. This work order will be applied by third echelon maintenance personnel..... history and misc notes page 30

(2) Depot. This work order will be applied to Signal Corps depot stock by depot
maintenance personnel only when equipment is--

(a) Undergoing scheduled repair for stock.
(b) Subject to other work orders that require application prior to issue.
c. Applied By. Field Radio Repairman or equivalent maintenance personnel. PARAGRAPH 3. Purpose of Modification To eliminate continuous radiation
at 340 mc as a result of parasitic oscillations, by connection the suppressor grid to the cathode of the local audio output tube V603.

PARAGRAPH 10. Modification Procedure.
a. Radio Receiver R-390/URR.

(6) Unsolder and remove the jumper lead connected between pin 2 and ground of tube socket XV603.

(7) Connect and solder a suitable length No. 22 AWG solid wire between pins 2 and 7 of tube
socket XV603.

b. Radio Receiver R-390A/URR.

(4) Unsolder and remove the jumper lead connected between pin 2 and 4 of tube socket XV603.

(5) Connect and solder a suitable length No. 22 AWG solid wire between pins 2 and 7 of tube socket XV603.

11. Recording the Modification. Ink or paint "MWO 11-5820-294-35/2" near the nomenclature plate on the front panel of each modified receiver. When modified equipment is packed or crated, clearly mark "MWO 11-5820-294-35/2" on the exterior of the case in a similar manner.

And a handy breakdown of the MWO structure:

MWO is a Modification Work Order.

11-5820 is a electron tube device (Radio)

11-5820-294 may be a version of the R390 or R390/A manual.

11-5820-294-35 tells us its a 3 to 5 level maintenance manual.

11-5820-294-35/2 tells us its the second change against the unit.

Field changes being MWO applied after manufacture. As opposed to MWOs applied in the factory after some units are built. The 3 fuse model of the R390/A is a factory MWO. You did not refit the receivers that were build and fielded. The adjustable trimmer caps on the mechanical filters is another factory MWO.

Field MWOs included:

Micro Dial on BFO for ASA

Re-cabling the antenna relay to use the C connector

Diode mod to replace the 26Z5's.

Think I got some of this from Rich McClung and another list member a decade back, perhaps. Wonder how ol' Rich is doing these days?

Date: Tue, 8 Mar 2011 11:45:48 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Fw: Best manual for R-390A? (YK2 ... YK3?)

The Y2K tome has a few incarnations. The latest that is out there is Y2K-R3 (revision 3). It is available for download at; http://www.r-390a.net/Y2K-R3/index.htm

After Perry ambushed me <j/k> I will be working on -R4 (revision 4). 95% of the grunt work was done by Perry and the 32 or so folks who contributed to this point (credits found on Chapter 0, page 2). The objectives of the Y2K tome is listed on page 2;

The stated goals of this project are to:

*1. Re-create the 1985 U.S. Navy Manual in a format that would allow addition of commentaries, footnotes, and additional information.

2. Replace the poor black-and-white photographic images with new color plates. (there are just some views that the original manual did not include, as resources permit those will be documented more thoroughly)

3. Replace the line and schematic drawings with newly drawn ones.

4. Add footnotes referencing related documentation, attributing the

additional material and corrections to the authors, and explaining unclear passages in the text. (the more often a question gets repeated on the reflector the more likely it will be expanded upon in the -R4 release)

5. Update the parts lists with currently available components. (put them in an Excel Spreadsheet like format)

6. Add descriptions, methods, and suggestions that were not covered in the
original manual.* *(* modifications *)*

My stewardship is to continue in the pursuit of these goals and to bring the best of what this reflector has to offer in the appendices. There are several active members of this list who have expressed a willingness to continue to contribute and we will attempt to gather their collective wisdom in the -R4 release.

The Y2K and it's releases is a "living document" that will grow and clarify over time. It is available as several downloads by chapter. Hint, you will end up going through a tree's worth of paper to print the entire document. I have one copy done on high grade presentation type paper and it completely fills a 3" ring binder. I have been asked by someone on the list if it was possible to run off bound copies and make them available to those who cannot or do not wish to work with an electronic copy. I imagine the cost of getting it professionally printed as some place like Kinkos would cost upwards of a hundred dollars. As chapters will go through revisions on a semi-regular basis a printed copy will be out of date, almost as soon as it is printed.

Date: Mon, 23 Jan 2012 18:20:03 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390 revival woes...

Question: Is there a convenient test point anywhere on this rig to accurately measure the 6.3VAC filament rail voltage?

.....

Not really. Just pull one of the tubes on an R390/A and measure the 6.3 on the tube socket. Look at the schematic and see what you are getting. Remember the R390 is 24 volts with 4 tube strings and you need to pick your point. If the 26Z5s have been solid stated the filament wire were likely cut off the tube socket. But you can wire the filament windings back to the tube sockets but not to the B+ cathode pin so you have a place to measure the voltage. I do not know why the filament voltage was hacked out of so many of the power supplies when the diodes were installed.

Panel lights seem a little dim compared to my EAC 390A.

.....
R390 dial lights are not as bright as R390/A lamps.

R390 lamps are 28 volts on a 25 volt circuit. Several (Ok a couple) different lamps are available. Different manufactures also have different lumens for the same part number.
The lamp is in range of acceptable type values. The lamp may pull a bit less current to give it a longer life span. There are also red, blue and other color lamps plus Long life lamps. Roger AI4NI

Date: Mon, 14 May 2012 11:30:31 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390/URR Completely dead!

We know the original line filters have internal caps that conduct enough, current to ground, to trip modern GFI devices. This current is also the source of many shocking experiences.

Options are: replace it with another filter from a hanger queen (ask here on the reflector) or NOS. Gut the one you have and wire it straight through. Re stuff the one you have with some smaller caps and bigger inductors. Find a nice filter device from a switching power supply that accepts the new style computer cords and install it with a butch plate. Re stuff the original case with the guts from one of these new style filters.

I think you have more problems than just the filter. It could be that a cap shorted and then opened a inductor in the filter. But I think you have a short further down the line. I am not surprised the fuse did not blow and you could expect a problem after the fuse.

Pull out the power supply and audio deck and check the 27 ohm resistors and the 6082 series regulator tubes. Check the oil filled power supply caps in the main frame chassis. These two critters are located different than in the R390/A. The R390 depends on the series regulator tubes to filter the B+ ripple not so muchthe filter caps. If the caps are not shorted with a meter, or just plain rusted to the point of leaking, they are likely good.

Once you get the filter replaced. Un plug all the wire harness connectors. Get out your power cord with the in line fuse and make sure you have a small 2 amp fuse in the test fuse holder. You do not want to burn up a wire harness looking for a short. Drag out the schematics to determine what order from power cord to speaker the connectors should be re connected in Do not unplug and re plug connectors with the power on. Be systematic in your procedures.

Not a big problem.

Date: Mon, 14 May 2012 12:43:42 -0400
From: wc4g@knology.net
Subject: Re: [R-390] R-390/URR Completely dead!

"Once you get the filter replaced. Un plug all the wire harness connectors."

Note: When you unplug the IF deck connector you will lose filament voltage to V607 and then lose B+ regulation. - - Ask me how I know - -
---

From: Robert Newberry <N1XBM@amsat.org>
Subject: [R-390] Green gear

I'm about to remove my RF deck. I've read on r-390.com about the green gear.
Well first off don't panic the RF deck is still in place.

I removed the gear and turned it over to see the green side. From the description I read it appears the gear is flipped over and re-installed back in its post aligned properly on its shaft engaging the gear behind the the large brass gear front lower center. I did this and the gears can still move and that shaft moves. I assume all this does is keep the gears in sync so them moving is OK as long as they move together. For some reason I thought this gear would locked the whole gear train in place. Like I said the RF deck is still sitting in the chassis, I wanted to be clear I have the gear installed correctly before I move anything.

Date: Tue, 4 Dec 2012 14:27:07 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Green gear

Green gear worries are greatly over hyped.
If you have one use it.
If not continue with out it.

If you can not look at the gear train and see where it is at as you pull the Rf deck and get the Rf deck back in the chassis with the cams setting where they were when you removed the deck you should not have removed the deck while under that much influence.

Now you just have to move the cams and parts around to where every thing lines up at 2+000 and reset the Rf deck.

With out the green gear, a couple of the slug rack like to run to dead bottom as you life the deck free from the chassis. Remove the slug rack

springs on .5-1 and 1-2 racks before you remove the deck with out a green gear.

When you pull the R390 RF deck off chassis two gears riding on the MHz shaft come uncoupled from the MHz shaft. You can then move the .5-1 and 1-2 cams without moving the rest of the gear train.

Just set the Deck to 2.+000 where the cams line up with the marks. Dial the deck to 2.+000 when you reset the RF deck. you have to watch where you have the 10 turn stop on the Mhz shaft so you can dial from -965 to +035.

Date: Tue, 4 Dec 2012 15:09:11 -0600
From: "KA9EGW" <ka9egw1@britewerkz.com>
Subject: Re: [R-390] Green gear

If one knew the diametral pitch [DP] and tooth count on this gear, sourcing a replacement should be easy [famous last words...]. Unfortunately I don't have one; my 390A doesn't use it... According to a number of different sources, to figure the DP you take the tooth count, add 2, and then divide by the outside diameter in inches. If someone can supply this information, I would be happy to see if there's anything I can do to help source replacement 'green gears' at cost-effective pricing [i.e. cheap]. Hopefully it's a standard DP [20,24,32,36,48...something like that].

Date: Wed, 5 Dec 2012 01:27:35 -0600
From: "KA9EGW" <ka9egw1@britewerkz.com>
Subject: Re: [R-390] Green gear

Other than allowing storage inside the radio, what purpose does the convex/concave aspect serve? As I understand it this gear transmits no power; it merely serves to lock two others relative to each other. Or am I completely off base?

Date: Wed, 5 Dec 2012 06:25:53 -0500
From: Robert Newberry <N1XBM@amsat.org>
Subject: Re: [R-390] Green gear

I don't know I've put the question to the list I haven't gotten an answer specific to my question. As best I can tell (if it's installed correctly) it doesn't actually lock but rather tie the Khz gears together so they all move as one. The gear does nothing for the Mhz, which I assume is because the Mhz is because it's harder to move and easier to put back.
Please don't flame me, I'm totally new to 390s and just trying to feel my way out here.

I'm gonna post a pic of my green gear installed too. Maybe that will help or aid in answering my question.

Date: Wed, 05 Dec 2012 06:46:18 -0500
From: "Robert N. Newberry" <N1XBM@amsat.org>
Subject: Re: [R-390] Green gear

https://picasaweb.google.com/RNNewberry/GreenGearR390?authuser=0&authkey=Gv1sRgCNrLjrGppZHfvgE&feat=directlink

That is the link to the pictures of where I have my green gear installed.

Date: Wed, 5 Dec 2012 07:54:32 -0600
From: "KA9EGW" <ka9egw1@britewerkz.com>
Subject: Re: [R-390] Green gear

I hate to sound like an idiot, but is that the 'storage' position or the 'deployed' position? I'm guessing 'deployed' based on the partial disassembly evident in the pics. In either case, if there is still a need for these and someone can supply the info, I am willing to see if they can be fabricated [In addition to being an Amateur Radio op I also have a small machine shop].

Date: Wed, 5 Dec 2012 08:59:21 -0500
From: Robert Newberry <N1XBM@amsat.org>
Subject: Re: [R-390] Green gear

Well I'm not 100% sure myself if its installed correctly. As far as I can tell its deployed the gear is dished. When in storage the green side is facing in not engaged. When deployed the gear is flipped exposing the green side thus engaging the the gear. I'm gonna give it a few more days to see if I cam get a clarification. If I don't hear anything I'll drop this topic and have a go at it on my own.

Date: Wed, 5 Dec 2012 08:27:02 -0600
From: "KA9EGW" <ka9egw1@britewerkz.com>
Subject: Re: [R-390] Green gear

On another list, back in 1999 [:-)] WA6FEC already came up with the data, it's 48DP, 70 tooth, and .073 thick. Stock Drive Parts www.sdp-si.com lists a part A 1S 1-N48070 of which they have 414 in stock that could likely be made to work with a bushing in the bore but when those are gone they're gone. They also have several other 48DP 70-tooth gears that would require a bit more work. OK, my work here is done HI HI.

Date: Wed, 5 Dec 2012 12:23:02 -0500

From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] Green gear

Can someone confirm or deny that the center hole of the Green Gear is D-shaped? I thought it is, but can't get to one to confirm.

Date: Wed, 5 Dec 2012 12:42:56 -0500
From: Robert Newberry <N1XBM@amsat.org>
Subject: Re: [R-390] Green gear

Well seeing my original topic has been completely derailed I'll try to answer your question. The gear is oblong. The shaft has two flat sides parallel to each other.

Date: Wed, 5 Dec 2012 13:18:12 -0500 (EST)
From: ToddRoberts2001@aol.com
Subject: Re: [R-390] Green gear

I bought 2 reproduction R390 Green Gears from Hank a few years ago. They look perfect in every way. The center hole is an oblong shape, not a "D" shape.

Date: Wed, 5 Dec 2012
From: nryan@mchsi.com
Subject: Re: [R-390] Green gear

You're close! The hole actually resembles an elongated "O" with two parallel flat sides. On a related note, I think someone asked where the green gear lives when it's not deployed. Its "parking space" is located above and slightly to the left of the second gear on the left hand side of the geartrain front. Now we all know what that threaded hole is for, so put the green gear back when you're done so you don't lose it!

From: Robert Newberry <N1XBM@amsat.org>
Subject: [R-390] R-390 mods and weak points

I've been reading various websites and archived threads. I have a non A R-390 that is all torn down to individual modules. My questions are. Is there any caps or resistors that should be checked or replaced? I've read alot about "death caps" and 47 ohm resistors but everyone was talking about R-390A.

Are there any recommended mods? For example I've read about fatting up caps in the audio module to get more low end audio. Although these were referenced to the R-390A. I'm all set with the inrush mod for slower start

up and hanging a fan to aid with cooling.

Date: Thu, 6 Dec 2012 16:32:31 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Green gear Production Change

Find yourself a PDF copy of TM 11-5820-357-35 on the net.
You ask, am I using it correctly?
See page 67 of the TM.
See figure 43 of the TM

Read paragraph 59. Rf Subchassis (fig.40 and 41.)

a. (3) Note. The offset gear is used only to maintain synchronization of the gear train when the rf subchassis is removed from the receiver. In early production models, the green offset gear is reversed to disengage from the rf gear train.

_____ end of TM stuff _____

There is no comment in the TM about needing the gear.
There is no comment in the TM about the gear locking the gear train.

Figure 43 shows the green gear mounted on the end of the shaft. Make sure the gear's D hole sets on the shaft. The 6 x 32 bolt should firmly hold the gear to the shaft so
the gear does not turn on the shaft and allow synchronization of the gear train
to be lost.

When you mount the gear up top in its storage space, you turn the teeth away from the front plate. Green side up.

When you mount the gear on the end of the shaft in use, you turn the teeth out from the front plate to engage the gear. Green side up.

The dish in the gear lets a thin piece of sheet metal perform an elegant function.

I hope you have pulled the deck and gotten on with the maintenance, these receivers are for receiving signals not pondering over.

OK a change to the R390 RF deck.
Early production had the gear on the shaft backwards.
Later production had a place to mount the gear up near the top of the gear train on the front of the gear train assembly. Roger

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Date: Thu, 6 Dec 2012 15:33:11 -0600
From: Cecil <chacuff@cableone.net>
Subject: Re: [R-390] R-390 mods and weak points

The 47 ohm resisters are in the R-390/URR. There are 4 of them that usually need to be replaced. I usually up size them to 5 watt. The caps are high quality and are usually not a problem but do fail from time to time. There is no death cap issues in the R-390 as there are no mechanical filters...it's all L/C filtering which is what makes it sound a good bit better.

The slug rack cores are unique to the R-390 and are not interchangeable with cores from an "A". Also don't mix them up in the radio....they are color coded....make note of that on disassembly. The power supply filters are oil caps....usually good also.

All else is pretty standard.....and the green gear thing is way over blown....it's not necessary especially if you are doing a rebuild...mainly a convenience if doing simple maintenance.

Date: Thu, 6 Dec 2012 16:35:09 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Green gear

Hi Roger, I believe you may be confusing folks with the 02+000. You may be
thinking of the 'A' model with the 07 +000.
The R-390 is set on 02 000 to set the cams.
Don, you are right the R390 aligns at 2.000 not +000.

Date: Thu, 06 Dec 2012 17:40:53 -0500
From: "David C. Hallam" <dhallam@knology.net>
Subject: Re: [R-390] R-390 mods and weak points

The 47 ohm resistors apply to the R-390. They are 2W carbon comp cathode resistors in the power supply and over heat badly. Change them to 5W ceramic composition resistors. Be sure and add the cooling fan to direct air on these resistors. That area gets hot. The series B+ voltage regulator generates a lot of heat.
There are no "death caps" in the r-390.

Date: Thu, 6 Dec 2012 22:42:46 -0500
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] R-390 mods and weak points

> The 47 ohm resisters are in the R-390/URR. There are 4 of them that

> usually need to be replaced.

Actually 8. Four in the regulator section at the 6082 cathodes, and 4 in the power supply at the rectifier cathodes.

Date: Sat, 8 Dec 2012 13:55:16 -0500 (EST)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390 mods and weak points

Robert ask about R390 problems and David KW4DH pointed out the 47 ohm resistors in the power supply. There are also 4 of these resistors in the audio deck that balance the voltage regulator current through the tube sections. Take a look at these also. One or more may be out of range from past tubes going bad and pulling a resistor into it's char zone. I do not know if there is room in the audio deck to install the 5w ceramic composition resistors. But I would consider it.

Most of the heat from the Audio deck voltage regulators comes from the 6082 filaments 25.2 volts at .6 amps is 15 watts for each tube. 285 volts regulated down to 180 volts at 200 ma is 21 watts in regulation. That 51 watts on the audio module.

You could use 4 each 5 watt resistors 1.5 K resistors. Looking to drop 75 volts
at 200 ma across a parallel resistance of 375 ohms 15 watts over a 20 watt set of resistors.

Then you are looking to regulate 210 volts to 180 volts at 200 ma with some solid state transistors at 6 watts.

The 26Z5 filaments were putting out 7.56 watts. The 1.5 K resistors could be mounted in the 26Z5 sockets to move the heat back over to the power supply.

Once you are only trying to regulate 6 - 10 watts, solid state regulation with some plug in modules in place of the 6082's becomes real doable.

Just moving over to solid state from the 6082's saves 30 watts under the audio deck. just on the filament power. You can then move some more of the regulation voltage drop power over to some fixed resistors.

Several of the Fellows have presented working solutions here on the reflector and have web pages on the subject of running the R390 cooler.

There are mods you plug into the 6082 sockets and save 30 watts right off the getgo.

Date: Mon, 10 Dec 2012 17:42:19 -0500
From: frank hughes <fsh396ss@gmail.com>
Subject: Now available for download: R-390 1954 Air Force "Charts & Diagrams"

Thanks to the generous efforts of Al, W8UT, this R-390 manual is now available for download! It is a 7 June 1954 Air Force "Charts and Diagrams", version C-5-15-(d) Rev
20 Sept 1956. http://www.boatanchors.org/downloads/
Take a look at the README first so you know how the manual is broken down.
http://www.boatanchors.org/downloads/readme.txt 73 Frank KJ4OLL

From: "howard m. mills" <w3hm@frontiernet.net>
Subject: [R-390] Zero adjust on R-390 receiver

Can anyone explain how the Zero Adjust works on an R-390 receiver. I have
two of them and the Zero Adjust doesn't work on either one. The manual is
of no help.

Date: Sat, 16 Mar 2013 10:46:27 -0600
From: Anthony Casorso <canthony15@msn.com>
Subject: Re: [R-390] Zero adjust on R-390 receiver

It is a mechanical clutch that connects the PTO drive to the veeder-root display. You tune in your reference signal (like WWV or whatever) and then turn on the BFO. With te BFO control centered, you tune in the signal and set the dial at the "correct" frequency. For example you tune in WWV at 5Mhz and adjust the tuning for 5.000. Then you crank the zero adjust knob clockwise enough turns to release the clutch. Then you adjust the Kilocycle tuning knob for a zero beat. The display should not move because the clutch is released. Then you unscrew (CCW) the zero adjust knob to re-engage the clutch. Now you have zero beat at a dial setting of 5.000.

Date: Sat, 16 Mar 2013 14:34:51 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] Zero adjust on R-390 receiver

Mine has never worked correctly either, it takes a lot of effort to separate the clutch and it mating surface, it does work but with effort. It is probably adjusted incorrectly and I haven't had the time to drop the front

panel to check it out and see what the problem is.

Date: Sat, 16 Mar 2013 14:40:24 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Zero adjust on R-390 receiver

You shouldn't need to drop the front panel to adjust it.
Turn the radio upside down. You the have access to the assembly.

Date: Sat, 16 Mar 2013 14:06:24 -0500
From: n4buq <n4buq@knology.net>
Subject: Re: [R-390] Zero adjust on R-390 receiver

First R90A I had (Motorola), the clutch just wouldn't release properly. I had it apart a couple of times, cleaned the clutch plates, made sure there were no burrs, etc., but it just never worked like it should. Second R390A (Teledyne) I did the same thing and the clutch worked great. I have heard that some of them just never did work properly.

Date: Sat, 16 Mar 2013 15:07:37 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] Zero adjust on R-390 receiver

Is there an adjustment in there? Mine needs about a half a turn to separate the surfaces but it gets difficult to turn once it gets to the point where the surfaces start to separate, these is some drag also and I have to turn it back and forth a few times to get it to stop turning the whole mechanism. I have it adjusted so it can't go in more than half a turn, if I turn it in anymore than that I feel like I'm forcing it and it creates drag (bending something?) when tuning from about 400 to approx 300 but only when tuning down,
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Date: Sat, 16 Mar 2013 14:21:43 -0500
From: n4buq <n4buq@knology.net>
Subject: Re: [R-390] Zero adjust on R-390 receiver

That's the way my Motorola clutch worked (or, more correctly, didn't work).

A couple of things to check. Are all the screws in the front panel? If not, it could be allowing the panel to bow more than it should. Second, is the clutch plate (the disc that's on the end of the front panel screw thingee) solid and made like it should be? My Motorola had a rather home-made looking device which I replaced (it still didn't work like it should, though).

Could be that there is dried lube between the clutch plates. I don't think

they're supposed to be lubricated with any kind of "wet" lube" like oil, etc. (maybe, if anything, a dry lube like talc(?)). If so, the plates could just be sticking together with grease/oil. I seem to recall Roger having some thoughts on this way back when I worked on mine. Maybe he'll chime in.

Date: Sat, 16 Mar 2013 15:44:53 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: [R-390] FW: Zero adjust on R-390 receiver

The front panel is fine and I'm pretty sure the clutch plate is original and I would think it was dried lube except that Chuck Rippel restored it 7 or 8 years ago and I know it was very well lubed when I got it back and it still tunes like butter except for between 300 and 400 Kc going down. I'll have to bite the bullet and pull it out of the case to see what's up, I'm pretty sure it was fine when it came back.

Date: Sat, 16 Mar 2013 15:47:38 -0400
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] Zero adjust on R-390 receiver

Even light oil will turn into varnish after some number of years. Given the way these radios got (mis-) lubed by various generations over the years - who knows what's in / on the plates or the rest of the assembly. Dust / airborne crud / bits of stray trash are also a source of trouble. Disassembly / cleaning / visual inspection is often the only way to be sure you have all the guck out of something like this.

The clutch is only designed to go just so far. Past that point you likely are trying to compensate for something that's out of tolerance. First suspect would be the crystals?

Date: Sat, 16 Mar 2013 15:55:03 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] FW: Zero adjust on R-390 receiver

Take a look at the clutch plate. *IF* the plate has come loose and rotates, then it won't work right. It is a press fit. If it has come un-done, I don't know what you can do to get it back to working.

Date: Sat, 16 Mar 2013 15:56:51 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] FW: Zero adjust on R-390 receiver

Alright you guys talked me into it, I'll pull it apart and let you know what I find,

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Date: Sat, 16 Mar 2013 16:01:18 -0400
From: Bob Camp <ham@kb8tq.com>
Subject: Re: [R-390] Zero adjust on R-390 receiver

Loose clutch plate fix: Beg .. borrow ? steal one from another radio. Might try a good clean and some epoxy. I've never tried it, no idea if it could be made to work.

Date: Sat, 16 Mar 2013 16:13:33 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] Zero adjust on R-390 receiver

I don't know if epoxy would do it.
There *may* be a method of "staking" it to the shaft with a pin punch.
Don't know as I haven't tried it.
Right now mine is apart for restoration.

The clutch has to dis-engage from the geartrain er make that the PTO. To allow the shift without moving the Veeder Root counter.

Date: Sat, 16 Mar 2013 15:26:54 -0500
From: "KA9EGW" <ka9egw1@britewerkz.com>
Subject: Re: [R-390] FW: Zero adjust on R-390 receiver

Knurl the shaft and reassemble?

Date: Sat, 16 Mar 2013 16:36:51 -0400
From: rbethman <rbethman@comcast.net>
Subject: Re: [R-390] FW: Zero adjust on R-390 receiver

That may be a possible solution.
Then you are talking about taking the shaft out to do the knurling.
You certainly couldn't knurl the inside of the clutch.

Date: Sat, 16 Mar 2013 16:38:49 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] Zero adjust on R-390 receiver

OK I have it upside down on the floor and one side of the clutch goes in farther than the other side, something is binding it or or it appears that way. Hard to tell with the front plate on. If I put a very thin screwdriver in there that part of the clutch will open more but then the other side binds against the mating surface. I think I'm goping to have to take it apart to really see what's going on. The three little rods seem to be ok and not binding.

Date: Mon, 18 Mar 2013 19:34:14 -0500
From: "Thomas Frobase" <tfrobase@gmail.com>
Subject: Re: [R-390] Zero adjust on R-390 receiver

Just to draw this to a close, I talked to Howard on the phone today while we
walked through the calibration adjustment on a R-390 not "A" on a radio I have here. On the R-390 there is a spring loaded clutch which couples a set of gears that is driven off of the main tuning shaft to the left of the main tuning
shaft with the radio upside down. When the calibration knob is screwed in
it raises the clutch and allows the main tuning knob to turn about a quarter
of a turn, the second gear toward the rear of the radio is disengages thus not allowing the counter to move. It looks like the clutch on his radios is stuck with old grease. The clearance on the clutch is very small and hard to see. And that is all I know about that!

Date: Tue, 19 Mar 2013 09:16:16 -0400
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] Zero Adjust Clutch Repair

I don't know about Howard's but on mine the clutch will pull away from it's mating surface a little bit but not uniformly, in other words one side of the clutch pulls away more than the other. I've put a thin screwdriver between the clutch while it's partially open and the other surface and it won't open any more overall, the clutch will pull away more where I put the screwdriver in but the opposite side then closes correspondingly if that makes any sense. When the Zero adjust touches the three little rods it will only move them in a little bit then one side or other binds and it becomes very difficult to turn it in any more, it does open enough though that after a few back and forth turns of the Kc change knob it will work and I can zero it. I'll try the WD-40 again with the small screwdriver. I did squirt some WD-40 in there a while ago but there was no difference, I did not try opening them with the screwdriver though,

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Date: Tue, 19 Mar 2013 10:00:09 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Zero Adjust Clutch Repair

If I recall this correctly, each clutch disk (or every other disk?) has alternating sets of round and slightly elongated holes (I don't recall exactly but that's the gist of it). I assume the elongated holes are to eliminate any mismatch between the center of the hole and the center of those little pins.

It has been several years, but as I recall, those disks can be installed in various configurations and I assume there is a right way and a wrong way to assemble them. I seem to remember alternating the round holes and elongated holes as I stacked the discs. That may or may not have made any difference, but if the pins are sticking like you report, it could be the discs have been stacked improperly.

While it isn't a picnic, it really isn't all that difficult to tear the clutch down, clean it, and reassemble it; however, as it turned out for my first R390A, it didn't really help (it did on the second one, though). YMMV.

Date: Sat, 15 Jun 2013 02:02:51 -0700 (PDT)
From: Ray Murray <ai2s@yahoo.com>
Subject: [R-390] Need Detent Spring for R-390 (not -A)

I need a "Detent Spring for the MC portion of the gear train on my R-390 (not A). My Service Manual TM-11-5820-357-35 Shows on Page 85, The Index No. (part number) is "60" It attaches with two phillips head screws to the "RF Subchassis Rear Plate" bottom right hand corner near the MC knob shaft. The spring portion is broken off but the mounting tab remains. It is 1 1/4 inches wide and the mounting holes are 7/8 inch center to center. Can anyone help with this part or know someone who can?

Date: Sat, 15 Jun 2013 17:21:49 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] Need Detent Spring for R-390 (not -A)

The detent spring is the same item on both the R390 and the R390/A. Some one of the fellows will likely offer you one at a price you can not refuse.

Date: Sun, 7 Jul 2013 08:39:50 -0700 (PDT)
From: Kevin McGrath <kj_mcgrath@yahoo.com>
Subject: [R-390] R390 (non-A) broken tuning slug

With the audio problem 'solved' I'm on to the next issue. The 16-31 MC bands appeared to be dead. But after listening carefully, I could just barely hear the CAL signals. So, I hooked up my ICOM transceiver on the bench next to the R390 and set it to 1 watt output into a dummy load (I need to get real signal generator at some point). With no antenna on the R390, the signals from the ICOM were clearly heard on each of the 16-31 MC bands, so they were not completely dead. I also noticed that the antenna trimmer had no effect; and hooking up a short length of antenna wire

resulted in no increase in the received signal. It was as if the front end of the R390 was somehow 'disconnected' on those bands, but a strong signal could make through to following stages

Consulting the schematic and theory of operation, it appeared that the fault might be in the 1st RF amp? where the various tuning coils are switched in. I suspected a bandswitch issue in switching in T206 and Z206, the tuning coils for 16-31 MC. But then I noticed that the tuning slug for Z206 had broken off. That has to be it! (he says hopefully). With the broken slug, the 1st RF amp is completely detuned in the 16-31MC range. That brings up my question: how does one remove and re-install a slug rack in the RF section? Those springs look easy enough to disconnect, but tough to re-connect. And, I would appreciate tips on fishing out the broken slug.

Date: Sun, 7 Jul 2013 15:47:42 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R390 (non-A) broken tuning slug

The real trick is not to drop the springs through the hole into the RF deck so that you have to pull the deck to get the spring back.

Run the slug rack to the bottom of the travel.
Loop a small wire / good thread under the top of the spring.
Lift the spring off the slug rack.
Do not drop the spring into the RF deck.

Going back, hook the deck end first, and lift the spring up onto the slug rack. Once you have the springs off, the slug rack will just lift out.

Clean and lube your guide pins. The R390A has rollers in the newer production runs. Early R390A had fixed pins like the R390's The fixed pins look just like the rollers but do not have moving parts. Pins and rollers that have been neglected get flat spots.

Putting the slug rack back in can be a bit tricky.
You have to get all three slugs started into the coils at the same time.

Just try it once as a learning experience.
The next time you do it you will be a pro.

You may want to loosen up the two small bolts the hold the slug adjust nut to the slug rack. Run the slug rack all the way down and let the slug nut plate float to a best alignment position to center the slug location under the slug rack. Tighten up the two small bolts for the slug nut plate. Repeat for each slug. You would only do this after you repaired or changed a slug.

You need not get the spring center or exact after a repair. Do an alignment on the top end with the slug up out of the coil. Then run the rack down, and float the nut plate to a position of minimum friction. If there is some off set between the slug and the adjustment screw, just let the nut plate float free while you get the thing mostly aligned. Then you can tighten the nut plate bolts. You will not be spinning the slug several turns, so it will mostly hang with minimum friction. If you do need to make a 1/2 turn adjustment, you may want to re adjust the nut plate center.

You can do the spring release and re install with a good pair of needle nose pliers.

You can super glue the broken slug.

You can re solder a broken spring between the adjuster and the slug.

You can re glue a spring that has separated at the slug with epoxy.

A break in the slug will change its properties but it can be re adjusted to fair performance. If you need a replacement slug ask for one here and see if you get for an offer direct. You may get offers on your original mail. Some of the Fellows have parts for sale but in such limited quantities it just is not worth the time to make a list. Ask for what you need and see what you get offered. Roger

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> From: Don Heywood <wc4g@knology.net>
>To: Kevin McGrath <kj_mcgrath@yahoo.com>
>Sent: Sunday, July 7, 2013 1:03 PM
>Subject: Re: [R-390] R390 (non-A) broken tuning slug
>
>Hi Kevin, Roger gave you a pretty good explanation in how to remove and repair your broken slug. However, the old R-390 version that you have does not have the adjuster plates above each slug as he tried to explain, the "A" version has these. Your slugs simply are threaded thru the slug rack and adjusted with your Bristol style driver. Preset the repaired slug to the same height as the other two and you will be close.
>
>Good Luck with your repair. I worked for quite a while with a KWM-2 trying to to an alignment before I found a broken slug. It was easily repaired (keep it straight while gluing) and the radio tuned up fine.

Date: Sun, 7 Jul 2013 14:46:56 -0700 (PDT)
From: Kevin McGrath <kj_mcgrath@yahoo.com>
Subject: [R-390] R390 (non-A) broken tuning slug - FIxed!

Thanks again to all who responded. The slug has been repaired and the 16-31 MC bands are working again. I used dental pick to lift the springs offthe rack, and removed the rack. Happily the slug was not stuck and it fell right out unexpectedly as soon as the rig was a bit over vertical. The slug bounced off the workbench but I caught it in one hand before it hit the concrete floor, with the other hand balancing this 85lb boat anchor. Didn't drop either one. The slug had parted cleanly just below the spring. I used superglue to put it back together and burnished the edges lightly with a jewelers file to make sure it moved easily once back in the coil. There was a bit of trouble getting the springs back on -- and almost did drop one back down the hole. A piece of dental floss tied around the upper end of the spring saved the day. (I dread having to remove the RF unit and thus getting into the mechanical aspects of the gear train. But I suppose that will come in time).

At any rate, the R390 is all back together an the 16-31 MC bands are working again. This list is a phenomenal resource. I went back and read two years of the archives and most of the 'Pearls'. No way I could have tackled bringing my R390 and R390A back to life without the combined wisdom, hint and kinks of this group.

Date: Thu, 6 Jun 2013 09:52:08 -0700 (PDT)
From: Dave Sampson <challanger13041@yahoo.com>
Subject: [R-390] r-390 power supply

does anyone have a solid state modification that replaces the 6082's and eliminates or drastically reduces the heat from the r-390 regulator circuit?

Date: Thu, 6 Jun 2013 13:30:47 -0400
From: Robert Newberry <N1XBM@amsat.org>
Subject: Re: [R-390] r-390 power supply

There is a guy on this list that makes a nice mod. I have his card around here. I can dig it out tonight. He may contact you before I can get that info.

Date: Wed, 5 Jun 2013 13:35:22 -0400
From: "Bill - KK4XO" <kk4xo.bill@gmail.com>
Subject: Re: [R-390] r-390 power supply

HSN #52 (Spring 2001) has something on it.
See: http://tinyurl.com/lxhbcgj

Date: Thu, 6 Jun 2013 13:01:05 -0500
From: Cecil <chacuff@cableone.net>
Subject: Re: [R-390] r-390 power supply

I would love to see that as well as I am slowly restoring one for my shack.

Date: Thu, 6 Jun 2013 14:29:24 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: [R-390] Solid State module

That would be me, send some info this evening ... Tom, N3LLL

Date: Thu, 06 Jun 2013 16:09:23 -0400
From: Dave or Debbie Metz <dmetz@ntelos.net>
Subject: [R-390] R390 SS 6082 Replacement

Tom Frobase N3LLL chimed in saying he is the one that had the kits. I purchased one a few years ago, and all I can say is fantastic. Much less heat, no wiring mods, just a plug and play. So much less heat and right on the money as far as voltage. Very professional too.

Date: Thu, 6 Jun 2013 19:12:41 -0500
From: "Thomas Frobase" <tfrobase@gmail.com>
Subject: [R-390] r390 regulator

Here is a link to the current installation directions, the unit depicted is a R-389 but installation on a 390 or 391 is the same. I am currently having the heat sinks cut I should have additional units for sale in early July, please email me off net. http://www.kitparts.com/r390-reg/r390.pdf

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Date: Thu, 6 Jun 2013 22:27:28 -0400
From: Roy Morgan <k1lky@earthlink.net>
Subject: Re: [R-390] {Collins} R390/URR Restoration

Here is a scrap of info from a Hollow State News, issue no. 36. This is about the R-390A, though, so carefully compare component numbers etc.

"There is one anomaly that I discovered. R-554 coming off Z-503 is schematically 2.2K. In four IF decks, the installed value was 470 ohms (and looked original). I temporarily removed this resistor and used a substitution box to experiment. It seemed that the 470 sounded much better than the 2.2K or any other value for that matter.

[Metz, Issue #36, pg 5]"

Date: Thu, 6 Jun 2013 22:53:23 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] r-390 power supply

We need to look in the archives.
This has been done before and well.

Just solid stating the 6082's saves 32 watts of heat from the filament heaters alone.

You can move some of the heat back over to the power supply. Route B+ through any old 9 pin tube filaments in the 26Z5 sockets. This will move 16 watts back into the power supply where the 26Z5 use to be. Some other robust tubes would let you put even more heat off the audio deck and on the power supply deck.

Just run the B+ some volts higher out of the solid state regulators and spread that heat across the entire receiver.

You can use the unregulated B+ and build a reference voltage with a string of zener diodes and use a couple robust pass transistors for the regulation. As the 6082's are 8 pin octal you can make up some plug in modules to get the job done. An external fan goes a long way with or without other changes.

Date: Fri, 7 Jun 2013 10:19:11 -0700 (PDT)
From: Perry Sandeen <sandeenpa@yahoo.com>

If one traces the R-390 PS output from the 26Z5 tubes you will see that it goes to C101, a 10 uF capacitor which is mounted on the front panel and is wired as a capacitor input circuit. This aids in raising the B+ to about double of what is needed.

Replacing C101 with a C354 Dynaco Choke replacement from Triode Electronics for $17.00 and rewiring the circuit to a choke input will substantially reduce the B+ to a more moderate level.? There is also enough space to add a modern Nihicon or equivalent filter capacitor of 100 uF or more to the output side of the choke. It would also be prudent to put a 100 ohm 1/2 resistor in series to the choke input to limit input surge.

Date: Sun, 11 Aug 2013 09:58:46 -0400
From: frank hughes <fsh396ss@gmail.com>
Subject: [R-390] R390 troubleshooting - I'm stuck, 3/8A fuse pops

I bought an R-390 from a "yard sale" parking lot table at the Orlando Hamfest. It looked very complete and possibly not previously mangled excessively. The seller said it was "Only used on Sundays by a little old lady...." Anyway, when I got it home and was able to remove some of the decks for inspection, discovered the IF assy. had been tinkered with, and

was non-functional.

I put in another spare R390 IF assy., brought the unit up on w/ Variac, and detected the delicate odor of carbon comps smoking. Some of the resistors in the power supply were cracked. After prolonged inhalation of these fumes, I found myself longing to vote for Democrats..very strange. Subsequently replaced all of the 47 ohm cathode balancing resistors in the audio module (the B+ regulator section) and the power supply (rectifier cathodes), with wirewounds.

Replaced the copper oxide relay selenium rectifier CR801 with diodes. Ran all the tubes through a TV-10, replaced the defective ones.

The unit still pops the 3/8 A fuse.
B+ is going way over 180V.

Went to TM11-5820-357-35 and started the step-by-step troubleshooting procedure for 3/8A fuse opening.
- C607, C101 are not shorted.
- measured from the 3/8 fuse to ground, = 148k ohms through V605, V606.
- Chassis ground to B+ jack shows 19k ohms, function switch=OFF
- Chassis ground to B+ jack shows 9.4k ohms, function switch= AGC, MGC. CAL
- Chassis ground to B+ jack shows 8.5k ohms, function switch= SQUELCH

So all this checks out.

The next section has me perplexed. 46. Checking Filament and B+ Circuits for Shorts; d. Locating a Short Circuit. If the tests out-lined in "c" above indicate that there is a short circuit in the receiver, determine in which subchassis it is located as follows:has me perplexed. All the tests in "c" passed, so if there is no short circuit, why is the 3/8 fuse opening?

I am not too proficient at test & troubleshooting, but really love these radios, and want to learn how to do these things, so any advice for other things I should try would be appreciated!

I have another R390 (pristine), obtained from KW4DH, used for SSB. The audio quality is amazing. (diode load to a KRK ROKIT 5" Studio Monitor) My goal is to use this second R390 w/ the 32V-2 for AM nets, if it can be saved!

Date: Sun, 11 Aug 2013 12:11:56 -0500
From: Tisha Hayes <tisha.hayes@gmail.com>

Subject: [R-390] R390 troubleshooting - I'm stuck, 3/8A fuse pops

I would put money on it that there is a capacitor somewhere that is the problem. While it may not test as a dead short it is probably leaking like crazy when voltage is applied to B+.

You can pull modules (unplug) things like the PTO, IF deck, RF deck, and see if it helps you isolate the problem down to a component in the power supply or audio decks.

Just brainstorming this, but you can also temporarily put an inline resistor into the B+ circuit (maybe at the fuse holder) to current limit the B+ so you can do testing. Just remember that the resistor will need to be able to dissipate 3/8 of an amp at B+ voltages so the wattage may be up there (or a string of resistors in series). I would not do that for long.

I assume you do not have a capacitor tester so you may need to selectively lift one leg free from each capacitor to see if it is the "problem child".
It will be a tough road to go (and frustrating) to "easter egg" and replace components in any other way.

You can also pull all the tubes out of their sockets, I do not think that is the problem (tubes) but it eliminates another bunch of components that can be involved. Then you are down to just looking through resistors and capacitors or some sort of short caused by a tinkerer.

If the PS and AF deck do not drive the current out of bounds then you can start to plug modules back in.

Date: Sun, 11 Aug 2013 13:55:16 -0400
From: frank hughes <fsh396ss@gmail.com>
Subject: Re: [R-390] R-390 Digest, Vol 112, Issue 14

Thanks for all the tips and advice, I feel much more confident in getting R390 #2 working now! I have a solid state kit from Tom, N3LLL to replace the 6082's and cool things down, but am waiting until the bugs are out of this R390 before doing the mod.

Thanks for clearing up which modules I can unplug for testing, and which should stay in place to retain B+ regulation. I read Dave Medley's tips about it, but the TM describes removing modules until the short is isolated, so I was confused about what to do.

I thought about using the good R390 to swap modules into for fault isolation, but I don't know enough about these radios to be sure that putting a bad module in a good radio might damage something in the good

R390. Discretion being the better part of valor, I would rather learn how to isolate the trouble in situ.

3/8A fuse wiring - WOW, I would have never have caught that change, now I know what to look for. I have a pile'o R390 power transformer assys. that I have been swapping in and out, not knowing that they might be a mismatch for the way this R390 chassis is wired.

I'm looking forward to going back to the office Monday so I can try all these tips and techniques! I have the "project" R390 and the HP 410C from Ashley, W7DUZ, plus various other ancient HP test equipment set up in a discrete corner, disguised to look like part of the rest of the CISCO network gear. Lunchtime and the occasional break lets me fool w/ the R390. The young people in the office think it is a CISCO router. "What are those little glass things?" "Air filters"

Date: Sun, 11 Aug 2013 14:42:27 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: [R-390] R390 troubleshooting - I'm stuck, 3/8A fuse pops

I vote for a cap that leaks at B+.

Likely a tube may have developed an internal short.
Back when the receivers were young it was almost always a tube.
Now its equal chance for a leaky cap.

R390's are bit more troublesome to trouble shoot by just unplugging tubes and modules. The filaments come in 24 volt strings. and some of the strings cross between modules.

But unplug all the tubes and run them through a tester for shorts if you can.

Plug in the 26Z5 if not solid state, the 6082's and V607 DC amp and the voltage regulator tubes. Then you have to plug in the other tubes in the V607 filament string V604, V603, andV509.

Then you can turn on the receiver and see if the B+ fuse holds. If not go looking for a leaky cap.

Then you can plug the tubes in one filament string set at a time.
Until you find the string that blows the fuse.

You hope to find a shorted tube with the tube tester and resolve this problem easily.

Eye balling caps in the modules may work. But this is an R390 not an R390/A so you do not expect to be looking at black / brown beauties known to fail.

There are two nice large oil caps in the R390 that may need checking.

My R390 schematic does not show the B+ fuse so I do not know if it comes before or after the caps. My schematic show a couple resistors across the filaments of V507 and V510 to imply that 1/2 the 12AU7's are running at less than full power. This could be true.

There can be frayed wires in harness and plugs. You may have to open some of the harness back shells to look for a broken wire.

Down load Tm 11-5820-357-35 from the R390.net site and read through the resistance checks for the wire harness if tube testing does not solve the problem before just opening up wire harness back shells.

Date: Thu, 15 Aug 2013 13:11:14 -0400
From: frank hughes <fsh396ss@gmail.com>
Subject: [R-390] R-390 b+ is fixed!

Thanks to the great advice and support of the folks here, the hamfest mystery R-390 is now producing a stable 180VDC B+!! - checked R625 and R626, R626 was supposed to be 2.7K measured 4.5k! (replaced) - found one shorted 26Z5W, even though I tested in a TV-10, either I missed the short test or ??? (replaced) Bringing in the AN/USM-323 tomorrow to see if the R390 can read any signals!

Date: Sun, 20 Oct 2013 12:02:47 -0400
From: frank hughes <fsh396ss@gmail.com>
Subject: [R-390] R-390 progress!!

This is a progress report, bringing a "basket case" R-390 back from the dead. Found this one at the Orlando Hamfest in February 2013. Unit looked complete, even had the covers. I was looking for a replacement for the R-390A I use for AM nets, I just like the sound of the R-390 better. Also, the filters in my "A" are starting to go off, not looking forward to the mechanical filter challenges.

I was tempted to replace the R-390A IF deck with an R-390 IF deck, having just read an excellent article in an old ER on how to do it. However, it looked like less work and more fun to find an R-390 and try to get it going. The Hamfest R390 did not work,(B+ was over 300vdc) and the IF deck had a foot long piece of mystery coax soldered to pins under the deck. With the super help and advice of folks here, the B+ regulation

was restored to 180vdc.

R626 had drifted WAY up, replaced it to restore regulation.
3/8A fuse kept blowing, turned out that there was a shorted 26Z5W.

Some resistors in the power supply were smoking, in spite of the "no smoking" sign clearly posted on the wall for all to see!

Replaced the resistors R801-R804 with the suggested wirewounds.

Replaced the power supply CR801 w/ a modern full-wave bridge rectifier.

Replaced 3TF7, V801, V802 26Z5W's w/ Kurt's excellent solid state units.
Replaced V605,606 6082's and V608,609 with Tom's wonderful solid state kit.

Although it is now a little disappointing that I can no longer use the 6082's as a source for heat-shrinking Teflon tubing, I will learn to live with it.

Super-glued the broken slug I found in the RF deck. It was broken off at the top, where the spring is inserted, so I will have to wait until I get to the RF alignment to see if it works.

Went to my pile'o hoarded R-390 IF decks and picked a clean looking one to install.

Some weak tubes prevented -7vdc appearing @ Diode Load, but fresh tubes in V501-V506 brought the signal level up to where it should be for starting alignment.

Friday I downloaded the 1955 TM 11-856 from
http://www.jamminpower.com/main/r390.html,
started working on "111 Alignment of 455-kc If Stages".

Injected 455kc into test point E210.

Was amazed to see how much signals came up by peaking T506-T501 and T207!

Stopped at "j" in section 111.
Adjusting the phasing capacitor in crystal filter Z501 is very weird, ie;
"Continue tuning the generator in this direction until the voltage output required to obtain the original reading on the vtvm is 1,000 times the voltage required at peak frequency"

I am going to read more before I try it.

Anyway, I am very encouraged and believe it there will soon be another R-390 in use on the AM nets!

Thanks very much for all the help to get it this far!!! 73 Frank KJ4OLL

Date: Sun, 20 Oct 2013 23:19:36 -0400 (EDT)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R-390 progress!!

Awesome,

You need to go back and visit the resistors in the power supply.
You think they are resistors when in fact they are slow-blow fuses.

If you over size them with some wire wound power rating, then the next time a 6082 or 26Z5 goes bad you get crisp wire harness instead of charred resistors. Over-size sounds good. But rather than test those tubes every six months just to check, I would let the 26Z5 and 6082 go to the end of their useful life, fry a resistor and do the repair and install a set of new tubes.(26Z5 and 6082).

But I would solid-state the 26Z5's and get good wire-wound resistors in the power supply deck. Even do some math, and consider some value larger than the original 47 ohms to drop the B+ back so the 6082 do not have to regulate out as heat in the audio deck.

I never liked the procedure to do the 0.1 and 1 KHz adjustments on the front end of the IF deck.

If you have a good counter just run 455 into E210 and peak both of those IF bandwidths as best you can. You still want to run 455 at 150 μV into the IF deck and get good clean 27:1 wiggly 30:1 modulation to CW ratio at 1/2 watt on the line audio output into a 600 ohm (2 ea 1200 ohms 1/2 resistor) load. Until you get a clean good IF and audio there is no need to even consider the RF section.

The glue on the slug spring to slug will work OK. We have been doing that for years.

As part of the RF clean up and adjustment, loosen the slug nut plate on the slug rack bar and let each of the slugs float to center with the slugs all the way in the cans. This will help keep slug and spring together.

If you need a 1/2 turn or so adjustment on any slug, you may want to redo

the adjustment of the nut plate alignment for that slug.

Keep enjoying and thank you for the feed back updates on the project.

Date: Sun, 20 Oct 2013 23:09:48 -0500
From: "Bill Hawkins" <bill@iaxs.net>
Subject: Re: [R-390] R-390 progress!!

Somewhere in the dim past, I ran across a procedure for aligning an IF ending in a crystal filter that didn't use a counter. Crystals age and drift in frequency, so you switch to the tightest filter position and tune the signal generator for peak output from the filter. The frequency won't be far from 455, but it could be 100 Hz away, which would mean low output from a strip aligned by a counter. Use the frequency that peaks the crystal to align the IF strip. Worked for me. Anybody else done that?

Date: Sat, 10 Oct 2015 13:52:07 -0400
From: Tom B <tbryan@nova.org>
Subject: [R-390] R-390 (not A) transformer

I am working on an R-390 (not A). Could someone tell me the DC resistance of the transformer primaries? The radio blows the AC fuse and I am worried that it might be the transformer. With the transformer disconnected, I read 1.7 Ohms between terminals 1 and 2, and 1.2 Ohms between 3, and 4.

Date: Sun, 11 Oct 2015 09:44:27 -0400
From: Tom B <tbryan@nova.org>
Subject: [R-390] R-390 (not A) MWO

I am looking for a copy of the original MWO 11-5820-294-35/1 for the the R-390 (not A). This makes some changes to the power supply.
I would like to know why they did this modification.

Date: Sun, 11 Oct 2015 12:54:51 -0400
From: Frank Hughes <fsh396ss@gmail.com>
Subject: [R-390] R-390 power issues tips

Glad you are trying to get another R-390 working! The folks on the list helped me get a Hamfest basket case working, mine had many problems, but the first one to solve was that the 3/8A fuse would not remain intact. Here are some notes I cut and pasted:

"The Hamfest R390 did not work,(B+ was over 300vdc).
R626 had drifted WAY up, replaced it to restore regulation.
3/8A fuse kept blowing, turned out that there was a shorted 26Z5W.

Some resistors in the power supply were smoking.
Replaced the resistors R801-R804 with the suggested wirewounds.
Replaced the power supply CR801 w/ a modern full-wave bridge rectifier."

Note I later learned that replacing the resistors in the PS with wirewounds was not a good idea, as these are sacrificial, and are supposed to open before the transformer windings, so as to protect them. By installing wirewound 4W units, I just made the transformer windings the fuse. The list does not support photos, but here are the links to some other info that the folks here sent me to help:

http://i180.photobucket.com/albums/x257/fish1_07/R-390/R390%203-8%20fuse_zpshh0h7vux.jpg
http://i180.photobucket.com/albums/x257/fish1_07/R-390/R390RegulatorCircuitry_zpsa4wkxeud.jpg
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Date: Sun, 11 Oct 2015 20:13:43 -0700
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: Re: [R-390] R-390 (not A) transformer

"I am working on an R-390 (not A). Could someone tell me the DC resistance of the transformer primaries? The radio blows the AC fuse and I am worried that it might be the transformer. With the transformer disconnected, I read 1.7 Ohms between terminals 1 and 2, and 1.2 Ohms between 3, and 4."

A good test for this type of problem is to connect a large, say, 100 w, 120v incandescent light bulb (if you can find one nowadays) across the fuse holder, fuse removed. When thusly connected and then powered, a bright bulb indicates a short circuit and limits the current to a safe level. Once the bulb is connected, try removing loads from the secondaries of the transformer. First and easiest would be to yank the 26Z5W rectifiers. IIRC, the transformer in the non-A is non-unpluggable (as per the -A) and so to remove further loads you may need to unsolder leads. After each load removal, retest with the light bulb. When it goes dim, you've found the secondary load at fault.

If bulb is still bright with all secondary loads removed, try disconnecting the primary supply leads and then connecting AC line to transformer primary winding (either one of the dual primaries would suffice) via a line cord and the bulb in series. If dim, transformer is not shorted, but you've a short in the AC wiring in the radio. If still bright, prepare a requiem for a dead transformer.

I've heard of the feedthroughs for the transformer terminals on the -A breaking down and becoming conductive to the transformer's case; I don't

know if the non-A's transformer is susceptible to this malady. In any event, if you've a shorted transformer, you've nothing to lose by exploratory surgery on the terminals. Hey, maybe you'd even perform and document a DIY rewinding job and post a tutorial for us on Al's R-390 site, as others have done for the audio output transformer and mechanical filters.

Date: Thu, 15 Oct 2015 10:16:09 -0400
From: Rodger Adams <rodger_adams@yahoo.com>
Subject: [R-390] Looking for R-390 Parts

I have an R-390 (non A) that is in good, working condition. I have collected a few spare parts and subassemblies, but have never come across an RF deck. I'd like to add an RF deck to my collection of spares. If anyone has an RF deck (any condition) they would be willing to part with, I am very interested in buying.

Date: Thu, 15 Oct 2015 13:18:37 -0400
From: hackmohr@myfairpoint.net
Subject: Re: [R-390] R-390 (not A) transformer

With an assumed good Non-A power supply out of the radio at my bench I get 0.7 ohms across each of the two primary windings measured directly at the base of the transformer. So far I've only had it powered up with the audio and if chassis in place. The regulated +180VDC was good so I'm assuming the primaries are OK.

By the way if you happen to have a spare RF slug rack and the Z219transformer assembly with mounting hardware I'm looking for them to get going again on my Non-A. Good luck with yours and keep posting as you work your way through it.

Date: Sat, 17 Oct 2015 09:39:31 -0400
From: Steve Hobensack <stevehobensack@hotmail.com>
Subject: Re: [R-390] R-390 Transformer

I have repaired the R390 transformer feed-through ceramic tubes. It is a fairly easy repair. The voltage breakdown happens in the tar potting near the hi-tension ceramic tubes. To repair, de-solder the bottom plate. Instead of de-soldering, I tapped a hawks bill knife along the solder seam of the plate. Apply a heat gun and remove just a small amount of tar near the plate winding tubes. replace the tubes with plastic tubing and replace the potting. You can use bees wax instead of tar.

Date: Thu, 10 Dec 2015 11:15:55 -0500 (EST)
From: Barry <n4buq@knology.net>

Subject: Re: [R-390] Test

One of these days, I'm going to drag out my R390 and overhaul it. I'd guess there'll be a flood of questions from me at that point. I've done a couple of R390As, but this is my first R390. I'm half-way assuming it will be easier to work on but don't know that for sure.

Date: Thu, 10 Dec 2015 12:58:51 -0500
From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] Test

> One of these days, I'm going to drag out my R390 and overhaul it. I'd guess there'll be a flood of questions from me at that point. I've done a couple of R390As, but this is my first R390. I'm half-way assuming it will be easier to work on but don't know that for sure.

Barry, (How many Barry?s are there?),

The non-A has its challenges, but some feel it is easier to overhaul. For instance, many of the capacitors are going to be still just FINE after all these years. Also there is the fabled Green Gear. And the voltage regulator system.

My suggestion is that you put a fan on the outside of the frame to blow air past the 6082 series regulator tubes (you do have some spare 6082?s right?). I have a picture of the one I cobbled up that shows how it is made and how it fastened to the existing bottom plate and frame screws. It makes a HUGE improvement in the temperature of the regulator section. Glad to send that picture to anyone interested.

> (Longing for the days of heady discussions regarding 3TF7s, kielbasa, ...meters, and just about anything else R390 related?)

For anyone living within driving distance of the Connecticut River Valley in Western Mass, I can recommend a source for superb authentic Polish Kielbasa.

For anyone who might work on a glow in the dark meters, or military grade regulator tubes, I offer this: Morgans Rule for Radioactive Meters and Voltage Regulator Tubes:DON'T BREAK THEM OPEN AND EAT THE INSIDES.

Date: Sun, 13 Dec 2015 03:59:41 +0000 (UTC)
From: "Drew P." <drewrailleur807@yahoo.com>
Subject: [R-390] Test

Roy Morgan done wrote: (snipped) "The ‘non-A’ has its challenges, but some feel it is easier to overhaul. For instance, many of the capacitors are going to be still just FINE after all these years. Also there is the fabled Green Gear. And the voltage regulator system.”

My suggestion is that you put a fan on the outside of the frame to blow air past the 6082 series regulator tubes (you do have some spare 6082?s right?). I have a picture of the one I cobbled up that shows how it is made and how it fastened to the existing bottom plate and frame screws. It makes a HUGE improvement in the temperature of the regulator section. Glad to send that picture to anyone interested."

Those 6082's do get VERY hot. one of our list members was working on a non-A resting on a newspaper-covered work surface, and reported that the 6082's set the newspaper on fire.

A worthwhile modification detailed on this list is construction of a simple soiled-state voltage regulator to replace the 6082's and associated circuitry. The 6082's, being relatively big power triodes, could then be auctioned off to the highest-bidding audiophool. The modification easily could be made plug and play to avoid disfiguring the radio. Further, the soiled-state regulator could be located external to the radio and connected via an umbilical, thus moving heat outside the box.

Date: Mon, 14 Dec 2015 11:51:26 +1100
From: "bernie nicholson" <vk2abn@bigpond.net.au>
Subject: [R-390] Fw: Re replacement of 6082 s

Re the 390 replacements of the 6082’s with 6080’s .....Hi Drew , If one was worried about Fil dissipation in the 6080’s A couple of extra power diodes would drop the voltage another 1.2 volts, with minimal consequences and at less than 10 cents each .....a cheap way out , But I soak tested the R390 for 24 hours and I couldn't detect any temperature rise in the transformer and the 6080’s weren't showing any signs of distress , I did measure 7 Volts of half- wave rectified DC across each tube , The 6080’s in OZ can be acquired for less than 3$, So a workable Solution at minimal expense and trouble!
cheers Bernie N web page www.radiomillen.net/vk2abn

Date: Tue, 22 Dec 2015 00:51:54 +0000 (UTC)
From: <g4gjl@btopenworld.com>
Subject: [R-390] Help with R-391 needed

This is an HT fault and though its on my R-391, I think the R-390 knowledge would be equally helpful in diagnosing, as I believe the R-391 electrical differences from the R-390 lie purely in the low voltage circuits..

I'm after some assistance in diagnosing the following fault, before I rip the R-391 wiring loom to pieces :o(The initial fault was 'no receive'. After some early diagnosis I noticed that all four 47-ohm ballasts in the rectifier deck had burned out. These I replaced with wirewound 4-watt units. On re-test the RX does not build up HT, and I can sense a heavy load on the power transformer as the rectifiers and regulator tubes warm up. After extensive probing with the AVO ohmmeter, I found the following:

I have isolated a +180vdc fault to the mainframe.
The following internal plugs are DISCONNECTED:RF deck, PTO/XTAL sub-chassis, calibratorI/F strip, audio deck (J319). PSU/transformer (actually irrelevant). Furthermore, I have unsoldered the HT smoothing cap, C103 positive connection, to eliminate this capacitor from the test..

Measuring with the ohm-meter from the audio deck test point to ground I get a 10.5 ohm resistance. (only when J620 is in place) The 10.5 ohm reading disappears if the audio deck plug, J620 is pulled. I can measure the 10.5 ohm resistance on the loom side P120-3 ? There are no other low resistance measurements on either the loom side P120-6, P120-7, J620-6 or J620-7: these are all high. So it looks like there is both a short and a break somewhere in the HT wiring of the mainframe loom. I have two questions, therefore:Q1. Are there any other capacitors on the HT+ rail, hidden away on the mainframe, which are not shown in the manual? (I am using TM11-863)?Q2. Are there any well known pinch points in the mainframe loom that I should focus on initially Note that C101 is irrelevant here as it is upstream on the regulator tubes.

Date: Sat, 26 Dec 2015 12:46:53 -0600
From: Tisha Hayes <tisha.hayes@gmail.com>
Subject: [R-390] Help with R-391 needed

It sounds like a shorted capacitor somewhere in the receiver.

I would pull all of the tubes (except for the rectifiers) and isolate the decks (if you can) and go through the exercise of lifting one leg off of every capacitor on that power string.

If you wanted to be nice to your transformer and power supply chokes you could use an external bench supply to liven up just that circuit, put a series resistor on your power supply to current-limit whatever is shorted as you go through this process (no reason to do the smoke test). If there are convenient places to break the circuit in to segments it will help isolate the fault.

Divide and conquer.

Date: Thu, 26 May 2016 14:02:00 -0400
From: Jason White <jjw3579@yahoo.com>

I recently got my hands on a Motorola manufacture R-390 “non A”. I’d wanted a 390A for a long time but I kind of fell in to this 390 and I figured the LC filters vs mechanical filters wouldn’t be a big deal to me. I’m finding out, though, it’s a lot harder to find “non A” specific information.

I’m not sure where this radio has been for the past 60 years, but it seems as though no one has ever messed with it. All the modules are Motorola except the power supply, and I don’t see any weird mods or out of place items. As far as I can tell it’s pretty much the way it was when it left Motorola. Where I can find serial numbers they all seem to match.

I brought it up on a variac and it appears to be working OK, just out of alignment a bit. I can tune around and hear signals where I expect to find them, pretty much, with the dial being off by about 20-40Khz one way or the other. I think the PTO may not be all that linear anymore. The tuning is not “heavy” and everything in the gear train seems to be moving as it should. All the slug racks follow the cams and none seem to have dropped off. It’s not as sensitive as I know it should be but I’m assuming that’s just age and should sort itself out when I start freshening it up.

I bought this radio to be a “user” instead of a museum piece, so I’m pleased to find it’s in mostly usable condition, but I know that before I start putting hours on it I should start replacing some of the old caps and out of spec parts.

I can find lots of information on doing that for the R-390A but it seems I may be more on my own with the R-390 Anyone know if a list of the bits to replace exists anywhere, or of any gotchas or "DO IMMEDIATELYs" I should know about? I know with the R-390A there are caps that should be replaced to keep from blowing out filters when they fail, I don’t know if there are similar components to worry about on the “non A”. I?ve also been told that the caps used in the “non A” aren’t as likely to need replacement- I’m not sure what to think there.

Basically, I’m interested in hearing what you folks who know this radio better than I would address immediately. My plan is to address those items first before digging in to trying to align it (I need to get my hands on a VTVM still anyway, I’ve always borrowed one)

Thanks for lending me your ears/eyes

Date: Thu, 26 May 2016 15:20:53 -0400

From: Jason White <jjw3579@yahoo.com>
Subject: Re: [R-390] R-390 "non A" cap replacement list/order?

They indeed made mine at least. I took a quick photo of the nameplate and part of the RF deck labeled Motorola.

https://imgur.com/a/tC07J <https://imgur.com/a/tC07J>

Date: Thu, 26 May 2016 19:25:53 -0400
From: Howard Weeks <weeksh@att.net>
Subject: Re: [R-390] R-390 "non A" cap replacement list/order?

I have at least three of the R-390 receivers - one I have had for 50 years. The only problem that I have had with any of them has been bad power supply filter caps. And an occasional tube! Did loose a line filter one time.

I have always considered them to be better receivers than the R-390A and I also have a couple of them. The mechanical filters is those receivers have become a detriment in my opinion.

Date: Fri, 27 May 2016 08:28:17 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R-390 "non A" cap replacement list/order?

Lucky you, there was only about 17,000 R390's made, which is way less than the 64000+ (some sources stating 140,000) R390A. I have one and compared to the R390A's, the capacitors within are of higher quality. All those in mine are still good (all Sprague Vitamin Q sealed in metal containers) after all this time.

I only have to change some resistors that drifted out of tolerance (especially in the power supply chassis). I recommend also that you begin searching for the 6082 regulator tubes if you don't have spares already. All the other tubes types (except the 3TF7) can be found easily. There is a lot of info available about the R-390 on the R-390 web site: just dig for it. And yes, Motorola made a lot of R-390's for Collins, including ones from the first order number in 1951.

Date: Fri, 27 May 2016 09:14:38 -0400
From: "Lester Veenstra" <m0ycm@veenstras.com>
Subject: Re: [R-390] R-390 "non A" cap replacement list/order?

There is a good solid state replacement for the 6082 out there somewhere. From Canada as I recall.

Date: Sun, 29 May 2016 23:25:52 -0400

From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] R-390 "non A" cap replacement list/order?

> There is a good solid state replacement for the 6082 out there
>somewhere. From Canada as I recall.

My very strong recommendation is to put a fan against the chassis to cool the 6082 tubes (and replace the cathode balancing resistors at their sockets). I'll send to Jacques and any others interested the picture of my lashed up fan plate that holds a fan in the right place.

Date: Mon, 30 May 2016 09:12:35 -0400
From: "Lester Veenstra" <m0ycm@veenstras.com>
Subject: Re: [R-390] R-390 "non A" cap replacement list/order?

Still not as good as removing regulator tubes and feeding in place from an external regulated supply

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Date: Mon, 30 May 2016 09:41:34 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] R-390 "non A" cap replacement list/order?

Since December the list accepts small images (up to ~210kB total message size). I think a photo of your setup would interest enough list members that you should post it, if you can reduce it to about 150kB before attaching it.

Date: Mon, 30 May 2016 17:23:05 +0000 (UTC)
From: Norman Ryan <nnryann@yahoo.com>
Subject: Re: [R-390] R-390 "non A" cap replacement list/order?

This is a good mod for the mod-averse. Good in that it doesn't alter the receiver -- arguably not a mod at all in that you just hang the fan off the side as Roy suggests.

The 47 ohm carbon comp cathode balancing resistors tend to increase in resistance over time due to extreme heat from the 6082s. I replaced my 47 ohm resistors with ten watt wire wound ceramics that hold their resistance better, but someone pointed out that it puts the power transformer at risk if a short circuit somewhere causes it to burn up. It seems that the two-watt resistors act as fuses in this instance.

If I had to do this over, I would use matched NOS carbon comp two-watt 47 ohm resistors and the fan. Even with the stronger (higher wattage) resistors, the heat is still too high not to consider Roy's fan option.

Some 220 volt fans will run sufficiently fast enough on 125 volts, thus enabling silent operation. I suggest orienting the fan so that it pulls the warm air out of the receiver.

Date: Mon, 30 May 2016 14:55:17 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] R-390 "non A" cap replacement list/order?

I would suggest using 2 watt metal oxide film resistors (NOT metal film) instead. They are generally of flameproof design, hold tolerance better when exposed to heat, and will also open up more quickly in a fault situation to better protect the 6082s, power transformer, and 26Z5s.

I would also use the same 2 watt metal oxide film resistors for R801--R804 (the cathode balancing resistors on the 26Z5 rectifiers).

Date: Mon, 30 May 2016 14:56:21 -0400
From: Frank Hughes <fsh396ss@gmail.com>
Subject: [R-390] R-390 6082 solid state

I replaced the 6082's on both R-390's with Tom's (N3LLL) solid state kit, great! http://www.kitparts.com/r390-reg/r390.pdf
(Not sure if Tom still makes these)

Date: Mon, 30 May 2016 19:32:45 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] R-390 6082 solid state

I still provide the modules, the provided ready to install including a jumper and silicon grease. It will work on 389, 390 & 391. Delivery time is about three weeks. It is easily reversible if need be. The kit is sold for $95 post paid conus. International is first class international mail and will cost a bit extra. Frank's link is to the installation proceedures

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Date: Tue, 31 May 2016 00:52:08 -0300
From: Samuel Rocha <battcharger@gmail.com>
Subject: [R-390] Collins foggy meter

I had just bought a 30L1 and kwm-2 Collins which need repairs and I had noticed that both meters become foggy as the equipment warms.
Is it recommended to open the meter and clean it inside?

Date: Mon, 30 May 2016 23:49:03 -0400
From: Roy Morgan <k1lky68@gmail.com>
Subject: [R-390] Fan Plate for R-390/URR (and R-391 and r-389)

Ok here goes - I expect that this image will get out over the list since it is well under the size limit. I also send the notes file that explains about the thing.

Date: Tue, 31 May 2016 14:30:09 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Fan Plate for R-390/URR (and R-391 and r-389)

Very cute, Roy. Thanks for sharing!

I wonder if those chassis holes happen to be close to a common mini-muffin fan size? If so, the efficiency might be improved by using three smaller fans with clear apertures (no blockage). You could also run one blowing in and two blowing out (or vice-versa) to avoid blowing air heated by the 6082s through the rest of the radio, or cooling the 6082s with warm air drawn past the rest of the circuitry.

(Not that I think it needs any improvement -- it looks like there should be plenty of air to keep things cool.)

Date: Fri, 3 Jun 2016 00:24:42 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: [R-390] R390 service manual TM 11-856 -- page 97

My PDF copy of this manual (which I believe I downloaded from Andy Moorer's site, www.jamminpower.com) has only a partial scan of page 97. It seems many of the other scans I find on the web are from the same original source, and also have a defective page 97.

Does anyone have a complete scan of TM 11-856, page 97, that they can post somewhere on the web (or email to me)?

It's not like page 97 is essential to fixing or adjusting an R390 -- I'd just like to have a complete manual for posterity.

Date: Fri, 3 Jun 2016 17:03:37 +0000
From: David Wise <David_Wise@Phoenix.com>
Subject: Re: [R-390] R390 service manual TM 11-856 -- page 97

You mean that gray horizontal band across the picture? I have that too. (I don't know where I got the scan. Windows says it's 184,092kB.The cover page has a handwritten annotation in blue ink in the lower left corner which looks like "V205 401".)

The exact same picture, without the glitch, is Figure 31 (page 54) in TM 11-5820-357-35. Perhaps you can paste it in place of the bad one. I have a

high-resolution scan (114,045kB) which you're welcome to if you can't find it out there.

Date: Fri, 3 Jun 2016 13:20:04 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] R390 service manual TM 11-856 -- page 97

Thank you to all who responded offlist to my request -- I have what I need. What a great list! Interestingly, I've downloaded the file from Andy's site several times (with several different browsers) and each copy has a scrambled/incomplete page 97. However, several people sent me p.97 from
their copies, which were also downloaded from jamminpower.com, and they
are fine. Go figure.

A couple of members asked if I needed the page from the 1955 or the 1953 version of TM 11-856. The only copies I've found on the web are the 1955 version -- I'm not familiar with the older version. If someone has the 1953 version already in PDF form, it might be worth posting it on the web just for completeness (but with the 1956 version readily available, it probably isn't worth spending the time to scan the older version).

Date: Fri, 3 Jun 2016 17:53:33 +0000
From: David Wise <David_Wise@Phoenix.com>
Subject: Re: [R-390] R390 service manual TM 11-856 -- page 97

I think Andy reworked it. Today's good "180MB" TM11-856.pdf is actually 152,388,484 bytes. It came from the same raw scan as the faulty TM11-856.pdf I downloaded in 2005 (188,509,751 bytes), but it's gone through different processing, with a newer Adobe PDF version, and was created by a different application. It is searchable, and portions of images are edge-sharpened and moved slightly, but blemishes are pixel-perfect identical. Anyone who needs a good page 97, just download it again now from www.jamminpower.com .

Date: Fri, 23 Sep 2016 12:05:15 -0400
From: "Don Heywood" <wc4g@knology.net>
Subject: [R-390] R-390/URR RF deck tuning slug colors

Guys, I have a really nice R-391/URR which shows the colors as dots on the
top of the slugs. I have copied the RF deck cover which has on the underside
a chart showing the tuning cans and their component designations, also the

frequencies to be injected and which adjustment is tuned be it the slug (low freq) or the trimmer cap (high freq) to aid in alignment. Anyway, I have edited this picture showing the color dots on the slugs in this cherry receiver. I have checked these colors against another Collins made R-390. For the most part they are the same except for the size of the slug in the 16-32 range of transformers. The R-391 has smaller diameter slugs than the
second R-390. Also the first row across the front (antenna transformers) have two colors in the R-391 and only one color in the R-390. All this aside, these colors should be a guide to replacing slugs. Also it shows these slugs are in fact different and should remind you to keep the slug racks intact when disassembling the RF deck.
This .jpg is too large to attach so if you want me to send you a copy, respond off line to wc4g@knology.net and I will send you a copy.
Note: this data is NOT for the "A" model.

Date: Sun, 15 Jan 2017 14:38:05 -0500 (EST)
From: GENE BALINSKI <g.balinski@comcast.net>
Subject: [R-390] R-390 plug-in caps and underside Photo(s) needed

My R-390 (not A) has developed a minor case of the hums. So I thought that I would start by replacing the 2 plug-in caps in the audio section. I am not overly familiar with the 390, and have been unable to locate the plug-in caps. Could someone please tell me where I could find them ?

Also, there may have been some mods by the previous owner(s). Could someone please point me to a web side with some good top and bottom photos of the 390 (non-A) ? If not, does anyone have some photos that they could send

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Date: Sun, 15 Jan 2017 15:02:18 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R-390 plug-in caps and underside Photo(s) needed

There is no plug-in filtering caps in a R-390.
There is only two 10uF capacitors there: one before the HV regulator, another one after. It will be surprising that any of the two failed, but who knows
However, the regulated 180V supply have a hum adjustment... Maybe it's time to check the power supply (and the 26Z5s, of course).

Date: Sun, 15 Jan 2017 16:08:45 -0500
From: Bob Camp <kb8tq@n1k.org>
Subject: Re: [R-390] R-390 plug-in caps and underside Photo(s) needed

Several ways to fix the electrolytics (they do fail).

1) Wire parts under the chassis and leave the originals there to look pretty
2) Pull the guts out of the originals and stuff them with replacement parts
3) Get an octal (?) plug and wire up the replacements on that. Plug them in and done I'm sure there are at least 20 other ways to do it.

Date: Sun, 15 Jan 2017 22:23:09 +0000
From: <joldenburg2@new.rr.com>
Subject: Re: [R-390] R-390 plug-in caps and underside Photo(s) needed

Back in the early 1990's the list was fortunate enough to have Dr. David Medley as a regular contributor to the list. He was a Collins Radio employee during the development of the R-390- series of radios. He maintained a website on the R-390/URR and it is still available at: http://www.r-390.com/
I was (and still am) an enthusiast of the R-390/URR and had many e-mail exchanges with Dr Medley. He even sold me one which he had restored himself. It is a prized part of my collection here.

Date: Mon, 16 Jan 2017 00:53:57 +0000
From: Raymond Cote <bluegrassdakine@hotmail.com>
Subject: Re: [R-390] R-390 plug-in caps and underside Photo(s) needed
Message-ID:

Yes i agree with Bob Camp. Re stuff the original cans as they are stamped with the correct values and look original, because they are!!!

Date: Tue, 30 May 2017 10:21:23 -0400
From: hackmohr@myfairpoint.net
Subject: [R-390] R-390 6082 Question

A question if you please. Is it likely (or even possible) for a tested good 6082 to still fail in the R-390 voltage regulator circuit? While working on RF and IF alignments the voltage has suddenly gone high to 280V. I've checked all 14 resistors in the VR circuit and they are all good. I've swapped out both 5651 reference tubes and the 6BH6 amplifier tube with no difference. I even moved all the tubes to a spare audio unit and it shows the same high voltage. The only thing I haven't replaced is the 6082's which both test good in the Hickok tester. I've ordered new ones but I feel like I'm missing something. Any other possibiliites?

Date: Tue, 30 May 2017 11:12:10 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R-390 6082 Question

Mark, have you changed the capacitors ?
At 280V out, R625 and R626 should look toasted by now..
Hard to tell what's going on there If no other measurements than the output can be taken. Not sure the problem is the 6082 if they test good on a tube tester. Not good either to have the supply connected to the rest of the radio during the debug process! Even if it's output is disconnected, the supply output have to be close to 180V.

If not, try to measure the pin 5 of the 6BH6 to understand what's happening. The voltage there should be low enough to put the 6082 almost at cut-off, like 100 to 120V (60 V below the output or lower).
Other possibility is that R616 have opened, or raised in value badly: V607 cannot control the 6082 grids (drawing current to GND) if there is not a high enough positive voltage at pin 6 (screen grid).

Date: Tue, 30 May 2017 11:56:08 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R-390 6082 Question

I hate myself sometimes (getting old, that's what it is). It just flashed thru my mind that V607 filament is a part of a filament string powered by the 25.2V. If V604 or V603 or V509 filament gone south, no more cathode heating for V607 and no more 180V regulator action !
CHECK THESE OTHER TUBES !!!

Date: Tue, 30 May 2017 18:19:38 -0400
From: "Bill Riches" <bill.riches@verizon.net>
Subject: Re: [R-390] R-390 6082 Question

A tube tester is 100% able to let you know if the filament is good. For really trusting it to test all other functions its reliably is iffy at best!

Date: Tue, 30 May 2017 19:58:59 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R-390 6082 Question

May I comment that it depends on the tube tester...."Mutual Conductance" testers (Hickock, Stark, etc.) sometimes provide very different test results than a true transconductance tester (AVO VCM 163, for example).
Same for leakage testing...

Date: Thu, 15 Jun 2017 06:52:46 +0000
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] SS 6080 VR replacement

My address is tfrobase@kitparts.com. I am in the process of making a new

batch, I have a couple almost complete.

Date: Thu, 15 Jun 2017 07:21:19 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] SS 6080 VR replacement

Here is a link to the installation instructions for the r-390 solid state regulator, this replaces the 2 regulator tubes and the 2 voltage regulators. It bolts on the side of the radio and is fully reversible. The price is $95 including postage domestically, international add $8.00. The pictures are of an R-389 installation...

http://www.kitparts.com/r390-reg/r390.pdf

Date: Sun, 9 Jul 2017 09:27:32 -0400
From: "Don Heywood" <wc4g@knology.net>
Subject: Re: [R-390] Does someone have a picture of where the 390 "Green Gear"is located ?

These views show the green gear in place. Also shows the storage location when the RF deck is installed.

Date: Sun, 9 Jul 2017 09:25:38 -0700
From: Pete Lancashire <pete@petelancashire.com>
Subject: Re: [R-390] Does someone have a picture of where the 390 "Green Gear"is located ?

Thanks everyone !!! I've confirmed the 390 I obtained does not have one. Another item to add to the searching

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Date: Mon, 10 Jul 2017 06:21:44 -0400
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] Does someone have a picture of where the 390 "Green Gear"is located ?

All the green gear does is keep the gear train synchronized when you pull it off. It is not difficult to re-synchronize, which you really ought to do anyway unless you didn't need to remove the gear train in the first place. The green gear may not be entirely useless, but it is certainly unnecessary.

Date: Sun, 16 Jul 2017 14:32:26 -0400
From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] Does someone have a picture of where the 390 "Green Gear"is located ?

At one time in the past, perhaps the now distant past, someone actually

reproduced the Green Gear. Finding one my take some time, and we hope there's at least one out there that you can get.

(By the way, as I remember, the thing has a dished central part, the central hole has two flats to kept the angular location on the shaft correct, and is a rather fine-toothed gear. Certainly not a stock item you might find at a gear manufacturer.)

But as folks have said, the thing is handy for keeping synchronization among the two parts of the gear train during dis-assembly, but it's not essential. I've not done that alignment, but we can assume that re-synchronization is both covered in the manual(s) and is not difficult beyond the expected carefulness needed.

Date: Mon, 17 Jul 2017 09:51:23 -0400
From: hackmohr@myfairpoint.net
Subject: [R-390] R-390 Poor Sensitivity

Looking for some help trying to figure out the cause of overall poor sensitivity in a Collins R390. I've been rebuilding this one over the past few years and finally brought it back to life in April. (Details here: http://home.myfairpoint.net/~hackmohr/r390/) After going through one round of alignments, subjective reception comparisons with an R390A and a 51J-4 show it performs rather poorly compared to these two. I've begun to check stage gain readings and I'm now finding discrepancies which are starting to point me in the right direction. I think. I'm using an AN/URM-25 Signal Generator that I'm assuming is in the ballpark when it comes to output levels. They may not be exact but I beleive they are close enough to detect the discrepancies I'm seeing which are on an order-of-magnitude level.

It appears that the IF Unit is functioning normally. I can more or less duplicate the stage gain measurements shown in the manual all the way through the 6 stages. A ~50uV 455kHz signal at J526, the input to the module gives the -7VDC reading at the Diode Load terminal. Moving to the RF Deck I find the first problem. At the input to the 3rd Mixer at E210 a 50uV 455kHz signal sometimes passes through OK, other times it goes into some type of oscillation. A 2.4mHz signal at the same level always goes into oscillation. At E209 on the 2nd Mixer I get no oscillations, but it consistantly takes around 4000uV to get the proper Diode Load reading at 2.4mHz. I've tested and swapped out both the 2nd and 3rd mixer tubes. All voltage and resistance measurements for the 2 tubes are normal. Z222 has also been swapped out with an assumed good one but to no avail.

Going back through the RF stages with the 2.4mHz signal I find: E208 10uV,[??] E207 11000uV, E206 2800uV, Bal Ant: 400uV. Anyone with

experience in stage gain mesurements see any patterns here? Something I'm missing? Maybe something in my test setup is causing the oscillations? Any and all help will be appreciated. Thanks.

Date: Tue, 18 Jul 2017 00:48:35 +0000 (UTC)
From: Larry H <dinlarh@att.net>
Subject: Re: [R-390] R-390 Poor Sensitivity

Hi Mark, The RF deck on the 390/urr can be challenging. The correct injection frequencies need to be calculated for each mixer for each 1mc band. The first mixer and xtal osc varies by mc band and only used when below 8mc. You might try a frequency above 8mc, since it is much simpler. Then above 8mc, the second mixer subtracts the dial frequency from the 2nd xtal osc freq to create the input to the 3rd mixer, which is always 2-3 mc. So to start with, you should verify that the mechanical alignment is correct, the tuning cams, 1st and 2nd xtal osc. ?The operation of the 1st and 2nd var IFs is very important. The 2nd var IF should always be at it's top (3mc) when the dial is on xx.000. ?Inject the dial frequency into the antenna and verify that the 3 caps on the 2nd var IF will peak correctly (not at the end of their range). ?For the 1st var IF, I like to use 7.9 mc input for this test. The 1st xtal osc freq is 10 mc for 7mc ant input resulting in 17.9mc out of 1st mixer. If all 6 resonant circuits do not peak correctly, that is the first thing I'd go after. I usually find a bad connection on these cans pins or a bad mica cap inside or a bad xtal or switch connection. Use deoxit very sparingly. All 3 for each set are the same, so you can swap them around to see if the symptom follows. Don't forget that the slugs in the var IF are different than the RF slugs. Good luck.

Date: Wed, 30 Aug 2017 18:59:58 -0400
From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] R-390 Poor Sensitivity

Thanks much for your experience and advice on the R-390/URR. (I have at least one plus variants that will get overhauled after a while). Its been quite some time since I worked on any of these.

> ...verify that the 3 caps on the 2nd var IF will peak correctly ..... If all 6 resonant circuits do not peak correctly, that is the first thing I'd go after. I usually find a bad connection on these cans pins or a bad mica cap inside or a bad xtal or switch connection. Use deoxit very sparingly. All 3 for each set are the same, so you can swap them around to see if the symptom follows.

I'm not clear on what you mean here - do you mean that there are 6 resonant circuits In the 2nd IF (two in each IF can)? Are the mica caps you refer to inside the IF cans? Thanks for any clarification.

Date: Fri, 7 Sep 2018 11:23:58 +0300
From: Edward <navydude1962@yahoo.com>
Subject: [R-390] R390(non A) questions

I have always been a fan of the R390A, especially since the mods and restoration tips are well documented (Thank you, Chuck Rippel and others). The R390 (non A) is a different story. The only site I have come across is Dave Medley's page (RIP). Is there a comprehensive list of mods and restoration tips, along the lines of Chuck's Eager to learn more about this receiver, as I am on the verge of getting one. Thanks in advance.

Date: Fri, 7 Sep 2018 12:53:58 -0400
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R390(non A) questions Pearls of Wisdom

The R390 Fellows keep up the following web site. www.r-390a.net/
The R390 and R390A both exist and we Fellows just keep them together.
The R390A TM says read your R390 TM for procedures to complete R390A maintenance.

Date: Fri, 7 Sep 2018 16:00:09 -0500
From: Cecil Acuff <chacuff@cableone.net>
Subject: Re: [R-390] R390(non A) questions Pearls of Wisdom

This may stir some up but... What you will find with the R-390/URR is that it's a much better built radio. You don't need lists of trouble prone capacitors...because there aren't any. All high quality mil spec (when that meant something) metal cased capacitors with glass seals. No mechanical filters that tend to wear out and fail, no electrolytic filter caps to rebuild...the 390 uses oil bath caps that rarely fail.

Biggest issues are a few 47 ohm 2 watt resistors that go out of spec. Some below the audio tubes and some below the regulators in the power supply. Standard practice is to replace them with 5 watt wire wound cement blocks. Also the regulator tubes run hot so a muffin fan in that area helps a lot...beyond that it s tubes, out of tolerance resistors and cleaning, lubing and alignment. They sound better too.

Some will say the 390 is a mans radio and the A a boys radio.

It's strange... the 390A's seem to sell for more and there were way more of them made than the 390's....seems backwards to me The 390A is a cost reduced version of the R-390/URR...not sure how many they built but it wasn't anywhere near the 60+ thousand A models. Won't see much from Rippel on the 390. Was told they scared him...probably urban legend

though...haha!

Date: Sat, 8 Sep 2018 00:11:36 +0300
From: Edward <navydude1962@yahoo.com>
Subject: Re: [R-390] R390(non A) questions Pearls of Wisdom

Thanks, Cecil. Much appreciated. Just what I was looking for!

Date: Sun, 9 Sep 2018 14:37:16 -0400
From: "Lester Veenstra" <m0ycm@veenstras.com>
Subject: Re: [R-390] R390(non A) questions Pearls of Wisdom

And of course: http://r-390.com

Date: Sun, 9 Sep 2018 17:53:39 -0700
From: Larry H <larry41gm@gmail.com>
Subject: Re: [R-390] R390(non A) questions Pearls of Wisdom

Thank you Lester. I noticed that the link to Rippel's home page in Medley's page was not working. Here's the link to his archived page: https://web.archive.org/web/20090204020515/http://www.r390a.com/

But, there's not much R-390 info there.

Date: Sun, 9 Sep 2018 23:45:21 -0500
From: Stan Gammons <s_gammons@charter.net>
Subject: Re: [R-390] R390(non A) questions Pearls of Wisdom

I seem to recall seeing an R-390 at a hamfest many years ago The things I've read on the R-390 say it was harder to work on than the "A" and more expensive to manufacturer and it had great audio. Yes, it does seem backwards. I would think the R-390 would sell for more than the "A" since fewer were manufactured. Seems like I gave $215 for the first "A" I had. It was purchased from Fair Radio in the late 80's. Seems like most want 6 times that much for one now. Anyone know how the R-390 performs compared to the "A" I've seen the Sherwood numbers on the "A". No numbers for the R-390 though.

Date: Fri, 10 May 2019 19:18:55 -0400
From: <jgedde@optonline.net>
Subject: [R-390] What have I done?

I bought another. Is this the start of a disease? This time it's not an R390A, but a bona fide Collins R-390 (not A). And, it doesn't work - needs repair. My wife saw the fun I had restoring the R390A and encouraged me to get the R390. Especially after I explained the history and the cost

reduction program and said the R-390 was less than 10% as common. I'm wondering if the r390 front panel is engraved or silk screened and if the latter how I can re-do the lettering? My R390A has mods: AGC, BFO, AF stage, better AF tube, gloss paint, etc. etc. but the R-390 I plan on restoring to all original.

What have I done? I bought a receiver with nowhere near the online support material available and parts availability is near non-existent. Ugh. Yet I can't wait to get my hands on it!!!!

Last night I redid the knobs on the R390A and it looks really good. All I have left to do is put it into its newly restored DX-100 enclosure. <clip>

Date: Fri, 10 May 2019 21:26:05 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] What have I done?

If I'm not mistaken, all the R390s had engraved panels and only the As had silk-screened panels.

Date: Fri, 10 May 2019 21:43:20 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] What have I done?

Any info you may need (or cannot found elsewhere) about the R-390, just ask me. I began me "R-390" disease when I first touch one in 1982, my R-390As came after...

Date: Fri, 10 May 2019 21:52:17 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] What have I done?

Barry, you are right. I have the SN 2074 of the first order (14214-PH-51-93), made by Collins.

Date: Sat, 11 May 2019 13:28:38 -0400
From: "Lester Veenstra" <m0ycm@veenstras.com>
Subject: Re: [R-390] What have I done?

http://r-390.com

Date: Sat, 11 May 2019 23:13:40 +0000 (UTC)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] R390 Non-A notes and mods

Dave Medley(sp) who was THE non-A guru left us several years ago and

his web site AFAIK is gone. James 'Andy' Morrer has a R390 site with manuals but there doesn't seem to be any sites that carry the *Learned by the School of Hard Knocks* tips, tricks, and mods.

IIRC there was a SS PS regulator circuit published in the Hollow State News years ago. Considering the cost of tubes, heat and complexity of the OEM circuit, a SS PS mod seems very attractive. If list members have such data, perhaps it could be posted as a subset on the R390FAQ site. Since the R390 and R725 were produced in such small numbers helpful tip s and hints may be scattered hither and yon. Gathering, consolidating, and posting such info could prove valuable.

Date: Sat, 11 May 2019 18:15:25 -0600 (MDT)
From: Gary Biasini <gary.biasini@shaw.ca>
Subject: Re: [R-390] R390 Non-A notes and mods

I think Dave Medley's site has been kept alive at r-390.com

Date: Sun, 12 May 2019 00:28:08 +0000
From: Bob Young <bobyoung53@hotmail.com>
Subject: Re: [R-390] R390 Non-A notes and mods

http://www.r-390.com/ third time is a charm.
[http://r-390.com/DJM!.jpg1zA]<http://www.r-390.com/>

Dave Medley's R-390 Compendium of Knowledge<http://www.r-390.com/>
Dave Medley's R-390 Compendium of Knowledge Reposted by Lester Veenstra K1YCM /3 M0YCM.

David became a SK May 2, 2010, in Tucson [RIP friend, HANK KN6DI]. This site is devoted to the wonderful Collins R-390/URR Radio. www.r-390.com

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Date: Tue, 14 May 2019 03:43:59 +0000 (UTC)
From: Fred Stillwell <fred.s43@frontier.com>
Subject: [R-390] R-390 Green Gear function

It appears like the green gear, when installed, replaces the function provided by the gear(s) on the KC tuning shaft. Is this correct?

Date: Tue, 14 May 2019 06:25:14 -0500
From: Cecil <chacuff@cableone.net>
Subject: Re: [R-390] R-390 Green Gear function

Pretty much. It's not as vital as many believe. It locks things in place if you are just pulling the front panel for a quick job. If disassembling for

restoration you can just set things to the numbers then make sure they are set the same during reassembly.

Date: Mon, 20 May 2019 19:32:27 -0400
From: <jgedde@optonline.net>
Subject: [R-390] New R390

My new to me R390 arrived Friday. SN 2445. It's a bit of a needing TLC beast, but as of tonight I got it receiving stations. A lot more to do, but I'm making progress.... This time I'll post a "before picture." It's not strictly a "before" photo since I've done a lot of cleaning, but it's how she stands right now. Ugly but not for long...

I fixed the power regulator circuit, aligned the IF, fixed the AF deck. A lot of burned up and/or broken resistors as a result of a tube failure (cracked glass and short). Right now, the RF stage is woefully out of whack, the unit jumps frequency (by 30 kHz or so) randomly (cause TBD), the squelch doesn't work, the antenna relay is marginal, an intermittent issue where it goes dead until I cycle power, or it starts humming bad until I cycle power (almost like a LF oscillation), etc. I thinks it's a B+ oscillation in the regulator. I'll get it sorted out.

So far my observations are that the R390 has smoother audio and is much more stable (apart from the frequency jumping) than my R390A which allows ECSS on the R390 which I can't do for more than a short time on the R390A. But as a negative, the R390 puts out an huge amount of heat from the regulators! Definitely a winter radio. Heats the room. Apart from that my complaints are that the R390 is not as easy to work on as the R390A. Not even close.

Date: Tue, 21 May 2019 12:41:20 +0000
From: Les Locklear <leslocklear@hotmail.com>
Subject: Re: [R-390] New R390

In the immortal words of Neil Clyne G8LIU "The R-390 is a man’s radio, the R-390A is a boys’ radio."

Date: Wed, 22 May 2019 21:26:05 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] New R390

"The R-390 is a mans radio, the R-390A is a boys radio." I'd love to hear more about why that is... I wanna be a man! LOL I fixed two more issues tonight The big giant 10 uF Vitamin Q B+ filter cap was acting up and causing the hum (ripple was falling below the dropout voltage on the regulator.) I hid a modern electrolytic down inside and abandoned the

monster oil filled unit in place. Another issue was a metal shaft for the antenna trim... Needs to be non-conductive. I lathe turned a new one from Delrin - issues (overloading) gone. Fiberglass might be nicer and stronger but I don't have any.

Date: Wed, 22 May 2019 21:23:06 -0500
From: "William J. Neill" <wjneill@consolidated.net>
Subject: Re: [R-390] New R390

And I wonder where the R-389 and R-725 stand in this pecking order?

Date: Wed, 22 May 2019 21:31:24 -0500
From: "Joe Koester" <jwkoest@charter.net>
Subject: Re: [R-390] New R390

I would like to know too. I would love to have an R389 even more so than my R725. Though I really don't know why!

Date: Wed, 22 May 2019 19:34:58 -0700
From: Renee K6FSB <k6fsb.1@gmail.com>
Subject: Re: [R-390] New R390

The R725 is the ladies radio, cute and pleasing audio....not sure about the 389

Date: Wed, 22 May 2019 22:48:57 -0400
From: W2xj <W2xj@w2xj.net>
Subject: Re: [R-390] New R390

Yes but in “real” wartime (1967 Mideast war) we used RACAL’s as the preferred R390 replacement. They were much more advanced technology. They were the first choice of the electronic intercept guys.

Date: Wed, 22 May 2019 22:38:18 -0500
From: Robert Nickels <ranickel@comcast.net>
Subject: Re: [R-390] New R390

The R-389 is like the bass singer in a quartet.

Date: Wed, 22 May 2019 23:08:18 -0500
From: "Joe Koester" <jwkoest@charter.net>
Subject: Re: [R-390] New R390

Let's see, a man's radio, a boy's radio, and now a lady's radio. That's amazing. What criteria did you use to come up with this? Assume you have heard an R390 and an R390S, but have you heard an R725?

Inquiring minds want to know!

Date: Wed, 22 May 2019 23:09:28 -0500
From: "Joe Koester" <jwkoest@charter.net>
Subject: Re: [R-390] New R390

That's good - I like that. Reminds me of the Statler Brothers!

Date: Thu, 23 May 2019 05:58:30 +0000 (UTC)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: Re: [R-390] misc posts

<clip> Wanting a R 389. I wanted one years ago but i didn't have enough grandchildren to sell. I also realized that using, maintaining and repairing it was far more work than I ever wanted to get into.
The R725. If it's a ladies radio get me a dress and some lipstick. (As I live in CA no one would bat an eye - even if I grew a beard with my new outfit. It doesn't have the ringing of the mechanical filters. If you can score a Non-A IF [a difficult feat in of itself] Tom Marcotte (sp) wrote a step by step article to be able to add it to your *A* that's in the Y2KR3 manual. Or if one comes up for sale on ebay, pay the price -you can cry about it later- and enjoy.

But if you want to be a real Caveman man and suffer the OEM crappy audio - go for it. We don't discriminate against masochists on the list. The R390 Non A Wrote: "TheR-390 is a man's radio, the R-390A is a boys radio." I'd love to hear moreabout why that is... I wanna be aman! LOL

Well, first you have to find one to buy. Then see if your credit card can take the hit. Then, you'll have the heat to deal with. There is an expensive to maintain, complicated regulated PS. Less commonly used IF tubes which are in a series circuit, large leaking oil caps, almost impossible to find spare parts for starters.....so go for it Bubba. It'll keep you out of gin mills in the winter time.

But there is the nice sounding LC IF and the potential for a good audio and other upgrades. Also the issue of getting nice clean large ski's... So put on you're Fred Flintstone outfit grab a club and charge! And of course as our most respected senior: senior member Les Locklear would add: YMMV

Date: Wed, 22 May 2019 23:02:58 -0700
From: Renee K6FSB <k6fsb.1@gmail.com>
Subject: Re: [R-390] New R390

Having had a 390, 390a and for several years a 725. the 725 (has audio deck mod to PP etc as did my 390A) is so much smoother and lacks

ringing of the filters, also does not heat the room as does a 390.....in my opinion, best of both worlds. the only thing i miss is the squelch... that WILL be added when I have time.

Date: Thu, 23 May 2019 19:49:32 +0200
From: Clemens Ostergaard <clemenso@gmail.com>
Subject: Re: [R-390] New R390

The R389 a bass singers radio (very low frequency, sorry..)
The R391 a robot's radio ?
The R-648 an invalid's radio (bc lightweight)
But what about the R-392? An introvert's radio? Better suggestions?

Best regards, (and yes, the R390 is a pleasure to listen to, I think I hooked it up with a Sherwood SE-3, even better. Or was that with the -A)
Clemens S. Ostergaard, DENMARK

Date: Fri, 24 May 2019 07:49:00 -0400
From: <jgedde@optonline.net>
Subject: [R-390] R390 B+ Current?

I'm still having trouble with the voltage regulator. Low B+ and a hum. There's plenty of input voltage available, but the output isn't right. Right now I have a 180V bench supply feeding the radio through the B+ test point and all is working but the current is seemingly high. I see about 170mA. Does this sound right? It may well be, but I want to make sure I'm not trying to fix the wrong thing.

Date: Fri, 24 May 2019 08:57:54 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 B+ Current?

What is the state of the 6082s ? Have you a tube tester to test those? Whatever the output voltage you got, the plate of the 6BH6 (V607) normally have to be a few volts BELOW the output. If C608 is leaky, this will reduce the output voltage for sure because it will make the 6BH6 grid raising higher than it should. Expect it to be leaky anyways: I do not see any original one that was faultless. Check also R615: I once found one that was measuring almost 1 meg. Replace it by a 1W part. When all is in order, you should get 180V out ± 3V and the Hum Balance should work (provide a minimum output hum setiing). BTW, it is easier to debug when it give you lower than expected voltage than the reverse !

170mA is within the spec: the transformer is rated at 200mA DC !
But if there was no leakage test done on the B+ rail, to detect any leaky cap., it can be that you draw more current than the designed value.

Any other question, just ask !

Date: Fri, 24 May 2019 17:12:57 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 B+ Current?

Thanks Don,

I will check C607. The 5651's have already been replaced with one's I tested to be good.

John

-----Original Message-----
From: Don Heywood <wc4g@knology.net>
Sent: Friday, May 24, 2019 9:29 AM
To: jgedde@optonline.net
Subject: Re: [R-390] R390 B+ Current?

Hi John, maybe I can be of some help. I have attached a schematic of the regulator circuit showing what I think you should look at besides what Jacques mentioned. A leaky C607 will give you problems also.
I have had to substitute the two circled tubes in the past to achieve the 180VDC, and I always change those two resistors.

Date: Fri, 24 May 2019 17:13:36 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 B+ Current?

The state of the 6082's were new in box but I am suspecting they failed. My tube tester (NRI Model 70) doesn't have a listing for the test settings for the 6082. I will check C608 but I think I did already. R615 is spot on. I've also replaced the four 47 ohm resistors since they were burned, as well as R625 and R626 which were charred beyond recognition. After doing all that, the receiver worked for a few days, B+ was normal, no hum. The resistors I replaced are still good. Also, the resistors for the 6BH6 are good also. I may rig up a test setup to measure the Gm of my stock on 6082's to test them. I'd like to measure the leakage on my B+ like you suggest. How is that done?

Date: Fri, 24 May 2019 17:51:09 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 B+ Current?

6082: same as 6080 for testing, but 26.5V filament you can use 25 V for filament if available on your tester and same other settings for a 6080 if

your tester have it.

Do not rely on check for C608: You need a leakage tester to know it is good or not. Otherwise, just shot-gun it. Any modern 0.22µF/250V cap will do. A leakage tester is easy to assemble if you have a variable DC supply, but talk about that later...

Measuring leakage on the B+ 180V line.
1_ Do not power the filaments.
2_ Use a mA meter in series with your variable supply
(you have one, it seems).
3_ Connect the 180V DC supply with the mA meter in series to the 180V test point.
4_ Power on the supply, let the current value stabilize and read the value, if it does not balance across 0, this is not good: something draws current and should not.
5_ Disconnect the power to every module in turn to see which one draws current.
6_ Suspect supply decoupling capacitors first. The Sprague Vitamin Q should still be very good for the age they have, but from experience, not all of them....

Check that first, then came back to me please.

Date: Fri, 24 May 2019 18:23:20 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 B+ Current?

Thank you! I used your suggestion and tested the 6082's as if they were 6080's but with setting the filament for 25.2V. The two new units test good. But my unit is only an emissions tester... The two old ones I have, only one tested good as an aside.

With filaments off, I see the radio drawing 15 mA from my supply no matter what I disconnect. I had to pull the 5651's to take this measurement since they were lit up. I can only conclude the badness in in the AF deck somewhere.... I'm feeding the 180V into the B+ test point on the side of the radio. 5651's and 6082's are out for this test.

Date: Fri, 24 May 2019 18:33:04 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 B+ Current?

Actually, I used the DMM and measured 9.8 mA with 186V in. R then equals about 18k. I wonder if C606 is bad...

Date: Fri, 24 May 2019 18:44:11 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 B+ Current?

Wrong conclusion. C606 is OK. Pin 7 and 2 on the 6BH6 are shorted together creating a path through the 18k power resistor (which was warm) and the 1k cathode resistor. I am considering this a normal result. R623 + R618 = 18k + 1k = 19k = 186 / 9.8 mA. Mystery solved. I am moving on to check those caps that Jacques and Don suggested.

Date: Sun, 26 May 2019 07:02:14 -0400
From: <jgedde@optonline.net>
Subject: [R-390] R390 not A calibrator issue

One of the last problems (apart from my B+ issue) I'm tracking down is a non-functional calibrator. If I pull my calibrator and connect its output to my scope I get a strong 100 kHz signal out (after replacing a tube and adjusting it.) My adjustments consisted of setting the crystal oscillator to 1 MHz using a frequency counter, then adjusting the multivibrator cap to lock at 100 kHz. I get a strong, reasonable looking 100 kHz sine wave out on the scope

When it's in the receiver, I hear nothing. I'm thinking there's an issue either in the coax or the first RF stage. Any ideas? I'd rather not have to pull the RF deck if I can help it. John

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Date: Sun, 26 May 2019 08:09:18 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 B+ Current?

I tested C608 and C606 using Jacques multimeter method (it's a great method!!!.) I found the 0.22 uF to be leaky as it didn't drop to zero V at 250VDC. I was seeing about 30 nA of leakage (300 mV on my meter). Not excessive, but more than I think a capacitor feeding a grid with only a 560k resistor to take up the leakage should have. I replaced it with an Orange drop. I did the same test on the 0.1 uF and it was much better (a Vitamin Q) but I replaced it anyway. The radio still had problems though. Despite being new and testing good on an emissions tester one 6082 didn't work at all in the circuit. I swapped out that tube (although I think they really want to be a matched pair). More 6082's are coming.

So the radio works, and the hum balance works, but all is still not well. I had to chase the hum balance all over as things warm up else the hum returns. So, there's still something going on. I wonder if it's gross tube mismatch between the two 6082's? Or is it something else. I guess I'll find out when the new 6082's arrive. For now, I'll just measure the voltage drop across the four 47 ohm cathode resistors to see if they're sharing the total load properly. I will also check the big can capacitor

behind the headphone jack. John

Date: Sun, 26 May 2019 16:28:00 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 B+ Current?

I found the problem and fixed it. Apart from the two charred resistors in the cathodes of the 5651's, it was a slightly leaky C608 and one other bad resistor (R616). That one was tough to find as it tested at 86k (versus 82k it should be) when it was cool. As the radio heated up, it changed in value - a lot. I should have changed it from the start because I didn't like the look of it. It was dull in appearance not shiny like the rest of the resistors. Weird.

I also brought my AF deck up to MOD 4.

I now have a B+ supply of 181.7V with 160 mV p-p of ripple (and a room heater to boot.) John

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Date: Sun, 26 May 2019 18:11:34 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 B+ Current?

Very good ! Remember that this R-390 was made in 1954: 65 years old now. I was here only one year before... A drifting R616 explain the problem you had. My oldest "boat anchor" is actually a National HRO MX (1940). Another interesting receiver to play with btw.

Date: Sun, 26 May 2019 18:26:53 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 Non A Upgrade Info Wanted

I will write a list of all the parts I had to change in my R-390.

Maybe it will help others.

To come soon: how to PROPERLY fit 6080s into a R-390 (the 6082s are becoming a little scarce these days, were they made only by RCA ?).

Next will be how to replace those with something more "modern"... (horrible thing: a solid state solution, kind of, purists have to stop reading here)

I know that it was already done by others, but not the way I intend to do it...

Date: Tue, 28 May 2019 17:47:49 -0400
From: <jgedde@optonline.net>
Subject: [R-390] A lesson learned and two questions

Lesson learned! Don’t accidentally reverse the connectors for the PTO and the Calibration Oscillator (J115 and J116) on a R-390 (not A). If you

do, it'll kill the PTO tube. The connectors are side by side and are identical --- not keyed. Not a great design practice FWIW.

And now my first question: on a R390 (not A) is it normal for the ZERO SET knob and shaft to be able to completely unscrew out of the radio?

Are there "Pearls" for the R390? Where are they? Is there a way to search the R390 archives? OK, OK that was four questions. Two for one sale ?

Date: Tue, 28 May 2019 16:58:51 -0700
From: Larry H <larry41gm@gmail.com>
Subject: Re: [R-390] A lesson learned and two questions

John, Can't speak to most of your questions, but there is a tool to search the archives. It's here:
https://w9wze.net/ReflectorSearch/SearchReflectorForm.php

It was out of commission for many months and I am glad it's back. Be patient, the results take a minute or so.

Date: Wed, 29 May 2019 1:46:48 +0000
From: <joldenburg2@new.rr.com>
Subject: Re: [R-390] A lesson learned and two questions

Dr. David Medley's page for the R390/UR is still out there:
http://r-390.com/

Lots of good info presented by a member of the original design team at Collins.

Date: Tue, 28 May 2019 18:55:24 -0700
From: Larry H <larry41gm@gmail.com>
Subject: [R-390] HHI SITE Reflector Archive search tool is back

Hallelujah!!! We can search our archives once again. Here's the link:
https://w9wze.net/ReflectorSearch/SearchReflectorForm.php .
For those new to it, it takes a minute or so to see the results.
Thank you *Walt Cates!*

Date: Wed, 29 May 2019 14:01:49 +1200
From: Ken <kenharpur@startmail.com>
Subject: [R-390] R-390 info

Hi everyone, I'm glad the list has sprung into life again after a long time being relatively quiet. All this talk of the R-390 is getting me inspired to grab mine out of storage and start work on it. I too would be very interested in a compendium of knowledge for the R-390.

Really enjoying all the stories from you guys that used them “professionally”, very interesting.

Date: Thu, 30 May 2019 22:47:14 +0000 (UTC)
From: wli <wli98122@yahoo.com>
Subject: Re: [R-390] R390 info

I lumped all the msg re the R390 into a single 451mB pdf file in "Pearls"

Date: Thu, 30 May 2019 18:03:29 -0400
From: <jgedde@optonline.net>
Subject: [R-390] What gives me a rash on my hands?

Whenever I work on my R390 (not A) I get an itchy, bumpy rash on my hands. Sort of like poison ivy. Is that unheard of? What's on this radio? Weird huh? A good scrub after working on it with Gojo seems to get rid of whatever is causing it.

Date: Thu, 30 May 2019 17:15:30 -0500
From: SGS 126 <brloper@gmail.com>
Subject: Re: [R-390] What gives me a rash on my hands?

Use some rubber gloves if you can’t figure it out

Date: Thu, 30 May 2019 20:06:00 -0400
From: Bob Weiss <bobweiss1967@gmail.com>
Subject: Re: [R-390] What gives me a rash on my hands?

MFP varnish maybe?

Date: Thu, 30 May 2019 22:21:11 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] What gives me a rash on my hands?

Not that experienced anything similar myself, but I believe it can be the MFP coating. You can be particularly sensitive to the chemicals in the MFP coating that prevent fungus growth and etc. Just hope that you do not developed allergic reactions to the radio itself...

Date: Sat, 1 Jun 2019 07:33:07 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 B+ Current?

I thought I had found it since the radio behaved well afterwards, but alas it was not to be. I found that after the radio ran for a while (45 minutes at least), suddenly the hum would return. When the radio cooled

off, all would be well again.

Putting a desk fan next to the radio delayed the onset, but it didn't stop it. So, clearly I had some kind of thermal issue. I was thinking a cracked resistor.

Inspection showed nothing obvious so I used my SMT hot air rework iron to heat components one by one after the radio had cooled. Lo and behold, the hum returned almost immediately. So, a thermal issue was confirmed. Problem is, after heating the parts, all I did was make the hum become persistent - even when cold. But what did I heat that caused it? After heating so many individual parts, inevitably all in the area got hot. Except now when they cooled off they didn't become good again.

Still thinking a resistor issue, rather than go through the trouble of multiple surgeries replacing resistors one by one, I just replaced them all (in the regulator circuit). This made no difference whatsoever! Damn! I tried different tubes (6082's, 6BH6 and 5651's), it made no difference. So, not a tube, and not a resistor and not a capacitor (or so I thought since I had already replaced the two cans).

Staring at the schematic yielded no good thoughts. Staring at the underside of the AF deck, I noticed something I hadn't noticed before: a SM polka dot box capacitor buried down on the floor (or is it really the ceiling?) between pin 5 of the 6BH6 and ground. What is that doing there? I didn't see it on the schematic - but it's there... Off to the right of the 6082's - between the grids of the 6082's and ground - C607.

This morning I dug it out of there after removing two layers of resistors and replaced it with a CD dipped silver mica. (Before I pulled it, I clipped one end as a test and powered up the radio to see if it did anything profound - hummed really bad!)

Now the radio is all put back together and hum free! The B+ supply only has about 25 mV of ripple after adjusting the hum balance. All's finally well I think. So, all in all, there were multiple problems with my B+: leaky oil/paper caps a bad resistor, two bad tubes, charred cathode resistors in the reference tube string.

To make a long story short, If you ask me in simple terms why the radio hummed, I'll answer "because it doesn't know the words..." ?

Date: Sat, 1 Jun 2019 19:56:58 +0000 (UTC)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] R390 B+ Current?

Thank you for the taking time to document this problem and of course your story on the hunt. This is how you find problems and fix them. But, you show once again that we can keep these radios operating.

Date: Mon, 3 Jun 2019 20:43:42 -0400
From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] R-390 info

R=390/URR (“non-A”) folks: the two series B+ regulator tubes (6082’s) in these radios make a LOT of heat. I cobbled up a fan plate to hold a fan onto the outside of the radio to cool the area - it makes a huge difference in the temperature of that section of the radio (and no doubt the underside of the radio too). It slips onto the existing bottom cover and frame screws for a no-changes addition, except for power connection. I have a picture with ruler and notes file so you can make one yourself if you want - will send to anyone interested.

Date: Tue, 4 Jun 2019 06:51:32 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R-390 info

Hi Roy, I'd like a picture of your fan mod...

Date: Wed, 5 Jun 2019 19:23:24 -0400
From: <jgedde@optonline.net>
Subject: [R-390] R390 Low Gain at 8 kHz BW

I'm having a strange issue with my R390. It's all aligned and working very well, except for the 8 kHz bandwidth. I see about a -12 dB loss in signal when set for 8kHz. All other bandwidths are OK. The bandwidth switch is clean and passes continuity tests. Any ideas?

Date: Wed, 5 Jun 2019 18:42:51 -0500
From: Cecil <chacuff@cableone.net>
Subject: Re: [R-390] R390 Low Gain at 8 kHz BW

Is this a 390 or a 390A?

Date: Wed, 5 Jun 2019 20:08:37 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 Low Gain at 8 kHz BW

390. I would've said "not A" but I got hollered at for doing that. I replaced R519 and R520 since they were high, but it made no difference... They are supposed to change the gain of the IF deck to make up for the loss in gain due to the changes in IF coil coupling with bandwidth changes.

Date: Wed, 5 Jun 2019 20:09:24 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 Low Gain at 8 kHz BW

12dB down ? WOW ! I have one or two ideas:

1_ Check all the 2.7 ohms resistors in the IF deck: they are only used when the 8kHz BW is selected. (R514, R 524, R529, R534) check also the internal IF coils continuity (the ones selected for the 8kHz BW).

2_ Check R519, which was a selected manufacturing value to set the global IF strip gain when the 8kHz BW is used. Remove it or measure value. If doubtful, replace with a modern resistor of the same value.

Date: Wed, 5 Jun 2019 19:11:32 -0500
From: "Ron.K3PID" <ron.k3pid@sbcglobal.net>
Subject: [R-390] A Guy Can't Win!!!

So we give a guy heck when he puts (Non A) after R-390 and then when someone correctly refers to an R-390 we ask if it?s an A or not! Let?s be consistent!!! Proud owner of an R-390/URR
Ron K3PID

Date: Wed, 5 Jun 2019 19:18:59 -0500
From: Cecil <chacuff@cableone.net>
Subject: Re: [R-390] A Guy Can't Win!!!

The question was posed politely to be sure an ?A? was not assumed as it is at times. R390/URR removes all doubt.

Date: Wed, 5 Jun 2019 19:21:45 -0500
From: Cecil <chacuff@cableone.net>
Subject: Re: [R-390] R390 Low Gain at 8 kHz BW

You've done fine...the question was to be sure you got the proper answer to your question....and you have.

Date: Wed, 5 Jun 2019 20:27:36 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 Low Gain at 8 kHz BW

OK. OK. Do ya see an "A" there Sherlock? Kidding! Just being funny.

Date: Wed, 5 Jun 2019 20:36:08 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 Low Gain at 8 kHz BW

HI Jacques, I replaced R519 thinking that was it (it did measure high). I have checked all the 2.7 ohm resistors and they are all fine. I checked them but I didn't really suspect them since the passbands were all good (see second para). No obvious Q issues. I will check again tomorrow. I'm beat and it's getting hot in the lab from running this beast.

I haven't checked the resistance of the coils yet. I checked all the IF bandwidths using a spectrum analyzer with tracking generator feeding E210 and measuring off the grids of each stage with a JFET probe into the spectrum analyzer. All the bandwidths are perfect, just 8 MHz is low. I also see it in the diode load voltage.

When I get this straightened out, I'll post the plots of each IF filter like I did with my R390A (yes A). The passband is smoother with the R390 but the skirts are better with the R390A as is to be expected.

Date: Wed, 5 Jun 2019 20:36:52 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 Low Gain at 8 kHz BW

I forgot the first 2.7 ohms resistor: R507 !
These old eyes, you know...

Date: Wed, 5 Jun 2019 17:55:07 -0700
From: Renee K6FSB <k6fsb.1@gmail.com>
Subject: Re: [R-390] R390 Low Gain at 8 kHz BW

I had a similar issue eons ago. check the coils in the IF cans or at least verify continuity. I had one that had a broken wire.

Date: Fri, 7 Jun 2019 07:18:56 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 Low Gain at 8 kHz BW

I think I fixed the 8 kHz issue but I'm not sure why it worked... I isolated the problem to the 3rd or 4th IF amp or T503. I checked everything associated with these stages except for the big capacitors and I found nothing. I had this silly idea that one of the two tubes in those stages didn't like to operate at the gain set by the BW switch to compensate for the increased bandwidth. So, I simply swapped the tubes from the 1st and 2nd IF stages into the 3rd and 4th stages. Problem disappeared! Putting the tubes back they way they were brought the problem back. I just replaced all the tubes in the IF with some NOS JAN Sylvania's from 1969.
<clip>

Date: Sat, 8 Jun 2019 08:18:18 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Panel Refinishing

Unless it's a Helena Rubenstein model, in which case shades of pink are more appropriate.

Date: Sat, 8 Jun 2019 09:42:41 -0400
From: Bob kb8tq <kb8tq@n1k.org>
Subject: Re: [R-390] Panel Refinishing

If you dig back into the archives, even in government service there were radios with “not gray” panels on them. There also were a fairly wide range of gray-ish colors used. Done properly, there are a *lot* of very cool options. Deep blue with yellow lettering ?..

Date: Sat, 8 Jun 2019 13:39:26 -0400
From: <jgedde@optonline.net>
Subject: [R-390] R390/URR Gear train

I took apart my geartrain for cleaning this morning on the 390. No end to solidified lubricant. Now I'm putting it back together. I noticed before I took it apart that the big brass split gear (part 73) wasn't preloaded. Nowhere in the manual does it say how this should be done or what it's supposed to preload. What is this for? It meshes with another gear assembly (79) that has two gears separated by a spacer. I've attached a photo of what I'm asking about.

Date: Sat, 8 Jun 2019 15:41:12 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R390/URR Gear train

I presume that, like any other split gear, it should be preloaded a couple of teeth for anti-backlash. Don't know why it wasn't preloaded when you disassembled it, but maybe someone just didn't do that the last time it was assembled.

Date: Sat, 8 Jun 2019 21:48:39 +0000 (UTC)
From: Perry Sandeen <sandeenpa@yahoo.com>
Subject: [R-390] R390/URR For Sale

I've decided not to move the R390/URR I recently purchased on ebay with me to SC. It is complete with power cord. It works on all bands EXCEPT .5 to 1MHz but has very low sensitivity on all others. Has both OEM meters that did show movement on both RF and audio.

Cosmetically fair. Paint is worn through to bare metal behind the KHz knob. Asking $250 plus shipping from 92220-5327. Shipping weight 81 lbs. Please send an original email off list if interested or call me at nien 51-nien too too 6 nien forth sevinth.

Date: Sat, 8 Jun 2019 17:49:05 -0400
From: <jgedde@optonline.net>

Subject: Re: [R-390] R390/URR Gear train

Ahhhh! Now I see. That big preload gear (the brass one) preloads that gear connection through the gear with the four holes. Wacky. "Pretty sneaky sis!" Thanks for the pic Don! I've got it all back together and am synchronizing the Genva drive. Running into some small issues in that the TM calls out "figure 76" for verification of the switch contact positions and there is not figure 76 in the TM. Arrgggh. I have two versions, they both refer to figure 76 and neither has it. Thank you kind sir! John

-----Original Message-----
From: Don Heywood <wc4g@knology.net>
Sent: Saturday, June 8, 2019 5:28 PM
To: jgedde@optonline.net
Subject: Re: [R-390] R390/URR Gear train

OK, John, I turned one of my receivers up on end and can see that those gears with the four holes will mesh with the small gear on the PTO shaft when you reinstall the RF deck and mate it with the KC knob mechanism. I took a picture and attached it.

-----Original Message-----
From: jgedde@optonline.net
Sent: Saturday, June 08, 2019 4:12 PM
To: 'Don Heywood'
Subject: RE: [R-390] R390/URR Gear train

Hiya Don,

I get the preload thing there are about a half dozen other ones I already did in putting it back together. This one is different as it doesn't seem to be able to lock itself. What I mean is this... All of the other split gears get preloaded then the preloaded gear engages itself in another gear a single one so as to be able to spring open within the gear profile of the regular gear and eliminate backlash... The key thing with this is that the split gear spreads between teeth on a single gear. Easy.

Now, the one I'm asking about preloads but engages in to*two* separate gears. One preload gear for each of the two normal gears. In other words, the preloaded gear engages to another split gear except that gear doesn't have springs nor is the split laying on top of each other. There's a spacer between the two gears. It's very strange. If you look at the bottom of my picture you'll see a steel gear with four big holes in it. Directly behind that gear is another just like it. There's a spacer between them. One of those two gears is connected to the shaft and the other can freely rotate on the shaft. Above that gear to the left is the split gear. It's much bigger

than all of the other split gears and is made of brass. It has no holes in it apart from where the springs are located. See it? That gear can be preloaded but each of the sprung pair engages to a separate gear and the preload just unwinds! That's what's throwing me. John

-----Original Message-----
From: Don Heywood <wc4g@knology.net>
Sent: Saturday, June 8, 2019 2:59 PM
To: jgedde@optonline.net
Subject: Re: [R-390] R390/URR Gear train

John, I know the section of Pearls I referred you to is for the "A" model but the preload information still applies, in fact a lot of the pearls also affect the older model we work on. There has been a section added just for this older radio the R-390/URR! I can't see any number 79 in your picture, but if the gears have a set of springs between them then they need to be preloaded. This preloading procedure takes practice, slide one gear carefully to disengage from the gear it meshes with leaving its mate engaged, then using your thumb and forefinger slide the gears to overlap a tooth or two and while holding this relationship slide the first gear back onto the mating gear. If the springs come loose reinsert them with fine needle nose pliers of forceps.

I am only trying to help. I had to learn all this the hard way. Don

-----Original Message-----
From: jgedde@optonline.net
Sent: Saturday, June 08, 2019 2:30 PM
To: 'Don Heywood'
Subject: RE: [R-390] R390/URR Gear train

Hi Don and thanks, you pointed me to the R390A pearls and I'm working on a R390. The R390A from what I can see, doesn't even have the gear I'm talking about. There are a bunch of preloaded gears, but it's the one in particular I'm referring to. It doesn't seem to have any way of holding preload. Is it some kind of sprung thingamabob to prevent excess force on some part of the mechanism? I understand the purpose of the split gears to eliminate backlash, but this gear has nothing to lock to since the gears it meshes with are both freely rotatable. It's hard to explain. In my photo, the two spaced gears on the part marked 79 can both rotate independently. It wasn't preloaded to start with either yet everything seemed to work... John

-----Original Message-----
From: Don Heywood <wc4g@knology.net>
Sent: Saturday, June 8, 2019 2:07 PM
To: jgedde@optonline.net

Subject: Re: [R-390] R390/URR Gear train

Hi John, please go to: <http://www.r-390a.net/Pearls/> and look under the RF deck mechanical section and then do a work search (cont. f) for "preload" and see all the data. This preloading is to keep tension on the teeth to preclude any backlash when tuning back and forth, hence - no slop - have fun, 73, Don WC4G

Date: Sat, 8 Jun 2019 19:02:20 -0400
From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] Panel Refinishing

Howard Mills in the past would take your panel (plus money) in exchange for a refinished one:

-powder coat finish
-silk screened markings
-“engraved” markings filled in for silk screening
-SOMEtimes black available (make believe three-letter agency radio)

Date: Sun, 9 Jun 2019 19:41:14 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390/URR Gear train

Oh yes, I am indeed familiar! Too much so. When I set the MC gear I ran it fully counterclockwise and installed the deck with the MC band set slightly below zero, but not as far as where it stopped. So, when it's been installed I hit the 10-turn stop before I hit the end of travel for the deck itself.

That RF deck geartrain is definitely not for the faint of heart. I took the deck off to fix a crackle I get on the 0 MHz band. Thinking it was the switch, I went in there with intent to clean the switch up. Being able to see the gears up close, I decided all that gunk HAD to go and that started the ordeal. All pieces apart and cleaned in an ultrasonic cleaner with Purple Power/water and the gunk all came off although it took several runs to get it all off. Changed out the water/purple power three times because it got so dirty I couldn't see the parts anymore! The KC dial has a nice feel now. Before it was very loose and sloppy feeling and bound up every now and then. Now it has a slightly snug (damped feeling), slop free feel, yet turns easily enough that I can spin the dial with one finger.

Interestingly, whatever it the crap was, mineral spirits didn't touch it (no I didn’t put MS in the ultrasonic cleaner).

The gears are now lubed with Mobil Vacuoline machine tool way and gear oil from my home machine shop which is basically a detergent free

medium weight oil with a tackifier additive so it stays put. It's made to be such that it stays where you put it, but doesn't make a mess, doesn't attract dirt more than any oil, doesn't have an offensive odor, and works with a very thin film. The gears, shafts, bushings, etc. are well lubricated but you're hard-pressed to look at them and tell there's oil on them. Just the way I think it ought to be. The tackifier additive Mobil puts in there makes the oil kind of like you see in those auto parts store demos with the crank and gears where it makes the oil stick to the gears. (but for goodness sakes, don't put that Lucas snake oil, junk in your car's engine oil!!! I have a some tribology background and climbing oil is NOT what you want to happen inside your engine. But I digress...)

While I was in there, I cleaned the Veeder-Root in the ultrasonic cleaner with a well diluted mix of water and purple power, then repainted the shield/fingers over the numbers with thinned satin black acrylic enamel. Looks like new!

A pic of the RF geartrain back together is attached. John

-----Original Message-----
From: Don Heywood <wc4g@knology.net>
Sent: Sunday, June 9, 2019 6:18 PM
To: jgedde@optonline.net
Subject: Re: [R-390] R390/URR Gear train

Congratulations John, that RF deck is no easy task. There is one thing I have discovered you may be interested in, I will try to explain:

When you turn the MC knob down to zero you will notice that it goes just a little farther 'below zero'. This is where the ten turn stop should be set. Any further rotation should be stopped by the ten turn stop on the MC shaft.
If this is not properly set the force will be applied to the Geneva Mechanism, no Buenos... By now you should be familiar with what I am saying.

Good Luck and I was glad to help. 73 Don, WC4G

-----Original Message-----
From: jgedde@optonline.net
Sent: Sunday, June 09, 2019 5:35 PM
To: 'Don Heywood'
Subject: RE: [R-390] R390/URR Gear train

It's all back together and everything is preloaded properly. The KC dial takes a slight bit more effort to turn, but there's no slop whatsoever (it

feels like my R390A). The gunk is all cleaned off the gears, the rf deck has been reinstalled and the radio aligned. It didn't really need that much adjustment which means to me I put the geartrain back together correctly. What an ordeal though. I won't do that again any time soon...

Date: Sun, 9 Jun 2019 19:07:30 -0500
From: Francesco Ledda <frledda@att.net>
Subject: Re: [R-390] R390/URR Gear train

Very nice job!

Date: Sun, 9 Jun 2019 20:14:11 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390/URR Gear train

Thanks! One thing I forgot to write... It's all back together and guess what... It STILL crackles on 0 MHz. It's hard to pin down because it comes and goes. I get into it with the test equipment and it always stops whilst I'm trying to debug. Whatever it is, it's early in the RF deck chain. But I can now have the rf deck in and out in 30 minutes or less now that I've done it a few times - if I need to get it out again.

Date: Mon, 10 Jun 2019 07:10:56 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390/URR Gear train

Thanks Don. I am an engineer/engineering manager/project engineer by day. I design ultra-high reliability, radiation hardened, motion controllers and motor drivers for space use. My company's main product line is motors, gearboxes and actuators for space applications. For example, the Mars Curiosity rover and the upcoming Mars 2020 rover - we designed and built those actuators. Being exposed to that sort of thing, I work with very, very smart people who are the top experts in their fields. People from JPL, NASA, Northrop Grumman, Lockheed, BAE, etc. Needless to say, I pick up a thing or two about mechanical engineering...

Right now, my controller designs are in orbit around the earth deploying mechanisms and controlling the movement of solar arrays. It's very rewarding to see a launch go well and having something one conceived come to life and operate.

Getting back to R390 talk... I too suspect something with one of the transformers, but as you point out, testing by substitution is a good way to test. Alas, I don't have substitutes, so I have to debug the problem using other methods. I suspect a problem with the first can as I can see junk on

the grid of the first IF tube. My mental block is reasoning out why. The grid is biased by the AGC line and the problem still occurs with the radio in MGC with the AGC line pulled to ground. That point makes me wonder... My crackle sounds very much like what you hear when lightning is around. But, there's no voltage on the first can when in MGC mode. So, what could be breaking down? Or, is anything breaking down? I find myself wanting an old school signal tracer...

The radio has only two issues left to resolve before tackling cosmetic restoration. The crackling and the PTO endpoint adjustment. It's come a long way since I got it. Back then it had a bum power supply/regulator, dead bands, poor sensitivity, a wacky carrier meter (tracked down to loose resistance wire coils in the carrier meter adjust pot which were moving around during adjustment), an inoperative calibrator, RF geartrain issues, etc. etc.

John

-----Original Message-----
From: Don Heywood <wc4g@knology.net>
Sent: Sunday, June 9, 2019 10:35 PM
To: jgedde@optonline.net; 'Francesco Ledda' <frledda@att.net>
Subject: Re: [R-390] R390/URR Gear train

I am really impressed with the way you lubricated that RF deck, you sure know your lubricants. Maybe I can help with the crackle on the 1-2 mc band.
Inside those RF transformers are mica caps across the coils, I have found thru substitution of these RF transformers a few instances where these mica caps are breaking down. It has gotten to the point that they are failing, especially the ones with B+ on one side. To bad you don't have a second source of these RF transformers, I have a couple of junker RF decks which come in handy for substituting these transformers to find the offender and replace its caps. A cap checker may be of some help, but you need a higher voltage to make these caps fail.Regards,Don WC4G

Date: Mon, 10 Jun 2019 09:19:49 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390/URR Gear train

The hardest part about getting to the bottom of this cracking problem is to avoid getting an ear worm! Cracklin' Rosie from Neil Diamond. Right now my R390 is named Cracklin' Rosie and that song is stuck in my head!

From: Alan Victor <amvictor@ncsu.edu>
To: jgedde@optonline.net

Subject: Re: [R-390] R390/URR Gear train

Silver mica "disease"... metal migration may not require any applied voltage to occur and its affect is the noise bursts you describe. A possibility? Alan

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Date: Mon, 10 Jun 2019 10:16:46 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390/URR Gear train

Good call Alan. It was the 390 pF cap in the second RF can. Hit the can down one of the screw holes with freeze spray and the radio went nuts! It's replaced and the radio is quiet now. She's "Cracklin? Rosie" no more.

Date: Mon, 10 Jun 2019 11:40:20 -0700
From: Alan Victor <amvictor@ncsu.edu>
Subject: Re: [R-390] R390/URR Gear train

John, glad you found the bad C in the 390. This is an issue in some of the Hammarlund receivers and reported from users. Not sure how often this was found in the Collins devices.

Date: Mon, 10 Jun 2019 15:41:23 +0000
From: David Wise <David_Wise@Phoenix.com>
Subject: Re: [R-390] R390/URR Gear train

When I got my R-390A, I worked over the gear train. One notable thing I discovered was that one or more split gears were wrong way around. More effort is required to raise a rack than to lower it, and the fixed gear should push in the high-effort direction and the springy gear in the low-effort direction. This lets you use minimal preload, which reduces friction. It's complicated by the way effort adds up from all the downstream racks, and sometimes you are raising a rack on the steep backside slope of its cam. Taking all that into account, I reversed a gear or two. Sorry, I didn't take notes.

Date: Mon, 10 Jun 2019 16:29:01 -0400
From: <jgedde@optonline.net>
Subject: [R-390] R390 PTO endpoint

I've started to look into doing the PTO endpoint on my R390. The PTO is completely different than the Cosmos one on my R390A which I was successful in calibrating, including linearity. Where is the endpoint adjustment on the Collins R390 PTO? I can barely see a plug behind the transformer can. Is that where it's hiding?

My PTO also has a plastic plug screwed into a hole marked S701. Behind the plug is a hollow shaft with two notches to allow it to be turned with a screwdriver. What is that for? It does nothing as far as varying the frequency.

There is so much wealth of information online about the R390A and its various PTO flavors, but not much about the R390 PTO.

Date: Mon, 10 Jun 2019 20:01:37 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 PTO endpoint

The PTO end-point adjustment is at the same place in the 70H-2 for the R-390 that it is in the 70H-12 for the R-390A. See the green coloured hex screw in the attached picture. The Plastic Plug S701 is the access to the PTO heater temp. adjustment!

Date: Tue, 11 Jun 2019 14:17:43 +0000
From: wb3fau55@neo.rr.com
Subject: [R-390] 390-390A PTOs

Folks, if you would, please state the differences in the PTOs [390-390A] i thought they were the same.

Date: Tue, 11 Jun 2019 11:24:28 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] 390-390A PTOs

Long time! Hope you are well.

There is two variants of the Collins 70H-2 PTOs for the R-390, the original one and the "MOD 1". This MOD 1 variant is close to the Collins 70H-12 used in the R-390A, but not in every aspect. See attached p. 12 and 14 of the TM11-5820-357-35. Apart of the output connector that is a full-size BNC in the 70H-2 compared to the "mini" one of the R-390A version, the screen grid bias resistor for the 5749 has a different value(s) and the power connector pinout is different. Despite this, I believe that a 70H-12 (or any other brand of R-390A PTO) can be "adapted" to a R-390, providing that the mechanical mounting parts of the R-390 are used. The other way round, the a R-390A PTO is NOT a straight drop-in solution for the R-390.

Date: Tue, 11 Jun 2019 16:11:01 +0000 (UTC)
From: Roger Ruszkowski <flowertime01@wmconnect.com>
Subject: Re: [R-390] 390-390A PTOs

The R390 VFO is a permeably tuned oscillator. There is only one model of R390 VFO and it is the better Collins design for linear operations. The R390 VFO output cable has a regular BNC connector. The mounting frame of the R390 VFO is different in shape and an R390/A VFO, and will not bolt into an R390 receiver. The tube circuit passive components have different design and operating values than the R390/A VFO. The R390/A VFO is a permeably tuned oscillator. There are two stock numbers that will get you one of the two models of R390/A VFO. One model is a Collins design that follows the R390 design. The second model is the Cosmos VFO. The Cosmos VFO's obviously work, and are in use. The part was a reduced cost item injected in latter production contracts that were open bid build contracts, and not won by Collins. Other than the maintenance fellow adjusting end-point spread of the oscillator, the VFO parts difference is transparent. If you need to diddle the linear curve of a VFO, then you will prefer a Cosmos VFO to work on. The stack in the original R390 and R390/A Collins VFOs were assembled with slow drying sticky varnish. The assembly was jigged in a fixture. The shaft was spun. The little slide plates were 'oozed' into their needed places to lay the curve needed into the tracking alignment stack. Now the varnish is dry and the stack is glued into shape.You just do not try and improve the tuning curve of a VFO if you do not have to. The factory build, jig setup, tighten the bolts, and let the varnish dry got the job done; and it had been good ever since. Parts do come loose and some times things need to be repaired. An impact can cause a crack in the stack and small misalignment of linier tracking to result. Some detectives have found this problem and repairs were conducted. Aggravation exceeded the return on the investment. As you own the critter you can do it yourself for the education and experience. While in service you did not seek this education and you exchanged your suspect VFO for another package you expected to perform better than the VFO in hand. The Cosmos VFO was introduced to meet this diddling need of those who can not live with some one else's prior work. The checking need had to be meet. An alignment jig in every tool box was not the solution Collins proposed for this end play. The Cosmos VFO never made any of the maintenance manuals the alternate part number for the Cosmos VFO was published as a change page note to the parts manual. If not in stock then use this alternate number. Your first VFO was a Cosmos and you think that is the majority common part in the Field. To the casual procuring officer these things all look alike and please sign here.
Respectfully, Roger AI4NI

Date: Tue, 11 Jun 2019 21:33:00 +0000 (UTC)
From: "Tom M." <courir26@yahoo.com>
Subject: [R-390] Cosmos Patent Application

This is what engineers consider exciting reading.
See the patent app for the Cosmos PTO.

https://patentimages.storage.googleapis.com/eb/39/e5/74f9e06263332a/US3098989.pdf

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Date: Wed, 12 Jun 2019 16:46:06 -0400
From: "Lester Veenstra" <m0ycm@veenstras.com>
Subject: Re: [R-390] R390 PTO endpoint

http://r-390.com/pto.htm

Date: Wed, 12 Jun 2019 20:02:15 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R390 PTO endpoint

I came up with a simpler method once I learned where the EP adjustment screw was hiding. The R390 and R390A has everything you need built-in: no jigs needed. Calibration oscillator, a 10-turns counter, etc. So, it's very desirable to be able to do the adjustments while the PTO is in the radio. Problem is, with the R390, the front mounting bracket for the PTO blocks access to the adjustment screw. To get around this and not have make any funky tools, I just made up a simple surrogate bracket to use to set the endpoint. Made the bracket last night, installed it and had my PTO endpoint set in less than 15 minutes this AM. Add another 10 minutes to reinstall the OEM bracket, reinstall the block plug, and reinstall the PTO. Came ou once and back in once. With the surrogate bracket, the endpoint screw can easily be reached with a small screwdriver.

I have a mechanical drawing for the bracket I made if anyone is interested. You can make it with a vise, a hammer, sheet metal shears, a drill press (maybe even a hand drill), and careful layout with a machinists' scale (ruler). See attached pic... This was done on my Bridgeport mill but it didn?t have to be. I have two versions of the drawing: fractional inches and decimal inches. If you want a copy let me know your preference (as a home shop machinist I prefer decimal and hate fractional)

I didn't use the cal. oscillator since I have a very accurate digital frequency counter, but the calibration oscillator could be used instead. My PTO was very well linearized thankfully, but the endpoint was off about 6 kHz. It came right in with adjustment alone and no endpoint coil turn removal. I'm glad of this because my R390 PTO remains factory sealed. My R390A was another story... The R390A needed a turn removed, linearization etc. Thankfully it's a Cosmos so linearization is not too bad to do.

Basically, when adjusting the endpoint, the start point changes too, so you need to go back and forth a few times to get it spot on. You zero the dial at the low end and dial up to 3.455 and make adjustments at the high PTO

frequency which is the low end of the dial. Go back to 2.455, re-zero the dial, go back to 3.455 adjust and repeat until both ends are 2.455 and 3.455. Easy.

Date: Wed, 12 Jun 2019 20:55:13 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: [R-390] R-390 : L903 in the Calibrator Module

The calibrator module of my R-390 never had any "MOD" applied so L903 was never assembled in. Not that it was not working the last time I used it, but... I am not sure about the L903 value: the MOD list on page 4 of the TM11-5820-357-35 indicates 0.5mH (500 µH) but the schematic itself indicates 0.5µH (500nH). Which value is the right one ? BTW, L903 is not listed in the TM11-5820-357-35-P (the parts list).....

Date: Thu, 13 Jun 2019 06:14:26 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R-390 : L903 in the Calibrator Module

I put the 0.5 mH in mine...

Date: Thu, 13 Jun 2019 10:13:38 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R-390 : L903 in the Calibrator Module

Yes... 0.5µH for an oscillator running at 1MHz makes no sense (only 3.14 ohms of XL). Have you also changed the value of C905 (from 150 to 200 pF) ? I also read yesterday that the V901 and 902 have to be 5814As, maybe to better resist cathode poisoning (filaments on but no plate current most of the time). Is your calibrator working OK with L903 at 0.5mH ?

Date: Thu, 13 Jun 2019 17:55:14 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] R-390 : L903 in the Calibrator Module

I can't say it made any difference in how it worked... I left the capacitor alone. I thought the cap increase could reduce output from the 1 MHz oscillator. Where did you read about the tubes having to be 5814A's? I'd like to check that out too.

Date: Thu, 27 Jun 2019 21:04:10 -0400
From: <jgedde@optonline.net>
Subject: [R-390] R390 (not A) knob question

Is the antenna trim knob on the R390 supposed to be the small knob or

the medium one? I've seen photos both ways.

Now that the paint issues are behind me (mostly), I'm very close to completion. For the record, I'm not thrilled with the color (Rustoleum Granite Satin), but it went on, cured OK, and is close to the right color. It seems to be great or so-so depending on the lighting. But then again, Rustoleum Dark Machinery Gray is just as far off as Granite. But at least I don't have a mirror finish on what's supposed to be semi-gloss.

Date: Thu, 27 Jun 2019 22:05:13 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 (not A) knob question

It is a medium knob.

Date: Sat, 6 Jul 2019 07:39:13 -0400
From: <jgedde@optonline.net>
Subject: [R-390] Limiter on R390A vs R390

I notice a substantial difference in how the limiter performs on my R390 vs my R390A. Let me explain, the limiter on the R390 seems to be much easier to use as the control performs much more finely and is much easier to control. The R390 cuts off completely much higher in the adjustment range than the R390A. In the R390A, the limiting action is only up to about 3 or 4 on the dial before it cuts off completely. Further, the R390A, is nearly impossible to adjust right to the point of cutoff. After the adjustment is made, the action takes a second or two to settle out. Backing off the adjustment does nothing for slight movement, then audio comes back suddenly.

I suspect the R390A has an issue but I wanted to confirm that the operation should be the same or not before I dig into it.

Date: Sat, 6 Jul 2019 04:48:50 -0700
From: Larry H <larry41gm@gmail.com>
Subject: Re: [R-390] Limiter on R390A vs R390

John, Your 390A definitely has a problem with the limiter. It should operate smoothly to full cutoff at around 9 (depending on the signal strength). My first thought would be to check C101 and C536 for leakage, or perhaps R119 is bad.

Date: Sat, 6 Jul 2019 08:44:42 -0400
From: <jgedde@optonline.net>
Subject: Re: [R-390] Limiter on R390A vs R390 (need a pot)

Thanks Larry. I dug into it and found the problem right away. The limiter pot is open from end to end and open between the wiper and the end at about 1/3 turn. Now my problem is getting one to replace it considering the integral switch. Does anyone have one in their parts bin that they're willing to sell?

Date: Sat, 6 Jul 2019 17:20:14 -0700
From: Larry H <larry41gm@gmail.com>
Subject: Re: [R-390] Limiter on R390A vs R390 (need a pot)

Hi John, I have an extra one that I'll sell you for a reasonable price.

Date: Mon, 2 Dec 2019 01:30:14 +0000
From: Les Locklear <leslocklear@hotmail.com>
Subject: Re: [R-390] Shock mount update

Tom Frobase N3LLL has kits available to solid state those 6082 tubes and the rest of that circuit: tfrobase@gmail.com contact him. Highly recommended unless you want to cook pancakes on the side or top panels of a R-390/URR. More preferable than using those pesky fans.

Date: Mon, 2 Dec 2019 01:43:56 +0000
From: Les Locklear <leslocklear@hotmail.com>
Subject: Re: [R-390] Shock mount update

http://www.kitparts.com/r390-reg/r390.pdf

Date: Sun, 1 Dec 2019 18:17:39 -0800
From: Manfred Antar <manfredantar@gmail.com>
Subject: Re: [R-390] Shock mount update

I got 2 of these on 2 R390's - work great !!!

Date: Mon, 2 Dec 2019 02:28:41 +0000
From: Tom Bridgers <tarheel6@msn.com>
Subject: [R-390] 6082 tube SS replacement

I'd like to buy a pair of the 6082 SS replacements for my R-390. I looked on eBay just now, and did not find anyone offering a replacement for the 6082. Any leads about a source would be greatly appreciated.

Date: Sun, 1 Dec 2019 18:33:07 -0800
From: Manfred Antar <manfredantar@gmail.com>
Subject: Re: [R-390] 6082 tube SS replacement

Try Thomas L Frobase / Good Guy !!

Kitparts
www.kitparts.com
Cell 713 4768401
Office 281 5495990
That’s where i got mine. he also has some parts for 390A's

Date: Mon, 2 Dec 2019 16:37:21 +0000
From: Tom Bridgers <tarheel6@msn.com>
Subject: Re: [R-390] 6082 tube SS replacement

Just got off the phone with Tom, N3LLL, and had a great conversation about our hobby and what he is doing in retirement with electronics (particularly with the oil and gas companies).

Lots of really cool projects going on...

In addition to the 6082 tube replacement kit, he also has replacement kits for the ARC5 Rx capacitors and an interesting inverter replacement that mates perfectly with the shock mounts and three finger dynamotor power socket on the rear deck of the receiver.

Really neat stuff!

He also has kits for R388 and 75S1 series of Collins receivers.

An interesting side note, Tom is originally from Lima, Ohio - and spent many, many hours scrounging parts at Fair Radio Sales!!

Date: Thu, 5 Dec 2019 13:39:11 +0000 (UTC)
From: Thomas Hoyer <thoyer1@verizon.net>
Subject: [R-390] WTB Main Tuning Knob for R389

I know this is looking for a needle in a haystack attempt but - does anyone have a main tuning knob for an R389 that they'd be willing to part with?

Date: Thu, 5 Dec 2019 11:04:58 -0500
From: DogT <agfa@hughes.net>
Subject: Re: [R-390] WTB Main Tuning Knob for R389

They can be repaired if the 'fingers' are broken. I got a bronze bushing and glued it in the drilled out hole and it works fine. Of course you may just need a whole new one.

Date: Thu, 5 Dec 2019 18:04:56 +0000 (UTC)
From: Thomas Hoyer <thoyer1@verizon.net>
Subject: Re: [R-390] WTB Main Tuning Knob for R389

The main tuning knob for the 389, while it looks similar is not the same as that used on the 901 and 390A. It has a built in clutch to prevent damaging the PTO when tuning at the end points plus the main tuning shaft is larger in diameter so the std 390 series knob will not fit.
I may end up using a donor 390 knob and modifying it using some creative machining and brass rod to allow for the larger tuning shaft. But first I figured I'd at least test the waters to see if there was one out there

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Date: Thu, 5 Dec 2019 14:44:07 -0500
From: Roy Morgan <k1lky68@gmail.com>
Subject: Re: [R-390] WTB Main Tuning Knob for R389

I don't have one but I do have some hints that may help you avoid trouble (you may already know these things):

-the R-389 knob is NOT the same as on other radios
-it contains a clutch intended to avoid damaging the PTO
-it may have a larger shaft size (I am not sure about this point).

So yes, needle in a haystack is about right.

Date: Mon, 2 Dec 2019 02:28:41 +0000
From: Tom Bridgers <tarheel6@msn.com>
Subject: [R-390] 6082 tube SS replacement

I'd like to buy a pair of the 6082 SS replacements for my R-390. I looked on eBay just now, and did not find anyone offering a replacement for the 6082. Any leads about a source would be greatly appreciated.

Date: Sun, 1 Dec 2019 18:33:07 -0800
From: Manfred Antar <manfredantar@gmail.com>
Subject: Re: [R-390] 6082 tube SS replacement

Try Thomas L Frobase / Good Guy !!
Kitparts
www.kitparts.com
Cell 713 4768401
Office 281 5495990
That's where i got mine. he also has some parts for 390A's

Date: Mon, 2 Dec 2019 11:02:57 -0500 (EST)
From: GRIECO <tgrieco@optonline.net>
Subject: Re: [R-390] 6082 tube SS replacement

Thanks Manfred,
I ordered from Tom last week and it's on the way this week.

Date: Mon, 2 Dec 2019 16:37:21 +0000
From: Tom Bridgers <tarheel6@msn.com>
Subject: Re: [R-390] 6082 tube SS replacement

Just got off the phone with Tom, N3LLL, and had a great conversation about our hobby and what he is doing in retirement with electronics (particularly with the oil and gas companies).

Lots of really cool projects going on...

In addition to the 6082 tube replacement kit, he also has replacement kits for the ARC5 Rx capacitors and an interesting inverter replacement that mates perfectly with the shock mounts and three finger dynamotor power socket on the rear deck of the receiver.

Really neat stuff!

He also has kits for R388 and 75S1 series of Collins receivers.

An interesting side note, Tom is originally from Lima, Ohio - and spent many, many hours scrounging parts at Fair Radio Sales!!

Date: Mon, 9 Dec 2019 13:25:43 -0500
From: "Todd, KA1KAQ" <ka1kaq@gmail.com>
Subject: Re: [R-390] 500 khz filter

Here's a filter suggestion. Can't recall which piece of equipment it was used in but Collins used a 500 Khz filter in one of their aviation sets. It's a nice 10 Khz wide for more HiFi listening.

Filter number is F500E-94 if I remember correctly. They show up on ebay from time to time in the $25-$50 range. I think you have to clip off a pin or threaded stud but otherwise it's a direct drop in, same style. I use one in position 3 for my J4 with the 6 Khz in position 2.

Date: Thu, 9 Jan 2020 16:06:57 -0500
From: "wc4g@knology.net" <donwc4g@gmail.com>
Subject: [R-390] R-390 B+ short

Hello to all and Happy New Year. Recently I found a B+ short in an R390/URR on which I am conserving for a fellow. I found that the BFO ON/OFF switch which receives B+ in all positions of the FUNCTION SWTICH had a 14 ohm short to ground. This switch is physically different

than the ones in the "A" model receiver. The B+ lead (red/wht/blu) is attached to a switch terminal which is very close to the brass spacer which mounts the contact wafer to the switch base. There was a carbon track caused by years of small arcing when the BFO is switched ON. This is the second time I have had this problem over the years. When I repaired the carbon track by cleaning and using J.B. Weld as a filler, I used a hard plastic spacer instead of the brass one. This cured the problem and hopefully prevented another carbon track. This is something to think of when chasing down a B+ short. Regards, Don WC4G

Date: Sat, 15 Feb 2020 16:31:11 -0500
From: Mack McCormick <w4ax.mack@gmail.com>
Subject: [R-390] R-391 Motorboating with RF Gain beyond 7

My R-391 has developed motor boating (audio oscillation) when the RF gain control is advanced beyond 7. If you're run across this issue I'd appreciate knowing how you fixed it. I have rebuilt about a dozen R-390a and have a full test equipment bench. I'm just hoping for a head start before I begin troubleshooting the IF stage. Yes, I tried the usual searches but didn't find anything.

Date: Sat, 15 Feb 2020 17:37:48 -0800
From: Larry H <larry41gm@gmail.com>
Subject: Re: [R-390] R-391 Motorboating with RF Gain beyond 7

Hi Mack, This is usually caused by feedback due to weak bypass caps (screen, plate, or cathode). This is an easy check (grab a .1 - .5 mfd 400 v cap and ground the neg end and touch the + end to all those appropriate points). It can also be caused by a weak agc cap - try the slow position and see. And it could be a weak audio out B+ filter cap.

Date: Sat, 15 Feb 2020 22:29:40 -0500
From: Charles Steinmetz <csteinmetz@yandex.com>
Subject: Re: [R-390] R-391 Motorboating with RF Gain beyond 7

> My R-391 has developed motor boating (audio oscillation) when the RF gain control is advanced beyond 7.

Most likely, unwanted feedback due to one or more defective bypass or B+ filter capacitors (don't assume it's just one bad cap). Could be in the IF and/or AF section, and could be plate and/or screen caps (much less likely, cathode bypass caps). Larry's suggestion to use a temporary parallel capacitor is a sound troubleshooting technique, and pretty quick. I advise using spaghetti tubing or heat-shrink tubing on the "probe" lead, leaving just enough bare at the end to make contact with the target node. This greatly reduces the risk of accidentally shorting the target node to

somewhere unfortunate during the procedure. Best regards,

Date: Thu, 28 Oct 2021 21:38:42 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: [R-390] Power supply data

I was a list member several (15) years ago but now that I have two beaten and abused R-390's, I'm back! I am in the process of collecting the missing bits and pieces for both R-390 receivers but while I await their arrival, I've been thinking about that big heat generator, the regulated power supply. I have looked through the Pearls of Wisdom on the non-A power supply but find no hard data, just well intentioned guesses and opinions; mostly concerning the R-390A. For example, it seems that no one knows the ripple voltage on the filter cap just before the pass regulator. I calculate about 30 volts ripple assuming a 10 uF filter capacitor, 0.2 amps load current and a 1.5 mllisecond charging time. So doing some rough "worst case" calculations, I find that the 26Z5's and 6082's are operating at pretty much the upper end of their respective specs. The 26Z5 pair dissipate 2 watts for each plate assuming a worst case 40 volts drop within the tube and 50 mA of plate current in each section for a total of 8 watts.? Heater power is 26.5 volts @ 0.2 amps = 5.3 watts X 2 = 10.6 watts. The 6082 pass regulators are assumed to have, worst case, about 190 volts across them also with 50 mA for each section = 9.5 watts again times 4 for a grand total plate dissipation of 38 watts. Heater power is 26.5v X 0.6A = 15.9 watts X 2 = 31.8 watts. Eliminating both pairs of rectifiers and pass elements would remove perhaps 88 watts of heat from the receiver, again, worst case.

I'm looking into an article published in "Ham Radio Magazine" in the July 1970 issue starting on page 52. It just uses a single SCR plus a diode and a resistor to regulate B+. Of course the rectifiers are also solid state and the filter capacitor is much bigger in value then one would normally expect.? If you want a pdf copy of this article, contact me off list. The interesting thing about this circuit is that the power transformer secondary voltage just needs to be higher then the regulated voltage you want but there is no worry about how much higher the transformer secondary voltage is. The SCR is biased OFF as long as the filter capacitor is at the set voltage. Only when this voltage falls below that set by the gate resistor and series diode will the SCR again conduct and charge the filter cap. There are a lot of unknowns such as the stiffness of the SCR regulator and the noise caused by the SCR at turn on. A snubber network should help with the noise generated but how much noise is generated and how affective the snubber circuit will be are all unknows, at this time. Since heat is the enemy of just about everything, eliminating it should help increase the life of the R-390. Comments?

Date: Sat, 30 Oct 2021 00:54:57 -0400
From: <rodger_adams@yahoo.com>
Subject: [R-390] Troubleshooting Question

I have an R-390 (non A) that has developed the following problem. When I turn it on, it warms up and works normally for about a minute or so. Then without warning, it shuts down. Lights out, no B+, etc. It does the exact same thing every time I turn it on. Any thoughts on where to begin troubleshooting? How to easily isolate the B+ from the modules, etc. ? For the minute that it's on after warming up, the B+ reads 185 volts. Thanks in advance for any advice.

Date: Sat, 30 Oct 2021 10:06:13 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Troubleshooting Question

Going way out on a limb here, have you tested the rectifier tubes for shorts? Perhaps something is sagging and shorting after the filament(s) get hot.

Date: Sat, 30 Oct 2021 22:24:02 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] Troubleshooting Question

I assume that the etc includes the tube heaters are also loosing power? Could be anything in the primary line from the input filter to line switch to the power transformer itself.? If I was doing this, I would tack two wires to the power transformer primary and reinstall the power supply module. Monitor the voltage on the primary to see if it is still present when the radio quits. If the primary voltage is still present than the power transformer itself is suspect. If not then move the two wires to the output of the filter and repeat the process.

Date: Sat, 30 Oct 2021 22:42:02 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] Troubleshooting Question

Rodger, you will surely found my advice strange, but...
Just replace the mains fuse with a new one and retry.

Date: Mon, 1 Nov 2021 10:35:57 -0400
From: <rodger_adams@yahoo.com>
Subject: Re: [R-390] Troubleshooting Question

Thanks to all for your responses on my power supply troubleshooting question. Had a taken a quick look at the schematic before posting, I

would have realized there was only a few things that could have caused this problem. After tacking wires onto the power transformer to allow for measurements to be made on both primary and secondary side of the transformer, I was all set to "catch" the problem. When it next happened, I was losing power to the primary side of the transformer. That left 2 things, both which had been mentioned by list members, the fuse and the line filter. The FUSE was the culprit as Jacque suggested. I didn't even have to replace the fuse as it wasn't blown, but just had to twist it around in the socket a few times. Problem solved.

I am amazed that something as simple as dirty contacts between a fuse and the fuse holder could cause a problem with such a repeatable symptom. Before I started troubleshooting, this problem had recurred, probably 25 to 30 times and each time was exactly the same. The 390 worked for about 2 minutes and then shut down. Thanks all for your input and troubleshooting suggestions. Lots of lessons learned, including ask this list first!

Date: Mon, 1 Nov 2021 14:59:54 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] Troubleshooting Question

I was concerned that the issue was a failed switch. Surprised that the problem was simply a dirty fuse contact. Just goes to show that experience pays off, good call Jacques!

Date: Mon, 1 Nov 2021 11:15:05 -0400
From: Jacques Fortin <jacques.f@videotron.ca>
Subject: Re: [R-390] Troubleshooting Question

Well, that happened to me before. In my case, it was the fuse itself (a slow-blow one). It behaved as a breaker. Took days to find. It was not in a R-390 however.

Date: Mon, 1 Nov 2021 14:16:10 -0400
From: Alan Victor <amvictor@ncsu.edu>
Subject: Re: [R-390] Troubleshooting Question

I suspect it is even more bizarre than that.... Oxidation on the fuse metal contact forms a semiconductor junction, the net result is some rectification of the line V and not simply an IR drop! It would have been neat to see if the fuse interconnect was hot or if a scope would have displayed the rectification.

Date: Mon, 1 Nov 2021 19:41:14 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>

Subject: Re: [R-390] Troubleshooting Question

Could be. Evidently, the "semiconductor" became more of an insulator over a period of a few minutes. Obviously my track record of guessing is not up to par and my physics and chemistry background is dismal but I would hazard a guess that it has to do with temperature. Sort of like a PTC thermistor, the hotter it gets, the higher the resistance.

Date: Mon, 1 Nov 2021 16:50:26 -0400
From: Alan Victor <amvictor@ncsu.edu>
Subject: Re: [R-390] Troubleshooting Question

Good for you to find it and I put on the list of weird stuff that happens!
It is amazing how the EE in the CAN like DeOxit and so on fixes stuff that a lab full of test equipment may not catch!

Date: Mon, 1 Nov 2021 16:12:17 -0500
From: <frledda@att.net>
Subject: Re: [R-390] Troubleshooting Question

We did see those kind of failures all the time on high power RADARs.

Date: Tue, 2 Nov 2021 18:57:50 -0400
From: Chuck Kembring <kembring@epix.net>
Subject: Re: [R-390] Troubleshooting Question

People tend not to consider the simple fuse in the circuit. I spent a significant time in my career in the nuclear power industry and we could only use fuses from a specific manufacturer but also down to the specific manufacturing facility due to the audited manufacturers quality program. That focus didn’t come about by chance.

Date: Wed, 28 Sep 2022 12:28:17 -0600
From: "Jordan Arndt" <Outposter30@shaw.ca>
Subject: [R-390] R-391 video series

I'm pretty busy with several things here, but I came across a brief series of videos on Youtube covering an R-391 with modifications for RDF and ECM...Some of you may have seen these, but I hope the URL goes through for those who haven't...If not, search on Youtube for user My Messy Lab. The first video is here:

https://www.youtube.com/watch?v=pr8pXFtA_IU

Date: Sat, 1 Oct 2022 09:31:22 +0300
From: Martin Sole <hs0zed@gmail.com>
Subject: Re: [R-390] R-388 question?

The 75A-4 modification detailing a change of both mixers to double-triode 6DJ8 tubes can be found on pages 42-44 of Ham Radio Magazine for April 1970. Article was written by Ray Rinaudo W6ZO.

Date: Sat, 1 Oct 2022 06:58:29 -0400
From: "James A. (Andy) Moorer" <jamminpower@earthlink.net>
Subject: Re: [R-390] R-388 question?

Here is a link to that issue:
https://worldradiohistory.com/Archive-DX/Ham%20Radio/70s/Ham-Radio-197004.pdf

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Date: Sun, 2 Oct 2022 16:20:50 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: [R-390] R390 Name Plate Screw Size?

I have an R390 that's missing one of the screws that holds the nameplate to the front panel. I'm pretty sure the size for the R390A is #2-56; however, this is an R390 and appears to have #3 screws (measures about 0.097" diameter). Does anyone know whether the R390 used #3 sizes for the nameplate or, possibly, has someone tapped the holes just a bit larger in my front panel to accommodate #3 screws?

In any case, I suppose I'm going to need a #3 to fill that hole. Not sure if the local store where I've bought lots of small stainless-steel pan-head machine screws will have #3 but I can check.

Date: Sun, 2 Oct 2022 19:03:52 -0400
From: "thoyer" <thoyer1@verizon.net>
Subject: Re: [R-390] Name Plate Screw Size?

The screws on both of my R390's are 2-56.

Date: Sun, 2 Oct 2022 19:13:10 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Name Plate Screw Size?

I figured #3s were an odd size. Likely someone modified the panel and I think finding another #3 screw won't be easy.

Date: Sun, 2 Oct 2022 19:50:51 -0700
From: Renee K6FSB <k6fsb.1@gmail.com>
Subject: Re: [R-390] Name Plate Screw Size?

#3 you mean a 3-48? those were on the ARC-5 stuff IIRC

Date: Mon, 3 Oct 2022 01:15:42 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Name Plate Screw Size?

Unfortunately, I don't have an ARC-5. I'll have to keep looking. Not a big deal, but would like to plug that hole.

Date: Mon, 3 Oct 2022 07:38:31 -0400
From: Nick England <navy.radio@gmail.com>
Subject: Re: [R-390] Name Plate Screw Size?

Hobby store (if they still exist)
Model railroad supplies.s
Screw sizes down to 000

Date: Mon, 3 Oct 2022 06:48:13 -0500
From: Tom Frobase <tfrobase@gmail.com>
Subject: Re: [R-390] Name Plate Screw Size?

Send me your address I will send you some

Date: Mon, 3 Oct 2022 07:58:35 -0700
From: Mark Glusker <mark.glusker@gmail.com>
Subject: Re: [R-390] Name Plate Screw Size?

McMaster-Carr is a great source for small hardware.
https://www.mcmaster.com/91772A089/

Date: Mon, 3 Oct 2022 15:15:48 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] R-391 video series

Thanks for the link! I watched all five videos, kudos to My Messy Lab. I have only seen one R-391 in the flesh and that was some 50 years ago when I was stationed in Germany while in the Air Force. It belonged to MARS and was in their storage cage but was never used, AFAIK.

Date: Mon, 3 Oct 2022 11:19:50 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Name Plate Screw Size?

Yes, and I forgot to look there. Unfortunately, sold in quantities of 100. Fastenal has them listed for $0.11 each but I'm not sure I can still order from them as I think they changed their business to more of a commercial- only supplier. I might still try that though.

Date: Mon, 3 Oct 2022 10:48:03 -0600
From: "Jordan Arndt" <Outposter30@shaw.ca>
Subject: Re: [R-390] R-391 video series

>From what I could glean from his videos, he picked up a rack full of TTY equipment which included the R-391.

The guy is pretty good at troubleshooting and very thorough...!
I had to advise the group about those videos after seeing them myself...

Date: Sat, 12 Nov 2022 21:58:33 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: [R-390] R390 B+ Expected Tolerance

I discovered that the regulated B+ is running about 175v instead of 180v in my R390. I found R625 had drifted from 1k to 1.2k and, since I think that was originally a 1%, I replaced it. I now get very close to 3.7k at the cathode of V609; however, that didn't change the regulated voltage. I have five 5651s and except for one of them, virtually any two will produce 175v. If that fifth tube is in place, I get about 185v. According to my Hickok 752A, the fifth one appears to have a different current draw at its regulating voltage and that might account for the difference. I have a spare 6082 that I've tried swapping in either socket with no differences there either. Running at 115VAC input and getting close to 300v unregulated input to the regulator. It leaves me curious as to how close to 180v is within specification. I've searched the manuals and I can't seem to find a tolerance for that. Anyone know?

Date: Sun, 13 Nov 2022 05:42:16 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] R390 B+ Expected Tolerance

The R-390 Finial Engineering Report, 15 Sept 1953, page 14, aka pdf page 19Input voltage variation +/- 15% results in a B+ change of +/- 1 volt maximum.Load current from 100mA to 200mA results in a B+ voltage change of +/- 2 volts maximum. The 5651 voltage variation is 87 volts +/- 5 volts.? Current change through the 5651 from 1.5 mA to 3.5 mA results in a 3 volt maximum change. Besides the resistors you have mentioned, a leaky C608 will also cause problems per Dave Medley at:
https://cvths.org/radio/r390/docs/misc_R390-URR_R391-URR.pdf

Date: Sun, 13 Nov 2022 00:52:24 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 B+ Expected Tolerance

Have you checked / changed C606 ? Any leakage from it will lower the regulated output voltage, The output cannot be dependent on the 6082 tubes, unless they are worn out. 5651 tubes: when they are worn, the voltage across increases, and the regulated output as well... Have you checked all the values of all the resistors in the regulator circuit ?
My own R-390 runs at 182V output, so I guess it is OK. 175V should not make a big difference, anyways... If ever you need NOS 5651, let me know: I have few dozens of those...

Date: Sun, 13 Nov 2022 09:20:28 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R390 B+ Expected Tolerance

Thanks for the replies. I didn't check C606 or C608 so I have something I need to do now! Hopefully that'll get the regulator back up to 180v.

Date: Fri, 18 Nov 2022 11:11:56 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R390 B+ Expected Tolerance

I replaced C606 and C608 with new paper caps but still only getting 175V instead of 180V.

David Medley's page on the VR circuit states that once the VREF tubes have ignited brightly, their brightness should reduce somewhat after a short while. I don't think I'm seeing that behavior and am wondering whether I still might have a problem with the reference voltage to V607.

I've tested the 6082s on my (uncalibrated) Hickok 752A and, while the readings there could be off, they don't show any obvious signs of problems and I haven't found any other resistors in/around that part of the regulator to be out of spec far enough to make this difference.

Any other suggestions as to what to look for here?

Date: Fri, 18 Nov 2022 16:40:19 +0000
From: David Wise <d44617665@hotmail.com>
Subject: Re: [R-390] R390 B+ Expected Tolerance

175/180 is less than 3% error. I would be delighted to be that close. What's the tolerance on the divider resistors? One also has to consider bias voltage variation in the tube that senses the error.

As tubes warm up and begin conducting current, B+ drops, which reduces the current into the VR tubes. The VR tubes warm up also but the B+ effect dominates.

Date: Fri, 18 Nov 2022 18:13:45 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] R390 B+ Expected Tolerance

I don't think that there is a real problem here. There is no regulated voltage adjustment so whatever the tolerances are will set the voltage. The 5651 has an average regulated voltage of 87 volts +/- 5 volts, per the datasheet. With two in series, I would expect that the uncertainty would be 174 volts +/- 7 volts.. R624 and R625 are 10% resistors, I didn't find R626 in the parts list but I assume that it is also 10%.

The preliminary R-390 manual calls out 180 volts +/- 5 volts on page 169 (pdf page 192) when measured with a TS-505. The TS-505 has a +/- 4% FSD specification so it's measurement accuracy is +/- 8 volts on the 200 volt range. Considering all of the above tolerances, 175vdc does not sound unreasonable, IMHO .

Date: Fri, 18 Nov 2022 13:21:46 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 B+ Expected Tolerance

When you mention "new paper caps" did you really mean paper-in-oil caps? I do not trust any paper cap for a long time, except the sealed ones (Sprague Vitamin Q, for ex.) All "real", not vacuum sealed PIO caps develops leakage with time. Better to use Mylar (polyethylene) or polypropylene ones, especially for C608.

There are other causes that can make the output a little low in this circuit: R623 can be of an higher value than the tolerance range.
One of the two voltage divider resistors R616 and R617 can be out of their tolerance range, or both.

V607 can have a higher transconductance than the "mean" value.
The sum of the voltage drops of V608 and V609 should be 170V: if it is lower, the output of the regulator will be lower as well.

Just curious: what is the brand of the 5651 you have there ? They vary by few volts from one maker to the other and when they age also (they tend to go up when they age).

If nothing wrong can be found in the resistor values and you are still unhappy with the 175V (which is not a bad result at all, IMHO), try to lower the value of R626. A 100K resistor bridged across the actual R626 should raise the output by few volts... Adjust value in consequence of the measured result.

Last comment: the HUM BAL. adjustment can "move" the output voltage also. be sure to adjust for minimum AC voltage at the test point J601.

Date: Fri, 18 Nov 2022 14:58:48 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R390 B+ Expected Tolerance

I should've said film caps, not paper.

Vishay MKT1813422254 and Vishay MKT1813410255

Honestly, I'm tempted to put the original parts back in. They're probably still good and may last even longer than these replacements. I'm seeing some very different voltages at V607 and am going to pull the AF deck once again to see if I can determine why those are the way they are. I do note that I'm not seeing 182V on the cathodes of the regulators and, with the 1.5V - 2.0V drop across the load balancing resistors (which, BTW, are running right around 50-ohms), accounts for a bit more of the "under-voltage". As David Wise commented, 175V is probably well within tolerance and I'm picking at nothing but, just the same, it bugs me... Yes - I have adjusted the HUM BALANCE per the manual.

Date: Fri, 18 Nov 2022 17:00:41 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R390 B+ Expected Tolerance

Sheepishly, I'm going to admit that the reason I was seeing very different voltages at V607 is that I was not measuring the pins of V607 but was looking at V604! The labeling on the top of the AF deck confused me a bit and I was off by one tube location.

The voltages are still off just a bit for the real V607 but not nearly as much as I thought. I might have spotted a few things with the new measurements so have more work to do.

Date: Fri, 25 Nov 2022 11:32:12 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R390 B+ Expected Tolerance

Still unable to post to the list...

Yesterday, I experimented with some shunt resistors across R626. 100k had almost no effect; however, I worked my way down to another 2.7k across it (making the total about 1.3k) and that finally brought the regulated voltage up to 180v Since 1.3k is obviously well out of spec, then

I'm wondering what's causing that to work and I'm thinking it may be possible that the 5651s are not drawing the correct current when they fire.

R624 checks high (a little over 600k) but shunting that down a bit doesn't help much at all.

If I'm not mistaken, my Hickok 752A seemed to indicate the proper voltage and current when testing them so not sure if that could be it; however, I did notice that one out of the five tubes I have did yield a much higher voltage than the other four combinations so that might be the case.

Date: Fri, 25 Nov 2022 16:29:50 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 B+ Expected Tolerance

R626 to 1.3K and just 180V on output
No good at all: the problem have to be elsewhere...
I am just wondering that your 6BH6 (V607) can be leaky.
If you have another one, please swap it !
R624 at 600K should not make any difference if there is no grid leakage current from the 6BH6, but it is exactly what I am thinking now...
I already mentioned a possibility of a "higher than normal" 6BH6 transconductance, but internal leakage is also a definitive possibility.

I once encountered a 6DC6 that disturbed the ACG line in my 51S-1 completely. And this particular tube passed all the test on my AVO VCM163 ! But inserted as the RF amp in the 51S-1, it turns the whole set into a basket case... Tubes tester are good, but do not tell you all the truth, obviously. This does not means that a tube that test bad on the tester will perform correctly in the receiver, however.

Like testing the 5651 on your Hickock 752A: this is not the real test to do, because all the testing currents and voltages within are AC. In the R-390 PS, the 5651s should run at 2.7mA and have 85 volts across each of them. The only valid way to test VR tubes is to test those using a DC supply, monitoring both the current thru and the voltage across. It took me few years to understand that, but...

OK, let's change that 6BH6 and try again, please. Don't forget to re-adjust the hum balance with the new 6BH6. If you don't have any, just tell me: it's another tube type I have enough to dance on.

Date: Fri, 25 Nov 2022 17:49:52 -0500 (EST)
From: Barry <n4buq@knology.net>

Subject: Re: [R-390] R390 B+ Expected Tolerance

I tried another 6BH6 and it didn't make any difference (of course they both might be less than ideal).

What I've found is one of the five 5651s has a slightly higher striking voltage (although I can't tell much difference in the current when it does strike). Using that tube along with virtually any of the others gets me 181.5V which leads me to believe the 5651s are still most likely the biggest hindrance from seeing much over 176V regulated voltage.

I adjusted HUM BALANCE afterwards as well.

Date: Sat, 26 Nov 2022 10:03:53 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R390 B+ Expected Tolerance

Given that, I should be seeing very close to 7mV (1000 ohms(2.7^2 mA)) across R625 and 85V across each VR tube, correct?

Date: Sat, 26 Nov 2022 12:57:05 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R390 B+ Expected Tolerance

Correction: That shouldn't be I^2*R but I*R (2.7V across R625). Thanks to Renee for correcting that for me directly.

Date: Sat, 26 Nov 2022 13:27:49 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 B+ Expected Tolerance

Er... not exactly. First, 2.7mA in 1000 ohms gives 2.7V across R625, and ~ 7.3V across R626. The 2.7mA value came from (180V - (2 x 85V) = 10V and 10V/3700ohms = 2.7027mA. ASSUMING that all the voltages and resistance values are exact. The two 5651 passes the same current value, if we neglect the contribution of R627 (85?A). BTW, R627 is there to force V609 to strike first, then V608 will fire. Otherwise, the output can raise up to 230V before the two VR tubes can strike, because their maximum striking voltage is 115V...

TOLERANCES:
A "normal" 5651 should operate between 1.5 and 3.5mA going thru, with a nominal voltage across of 87V, but the regulation spec is 3V from 1.5 to 3.5mA. Other sources (see attached) states that the voltage across can be between 82 and 90V... (argh !) The 85V I used in the previous calculations came from what I measured with many similar VR tubes that I previously

tested, especially European 85A2 variants. To mix the situation even more, the 5651A is spec'd at 85.5V nominal... (GE Essential Characteristics manual).

At the end of the day, if you find a pair of 5651s (or any other variant) that give you a regulator output very close to the 180V target value, keep them there! That "selection" of VR tubes will then override any other parts tolerances in the whole circuit. And yes, having a regulator output at any value between 170 and 190V can be "acceptable", as long as the regulation and output noise holds up.

Date: Sat, 26 Nov 2022 21:20:38 +0000
From: Peter Worrall <g4gjl.uk@gmail.com>
Subject: [R-390] Hum Balance

Recently mentioned in another thread, the hum balance control seems to get little press coverage. I wonder if the hum balance produces audibly different results as it is adjusted? I am of course in a 50Hz environment. I have both an R-390 and an R391, both of which will be on the bench in the next few weeks.

Date: Sat, 26 Nov 2022 14:45:14 -0700
From: "Jordan Arndt" <Outposter30@shaw.ca>
Subject: Re: [R-390] Hum Balance

Yes, you can hear the effects of the Hum Balance adjustment in the headphones, at least I could hear it with mine...

Date: Sat, 26 Nov 2022 21:17:11 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R390 B+ Expected Tolerance

Forgot to attach the spec. sheet.
Sorry for that.
---------- next part ----------
A non-text attachment was scrubbed...
Name: 483.pdf
Type: application/pdf
Size: 102628 bytes
Desc: not available
URL: <http://mailman.qth.net/pipermail/r-390/attachments/20221126/661c182a/attachment.pdf>

Date: Sun, 27 Nov 2022 20:25:36 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R390 B+ Expected Tolerance

To round this out, after replacing several parts that were either out of specification or just very suspect based on looks (spongy-looking resistors anyone?), the regulator's running at 181.5V using the pair of 5651s that got me there so I'm satisfied with it. Thanks again for all the pointers and help,

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Date: Mon, 28 Nov 2022 14:06:11 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: [R-390] Solid State Voltage Regulator

I'm considering building Dr. Jerry's design for the solid-state regulator as outlined here:

https://www.navy-radio.com/manuals/hsn/hsn-issue%2052.pdf

Rather than having to connect the output to the 180V test jack, I'd prefer to make it completely plug-in compatible with the tubes. This means the output will go though the 47-ohm cathode resistors which provide a small voltage drop. Would it be possible to simply add a regular diode(s) in series with the 180V zener diode (D1 and D2 for the initial schematic or just D4 for the alternate schematic) to increase the output voltage by a diode drop or two to do that?

Date: Mon, 28 Nov 2022 15:11:34 -0500
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] Solid State Voltage Regulator

Barry, N3LLL also makes a replacement regulator board, plug-in.
See attached.

---------- next part ----------
Name: r390_N3LLL_SSPSU.pdf
Type: application/pdf
Size: 448173 bytes
URL: <http://mailman.qth.net/pipermail/r-390/attachments/20221128/b32190ee/attachment.pdf>

Date: Mon, 28 Nov 2022 15:15:38 -0500 (EST)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Solid State Voltage Regulator

Yes, I've seen that one. I enjoy building and would like to build my own. It's certainly a fairly simple circuit.

Date: Mon, 28 Nov 2022 14:39:32 -0600
From: Tom Frobase <tfrobase@gmail.com>

Subject: [R-390] R-390 regulator module

After testing in one of my own radio's for 6 months, I have started offering an upgraded version of the regulator I built over the past 20 years. The new one is made on an aluminum substrate printed circuit board, it is easier than the original to install and is fully reversible. The cost is the same, $95 pp CONUS Here is a link to the installation instructions.

http://www.kitparts.com/r390-reg/New-r390-reg.pdf

Date: Thu, 1 Dec 2022 22:39:06 -0800
From: Larry H <larry41gm@gmail.com>
Subject: [R-390] Added Tom Frobase/Kitparts to our 'Parts Sources' list

I have added Tom Frobase/KitParts to our list of 'Parts Sources' on our website, r-390a.net. He has many Boat Anchor parts and a 'R-390 tube regulator SS replacement' (info located here: http://www.kitparts.com/r390-reg/New-r390-reg.pdf). Here's a link to our website page: R390A Parts Sources.pdf (r-390a.net) <https://www.r-390a.net/R390A%20Parts%20Sources.pdf>. kitparts website is here: http://www.kitparts.com.

Regards, Larry

Date: Sun, 4 Dec 2022 21:04:43 -0600
From: Barry Scott <72volkswagon@gmail.com>
Subject: [R-390] Gear Train Question

Aside from the various manuals, does anyone know of any teardown/rebuild sites for the R390 gear-train? There are some good articles on the R390A but I don't see anything for the R390. I've done an R390A so not completely unfamiliar with the process and I think I can do it without additional pictures, etc., but thought I'd ask. In regard to this, is it the case that the entire gear-train can be separated from the RF module without disassembling the gears and shafts? If so, I might settle for cleaning and lubing it as one assembly as opposed to disassembling each gear. The gears in mine aren't particularly covered with grease, etc., and might clean up good enough that way.

Date: Sun, 4 Dec 2022 21:12:04 -0800
From: Larry H <larry41gm@gmail.com>
Subject: Re: [R-390] Gear Train Question

Hi Barry, There's quite a bit of info on http://www.r-390.com. Did you look at that? A link to it is in our 'websites' section of the

'References' page under 'Dave Medley' on our r-390a..net website..

Date: Fri, 24 Mar 2023 23:07:27 -0700
From: Larry H <larry41gm@gmail.com>
Subject: [R-390] Updated R-390 Newbie doc w/MK-288/DA-121 impedance adapter nfo

Hi All, I just updated my R-390 Newbie document on our website with information about the MK-288 impedance adapter kit. It contains the DA-121 impedance adapter to be used with the R-390 series of receivers and a signal generator. It's listed in our 'Reference' page in the 'Other Tutorials' section at the bottom. Here's a direct link to that section: The R-390A 'Other Tutorials' section <https://www.r-390a.net/faq-refs.htm#Other%20Tutorials>.

Date: Sun, 26 Mar 2023 18:48:20 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: [R-390] Signal Corps documents WRT R-390

Found in the preamble of the Final Engineering Report for the R-389 and R-390, September 15, 1953

Signal Corps Contract No.: W36-039-SC-44552Signal Corps Specification: SCL-1134-BDepartment of the Army Project No: 3-24-01-051Signal Corps Project No. 15-805G-2

Does anyone know of or have copies of the above documents?

Date: Wed, 26 Apr 2023 19:02:45 -0500
From: Barry Scott <72volkswagon@gmail.com>
Subject: [R-390] Corrosion Under Green Gear

I finally started the tear-down of my R390. When I pulled the green gear from its home position, I found a considerable amount of aluminum oxidation under it. I'm presuming someone cleaned it with something that harms aluminum (Simple Green, etc.). I put a liberal amount of DeoxiT on it but that didn't really help (didn't think it would). Any ideas what might dissolve that?

Date: Thu, 27 Apr 2023 02:09:34 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] Corrosion Under Green Gear

Bar Keeper's Friend spray foam works for me. Less then $4 per bottle.

Date: Thu, 27 Apr 2023 09:46:59 -0500

From: Barry Scott <72volkswagon@gmail.com>
Subject: Re: [R-390] Corrosion Under Green Gear

I hadn't thought of BKF. That stuff works great on almost anything. Once I get the RF deck out and disassembled, I can try that on it.

Date: Sun, 28 May 2023 22:32:25 -0700
From: Larry H <larry41gm@gmail.com>
Subject: [R-390] Errors in the 'R-390 Cookbook'

There have been many comments posted over the years about errors in the'R-390 Cookbook'. And rightly so. I stumbled across one from Barry Hauser in 2000 and Roy Morgan in 2006 that were similar and quite alarming. I know it seems pretty late to be doing anything about it, but we've had numerous new users since Roy's post, that might be unaware of the issues. I've summarized them and put them in a document on our website and replaced the link to the 'R-390 Cookbook' with it. Here's the link: r-390_COOKBOOK.Errors.pdf (r-390a.net) <https://www.r-390a.net/r-390_COOKBOOK.Errors.pdf>.

If you still want to see the 'R-390 Cookbook', there's a link to it at the bottom of my article. Should I remove all links to the 'R-390 Cookbook' and/or remove the 'R-390 Cookbook' from our website?

Date: Mon, 29 May 2023 18:41:00 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: [R-390] Fwd: Errors in the 'R-390 Cookbook'

Point taken about the 6080. Thanks for keeping up with the changes to the Cookbook. Don, W5OR (SK) would be proud!

As for voltage measurements and such, it is always seems to be overlooked that 115vac is an average voltage, not an absolute. Same for the 180 VDC regulated power supply. Both have tolerances, the former caused by the normal variation of the AC line over the day (+/- 10% when the R-390 was designed) and the latter is caused by the 5651.

The 5651 VR tube tolerance is +/- 5 volts so when in series, the absolute worst case voltage variation is +/- 10 volts. The purpose of the regulated power supply in the R-390 is to hold the B+ relatively invariant over the normal AC supply voltage range. There is no voltage adjustment pot because the actual B+ voltage is not important. The redesigned R-390A, of course, did away with regulated B+. The current regulator should have also been dropped but the Signal Corps made it a requirement, so it lived on.

The TS-505 VTVM is specified as the voltmeter used to test and align the R-390. It has a DC voltage tolerance of +/- 4% of full scale. So the 200 volt range has an uncertainty of 16 volts DC at full scale. For AC measurements, the tolerance is +/- 6% of full scale. Modern DVMs have much better specs so I am sure that the modern test equipment is causing some panic when things are actually within specification.

For test and alignment, the AC line tolerance for the R-390 is +/- 5% which gives a high value of 120.75 VAC. So I would be more concerned with the heater voltage of all of the tubes in the R-390 / R-390A than in the line or B+ voltages. Typically, receiving tube heater voltage tolerance is +/- 10% which guarantees that the tube will meet published specifications. Today's line voltage average is 120 VAC+/- 5% so things are actually better now then in the day, Regards Jim

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Date: Tue, 28 May 2024 00:56:37 +0200
From: "francesco.sartorello" <francesco.sartorello@virgilio.it>
Subject: Re: [R-390] Series 500 IF Module

Hi all, will be home next week and will dig for the 725 manual, I remember that a small power transformer was certainly added to supply the IF chassis with 26Vac for the filaments. Do let me know all the info you need!

Date: Mon, 27 May 2024 23:01:50 +0000 (UTC)
From: "Tom M." <courir26@yahoo.com>
Subject: Re: [R-390] Series 500 IF Module

The small added transformer was for hum bucking on the PTO. I originally thought it was for IF filaments but that?s not the case.

Date: Wed, 29 May 2024 13:55:49 +0000 (UTC)
From: Byron Tatum <bjtatum1@att.net>
Subject: [R-390] R-390 (Series 500) IF Unit

Thanks all for the help! I now have schematics of Series 500 IF unit and the alignment info. My goal is to have a modified R-390 IF unit fitted into an R-390A mainframe for listening pleasure. I don't feel I need the mu-metal shielded PTO nor the hum-bucking filament circuit for PTO/BFO. In this R-390A mainframe I will use the Longmont Labs modified audio deck. I studied the ER article years back when it first appeared and have had an interest in one. I have a boxed one from Longmont Audio Labs to try out, out of an estate. (snip>

Date: Wed, 29 May 2024 18:22:29 +0000 (UTC)
From: "Tom M." <courir26@yahoo.com>

Subject: Re: [R-390] R-390 (Series 500) IF Unit

Good luck with the project.
I did it and wrote the article for ER.
Still use it over 20 yrs later.

Date: Mon, 3 Jun 2024 08:37:05 -0400
From: <kljos@att.net>
Subject: [R-390] Variac Startup for Stored R390

My R390 which was restored by Don Hayward about 12 years ago but has been idle for past 7 years after moving to new QTH. I've read mixed opinions on the forum about slowly bring up the R390A with a variac. is there any major risk with the R390 (non-A)? I will be monitoring current draw with an ammeter. Jerry
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Date: Mon, 3 Jun 2024 18:34:10 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] Variac Startup for Stored R390

Jerry: If the intent is to limit current by controlling voltage then there are much better and safer ways to do this. The typical B+ power supply is a low impedance circuit. By this I mean that a relatively small change in the applied voltage will cause a great change in input current. It is difficult to control voltage steps by turning the knob on a VARIAC, especially if you monitor neither voltage nor current. Using this method is like crossing one's fingers and hoping for the best outcome.

Typically, reforming electrolytic capacitors is the reason stated for using a VARIAC. If the capacitor has not been in use for years then the chance of a low resistance in the dielectric barrier between the etched aluminum foil and the electrolyte is quite high. If a voltage is applied to an electrolytic capacitor in this state then a high current will flow. This will cause the capacitor's internal IR losses to produce heat which can cause the remaining electrolyte to expand and burst the container. If the capacitor reforms quickly then the internal heat produced is low. If the reforming process takes some time then much more internal heat is produced.

One method to control the current supplied to a radio that has been out of service for a while is a dim bulb tester. A fine tutorial can be found here: https://www.antiqueradio.org/dimbulb.htm. The incandescent bulb's resistance is nonlinear. At low current the bulb resistance is near zero. As the current increases, the bulb's resistance also increases thus limiting the current to the radio under test. So a problem in the power supply of the radio will result in a large current and a brightly shining bulb. While

the dim bulb tester is great for testing a reworked radio it does not limit the electrolytic capacitor reforming current to a level that allows the capacitor to reform without producing a lot of internal heat. An easy method to reform an electrolytic capacitor is to pull the rectifier tube and substitute solid state rectifiers in series with a power resistor to limit the current to a level that will not cause a lot of internal heat in the electrolytic capacitor. One can use a salvaged tube base to mount this rectifier and resistor circuit.

The resistor value can be calculated by using the secondary voltage and the limiting current needed to safely reform the electrolytic capacitor. If the power transformer B+ winding produces 300 volts between the center tap and one of the rectifier plates and you want to limit the reforming current to say 50 mA then the resistor's value would be 6k. The wattage would be 300 X 0.05 or 15 watts. This would allow a shorted electrolytic to stay cool or one to slowly reform without getting too hot in the process. As the capacitor reforms, more of the applied voltage is dropped across the electrolytic capacitor and less across the series resistor. Once the voltage across the resistor drops to about 15% of the applied voltage, the capacitor is sufficiently reformed to allow for normal operation. This can take 15 minutes (or less) or dozens of hours (or more), it all depends on the initial condition of the electrolytic capacitor. Remove the resistor and diode network and reinstall the rectifier. At this point the dim bulb tester will let you know if all is well or additional troubleshooting is needed. This rectifier substitute can also be used to test all coupling and bypass capacitors it the radio. Just measure the voltage across each capacitor to see if the capacitor is leaky and a much lower then expected voltage is measured. Regards,Jim

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Date: Mon, 3 Jun 2024 15:07:29 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] Variac Startup for Stored R390

There is no electrolytic capacitors in the power supply of a R-390 (non-A). Put a voltmeter in the B+ test point of the power supply/audio module wrt to GND to monitor the regulated +180V. If the value there stabilizes at +180 ? 2V after power on, you are good to go. If there is too much current drawn by the + 180V line, the output of the regulator will not be able to climb up. If there is an internal fault in the power supply circuitry, the output can go higher than 250 V. If this happens, shut the power off and diagnose the circuit. Last time I seen this type of problem, it was because the filament of V509 gave up.

Date: Mon, 3 Jun 2024 22:22:41 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] Variac Startup for Stored R390

Jacques: This assumes that the R-390 is stock and has not been repaired with aluminum electrolytics. Looking in the manuals for stock "electrolytic" we find: TM 11-5820-357-35P (R390NonA): C231 and C612 are both Tantalum electrolytic caps. C103 is listed as oil filled paper but the schematic shows polarity markings, curious. TM 11 5820-358-34P (R-390A): C603, C606 and C609 are electrolytic caps. C603 and C606 are aluminum electrolytics, C609 is Tantalum. There is no telling what the "dreaded" previous owner has done. With the ongoing stuffing the old components with new, there is no telling what is hidden. Not to mention the circuit "improvements.

Date: Thu, 22 Aug 2024 12:05:19 -0400
From: Nick England <navy.radio@gmail.com>
Subject: [R-390] Large complete R-390A schematic from Signal Corps drawings

John N3JKE has spliced together the 8 individual sheets of the schematic in the Signal Corps drawings archives. He did a great job and it looks excellent. If you want a poster for your workshop, the complete size is 188x40 inches - I think FedEx Office or other places can print that if you like. JPG file -
https://www.navy-radio.com/rcvrs/r390a/drawings/17310-09/09-11-SM-J-249190-COMPLETE%20R-390A%20SCHEMATIC%20DIAGRAM%20120dpi.jpg

PDF version -
https://www.navy-radio.com/rcvrs/r390a/drawings/17310-09/09-11-SM-J-249190-COMPLETE%20R-390A%20SCHEMATIC%20DIAGRAM%20120dpi.pdf

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Date: Thu, 22 Aug 2024 11:30:40 -0500
From: "Les Locklear" <leslocklear@hotmail.com>
Subject: Re: [R-390] Large complete R-390A schematic from Signal Corps drawings

Makes the saying "getting into a schematic" a whole new meaning.
I can envision guys wanting to extend the "shack"

Date: Thu, 22 Aug 2024 09:40:46 -0700
From: Larry Haney <larry41gm2@gmail.com>
Subject: Re: [R-390] Large complete R-390A schematic from Signal Corps drawings

John, Nice work. Very clean. I like having the wiring and filaments on the schematic.

Date: Mon, 2 Sep 2024 18:55:15 -0400 (EDT)

From: Barry <n4buq@knology.net>
Subject: [R-390] Gear Train Removal

While I have the RF Deck out, I'm going to clean and lubricate the gears, rollers, etc. Reading the manual, apparently the from "apron" of the gear train can be removed without all that much difficulty. If I remove that apron, do the gears stay with the main part of the deck or does some of them come off with the apron?

I'm asking because, while I'm still considering a complete teardown (which is just a bit more daunting than the A model which I've done before), it might be good enough if I can maximize the exposure of the gears and just settle for cleaning/lubing them in situ. Any comments on that?

Date: Mon, 2 Sep 2024 18:36:30 -0500
From: Barry Scott <72volkswagon@gmail.com>
Subject: [R-390] R-390 CAM Alignment

In the R-390, I notice that for the 16-32 MC CAM, when the others are in alignment and the lines can be seen through the holes for those, the line for this cam is hidden by the 8-16 MC CAM underneath it. I don't see how that could be visible and presume it's normal but wondering how one is supposed to align the 16-32 MC CAM properly.

Date: Mon, 2 Sep 2024 22:36:04 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] R-390 CAM Alignment

Barry, wasn't supposed to be a second hole in the 8-16 MC cam thru which the index mark for the 16-32 MC one can be seen ? The 8-16 MC cam should be aligned first ! As far as I remember, there is no clamp that can be loosen on the 8-16 MC cam shaft to adjust the cam position. It should be aligned by rotation of the KC knob, then the proper 000 KC reading of the counter can be adjusted and then all the other cam positions in the order specified in the chapter 73 of the TM11-5820-357-35. Be sure to apply the procedure of the chapter 73 (page 88) from the very beginning !

Date: Mon, 2 Sep 2024 22:47:24 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] R-390 CAM Alignment

> Barry, wasn't supposed to be a second hole.....

I don't know if there was "supposed to be" an extra hole, but there's not one in mine. I haven't loosened any camshaft clamps so if it was in

alignment before, then it should still be in alignment now. I mostly just wanted to check it.

> The 8-16 MC cam should be aligned first.....

Yes, the steps are certainly to be followed to the letter. While I don't think it's particularly difficult to get things back in alignment (speaking entirely from just the perspective of the A model), I don't really want to "fix it" if it isn't "broken".

Date: Tue, 3 Sep 2024 03:16:14 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] Gear Train Removal

I think that the tendency is to overdo gear lubrication, not underdo it. The Preliminary R-390 manual says "It must be remembered that over lubrication can cause more harm then no lubrication."? I tend to agree having bought an R-390A from the late Hank Arney that was so over greased, the KC and MC knobs were frozen. A lot of solvent, detergent and denatured alcohol using an acid brush mounted on a dowel to get deep into the gear works finally freed the binding. There was no need to do a complete teardown.

Our brother collectors of clocks do not lube gear teeth, just pivot points, and sparingly. The thought is that grease attracts dust and dirt which does more harm then good. In the half dozen R-390A I have reworked, I have yet to find a worn gear. Has anyone?

Date: Mon, 2 Sep 2024 23:28:45 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Gear Train Removal

I agree. I removed the VR counter just so I could clean behind it and there was so much gunk there. It looked like someone had used some spray lube that had attracted dirt and grime. After I washed the counter, it runs with much less torque. Same for the split gears on the KC gear/clutch assembly. It's already starting to move better and I'm just getting started cleaning it up. I enjoy this part about as much as any part of working on these radios. I just don't like working on a dirty piece of electronic equipment.

Date: Mon, 2 Sep 2024 21:38:57 -0700
From: Larry Haney <larry41gm2@gmail.com>
Subject: Re: [R-390] Gear Train Removal

Hi all, I've had a bunch with over lubed or incorrectly lubed gears,

tuning racks and cams, and a few under lubed digital readouts, but fortunately nothing so bad as to seriously impair operation. I guess I've been lucky. And no worn gears.

Date: Tue, 3 Sep 2024 13:08:59 +0000 (UTC)
From: Thomas Hoyer <thoyer1@verizon.net>
Subject: Re: [R-390] Gear Train Removal

I do the "WD40" Bath to clean the gear trains. I get a big can, remove the RF deck, Place it over a pan and start spraying. I'll use a tooth brush, acid brush, q-tips or whatever needed to help clean the hard to get to areas. The WD40 does a good job at breaking up the old grease / lube. Once everything is loosened up and turning freely I'll let it sit for a day to let the WD40 drip off and go back and lubricate the pivot / rotating points. Right or wrong, I do not lube the gear teeth. I'll end up using pretty much the whole can. Just did a 390A for a local guy. Tuning was hard and clunky. After the above described treatment it is now very smooth. Owner was very impressed!

Date: Tue, 3 Sep 2024 10:41:26 -0400 (EDT)
From: Barry <n4buq@knology.net>
Subject: Re: [R-390] Gear Train Removal

Thanks for the WD-40 tip. I find I'm not fond of the residue it leaves but it definitely will dissolve grease and oil. I'm planning on using an engine degreaser followed by judicious use of synthetic oil where needed. I plan to remove the slug racks and transformers before cleaning to avoid getting any fluid in those. Hopefully it will be enough to get the job done.

Date: Tue, 3 Sep 2024 08:48:38 -0600
From: "Jordan Arndt" <Outposter30@shaw.ca>
Subject: Re: [R-390] Gear Train Removal

I use MG Chemicals Penetrating Oil as a de-greaser, along with dish soap and hot distilled water and a bunch of stiff nylon brushes..any lube goes on after the hot water runs off clean as indicated by white paper towels laid under the front of the deck...It usually takes a few repeats of the process...My .02 worth...

Date: Tue, 3 Sep 2024 15:09:56 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] Gear Train Removal

This is similar to what I have done. I do a four step process with a spray and scrub with WD-40 as a solvent, spray and scrub with Krud Kutter as a detergent, a spray water rinse and then a spray alcohol rinse as a water

release agent.? I use an acid brush attached to a dowel to reach into the gearworks and repurposed spray bottles to apply the liquids.

Repeat the above as many times as needed but always end with water then alcohol rinse. My feeling is that neither WD-40 nor Krud Kutter will attack all deposits found in the gearworks. Nothing special about Krud Kutter except that it doesn't appear to attack aluminum, not sure about other similar products.

Date: Tue, 3 Sep 2024 15:48:58 +0000 (UTC)
From: Thomas Hoyer <thoyer1@verizon.net>
Subject: Re: [R-390] Gear Train Removal

I have also used Brakleen - in the green can for some of the harder stuff.

Date: Wed, 4 Sep 2024 09:26:32 -0500
From: Barry Scott <72volkswagon@gmail.com>
Subject: Re: [R-390] Gear Train Removal

Well, I don't quite know how it happened, but I can no longer get all the cams properly aligned. As I mentioned, I've removed the VR counter so that's one point of reference that I no longer have. I had been rotating the MC change gear one click or two and then back and no problem; however, I think I lost track of which way I had rotated it and now I can't get back to where 2.000 would normally be displayed by the counter. I'll mention that I've kept the Green Gear in place and, contrary to my previous comment, that gear does indeed keep the MC and KC gears synchronized and, given that, I don't know how they're no longer where I can get them back in sync.

According to the manual, as part of the complete gear teardown and rebuild (which I still have not decided to do), one is supposed to be able to rotate the MC gear CW (which I presume is taken to mean "CW as viewed from the rear"), until it hits a stop point and then, back up to the nearest notch which should correspond to 0.000. My presumption is that if I back off to the 3rd click, that should correspond to 2.XXX and rotating the KC shaft should eventually get the gears (and cams) in the 2.000 position. I found that there is something that causes a "stop" at full CW and full CCW. I think that stop is happening as a function of the Geneva mechanism and not the 10-turn stops (which aren't engaged when the RF deck is removed); however, CW or CCW still won't let me get the gears/cams in their proper setting and am wondering if I'm now truly "stuck". Any help is appreciated.

Additionally, to avoid getting the transformers' cores wet, I'm removing the slug racks and transformers while cleaning the gears and, right off, I

found that one of the slugs (for Z2223) was broken. I'm sure that didn't help performance any. I have it CA glued back together so that should help when I get this all reassembled.

Date: Wed, 4 Sep 2024 09:45:38 -0500
From: Barry Scott <72volkswagon@gmail.com>
Subject: Re: [R-390] Gear Train Removal

Make that Z223, not Z2223.

Date: Wed, 4 Sep 2024 13:22:52 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] Gear Train Removal

Barry, some COMMENTS imbedded in your text below.73, Jacques, VE2JFE in Montreal

Well, I don't quite know how it happened, but I can no longer get all the cams properly aligned. As I mentioned, I've removed the VR counter so that's one point of reference that I no longer have.

AH, DON'T WORRY: I HAVE DONE THE SAME FEW YEARS AGO....

I had been rotating the MC change gear one click or two and then back and no problem; however, I think I lost track of which way I had rotated it and now I can't get back to where 2.000 would normally be displayed by the counter.

FOR THE MC POSITION, JUST RELY ON THE ROTATING DIAL OF THE SYNC XTAL OSC THAT INDICATE ON WHICH MC POSITION THE SWITCHES ARE.

I'll mention that I've kept the Green Gear in place and, contrary to my previous comment, that gear does indeed keep the MC and KC gears synchronized and, given that, I don't know how they're no longer where I can get them back in sync.

IT DEPEND ALSO IF YOU SET THE PROPER MECHANISM POSITION CORRECTLY BEFORE REMOVING THE RF DECK. READ THE CHAPTER 59 CAREFULLY AGAIN !!! THEN, ROTATE THE KC SHAFT AND TRY FIRST TO ALIGN THE 8-16 MC CAM. IF YOU ARE LUCKY, ALL THE OTHER ONES WILL ALIGN (IF THEY WERE ALIGNED CORRECTLY PREVIOUSLY).
IF NOT, TRY A FULL TURN AROUND LEFT OR RIGHT (DEPENDING THAT YOU REMEMBER OR NOT WHAT YOU HAVE DONE BEFORE). OR... JUST TAKE THE PROPER ALIGNMENT OF THE 8-16 mc AS THE STARTING POINT AND FOLLOW THE FULL CAMS RE-ALIGNMENT PROCEDURE

CAREFULLY !

According to the manual, as part of the complete gear teardown and rebuild (which I still have not decided to do), one is supposed to be able to rotate the MC gear CW (which I presume is taken to mean "CW as viewed from the rear"), until it hits a stop point and then, back up to the nearest notch which should correspond to 0.000. My presumption is that if I back off to the 3rd click, that should correspond to 2.XXX and rotating the KC shaft should eventually get the gears (and cams) in the 2.000 position. I found that there is something that causes a "stop" at full CW and full CCW. I think that stop is happening as a function of the Geneva mechanism and not the 10-turn stops (which aren't engaged when the RF deck is removed); however, CW or CCW still won't let me get the gears/cams in their proper setting and am wondering if I'm now truly "stuck". Any help is appreciated. Additionally, to avoid getting the transformers' cores wet, I'm removing the slug racks and transformers while cleaning the gears and, right off, I found that one of the slugs (for Z2223) was broken. I'm sure that didn't help performance any. I have it CA glued back together so that should help when I get this all reassembled.

Date: Wed, 4 Sep 2024 13:42:58 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] Gear Train Removal

Ah, also forgot to mention: the RF deck have to be re-installed in the frame (see procedure chapter 59) BEFORE any re-alignment is attempted !

Date: Wed, 4 Sep 2024 18:18:49 +0000 (UTC)
From: Jim Whartenby <old_radio@aol.com>
Subject: Re: [R-390] Gear Train Removal

What you have experienced was a known shortcoming of the original R-390 design and is mentioned in "Chapter 6.0 Recommendations" starting on page 79 of the Final Engineering Report. Also mentioned are mechanical filters and tubes used that could have been upgraded if better tubes were available earlier in the design. But at some point, the design work had to stop or it would have never left the engineering phase. There is a point reached where the design is "Good Enough" aka GE. Relax and take a breath, nothing you have done is fatal and all can be corrected. Keep us informed.

Date: Wed, 4 Sep 2024 18:15:01 -0500
From: Barry Scott <72volkswagon@gmail.com>
Subject: Re: [R-390] Gear Train Removal

Success! TM 11-5820-357-35 (1962), at the top of page 84 (Step (50) (a) states that S206 should be on contact 5 for MC=2 (contact 7 for MC=0 and contact 6 for MC=1). Once I had that in position, then rotating the KC gear eventually brought all the cams into alignment. Whew!

Date: Wed, 4 Sep 2024 19:49:11 -0400
From: <thoyer1@verizon.net>
Subject: Re: [R-390] Gear Train Removal

Good deal! I remember when I got my 390, there was no green gear and someone had messed with the gear train - probably why the price was right..... I fought with that mechanism alignment for many hours and kept telling myself that it went together at the factory so I should be able to do it too. Eventually it all came together and the radio works well! Congrats, on to the next item.....

Date: Thu, 5 Sep 2024 10:32:48 -0400
From: "Jacques Fortin" <jacques.f@videotron.ca>
Subject: Re: [R-390] Gear Train Removal

Good news ! Let us know how the alignment goes.
