

## R-390 and R-390A Thread to November, 1995

Note: This compilation is not complete. Some posts undoubtedly got lost in the great Internet Black Hole and never reached me. Some I just left out. Many initial posts are deleted, because their questions are contained in the reply posts. The order is erratic - mostly it's organized by the original Subject Heading. But people sometimes change the heading as a thread progresses, or reply with their own heading. Thus, there are posts that are connected in terms of content, but don't appear together. Signature blocks have been deleted, unless they contained an e-mail address. Many folks don't include an e-mail address in their signature block, so remain somewhat anonymous! All headers have been deleted. The spelling has been cleaned up a bit, only so that I can use a search program without missing stuff because of odd spellings. A bit of editing has been done on some posts to shorten them. All errors and omissions are either the work of the original poster, or myself! However, note that folks are sometimes careless in differentiating the R390 from the R390A. There may also be the odd comment about other RXXX receivers. There is a lot of "R390(A) Lore" which I find fascinating, even if it ain't all that technical. Also, contrary information may be contained in some posts, so caveat emptor!

Subject: 2nd R390A good ' n bad news

Last night I turned over the "newer" R390A and started troubleshooting in earnest. Turns out it had been hacked more than imagined -- PTO has been solly-stated, and an IC audio amp had been added to help out the original as far as driving a modern low-impedance speaker. And a few other things.

So, imagine my amazement when the reason for its totally dud performance turned out to be a TUBE, namely the 6BA6 last IF amp! With an NIB RCA replacement, it is now a very "hot" receiver! Funny, it played for half an hour when I brought it home, before that tube expired. It had the original military 5xxx type number, so may have been born with the set. Power supply has been silicon-diodized, with a 50 ohm series resistor. I'm in no hurry to scarf up 2 more 25Z6s to restore it to original (would be easy) - don't need the heat or expense. Front end alignment was already pretty good, but playing with the panel of crystal trimmers worked miracles! Some of those trimmers had probably never been touched since the factory.

I thought the previous owner had bypassed the AC on/off switch, but turns out the microswitch that rides on the Function switch sticks sometimes. Anybody got any ideas?

Biggest problem is the BFO and product detector (buried under the IF sub-chassis, which I haven't yanked yet) are dead. Maybe I'll leave the other R390A set for SSB/CW (it has a prod detector hack whose little relay must be manually put in one position or the other) and use this one for AM. It does overload a little on strong AM stations, sow ill have to work on that.

PTO tracking on this one is much better than on my previous set. Made by "Cosmotron" of Long Island, NY, as opposed to "Progresstron" on my older one. Oops, that's "Cosmos Industries" or something like that. Either they or I have been watching too many '50s sci-fi flicks.

--mike k

Subject: 2nd R390A good n bad news

>I thought the previous owner had bypassed the AC on/off switch, but turns out the  
>microswitch that rides on the Function switch sticks sometimes. Anybody got any ideas?

Dallas Lankford published an article in the "Hollow State News" on fixing this troublesome microswitch, sometime in the past two or three years. The article was also reprinted in the IRCA "DX Monitor" and NRC "DX News". I don't have my index to HSN handy (it's at home, I'm at work), but perhaps someone else can supply the issue number. All back issues of HSN and an

Ralph Sanserino  
P. O. Box 1831  
Perris, CA 92572-1831

Make checks payable to Ralph. Subscriptions are \$5 for 4 issues; it's published 3 times a year. I think a complete set of Hollow State News is essential for anyone trying to maintain an R390A.

Steve Byan Internet: steve@hi.com

Subject: 2nd R390A good n bad news

Heh heh, even better news! Last night I noticed that the BFO Pitch shaft was sticking out from the panel a bit. After turning it about 3 times, what do I hear but good old BFO whistle on the AM station I had tuned in! Seems this particular knob and panel are missing the built-in limit stop that holds the knob to within +- 3 KC rotation, and it had gotten cranked out about 3 extra turns! I'm lucky the little PTO wasn't damaged. So for all its hacks, I now have a completely operational R390A, except that the 13 MC crystal appears dead. That band is dead quiet, and turning the trimmer for 13 MC has no effect. Anyone want to sell me a spare crystal? Well, first I'll pop open the box and see if it's just loose in the holder, etc. BTW, the product detector hack was well done in terms of volume matching - - if you zero-beat an AM station and cut the BFO in and out, you hear no change in volume. My only complaint is that on AM the detector definitely overloads a bit, and turning down the IF Gain doesn't seem to help much. That control was wide open, but the previous owner may have done that to compensate for that near-dead 6BA6. And another good point -- the limiter seems to work with BFO on.

73, mike k w9nrd

Subject: 2nd R390A good n bad news

Original from Mike K. re: 390A#2:

>Seems this particular knob and panel are missing the built-in limit stop that holds the knob  
>to within +- 3 KC rotation, and it had gotten cranked out about 3 extra turns! I'm lucky the  
>little PTO wasn't damaged.

Definitely. Both the main PTO and neat little BFO inductor can be damaged by letting the lead screws traverse too far..

>BTW, the product detector hack was well done in terms of volume matching -- if you zero  
>beat an AM station and cut the BFO in and out, you hear no change in volume. My only  
>complaint is that on AM the detector definitely overloads a bit, and turning down the IF  
>Gain doesn't seem to help much. That control was wide open, but the previous owner may  
>have done that to compensate for that near-dead 6BA6.

Since my IF module is now well-hacked, I can pass along something you can try to gain a little more AGC range, or another tip to avoid detector overload. Easy method: just detune the transformer (503? My notes are not nearby) that drives the diode detector to the point where it doesn't overload on a very loud AM signal. Monitoring the diode load voltage with a scope is helpful.

>And another good point -- the limiter seems to work with BFO on.

Just wondering, since the negative level of the AM detector diode helps to bias the noise limiter to a level appropriate to the signal being received, is there any bias being fed to the limiter when that product detector is cut in? As in leaving the diode connected to provide a DC voltage to the limiter while allowing the product detector audio output to ride on top? I've been musing a suitable method of doing this, as I'm freely hacking at my IF module while I locate a suitable replacement that works per OEM design (that probably won't be used until trade or resale <grin>).

I have a minibox with a tube version of Goodman's dual time constant (rf and af loops) 'hang' agc circuitry contained thereon which I'm hoping to adapt to the 390A. All the convenient inputs, outputs and jumpers on the 390A beg for these black-box but no-holes modifications. I had a solid state hang agc circuit slapped into my old tube (later SS) SB301 and really enjoyed crusin' the low end of 40 running QSK with my SB401 about 9 years back. SSB operations were a joy with this style of agc as well. Interesting that no rice boxes that I know of use a hang agc circuit. These things are great, if you have a front panel hang time control as well as time constant selection!

73! - Mark, NE9G

Subject: 2nd R390A good n bad news

Good stuff by Mark, NE9G.

First, I'd overlooked the fact that since the AGC and audio detectors are fed separately, one can indeed detune an IF to reduce the drive into the audio detectors, whether the original diode or an add-on product circuit. Easy enough to try, and to undo later -- just tune in an AM BC local and monitor the Diode Load DC output. About using the limiter on SSB/CW: The 6BE6 hack in my 1st R390A breaks the diode detector circuit and so nothing gets to the limiter system in the way of DC bias, so no it doesn't work. But I worked through the original schematic and found a place further down the line where I could move the relay/switch that would leave the DC path intact. Apparently whoever put the solly state PDet hack in my 2nd receiver went to the trouble to get it right. Don't know if he crammed a relay under the IF chassis or used diode switching. Hard to believe I haven't pulled out the IF chassis yet to look under, now that it's working. I remember the Handbook "audio hang" AVC circuits, but never heard one working. Didn't someone just post about how you could screw a diode bridge directly to the Line Audio outputs and feed the negative output into the Remote AGC? No kidding about all the wonderful things that are brought out to the rear of the R390A. Only needs an IF In and a Phono In (hi hi). BTW, I found my dead 13 MC band problem. The original big crystal had died, so someone replaced it with a modern small one. Unforch he didn't have any of those crystal socket adapters (like you used to plug a VFO into an crystal socket) to mount the little crystal, so he did a solder hack with some heavy gage wire. Amazing it lasted this long... I'll try to find a couple of those adapters (another crystal is done the same way) and re-do it right. The new crystal works great if you jiggle the wires. Also BTW this 2nd R390A and I discovered that CHU (Canada's WWV) has yet another "harmonic" transmission on 14,670. Rarely audible in Chicago.

--73, mike k w9nrd

Subject: 2nd R390A good n bad news

Mike if you want to check the main dial you can use the local AM stations. You will find their frequency within a few Hz. I think the standard is 20 Hz max. A quick PTO check will be to set BFO to "0", IF selectivity to 0.1 and tune for null at various spots across the dial. Locally we have 550, 720, 1120, 1260 and 1600. I was amazed at how close the R-390A tracks.

Subject: 390A DIAL LIGHT

Well, I just put plain old 6V pilots (41 or 47 type) in my R390A and they light up dim, but bright enough to read the numbers, which is more than I can say for the dashboard lighting in my car. And those bulbs should last forever that way.

Subject: 6 kHz filters for Collins R390' s ?

- >For that matter, are there KIWA filters that are suitable for
- >use in an R390A? In terms of impedances and size (nice if one would
- >fit in place of the 8 KC cartridge).

I think Dallas Lankford has been writing about fitting 6 kHz filters to R390A's in Hollow State News. I think at least one was also reprinted in the IRCA's DX Monitor. I'll check my back issues over the weekend and post a summary back here.

BTW, the new Collin's torsional filters come in 6 kHz bandwidth. Pretty reasonable prices, too.

Regards, -Steve Byan Internet: steve@hi.com

Subject: 6 kHz filters for Collins R390' s ?

Hollow State News #30: "Collins Torsion Mechanical Filter for the R-390A" by Ralph Sanserino adds 6 kHz Collins mechanical filter immediately after the 3rd mixer. Limits maximum bandwidth to 6 kHz (with 8 and 16 kHz filters selected, b/w is 6 kHz). Mod involves removing the RF chassis. Improves close-in dynamic range on non-crystal filter bandwidths. BTW, this article claims the R390A close-in dynamic range is significantly better on the 0.1 or 1 kHz CW bandwidths; it's

reputation as having a high dynamic range apparently comes from measurements using these CW filter bandwidths.

This article also appeared in the National Radio Club's "DX News" Vol. 61, No. 2. Hollow State News #35: "R-390A Filter - Mod 2" by Ralph Sanserino.

Mod 2 adds a 6 kHz LF-H4S ceramic filter (available from Kiwa) to the IF chassis.

Hollow State News #36: "R-390A Filter - Mod 3" by Ralph Sanserino. adds Kiwa 3 kHz filter module in place of 16 kHz mechanical filter (which is made useless by the previous 6 kHz filter mods). Very difficult mod. Dallas says: "Is this filter mod worth the effort? Probably not." HSN back issues can be purchased for a check or money order payable to "Ralph Sanserino" for US\$1.00 (USA, Canada, and Mexico) US\$2.00 elsewhere per issue.

Hollow State News  
c/o Ralph Sanserino  
P. O. Box 1831  
Perris, CA 92572-1831 USA  
Steve Byan steve@hi.com

Subject: Are the Hot Rods Back ?

In the 1950's and the HF Novice bands were alive and well the Hot Rods were the numerous versions of the 6L6/807 transmitters. In the receivers we added R9'ers and external Q-multipliers. Remember the aluminum foil covered bamboo fishing poles for beams. Looking back at some of the commercial gear, our Hot Rod homebrew rigs plus every way but up ARC-5 conversions; it is amazing that many of us were able to work WAS and DXCC. But we did. And it was fun working with the full blown hot rods of the day.

Then we entered the commercial era - On the high end you got a Collins with the middle of the road being Drake and Swan. Now the rigs were too complex and expensive to ruin the resale value with modifications. And our beloved Hot Rods disappeared.. Altho a few of us brave souls did some wonderful things with the R4C. Well fellows I think "Jack is back" Yes, Jack the Hot Rodder has found an excellent replacement for the ARC-5's. I believe today's Hot Rodder is the R-390A owner. A quick review of e-mail on the Boat Anchors list, Electric Radio Articles and Hollow State Newsletter indicates there is a high performance receiver we can afford to purchase, modify and use on the hams bands. And if you are careful; it will out perform the high cost rice boxes.

Now if we can just find a suitable transmitter for our hot rod operation. Yes, I think the Ham Radio Hot Rodder is back. As always my comments are my own. I would be interested in your comments on the subject.

de stan ak0b e-mail via randyw@crl.com

Subject: Audio from R390A

Jack--

Mouser or Hosfelt have the transformer you are looking for: 500 ohms to 8 ohms, at prices far less than Fair Radio. But..... for better audio, buy a \$19 mono amplified speaker from Radio shack and connect it to pin 14 on the back of the R- 390A. Looking over the top of the R-390A at the back, it will be the next to the last pin on the far left (the last pin is ground). You will then be taking the audio straight from the detector. I guarantee you will be pleased!

-tom bridgers KE4RHH Bridgers@A1.CCL.org

Subject: Audio Quality, 390 vs.390A?

I haven't heard a 390, but it is certainly true that the sharp mechanical filters of the 390A can make audio sound very harsh under certain conditions. If the audio has significant energy (lots of treble) at the edge of the filter's bandpass, then it excites "ringing" and you get it as high-frequency noise at the bandpass edge.

I know of two ways to avoid it. First, use a wider BW than the signal has. This lets in more QRN and QWM but delivers the best fidelity and clarity. The other is to use an outboard audio amplifier with a tone control or graphic equalizer or (best) parametric equalizer to cut off the treble response a little bit short of where the rx's bandpass filter cuts it off. This will cut out the ringing harshness. I've \*heard\* that the 390's straight L-C IF filters are less harsh, but that's for owners to say. --mike k w9nrd

Subject: Bad Cap Kills R390A filters

I read in an issue of the Hollow State Newsletter that there is a paper cap in the filter circuit of the R-390A. (Nowhere near a manual now...sorry.) I would assume this is the coupling cap into the filter.

Anyway, the story went that one unlucky soul wasn't getting any audio from the rig, and switched to all the filter positions, trying to see what was wrong.

That cap was shorted, and put B+ into the filter. Actually, all FOUR. The recommended replacement is a .01 600V job, and thanks to Steve Byan on the List, I have one to install when my Round Tuit alarm goes off.

I guess my question here is, are there any other receivers out there with similar catastrophes waiting to happen? Like, f'rinstance, the 75A-4?

Something to think about!

--Andy wallace@mc.com

Subject: Bad Cap Kills R390A filters

Hi,

>I read in an issue of the Hollow State Newsletter that there is  
>a paper cap in the filter circuit of the R-390A. (Nowhere near a manual  
>now...sorry.) I would assume this is the coupling cap into the filter.

Yes, this is C553 which couples the plate of the 1st IF amp V501 into the filters. Someone suggested replacing it with something more reliable which is a really good idea.

When I got my R390A it didn't take long to discover the AGC wasn't working properly. This turned out to be caused by a short to ground in the output windings of one of the mech. filters. I worked around it by modifying the grid circuit of V502 to shunt feed in the AGC through a high value resistor (about 100k) and isolated the mechanical filter outputs with a 0.01 cap in series with the lead from the bandwidth switch, grounding the common point where the AGC used to feed to the mechanical filters. It seems to work OK and I'm pretty sure the 4Kc filter is the shorted one as it doesn't sound "quite right".

I've got a new filter from Fair Radio but am still working up the courage to replace it - the wiring around those filters is <not> easy to work on!!

73, Morris

Subject: Bad Cap Kills R390A filters; ID that Cap!!

>I read in an issue of the Hollow State Newsletter that there is  
>a paper cap in the filter circuit of the R-390A.

It is C553. Every IF deck I work on gets a 0.01uF 1kV cap in there, first thing! BTW, some R390A manuals have C553 MISLABLED in the pictorial diagrams as C533. If you go by what it says on the IF chassis, and in the T of O part of the manual, it is C553.

Shaun P. Merrigan merrigan@nyquist.ee.ualberta.ca

Subject: Ballast tube replacement: here' s how

I'm not familiar with the R-390A or its ballast tubes, so I might be blowing hot air here, but my experience with my RT-70 and AM-65 might be helpful. The AM-65 has a ballast tube which sets the

filament current in the RT-70 to about 600 mA. My unit seems to have the wrong tube in it; it passes about 800-900 mA, which overloads the filaments and kills tubes. Since I know how hard it can be to find the right ballast tube, I wimped out and built a solid-state replacement for it. The good news is that my replacement plugs in place of the original ballast tube, so it doesn't damage the radio set, and I can un-modify the set in about 30 seconds if and when I stumble across the right tube.

The replacement I built is basically just a voltage reference, a dual op-amp, a pass transistor and a few discretes, wired up as a constant-current source. I built it on a small piece of perf board, attached it to an octal tube base, and slid a piece of PVC pipe over the board. I cut away the pipe to allow air to flow over the heat sink and keep the heat sink from touching the pipe. The heat sink gets pretty hot (the transistor is dropping about 6.3 volts at 600 mA), but in my set it doesn't seem to harm the PVC tube. Somebody with better mechanical skills and tools than I have could probably come up with better packaging. It regulates the filament voltage very well. It regulates more tightly than the original ballast tube, but otherwise it is functionally the same as the original ballast tube (although it only can pass current in one direction, so it cares about the polarity of the voltage on its pins).

Maybe a similar unit could be built to keep an R-390A warm while you look for the right ballast tube at the right price. Let me know if you need more details about my ballast replacement. I could post a Postscript file of the schematic easily enough, or mail a copy of the schematic to anybody who sends me an SASE if necessary. The design should be fairly easily adaptable for other uses.

Mark J. Blair, KE6MYK mark.blair@tus.ssi1.com

Subject: Black Face R390A?

>Mark Shaum <mshaum@xnet.com> wrote, re: Fair Radio and 390A shipping  
>One warning, tho. Anybody ordering a unit may inquire as to possibly paying  
>a bit extra for proper packing?

May I jump in to support that idea? I've just taken delivery of a beautiful black-face R-390A mounted in an equally beautiful contrasting gray cabinet. But it arrived via UPS with shipping damage. It's still a Black face? I was considering redoing one of my 390A front panels with a white lettering on black background motif. Strictly for my unit that will shortly spout some additional positions on some of the switches <g>. Was a black 390A ever produced in a manufacturing production run? Anyway, glad yours arrived without too much damage. These things definitely need a wooden crate shipping container, or some very dense packed spray foam separating inner from outer cardboard boxes..

73! - Mark, NE9G

Subject: Black Face R390A?

>Black face? I was considering redoing one of my 390A front panels with a  
>white lettering on black background motif. Strictly for my unit that will  
>shortly spout some additional positions on some of the switches <g>. Was a  
>black 390A ever produced in a manufacturing production run?

I find the shiny black panel with white lettering to be very attractive, especially in the gray case. This one has been repainted but according to Les Locklear (see recent ER in which a picture of him and this radio appears) it was originally manufactured as a black panel radio. The story is that a small number of these were made for non-traditional intercept purposes. I'd be happy to hear from any R-390A historians who can confirm or deny this story.

Dick Dillman/WPE2VT <ddillman@igc.apc.org>

Subject: Cosmos PTO end-point / linearization

>To accurately adjust the linearization compensators at \*each\* 25 kHz point, one would >need to make an adjustment jig with a large (or geared) substitute dial mechanism -- or >figure out how to make the adjustments with the PTO installed in the chassis.

Isn't the 390A PTO (and its family) one MHz range for every 10 turns, exactly? So it seems to me you could be in business with a simple turns counter. If it has tenths-of-turns, all the better, but a needle pointing at a mark on the coupling to the counter would assure you're spot-on. The frequency

counter would be a must... I imagine a jig like this would be useful for the other PTOs as well, and you could just tap the stacks into line while watching the counter.

--Andy wallace@mc.com

Subject: Cosmos PTO end-point / linearization

At 03:27 AM 9/22/95 -0500, SHAUN MERRIGAN wrote:

>So we have established that: Cosmos PTO's do have an endpoint  
>adjustment, they also have a unique compensation stack adjustment which  
>is accessible from the outside of the PTO. This raises the possibility  
>that one could do an endpoint/linearizing adjustment without having to  
>remove the PTO shielding cans. Anybody tried it??

Shaun et al.,

Yes, I've tried it -- made a first pass at it anyway! And I can confirm that your description of how the PTO works is quite accurate, from my experience. I adjusted the end-point slug with the PTO removed from the R-390A chassis and hooked up to a frequency counter. This procedure worked fine, and I was able to correct for my approximately 1% (10 kHz in 1 MHz) PTO/dial error. I put a paper template under the shaft coupler plate, and that worked accurately enough to get it within +/- 100 Hz on all 100 kHz calibration points.

Now, as far as adjusting the little linearization compensators (of which there appears to be one for each 25 kHz of tuning range), I found I really couldn't get an accurate enough position measurement with my paper template method except on a repeating 360-degree basis -- i.e., a single calibration mark per rotation for each 100 kHz point.

To accurately adjust the linearization compensators at \*each\* 25 kHz point, one would need to make an adjustment jig with a large (or geared) substitute dial mechanism -- or figure out how to make the adjustments with the PTO installed in the chassis. Right now, I'm figuring to work on the latter approach. It appears it will require some specialized tweaking / viewing tool(s). Roy Morgan and I are collaborating (cross-country) on this dubious endeavor. Any and all advice from other intrepid souls who have "been there and done that" is eagerly solicited.

In any case, at the moment I have probably +/- 200 Hz accuracy anywhere along the 1 MHz range, with +/- 100 Hz accuracy at the 100 kHz cal points. Not bad... but not as good as it could be. This was just a first attempt to figure out how it worked and what might be done.

Electrical/thermal stability of this PTO appears excellent, BTW, especially with the oven running. So far, I would give the Cosmos PTO pretty good marks, both in terms of design and implementation.

One thing I want to mention, however. It was previously stated that Cosmos moved the end-point slug access hole over behind the output transformer. In order to access and adjust this slug, it is necessary to remove the output transformer shield can. The PTO's B+ goes through this inductor, which is cleverly wired to its base with BARE BUS WIRE. A non-conductive alignment tool and other insulating precautions are \*highly advisable\* here.

(Obviously, this is one area where Cosmos \*doesn't\* get high marks for design!)

Stay tuned... Bill VanAlstyne, N6FN bill@cruz.com

Subject: CV-591 SSB converter HELP

>Just picked up one of these and would like to try it out. No manual.  
>Until I get one, could someone give me the pinouts of the twelve  
>terminals on the back? I assume this is for 455 kHz IFs, and I  
>would like to attach it to an R-390A.

The rear panel connections are as follows:

Terminal strip E1

1 - 600 ohm audio

- 2 - 1mW 0dbm audio
- 3 - Common for above \*
- 4 - 8 ohm audio, 2W high, 150mW low
- 5 - Common
- 6 - 600 ohm audio, 2W high, 150mW low
- 7 - Ground
- 8 - Sideband
- 9 - Ground
- 10 - BFO Relay
- 11 - Ground
- 12 - Bandsread

\* - When no load is connected across terminal 4 & 5 or 6 & 5 or pins C & D or B & D of P4, connect jumper across terminal 1 & 3

Plug P4

- A - 600 ohm low, 1 mW
- B - 600 ohm 2W high, 150mW low
- C - 8 ohm 2W high, 150mW low
- D - Common

Okay, so much for that. Here's how I have \*my\* '591 hooked up to the '390A:

IF input to J1, 8 ohm speaker connected to 4 & 5 of E1, high/low output level switch to high.

Did you ask about V9 in another message? It's a 12AU7 and functions as a side tone generator and relay driver: "When an applied negative on the grid is sufficient to cut off the stage, the relay K3 is deenergized. This action in turn trips the sideband two step relay K2."

Best Regards, Dick Dillman/WPE2VT <ddillman@igc.apc.org>

Subject: CV-591/URR info please...

- >Please reply if you haven't got answers to your questions. I have
- >a 591 manual at home, from Fair Radio, but I'm winding up a week in
- >New Orleans and won't be home until Saturday.

Bill, your the only reply I got on this as of yet. I would really appreciate it if you could e-mail me the pin out or hook-up information for interfacing the CV-591 to an R-391 (R-390). As I said in the first message, I also would like to know the function of the missing tubes, V9 and V10.

Thanks, Sean

Subject: Dead band segments on R390A

I finally got some time to start going through my R-390A band by band with a signal generator, and discovered that I apparently have some bad 2nd osc crystals (my tentative conclusion). I'd like some corroboration or whatever from you experts! Bear in mind the radio is thus far not realigned or tweaked up in any way. Here's what I did:

1) I set my signal generator for exactly 100 uv output in the center of each 1MHz segment, tuned in the signal, peaked the antenna trimmer, and recorded the carrier level meter reading. Generally, I got somewhere between 35 and 45 db.

2) On the 1MHz, 18MHz, and 28MHz segments, however, the generator's signal was undetectable at any output level. Zilch. The 1 MHz and 18MHz segments use the same osc frequency (21MHz); the 28MHz segment's osc frequency (31MHz) is not shared. My conclusion here is that these two crystals (10.5MHz [Y402] and 15.5MHz [Y415]) are deaders.

3) A third pair of segments, 3MHz and 20MHz, both use the 23MHz osc (11.5MHz [Y404]), and produce a severely attenuated signal (about 10db) -- but the signal is there. Peaking the oscillator output capacitor doesn't increase the level.



What I would do now, if I had a scope (I can borrow one from work if I need to), would be to look at the output of the osc at each of these band positions. It seems pretty clear that I have at least two bad crystals. But what about the "weak" segment pair? Can a crystal be "bad" in such a way as to cause the heterodyne out of the mixer to be way down in amplitude?

If anyone knows of a source for these crystals or has any for sale, please let me know. (I'll confirm that the crystals are definitely bad before jumping to conclusions, of course.)

Any feedback appreciated...

Bill, N6FN bill@cruz.com

Subject: Dead band segments on R390A

I too would appreciate a source for R390 xtals.

My 2nd set had two dead ones (yes, they fail) replaced with CB-walkie-talkie size jobs. Unforch, someone did a hideous both of soldering thick wire stubs to the crystal pins so they would fit the big old sockets. I'd like either full-sized xtals or a socket adapter.

BTW, it sounds like your xtals are indeed bad. Don't toss 'em, but cut the can from the base, and use the base to solder in the modern CB size, if that's what you get for replacements.

Or send 'em to me and that's what I'll do :- ) 73, mike k w9nrd

Subject: Fair Radio and R390A' s

I decided to opt for a "used-repairable" R390A from Fair Radio as the incremental cost over that usually found for a tested/guaranteed IF module that I needed was minimal. A call to inquire as to what "used-repairable" meant yielded their test procedure: "We check them out by tuning them to a local AM station. If we get audio, it's Ok." These units are reported to be physically complete, 'cept no covers or meters. \$175 catalog price.

One warning, tho. Anybody ordering a unit may inquire as to possibly paying a bit extra for proper packing? My unit arrived in a cardboard box barely large enough to hold the unit. Packing materials consisted of an inch to two inches of crumpled newspaper. Not even close to sufficient for a unit of this weight. The unit was quite dirty, and had apparently shared a room with somebody applying white paint somewhere with an airless sprayer. The minuscule white dots on the front panel cleaned up easily. The overspray on the knobs didn't..

My unit had the right rear lower corner displaced about an inch and a half, with the right side and rear panels curled inwards over 90 degrees. I believe this damage did occur in shipping, as there were plastic pieces in the box from the smashed B+ fuse holder. I considered asking for a replacement unit, as Fair Radio does have a 10 day return policy. However, an electrical inspection revealed the unit to be 100% complete and operational. And I thought I was getting a set to cannibalize.. now I have two working 390A's <grin>.

So, my weekend has been spent working with that side and rear panel. I'm just happy they were made of aluminum and not steel. Many hours of wood blocks, C-clamps, a bench vice and hammering (with mucho colorful dialog) later, I have things straightened out, at least to the point where all screws fit in the designated threaded holes. Those thick side panels are a bear to straighten, although I had more trouble with the rear panel with the well-warped curled edges. It actually looks quite good. I may consider painting the side panels after using some filler to smooth out the vice grip and hammer scratches. Finding some something to match the original translucent gold-colored treatment might be difficult. Yellowed clear lacquer? <grin>.

Anyway.. after a general cleanout, front panel scrub and knob repaint, the Motorola 390A looks great, and actually works equal to my Stewart-Warner unit even though it hasn't been aligned yet. Time for a homebrew diversity adapter, I guess. One note on this one is that the 16 and 8 kHz mechanical filters were Collins, and the 2 and 4's were Motorola brand. A question about knobs and the front panel. On both of my units, the smaller knobs are all flat-black in finish. The main tuning and bandswitch knobs are gloss black, as is the digital readout bezel. Is this standard?

About paints. I picked up two excellent products from Wal-Mart. One is the "Color Creations" brand flat black indoor/outdoor fast dry spray enamel, p/n 20004. Provides a durable and smooth flat black. Another can is Nybco Hi-Gloss Lacquer, #2302 Gloss Black. This provides a very fast drying finish, although I've had some small orange-peel effect when experimenting on large flat surfaces. This effect is minimized if I leave the can and the workpiece outside long enough to equalize the paint and target piece temperatures.

Using the flat black spray provides a very nice base coat with good fill characteristics. A light coat of the gloss over the flat black brightens up a knob very nicely. The gloss black by itself did not provide a very durable finish by itself (although if I had let it cure longer, it may have done better). Either that or the Lacquer reacted a bit with the original paint on the large knobs.

Now I'm glad that our house wiring wouldn't support a T-368, or I'd be pestering one of the locals about his 'spare' unit. These later-model mil units are addicting!

73! - Mark, NE9G

Subject: Fair radio R390 part 2

>I FOR ONE FAILS TO UNDERSTAND THE OBCESSION WITH WHO MADE IT.  
>THESE WERE ALL MADE TO THE SAME SPECS, RIGHT ? SO WHAT IS THE BIG  
> DEAL ABOUT \THE MANUFACTURERS NAME ON THE LABEL ?  
>73 RAG OZ8RO

Ah, yes, obviously someone unfamiliar with the vagaries of U.S. Military equipment.....let me enlighten you. Having retired in 1983 as a Master Chief Electronics Technician (U.S. Navy) with 14 years of active service and 9 as a reservist, I can assure you that \*sometimes\* it makes a \*BIG DIFFERENCE\* who the manufacturer was, specs notwithstanding.

One of the most glaring examples which I encountered was the U.S. Navy's AN/WLR-1 series of ECM receivers. Essentially, they were "all the same" but, sad to say, I was cursed with a Sylvania-built set, and it \*REALLY\* sucked when compared to a Collins-built unit! And by that I mean the reliability, primarily; they were \*always\* out of adjustment and requiring tweaking of the power supply voltages (ever seen a "drifty" power supply? Well, that's what we had!).

The same type of thing was true of the Navy's AN/WRT-2 HF transmitter; if you had one of the original mfr's units (either GE or Westinghouse; I've forgotten which designed it) they were pretty good, but if you had (as we did) one of the Federal Radio & Telephone units you could count on serious PA problems eventually (like sagging runner rods for the rotary inductor contact, resulting in arcing, burned coils, etc.). Not only that, on \*two\* transmitters on \*two DIFFERENT\* ships the HV lead from the Power Supply drawer (the lowest one) to the PA drawer (the highest one) \*SHORTED\* to the cabinet inside the rear cable tray. This necessitated removal of \*ALL THE DRAWERS\* and no, they did \*NOT\* have quick disconnect fasteners, they had terminal strips with a gazillion spade-lugged wires to each drawer. The drawers were a two-man lift, too (except for the Power Supply which was three men and a small boy.....). BTW, there was no rear access to the cabinet because of the deck-to-overhead steel frame supports on which the 'mitter was mounted.

All of which simply points out that \*sometimes\* "built to print" or "built to the same spec" does \*NOT\* mean "works the same as the original design." It should, but sometimes it just doesn't.

Now, is this true of R-390As? I don't know; ours were by some fly-by-night outfit (obviously not Collins) and we never had to replace a subassembly in four years of "arduous sea duty" (we steamed a \*LOT\*!). Most common problem was - guess what! - the ballast tube. \*WORST\* problem was a broken IF can slug that dropped down inside, requiring partial mechanical disassembly to get it out and a rather extensive alignment afterwards. Ours were good receivers, I have no complaints on that score.

73, Paul, K4MSG (ETCM, RET) pbock@melpar.esys.com \*

Subject: Fair radio R390 part 2

Well stated, Paul! The firm that bids the lowest, gets the contract and often the results show up as poor construction in the final product. Certain firms are better situated and can produce a better

gizmo. All R-390A's are NOT alike. I recall seeing one non-Collins/Motorola unit that had less metal in the gear train.

73 de Jack

Subject: Fair radio R390 part 2

About ethnic purity of R390As -- I for one am proud of my mongrel sets, with no two modules by the same maker. It illustrates for future collectors and historians the modular design of this receiver. Any set that got USED much by the military will have a mix of modules, and that adds to the authenticity. If you had 3 R390As, and between them you had one each of each module by Collins, Moto, and EAC, would you (a) build three ethnically pure sets, or (b) mix 'em up on purpose. To sell to someone else, I'd have to do (a). For my own use, I'd group by condition -- the cleanest, smoothest-tuning mainframe+RF-deck would get the cleanest, least-hacked other modules, and so on down the line.

BTW, don't you hate hacks and mods that make a module only work with that mainframe or another hacked module? You can't mix n match with other sets any more, so it ain't a true R390A. Do others agree that some EAC parts were in effect built by Hammarlund? If so, then for the RF deck they might be better than Collins -- for sheer physical construction quality, Hammarlund is hard to beat, since National isn't in the game.

I'll change the ballast scheme when the tube burns out. I agree with peaking the IFs, while detuning the last coil (after the AGC) to avoid overloading the product detector hack. 73, mike k w9nrd

Subject: Fair Radio R390X Ser

Don't forget that the straight -390 used an extra rf amp, and had pass regulated B+, ala R-389. The straight -390 was made by both Collins and Moto, some folks say the Motorolas are actually better, couldn't vouch for that, however, as I have only -390A's. I think more than a cost cutting measure, the -390A was an example of lessons learned regarding selectivity (addition of mech. filters), RF overloading due to too much RF gain, and the destructive effects of the heat generated by those monstrous 6082's in the power supply. My vote is for the -390A, disregarding the inferior (to the -390) audio.

73, Scott

Subject: Fair Radio R390X Series Radios

Boatanchor Gang:

I have not received the Fair Radio ad with the ad for the R390X receivers. I have been following the thread on this and have not been able to determine if the receivers in question are R390 or R390A. There is a BIG difference: R390- The original of this series. Permeability tuned PTO, RF, and IF sections. CRYSTAL filter in IF. Somewhat rare. I do not believe these were manufactured by anybody other than Collins. I believe some AMers prefer this radio due to the characteristics of the crystal filter being optimum for AM reception.

R390A- A cost reduction program resulted in the R390A. The primary design change was the substitution of 4 mechanical filters for the crystal filter. The R390A retained a simplified crystal filter for the 1000 Hz and 100 Hz filter selections. The RF deck was simplified by changing to linear tuning coils. The R390A was built by numerous contractors. There were probably 100,000 of these things made. Widely regarded as the best vacuum tube general coverage receiver ever made.

Alright, which type of unit is being offered by Fair Radio per the recent thread ?

73 KF5N Renaissance Engineering egr002@email.mot.com

Subject: Fair Radio R390X Series Radios

At 12:29 PM 9/20/95 -0500, Grant Youngman wrote:

>>I have not received the Fair Radio ad with the ad for the

>>R390X receivers. I have been following the thread on this  
>>and have not been able to determine if the receivers in  
>>question are R390 or R390A. There is a BIG difference:

One should assume then it's the R-390, rather than the R-390A that's being advertised. Both versions have the same IF selectivity settings. The R390 uses a single crystal for the .1 and 1.0 kHz positions. This is bypassed for the 2, 4, 8, and 16 kHz bandpass ranges. \$525 might be considered a lotto dough for the '390, even with meters. However, I understand these were made by both Collins and Motorola so perhaps one could specify the brand if any are left. Probably the best strategy would be to visit Fair and select one of the un-checked R-390A's for \$175. For the cost differential, it would probably pay for such a "mini-vacation"! The other alternative is to keep an eye out for a "hamfest bargain" before the word gets out and prices soar.

73 de Jack

Subject: Fair Radio R390X Series Radios

>R390A- A cost reduction program resulted in the R390A. The  
>primary design change was the substitution of 4 mechanical  
>filters for the crystal filter. The R390A retained a simplified  
>crystal filter for the 1000 Hz and 100 Hz filter selections.

Ah, no, the R390 was not based on crystal filters. The IF bandwidth was changed by changing the Q of the IF transformers by resistive loading. The Technical Report described this as a process requiring close control of the IF transformer construction. The mechanical filters were both a production simplification and better filtering. Then again, some people say they make the sound 'mechanical' versus the smoother R390, which does not have filters. Don't have the books in front of me, but the R390 did use a crystal filter to get down to 100 Hz. Don't recall a 1000 Hz position.

Bill Hawkins bill@bvc.frco.com

Subject: Fair Radio R390X Series Radios

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> filter to get down to 100 Hz. Don't recall a 1000 Hz position.

>  
> Bill Hawkins bill@bvc.frco.com

Ok, then it would be correct to say "The primary design change was the substitution of 4 mechanical filters for the LC IF filter which varied bandwidth by changing the Q of the IF transformers". Both the R390 and R390A use a crystal filter for the 100 Hz selectivity, while the R390A also uses the crystal filter for the 1000 Hz bandwidth.

I stand corrected. Thank you for the input.

73 KF5N Greg Raven egr002@email.mot.com

Subject: Fair Radio R390X Series Radios

At 02:52 PM 9/20/95 -0500, Gregory Raven wrote:

>Ok, then it would be correct to say "The primary design change was the  
>substitution of 4 mechanical filters for the LC IF filter which varied bandwidth  
>by changing the Q of the IF transformers". Both the R390 and R390A use a  
>crystal filter for the 100 Hz selectivity, while the R390A also uses the  
>crystal filter for the 1000 Hz bandwidth.  
>I stand corrected. Thank you for the input.  
>73 KF5N  
>Regards, Greg Raven egr002@email.mot.com

Both receivers uses a 455 kHz crystal in the .1 and 1.0 kHz selectivity positions. "When BANDWIDTH control S501 is in the .1 KC or 1 KC position, Y501 (The 455 kHz crystal) functions in the circuit..." Quoted from the R390A TM 11-856A. Similar words are used in TM 11-5820-357-35 for the R390/URR.

73 de Jack

Subject: Good Deal!

A while back there was a thread of BA shipping horror stories so I thought I'd pass along a good experience. During an exchange about R390A's and sideband converters I offered to copy my CV591 manual and mentioned that I didn't have a converter. Peter Brickey emailed that he had a converter for sale and after delays due to my work schedule I bought it. When I got home from my last work related adventure the converter was in my home office being eyed suspiciously by Bonnie and our cats. The CV591 was bubble-wrapped and double boxed with styro peanuts, you couldn't ask for a better job of packing electronic equipment. Thanks Pete!! "That radio thing" was taken (by demand) out to the shop for cleaning and pwr up and every one of those little glowing things came alive. This isn't a tech post, just a note to say I've had good luck trading with and buying from list folks.

Ed Zeranski ejz@marlin.nosc.mil, work

Subject: Lamps on meters R390A

At 04:42 AM 8/4/95 -0500, you wrote:

>Hi I am just wondering are there/or should it be light on my meters (R-390A),  
>I can't find any on the schema, just for the mechanical dial.

Rolf, I imagine you have probably received other responses to this question, but thought I would answer anyway. :) The meters in an R-390A are radioactively fluorescent, with the needle and scale painted with radium (or something similar) paint, like the old watch and clock dials of the 30s and 40s. I have \*heard\* that the glass in these meters is coated to minimize outward radiation from the dials, but I don't know if this is actually true. Someone else on the list could doubtless confirm or refute that. In any case, the amount of radiation emitted is quite low.

I can think of three possible justifications for omitting meter lamps from the design:

- a) During night operation when illumination is required, visibility of the frequency display is \*necessary\*; visibility of the meters is not.
- b) The use of incandescent light on the panel should be held to the minimum level required so as not to present excessive enemy visibility during blackout conditions.
- c) The lamps in the frequency display housing are very easy to replace with just a screwdriver (which was clipped to the back of the set). And, there are \*two\* freq display lamps: if one fails, the display is easily readable in the dark with only one lamp operating. An internal meter lamp would probably have no back-up, and might well be difficult to replace under field conditions in any case.

This is all speculation on my part... Maybe right, maybe not. Standard disclaimers apply. :)

Bill VanAlstyne N6FN bill@cruz.com

Subject: Lamps on meters R390A

>Hi I am just wondering are there/or should it be light on my meters (R-390A),  
>I can't find any on the schema, just for the mechanical dial.  
>Rolf, I imagine you have probably received other responses to this question,  
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>40s. I have \*heard\* that the glass in these meters is coated to minimize  
>outward radiation from the dials, but I don't know if this is actually true.  
>Someone else on the list could doubtless confirm or refute that. In any  
>case, the amount of radiation emitted is quite low.

Bill and all,

Another of the pages omitted from the Fair Radio R-390A "partial" manual is the radiation warning. Judging from the precautions, it's no wonder that the property disposal people removed the meters before releasing them.

With apologies for my typos, it says:

**WARNING**  
**RADIATION HAZARD**  
(2-1/2 " diameter radiation symbol)  
**RADIOACTIVE MATERIAL**  
**CONTROLLED DISPOSAL REQUIRED**  
**ACCOUNTABILITY NOT REQUIRED**  
Audio level meter Ra 226 0.69uCi 6625-00-669-0769  
Audio level meter Ra 226 0.40uCi 6625-00-669-0779  
Electron Tube 0A2WA 5960-00-503-4880  
EEVC U 238 0.1uCi  
CBS Hytron Ni 63 0.5uCi  
Raytheon Co 60 0.2uCi

**Radiation Hazard Information:** The following radiation hazard information must be read and understood by all personnel before operating or repairing the Radio Receiver R-390A/URR. Hazardous radioactive materials are present in the above listed components of R-390A/URR.

The components are potentially hazardous when broken. See qualified medical personnel and the local Radiological Protection Officer (RPO) immediately, if you are exposed to or cut by broken components. First aid instructions are contained in TB 43-0116, TB 42-0122, and AR 755-15.

**NEVER** place radioactive components in your pocket. Use extreme care **NOT** to break radioactive components while handling them.

**NEVER** remove radioactive components from cartons until you are ready to use them.

If any of these components are broken, notify the local RPO immediately. The RPO will survey the immediate area for radiological contamination and will supervise the removal of broken components.

The above listed radioactive components will not be repaired or disassembled. Disposal of broken, unserviceable, or unwanted radioactive components will be accomplished in accordance with instructions in AR 755-15.

Subject: Lamps on meters R390A

According to my R-390A operator's manual(TM 11-5820-358-10), the same radiation warning was added in CHANGE No.4, which was published on 7 April 1975. And CHANGE No.3(25 April 1974) did not warn about radiation.

Takashi Maeba(maeba@ti.kshosen.ac.jp)

Subject: Lamps on meters R390A

Gang, let's not go overboard on this. Firstly, the Curie is an abs. measure of radioactivity, i.e. the rate of disintegration, and is a little under  $4 \times 10^{10}$  disintegrations per sec. Next lets look a Ra226, it's largely an alpha emitter, (95%), about 4% of the particles emitted are gamma but at an energy of 0.187Mev, on the lower end of the scale of gamma emitters.

I took a look at a smoke detector, it contains 0.9uCi of Am241, decay is 99+% beta at 1.5Mev. Or how about Thorium on heaters and it's oxides on cathodes, I don't know, you work it out, you decide, but it's not high on my list of things to lose sleep over.

How ever, one area about which there should be no laxity is ingestion or inhalation, max. recommended Ra body exposure is 0.1 microgram and that's not much. So the part about broken meters, etc. does seem worth keeping in mind.

Al Marshall "Real Radios Glow in the Dark" almarshall@acm.org

Subject: Last Ships to Get R390A' s

In doing some research into this topic, I came upon the following information on the last Navy ships to receive R-390A's.

As reported in past posts to this group, the last R-390A's made were by Fowler Industries in 1984. The five sets were purchased by Avondale Shipyards in New Orleans (just up the road from me) for installation on these two ships:

GUNSTON HALL LSD 44  
COMSTOCK LSD 45

These ships are 609' long Harper's Ferry Class dock landing ships, with a complement of 340. The respective commissioning dates of these ships were 4/89 and 2/90.

What happened was Avondale was given the specifications to build these LSD's of a previous class built by Lockheed in 1981. The R-390A requirement sort of stayed on the spec until it was caught on the third vessel out of an order for nine. The later ships got R-1051's. At least one of these five radios (s.n. 2) has turned up surplus already. Just thought there might be some interest on this.

73 de tom n5off

Subject: Line to Voice-coil Transformer?

> Can anyone suggest a source for a 600 ohm to 4-8 ohm audio matching  
>transformer?

I used one of Radio Shacks Universal Line transformers on my R390 with good results. This is Cat. nr. 32-1031. Try different combinations of taps for the loudest volume. Or they also have an AF Xfmr. 273-1380. This is 1K input and 8 ohm secondary. The primary is center tapped. Use half of it for a 500 to 8 ohm match. This is close enough.

Another tip: I have used a 10" P.A. horn speaker which has an 8 ohm voice coil on R390s. Those horns are very sensitive and it doesn't take much to produce a lot of noise! Using the transformer should really make it howl. The horn speaker is great for CW reception too. They seem to resonate near 700cps or so. Their transformer will set you back \$1.69

Steve n4lq@iglou.com

Subject: Military Gear Manufacturers

>>>Some contractor (like Collins) is selected to design and build the first  
>>>run of a piece of equipment.  
>>>The specs from that first run are then used to solicit bids for additional  
>>>runs - sometimes there is plenty of info and little room for error or  
>>>cost-shaving on the additional runs, sometimes there isn't.  
>>>The govt generally has to accept the equipment based on whether it meets  
>>>external specs (sensitivity, power output, etc.) and on interchangeability

>>of parts, but doesn't or can't test all things that lead to  
>>>ifferences in quality (but does test for specified MTBF,  
>>>mean time between failures). So sometimes the second run meets the specs,  
>>>but doesn't have the quality of the original design and manufacturer.

and then Paul, K4MSG, wrote:

> Excellent post, Nick! Having been on both ends  
> ("user/fixer," 1959-73, and "designer/builder," 1977-present) I  
> can confirm what you say.  
> The problem with "specs" really evolves around the parts  
> used to build the equipment. A quality contractor like Collins  
> (and there are many others as well) will use only  
> well-engineered, well-manufactured parts in a design.  
> Unfortunately, the "johnnie-come-latelies" will usually go to the  
> lowest bidder for the various parts, and therein lies the margin  
> for error: if the parts aren't up to snuff, reliability suffers.  
> having trouble obtaining cost-effective plating which was  
> reliable and of sufficient quality.

Really good stuff here. Having worked for several contractor types, I feel I can shed some additional light. Development contracts are always tough to make money on. A contractor like Collins would hope to win a follow-on production contract after the initial development because that's where the money is. Development costs a lot of money and most contractors would be happy just to break even. Remember too, that in general, the lowest bidder wins the production contracts... Since the Gov owns the design, anybody who they deem as qualified can and does win "build-to-print" contracts. There was a thread a while ago about Helena Rubenstein (I think), the cosmetics manufacturer, building a few R390A's. Logic can be strange sometimes.

One thing that's important to remember is that the contractor's purchasing dept. is obligated to solicit 3 bids from component suppliers. Again, the lowest bidder usually wins unless there is a preferred supplier, which takes a fair amount of paperwork to justify. Unless there is a savvy, uncompromising engineer involved, it's a crap-shoot if others in the organization are quality-minded enough to feel the justification is worth the hassle. All electrical components must meet certain reliability standards. It shouldn't really matter if you get parts from Allen Bradley or Mr. Resistor, as long as they're on the qualified parts list. It's true also that vendors have been removed from such lists because of quality problems. See the third sentence above.

When performing first article acceptance testing, the govt representative and the contractor's engineers and technicians sit down and run through the test procedures. If the unit meets the design spec, then it's bought off. Besides the normal electrical performance testing, the units can be subjected to a variety of shake, rattle and roll testing which may or may not uncover mechanical flaws. Latent mechanical defects, like those which occur from repeated use, probably won't be uncovered unless specifically called-out for testing.

In the preceding discussions, it seems that we've been discussing mechanical integrity more than absolute electrical performance, no? In this sense, it's hard to quantify what parts that are up to snuff, e.g. having "enough metal" in the gear trains, etc. True also is the difficulty in specifying common-sense design approaches; to wit, the high voltage wiring in the cabinet... I would bet there was a change order for that one... 'Nuf said.

Bob - N3MBY

Subject: Miltronix

Chuck:

Miltronix in Toledo, Ohio is owned by Rick Mish. He has rebuilt two R-390A's and one R-390 receiver for me, and he did a superb job. All of them were put back in like-new operating condition. In addition to solving any electrical or mechanical problems, he completely cleans the unit and repaints the front panel and knobs, as well as the meter and digital read-out covers. The basic charge for this was \$250, plus the cost of any parts or tubes replaced. Well worth the investment.



Rick can be contacted at: Phone or Fax: (419) 255-6220

By mail: Miltronix  
P.O. Box 3541  
Toledo, OH 43608

73's Tom KE4RHH Bridgers@leaders.CCL.org

Subject: NTIS

Group, (not to be confused with groupies)

A posting here yesterday afternoon by Randy Zelick prompted me to stop lurking and say something. He reported having received a set of R-390 TM's but that they were reprints (copies). This wasn't done by NTIS. DA (Department of the Army), otherwise known in NTIS jargon as 'the proponent', apparently had quite a few of the mid 50's to mid 60's TM 11's 'reprinted', as they did earlier manuals in the 40's. They include, just to name a few, the TM's on R-390, R-390A, and AN/GRC-19, including those on components, such as T-195 and R-392. Unfortunately, as Randy found out, these reprints aren't of the same quality as the WW-II vintage reprints. They were done by zerographic process, rather than by printing press. The quality of the photos is good, but not excellent. The contractor could have done a better job (I do [commercial]). On the other hand, they are always complete, uncirculated, and have all of the changes incorporated, rather than loose. And, they're available! I have some NAVSHIPS manuals in my collection which appear to have been produced by a similar method.

I've dealt with NTIS for many years. They can supply technical documents from not only DA, but Department of the Navy and Department of the Air Force as well. Over the years, I think that I've had only four problems with them. During the run-up to the Gulf War, one of my orders went into the bit bucket, and I had to reenter it. I've had several requests come back flagged 'unidentifiable'. This may mean that the manual is no longer in the system. However, check the manual number(s) on their response carefully. On one early occasion, I found that they had entered the number incorrectly. For this reason, I strongly recommend placing orders with them via FAX, rather than voice line. And if your handwriting is about like mine, either use a typewriter or printer, or print very carefully. Their FAX number is (703)487-4841. Give them a FAX number to reply to. You will normally get a response of some kind within two working days. Once, I had an order come back flagged 'US Government Agencies Only' (i.e., 'CLASSIFIED'). The manual was on the I-199 dynamotor and generator test set, first produced c1943, so I doubted the report, and called St. Louis and confirmed that it wasn't. I replaced the order, and (almost) received what I ordered. The confirmation on the reorder said that it would be a paper copy. What I got was microfiche. Many of the older manuals are being put on microfiche. Fortunately, microfiche readers can be had for a reasonable amount (mine cost \$130.00). Unfortunately, the contractor must have been the low bidder. The reduction ration used was non-standard, and the quality is slightly poorer than the hard-copy reprints previously mentioned. On the other hand, something is better than nothing.

Four other points. (1) NTIS charges are based on page count on a sliding scale. Their minimum, which was \$9.00 the last time that I checked, is expensive for two pages. Their maximum (was \$45.00) is cheap, for over 500 pages. And it doesn't matter if you order a thin one and a thick one. The price per manual is the same. (2) Their rules only allow one shipping/handling charge per order. (3) Be sure that you give them the correct number. If you tell them that you want TM-11-xxxx, and what you want is a Signal Corps or DA manual, you'll be disappointed. They'll enter it exactly the way that you sent it, and only the Marine Corps manuals have a hyphen between 'TM' and the following numbers. Computers are literal, as anyone reading this should surely know. (4) And don't ask for a manual for xyz radio set. To the best of my knowledge, Fred Chesson, Ray Mote and I have the only databases on technical publications for US military boatanchors cross-referenced by equipment nomenclature. Mine, which is also my equipment collection database, and includes cost and acquisition information and other accounting data, is currently at about 17MB, so don't send me a 360K floppy and request a copy of it! I have furnished a couple of copies, however. Anyone seriously interested can contact me. It's in dBase IV/5 format, and no, I won't convert it to ASCII or any of Bill Gates's trash.

Two publications which were, and I assume still are, available from NTIS on microfiche are DA PAM 25-30, CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS, and NPFC 2002, no title listed, but the same thing for the Navy. These replaced earlier pubs dating back to the 30's, and list, among other things, all the manuals currently available on military boatanchors. Consequently, they basically list what you can get from NTIS. You might be surprised at the original pub dates on some of the items. These are reissued quarterly, and you can buy one, or a subscription.

73 Robert Downs WA5CAB

Subject: NTIS 800 Number

Hello BA's

Try the NTIS number it is 1-800-336-4700 and select option 1 then select option 2, then tell them you need a military tech manual. They will forward you to the right people to take your order.

Fred Bohner oranges@frb.gov

Subject: NTIS 800 number

The correct number for NTIS manuals is 1-800-553-6847. They take plastic and they had all of the R-390A/URR manuals available. The price of the -34P "Direct Support..." manual is \$19.00 (the others were already posted).

Subject: Oil on R390A Mechanical

Rolf that is a good question hope someone can give us an answer. Having worked on a lot of TTY equipment over the years I have found to little is better than to much. Recently I had to dig large cakes of grease out of a R-390A gear train and believe the same to be true for it. I found in the TTY equipment a light coat of WD-40 keep everything working although WD-40 is not a lube. A drop of 3-1 oil in a few spots also does wonders. So go lightly, seems oil collects dust like a magnet and then you have what seems like boulders in the mechanism.

de stan ak0b

Subject: Product detector for R390

For the R390 why not take the low impedance IF output and feed it to a SBL-1 double balanced diode mixer and either use the built in BFO or build a dedicated BFO for the product detector...you will need 5 milliwatts into 50 ohms for the BFO signal

Clark Fishman WA2UNN cfishman@pica.army.mil

Subject: PTO Adjustment, 10 turns

So far I have not had the ambition to attack compensating stacks on PTO's (my 6 year old always wants to help =:)

I simply use the disk on the Oldham coupler as a guide, and make pencil marks on the disk and frame to turn the shaft exactly 10 turns, no paper templates or anything like that. Here is the procedure w/o the compensating stack adjustments.

- 1) Hook up freq counter to PTO output.
- 2) Make note of output in kcs for a 10 turn input, (ex 991 kcs for exactly 10 turns).
- 3) turn the adjusting screw 1/2 turn or so and make note of the amount and direction.
- 4) erase old pencil marks and make new ones (what was a convenient mark will now move to a new spot).
- 5) GOTO 2 until output is exactly 1000 kcs for exactly 10 turns from the spec. start and stop outputs. For example, the R390 PTO will output from 3455 kcs to 2455 kcs in exactly 10 clockwise turns.

Now that you have this mastered, you can attack the compensating stacks to get the 100 kcs points to fall right on, but I find the 100 kcs point usually fall in spec when the thing is aligned as described.

73 est bonne chance de tom n5off

Subject: PTO Makers

These are the PTO makers I have stumbled upon, there may be more:

Collins  
Cosmos  
Dubrow  
Motorola  
Progressitron

There may be more.

73 de tom

Subject: R:390A and product detector mod- errata!

Stan, AK0B asked for feedback on the R-390A product detector mod (using a 6BE6 as a self-excited product detector) as first published in the 1/68 CQ and developed by Cptn. Paul Lee, USN, W3JHR. There was also a knockoff of this design published in ER a year or two ago. Both detector designs, if built as published, WILL NOT WORK CORRECTLY! Both input excessive 455 kHz IF signal to the 6BE6; when built using the component values specified the detected audio will be distorted due to an overloaded 6BE6.

The solution is to reduce the carrier input to the mixer tube. If using a 5 pf coupling capacitor to pin 6 of V506B as the IF signal pickoff as Capt'n. Lee suggests, then the resistor from the signal grid (pin 7) to ground of the 6BE6 must be greatly reduced in value from the 11 K specified value. I recommend a value from 1.2K to 2.7K. At 2.7K the detected audio from the product detector almost perfectly matches that of the AM diode detector (no apparent volume change on a zero-beated AM signal when detectors are switched). Using the lower value slightly reduces the detected SSB audio but it's extremely clean.

I'd also suggest those doing this mod consider switching the audio between detectors through the use of a tiny relay installed in the IF chassis switched by the existing front panel BFO switch--instead of replacing said switch and routing new audio wires over to it. This will also allow the subsequent swapping of IF chassis for test purposes. In my own receiver I used a half-wave rectifier & filter cap off the 6.3 volt line to provide DC for one coil lead of a small SPDT reed relay, the other lead is "grounded to activate" via the existing BFO-ON switch. Just clip the one wire at the switch that has continuous B+ on it (and heat shrink or tape well) and ground that terminal of the switch. This will provide a switchable ground back to the IF chassis through the existing wire (instead of switched B+).

Never saw a subsequent errata msg. published in CQ or ER. Don't know why; I've had to 'fix' three R-390As now where the user complained about raunchy SSB audio. Done correctly, the mod sounds great, is reversible, and is well worth doing.....Bill

Subject: More-R390A product detector mod.

I neglected to mention on my previous post-- if one uses the switched audio relay option I suggested, the 6BE6 product detector/BFO will need to get its switched B+ via a second section of the added relay....if a DPDT reed relay with adequate ratings can't be found, try finding a mil or commercial surplus miniature sealed can-style relay. Or, a small power MOSFET with a couple hundred volt rating could be used for the power switching function driven off the same switched low voltage B+ (haven't tried it myself- oughta work- will require s'more R&D!).....Bill - de KD0HG/AAR8CC, ex WA9OZC

Subject: R390 gain problem

Thank you one an all for your suggestions!

I have made a mailing list of all the fine folks who took their valuable time to write me back on the R390A problem. This will go out to all who contribute so we can have the information in case one of us is unfortunate to experience a like problem.

Many suggestions were on the lines of alignment and tubes. All the tubes have been swapped one-for-one and the receiver has been properly aligned as per the book a few tips in the Hollow State News. Dallas Lankford suggested to me during a phone conversation that replacing all the tubes in the AGC line at one time might be a fix as there might be one that tests good but is not interacting with another thereby causing the problem.

None of the above....

I spent till about 1:30AM last night working on the receiver and trying various gain checks and tests to try and isolate this problem. Turns out the base problem is intermittent. Here's how. I was doing a gain test and happened to be listening to the receiver and out of the speaker came the ominous "frying" sound of a cap or coil going bad. The audio "LINE" level meter dropped about 12 db and when checking a signal the indicated CARRIER level dropped about 12 db also.

I went to hook or unhook my signal generator from the BAL antenna input. Of course, that will make quite a spark as the antenna jack is removed from the now ungrounded R390 and grounded signal generator. (My R390 ground happened to come off in all the moving around and the late hour.)

As the spark induced >pop< came from the speaker, back came the 12 db I lost on both the carrier and audio level meter. Of course, it never went away again that night. I went back at it this morning putting a tube extension in V201, the First RF amplifier.

Some of the voltages weren't right as follows.

Pin 1 +.5V instead of -.4

Pin 2 +3.1V instead of 2.8

Pin 5 +201V instead of 185

I went to check the plate voltage of the tube at pin 5 and the receiver popped again and up came the levels again. The tube voltages changed as follows:

Pin 1 -.9V

Pin 2 1.7V

Pin 5 196V

In short (pun intended) the tube started amplifying as noted by the drop in plate (pin 5) and cathode (pin 2) voltage. BTW: Using a scope, there was not noticeable change of the output of the RF deck assy at the input of the IF chassis at P-213 or P-218. The voltages on V202, the first mixer did not change. I am getting ready to do one more test before "operating" on the RF deck, something I had hoped to avoid, I am going to use a regular receiver as a gain checker. Taking a scope probe with a .5uf cap at one end, I'll connect the probe to the 2nd receiver, tune it to the same frequency that both R390's are tuned to and go through the test points looking for the point where gain falls off.

Failing that, I am going to take my can of freeze mist, take out the RF deck and hope I can orient it in such a way as to be able to operate it with the bottom exposed and start freezing components. In the solid state world, that works pretty good.

I expect that the problem will be around V201 with C255, C227, C229, C228 or one of the resistors in the vicinity breaking down.

I'll let you know.

-73- Chuck WA4HHG Collins Collectors Association Chuck Rippel [crippel@exis.net](mailto:crippel@exis.net)

Subject: R390 manual

Dear folks,

As you may recall, quite some time ago I tried to order an original TM for a R390 (not A) receiver from NTIS. I succeeded in placing a credit card order for same on the 13th of September.

Well on Saturday last (October 4) a package from NTIS did arrive, via priority mail having been sent from Virginia 5 days earlier. I got a very nice, very complete with latest mods, 390 manual! That's the good news.

The OK-but-not-wonderful news is that the manual is a reprint and inferior to the quality of a true original. Yes the schematics fold out, and yes there are photos. But the photos are a bit fuzzy and the smallest lines on the schematics show clear evidence of deterioration. It is staple-bound and done on regular-weight xerox type paper, so the manual is quite a bit thicker and more cumbersome than the true original.

It is remarkable that the government provides such a service in the first place - one of things I am happy to pay taxes for, and so I'm not complaining. Especially because the price is very reasonable (\$24.00). But if you are thinking of ordering a manual, you should know that it won't be quite as nice as the ones made 40 years ago.

If you do decide to go for one, the numbers are:

TM 11-5820-

-357-10 operations

-357-20 organizational maintenance

-357-20P organizational maintenance repair parts

-357-35 field and depot maintenance

-357-35P field and depot maintenance repair parts

The number to order NTIS manuals is 1-800-553-6847, 9-5 eastern time.

Randy Zelick

Subject: R390 TM maybe available

Dear folks,

I just got a reply from Larry Mills at NTIS regarding my inquiry about R390 technical manuals.

You may recall that I had navigated the royal run-around course between NTIS and various army and navy sources about a month ago. The last word, so I thought, arrived two weeks ago when someone from NTIS in Mills' office, but not Larry himself, informed me that they considered the R390 to be an earlier mod of the R390A and as such they would not stock the R390 manual, i.e. they only would have the manual which covers the latest revision of the unit.

So today comes an email from Larry Mills informing me that indeed the following are available (an excerpt from his message):

These are the prices for the following army manuals:

TM 11-5820-357-10 = \$17.50

TM 11-5820-357-20 = \$17.50

TM 11-5820-357-20P = \$17.50

TM 11-5820-357-35 = \$27.00

TM 11-5820-357-35P = \$17.50

SHIPPING \$6.00

**IF YOU WOULD LIKE TO ORDER THESE PLEASE CALL 703-487-4684 OR FAX 703-487-4841 WITH A CREDIT CARD OR MAIL IN A CHECK TO**

NTIS

5285 PORT ROYAL RD

SPRINGFIELD, VA 22161

These manual numbers were supplied to me by Larry Keith (thanks very much Larry) as covering the R390. Here is an excerpt from his message:

11-5820-357-10, 29 Dec 60, Operators Manual: Radio Receiver R-390/URR. Changes 4.

11-5820-357-20, 23 Mar 61, Organizational Maintenance Manual: Radio Receiver R-390/URR. Changes 1

11-5820-357-20P, 04 Nov 59, Organizational Maintenance Repair Parts and Special Tools Lists and Maintenance Allocation Chart: Receiver, Radio R-390/URR (TO 31R1-2URR-404). Changes 1

11-5820-357-35, 09 Mar 62, Field and Depot Maintenance Manual: Radio Receiver R-390/URR(TO 31R2-2URR-412). Changes 1

11-5820-357-35P, 04 Nov 59, Field and Depot Maintenance Repair Parts and Special Tools List: Receiver, Radio R-390/URR (TO 31R1-2URR-414). Changes 3. This one has a footnote that says: "No Stocks; do not requisition. Publication will not be reprinted.

So.... About 30 seconds ago (11:00 AM PDT) I spoke with Marsha at the number above and ordered the -35 manual (field & depot maintenance). If it turns out to be the right stuff, I will probably order a whole set.

=Randy= WB6MAI

Subject: R390 TM not available

> I finally got through to Larry Mills at the 'technical manual store' looking  
> for a new R-390 manual. The TM number for the R-390 (not A) is TM 11-856.  
> ...  
> The air force number for the same manual is TO 31R1-2URR-154. I called them  
> ...

I got a photocopy of the Field and Depot Maintenance Manual for the R-390 from Fair Radio. On the cover it says - - -

T.O. 31R1-2URR-412  
(Army) TM 11-5820-357-35  
Basic & Change Number 1  
9 March 1962  
Change Number 1 25 October 1992

This publication together with Technical Orders 31R1-2URR-391 (TM 11-5820-357-10) 29 December 1960 and 31R1-2URR-402 (TM 11-5820-357-20) 23 March 1961 supersedes Technical Order 31R1-2URR-154 (TM 11-856) 11 January 1955 including changes.

James Howard [jdhoward@helps.com](mailto:jdhoward@helps.com)

Subject: R390 vs 390A Audio

I answered my own question today as I summoned enough strength to get my 390 and 390A to the same location.

I had always wondered which one would have the best (worst?) audio quality in a side by side test.

Well now I know the answer.

73 de tom n5off

OHH, so you want to know also. No question, the 390 is much better. The lack of mechanical filters apparently contributes to this. The broadcast stations are much more pleasant to park on with the 390 than with the 390A.

Your mileage may vary . . .

73 encore de tom n5off

Subject: R390 vs 390A Audio

>I answered my own question today as I summoned enough strength to get  
>my 390 and 390A to the same location.

This past week I also repaired my R-390A by replacing the IF module...solved my AGC problem and took all of 5 minutes to do, man, I like troubleshooting like that!...

The R390 STILL sounds much better than the 390A on the same kind of speakers with the same antenna (well, through an antenna multicoupler), and basically all things are equal...I guess that one day I'll have to do the audio mods for the 390A and see what happens....

The one difference that I do notice is the filter shoulders are MUCH steeper in the 390A as opposed to the 390, as well they better be! It is much easier to tune out adjacent station interference on the 390A, the steep shoulders do make a difference...

Rick Blank, KI5SL rblank@txdirect.net

Subject: R390/390A failure modes?

Hi All,

This talk about the R-390/390A is very educational. I bought my R-390A three years ago, and have been collecting spare tubes and ballasts to make it a lifetime companion. I hope that will be 20-25 years. Many folks on this list seem to be intimate with the 390 series, so I'd like to ask what the common failure modes are. One person mentioned the ballast is a weak spot. I'd heard somewhere that the power xfmr is a known failure spot. True? If so, should I pick up a spare power supply module from Fair while they still have them? What are the common failure modes, so I can intelligently acquire spares? Thanks for any help.

Gary

Subject: R390/Mil contractors

TO>Anyone who has uncorked a few R-390A PTOs knows that the manufacturer  
TO>is important. I can't remember if it was Cosmos or Progresitron, but  
TO>I recall seeing some cheesy PTOs out there.  
TO>73 Terry O' WB9GVB

I have opened up Cosmos Industries PTO's that did NOT, repeat did NOT have any type of compensation stack. I suppose they must have linearized the units by adjusting the spacing of the wires on the coil form (the coil windings are on the outside of the coil form on the Cosmos PTO's that I have seen, perhaps this is why) Either that, or they found components which were perfectly matched (!) . Also, the "bearing" that holds the far end of the leadscrew is just a riveted on bushing, as opposed to a true roller bearing I have seen in other units. The only Cosmos PTO I have now does not appear to have any endpoint adjustment slug accessible from the outside. There is an adjustment, but it is only accessible from a hole through the rear support plate; I don't recall if there was a way to adjust the endpoints on these.... I have had trouble with Motorola PTOs: I have got one that is unstable (it will jump up or down 3 or 4 kHz for no reason; surgery is needed). This particular PTO was totally corroded (perhaps shipboard use??) when I got it. The seals had broken, and the aluminum parts had severe corrosion. I mechanically rebuilt it just for the heck of it. It works, but has the stability problem, and needs to have the compensation stack aligned. I have another that has a bad Z-702 (internal short, I think, just needs to be replaced). I have had pretty good luck with Collins PTO's; there is one in my "everyday" R390A which is working fine. Gee, maybe I could get these two Motorola units working. Anyone have a scrapper PTO or two kicking around???)

Shaun P. Merrigan merrigan@nyquist.ee.ualberta.ca

Subject: R390/Mil contractors

This is getting interesting. I have several COSMOS PTO's and from the looks of it the latest one probably has some differences from the early ones at least that's what the travel tag from the rebuilder (Tobyhana Army Depot) . I have not had much success in getting the early ones open all the way, what's the trick. Secondly, my R390A has a PTO built by some company here in Burlington NJ and other that the fact that for real accuracy I have to cal at the closest 100 kHz point to the freq I am interested in it works Ok. I thought I had read in ER that COSMOS had used a trim screw arrangement that changed the padding capacitance in order to linearize the PTO. I'd would think it might be a very beneficial to compare notes on these PTO's.

Steve Kd2ED

Subject: R390/Mil contractors

Steve:

Well, you said it. This IS getting interesting. I just took apart the Cosmos PTO I had, in order to confirm what I had said before. I was incorrect: this particular unit has an externally adjustable "end point" shaft, as we find on other PTO's (see below). It has something else as well: an externally accessible linearizing adjustment. (BTW, this also explains why this particular PTO has no linear compensation stack). Description of what I found: there is an adjustment coil,, with a slotted core slug which is adjustable via the rear of the PTO through a hole in the rear support plate. The innermost shielding can has no hole to access the slug, but the second can does. The coil itself is straightforward enough BUT has the added feature of a spring loaded slug. So the slug moves when you turn it (normal enough) but is also free to move against the spring pressure. On the end of the slug where the adjustment shaft (the one that we turn on other PTO's to adjust the endpoint) normally would be, there is a plastic or nylon rubbing block, which is biased against a round spring steel plate. This spring steel plate in turn has a protrusion that is biased against another plate which has a total of 60 or so small adjusting screws (there is a plastic ring on one side of this plate that acts like a huge common lockwasher, so the setscrews won't move once they are adjusted). I am sure you can see where this is going: the ring of tiny setscrews bear against the spring steel plate which bears against the rubbing block. This allows the adjustment slug to move slightly (we are talking about 1/32" max). So that takes care of the compensation stack.

I think I was wrong yesterday about there not being an external endpoint adjustment. What Cosmos did is MOVE the hole for the endpoint slug over so it is tucked in behind Z-702, I found the hole and the mounting spot for the adjusting shaft, but the component itself is missing. So I don't know if it was a capacitor or a coil. You may correct when you said it was a capacitor. So we have established that: Cosmos PTO's do have an endpoint adjustment, they also have a unique compensation stack adjustment which is accessible from the outside of the PTO. This raises the possibility that one could do an endpoint/linearizing adjustment without having to remove the PTO shielding cans. Anybody tried it??

Want to send me your Cosmos PTOs and I'll try it????

Shaun P. Merrigan merrigan@nyquist.ee.ualberta.ca

Subject: R390A "pinging" sound solved!

Thanks to all for the many responses. And the winner is...

- > Thermostat in the 17mhz crystal oven.. Been there, done that..
- > Dan Harlan N8ETQ

Way to go, Dan!

A \*close\* Second Prize to AZ0TH for:

- >Sounds like maybe the thermostat in your crystal oven, if you have the
- >R-390A/URR. Bimetallic strips do go ping when they flex, a lot like
- >the blinker blinker in your car.

>RF Buchanan

Problem was, the "ovens" switch on the rear deck was in the OFF position. However, perusal of the schematic revealed that there are THREE (count 'em) thermostatically-controlled ovens in an R-390A, and the one used in the 1st Osc circuit (17MHz) is \*not\* gated by the "ovens" switch like the other two are. It's always running.

Now, I \*really\* didn't know the answer to this, guys. NOT a test. Hi hi. BTW, FWIW, there are errors on my schematic copy which made this bit of desk-checking somewhat more of an adventure than it should have been. The labels on the 6.3VAC, Reg 150V, and RF-IF B+ lines along the bottom of p.2 (at least) are messed up... Details to anyone who's interested. I still haven't sorted out the interconnector pin numbers; some of them may or may not be wrong, too. Gee, I thought everything done for the military was supposed to be \*perfect\*? <g> Second major error I've found in this manual so far, and I'm just getting my feet wet...

Bill N6FN bill@cruz.com



Subject: R390A "pinging" sound solved!

At 03:12 PM 8/21/95 -0500, Jack Taylor wrote:

>Yes, my '390 ovens are OFF when the set is off. Actually some folks have  
>claimed 'reasonable' stability with the ovens OFF all the time. You might  
>want to check this out with a known frequency station such as WWV, etc.

"Reasonable," of course, is a relative term. However, I did a little test on this a week or so ago. After a 2-hour warm-up with ovens off (except for the "pinging" 17 MHz osc and Calibrator oven that is on all the time), I tuned in WWV on 10MHz (double-conversion region), carefully zero-beat it with the BFO, and it didn't wobble for 15 or 20 minutes, at which point it started to motorboat a little -- maybe a 4 or 5 Hz heterodyne. I don't know what kind of radios anybody else is used to listening to, but in my book, that's "reasonable". <g>

I can't imagine this level of frequency stability being unacceptable other than under the most rigorous long-duration, ultra-narrow-bandwidth CW requirements. AND -- I didn't do the same experiment with the ovens \*on\*, so I \*don't\* really know if the ovens make it any better than this! A real structured controlled experiment with multiple timed measurements of both delta temp and delta freq is what's called for here. If anybody really cares that much. <g> Anybody with the instrumentation to hand wanna volunteer?

Bill VanAlstyne N6FN bill@cruz.com

Subject: R390A AGC problem question

The talk about Hang AGC reminded me to ask:

On my original R390A (the one that's still 100% hollow state), when you switch from Slow back to Medium or Fast AGC, the RX blanks out totally for a couple seconds, as the big Slow AGC cap dumps its charge into the AGC line.

Switching AGC speeds in the other direction (Fast to Slow) is glitch-free. Now is this effect normal, something we put up with, or is there a bug in my receiver? No big deal, but you do miss a sentence or two of phone when it happens. My 2nd R390A, with the solid-state mods, doesn't exhibit this glitch. I think its AGC circuit is original (still tube); only the detector and BFO tubes have been replaced by FETs and an IC (works great, too).

For reference, I find the Fast AGC actually recovers and pumps noise between elements of moderate-speed CW; Medium pumps noise between words of SSB; and Slow is FB for SSB and CW if the SQB isn't ruff. If your R390A differs much from these observations, maybe something's wrong with my discharge circuit.

--mike k w9nrd

Subject: R390A AGC problem question

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>glitch. I think its AGC circuit is original (still tube); only the  
>detector and BFO tubes have been replaced by FETs and an IC (works great, too).

Both of my 390A's in stock form do the same thing. When that 2.2 mfd integrator cap is switched back to ground, it does tend to dump one heck of a spike onto the AGC bus, hanging it for a spell. The recovery time can be improved by hanging a zener from the agc to ground on the rear panel. I

limit mine to -24 volts with this method, which speeds the recovery and protects any experimental AGC circuitry that may be connected (hang discharge fet, etc).

73! - Mark, NE9G

Subject: R390A and SSB

Have you modified your 390A for SSB ? I am looking at the 6BE6 mod from CQ in the 50's. I am not a purist so can see nothing wrong with a good solid state product detector either. (I did the IC product detector to my R4C 15 yrs ago and it still sounds good.)

So what have you tried? I am in the final stages of the ER audio modification so still need to do the product detector for SSB. I do not want to destroy the fine AM qualities. A small relay to switch detectors should take care of that. I also do not want to do an external detector, however, using the IF out and then jumping back into the R-390A audio module does make sense. suggestions welcome.

P.S. Anyone have a boneyard condition R-390A that they would sell a few mechanical parts off of. ? I need the BFO stop and a Oldham for the PTO. I obtain a basket case unit that I am restoring and seems some of the mechanical parts disappeared in the past. Like tube shields, those little collars that hold the crystal switch gear and large knobs and of course the large knobs. Appears that someone removed the front panel and did not keep some of the necessary items. most of the electrical is Ok was just missing the PTO, got one of those with half (1/3) of the coupler.

de stan ak0b

Subject: R390A ballast tube

I think the simplest mod to get rid of the ballast tube is to replace the 6-volt heater tubes in both the PTO and the VFO with their 12-VAC equivalents (12BA6 in both, I think). Then jumper out two pins on the ballast tube. Another method I would not recommend for a "collectable" BA -- do what someone did to my 2nd R390A, and put FETs in both oscillators! I about tossed when I saw this, but if anything this RX is more stable and sensitive than my "stock" R390A. Of course this mod included 3-legged regulators (+12 or +15V) for the supply to these sandy intruders. 73, mike k w9nrd

Subject: R390A Cabinet Painting, Pt. 3

- > More on R-390A cabinet refinishing "education".
- > My cabinet has about a 5/8" diameter hole drilled in the side. I took it to a welding
- > company that is reputed to be the best in the area and they told me that welding that large
- > a hole up would require too much heat and wouldn't be possible without distorting the
- > cabinet.

They were incompetents, or they did not wanna be bothered.

- > They suggested that I try a product called "Lab Metal". Does anybody have
- > any experience with that?

That is not too big a hole. Back in the days when I was an uncle driven aircraft mechanic that was a simple patch, in one of several ways. One good way for thick panels is to cut a plug to fit out of similar material, and then aluminum braze it into place (you gotta be good with a torch to weld aluminum --- one art I have lost with age). A second way is to cut a double patch, one to fit and one to overfit on the inside, and rivet it in place. A third way, and probably the best for BA sorts of applications is to cut a rivet plug to fit. Then chamfer the inner and outer edges of the hole and rivet the plug in place. Then sand/machine to flush fit. Fill with aluminum solder around any slight cracks, or just bondo it.

Any good aircraft shop should be able to handle that in a pinch. Check around any good airport, or around any backwater airport where real shadetree mechanics still work.

Good Luck.

Bob/NA4G

Subject: R390A census, info wanted

I recently placed a new copy of the subject list out on the listserv, so if you wish to receive a copy, please see below. Still looking for more info. If you haven't yet done so, please send me a note with your 390A info.

73 de tom

----- coupe ici -----

listproc@theporch.com  
leave the subject line blank  
in the body of the message type  
get boatanchors r390a.users

Subject: R390A coax connectors - Need source

>Looking for a R-390A antenna connector source. I think I need a UG-421/U or UG-969/U  
>for the balanced antenna cable and a UG-573/U for the whip antenna connector. The  
>adapter connector appears to be UG-970/U.

The twin-coax to single coax adapter is not available. You can get a combination of two other connectors to do the job.

>Not sure what the internal connectors are..... yet hi

They are known as "MB" connectors, often referred to as "mini-bastards".

>I called a couple of "so called" coax connector sources

You didn't call "the man": The person at RF Connections is Joel. Credit card orders accepted with 2.5% charge, UPS shipment at cost (\$3.00 per pound nearby, \$3.50 to South East US.).

RF Connections  
213 N. Frederick Ave. Suite 11  
Gaithersburg, MD 20877  
Phone: 301-840-5477 or 301-869-3680  
Fax: 301-869-3680

Roy Morgan morgan@speckle.ncsl.nist.gov

Subject: R390A connectors

Fair Radio has a number of R-390A connectors listed on page 16 of their 1995 catalog. For the balanced connector they have the Starr 7162 for RG-58 and the UG-421 for RG-8 size coax. I didn't try to find a twinax to single center conductor adapter but instead just ran the shield to one of the center conductor terminals on the Starr 7162. They also have the MB or mini BNC connectors for module coax connectors listed in used condition for \$1.50 each.

Stan K8RPA, flegler@pilot.msu.edu

Subject: R390A Contracts Wanted

Has anyone ever seen an R-390A with the front tag indicating these makers/orders?

Stewart-Warner 1963 DA-36-039-SC-81547  
Communications System 1966 FR-11-022-C-4-26418(E)  
Clavier Corp. 1967 DAAG05-67-C-0016

>From the BA survey, no examples of these contracts have surfaced in about 150 samples. I am about ready to conclude that the SW contract for complete sets is valid, but we just haven't seen this SW contract here on the BA survey, and that the other two were simply parts contracts and not for full rigs.

Noted collector Wally Chambers has seen rigs with the SW contract, so I believe they are out there somewhere. He has only seen modules with the other contract numbers on them. Since there were a

multitude of parts contracts done, I suspect Comm Systems and Clavier made only parts (though Clavier surfaced later as Capehart and Fowler, and made complete sets). Any info or comment on these hazardous conclusions would be appreciated :-)

73 de tom

Subject: R390A crystal osc problem confirmed

A few days ago I posted a request for advice relating to the apparent failure of three of my oscillator crystals to do their thing. Thanks very much for all the advice I received from a variety of sources. This list is such a great resource! I really appreciate it.

A lot of the advice suggested that the problem might not actually be bad crystals -- maybe bad switch contacts, bad/dirty trimmers, etc. -- but after careful troubleshooting (including a final test of swapping in known good crystals close in frequency and retuning the oscillator output caps while monitoring the grid leak voltage at the mixer), I am sad to report that I do indeed have three bad crystals. No question about it now.

Just in case somebody has some extras they would part with, the ones I need are 10.5MHz, 11.5MHz, and 15.5MHz.

Short of that, the question is, where do I get replacements without spending an arm and a leg getting new crystals manufactured to spec (e.g., International Crystal)? Any and all ideas welcomed. For example, is there anything to be tried in the way of "resurrecting" dead crystals? Two of the three are completely dead; The 11.5MHz produces extremely low (albeit measurable) output, not enough to produce an adequate mixer output signal level.

Bill VanAlstyne N6FN bill@cruz.com

Subject: R390A Dial lamps

In message Wed, 2 Aug 1995 11:07:21 -0500 (CDT),

dma@IslandNet.com (Jan Skirrow) writes:

- > They are type 328. My R-390A runs the two in parallel from the 6.3vac bus
- > through a 2.7 ohm resistor. With this voltage drop the 328s should last
- > awhile. Mine didn't and I haven't found a source! What seems easy to come
- > by is the 28volt version of this lamp. Anyone have a source for the 5
- > volt 328??

The 328 is a common lamp used in many types of modern equipment. They should be available from all electronics supply houses. Newark electronics has them listed for \$10.26 for a package of 10 and they are 6.0v at 200 ma. with a 1000 hr rating.

James C. Owen

Subject: R390A help

- > I assume you don't have the full 390A manual, as you don't indicate whether
- > the if stage gains meet the specs in it. If this is so, let me know and I'll
- > send you the info - it is fairly lengthy! Of course if like me you find the
- > manual very difficult to find things in, these gains are given in paragraph
- > 105 on page 126.

I have the stage gain charts from both the army and airforce books. Problem is, I can sort of "make up" for the lack of gain with internal gain pot.

The receiver will make impressive numbers but with a meter indication that is 20 db low and the gain pot turned up nearly all the way. I have heard there is a cap which causes this problem but haven't found it out yet.

Chuck Rippel crippelexis@exis.net

Subject: R390A Knobs

>I need to refinish three knobs on my 390A...one is a replacement (seems to have a flat black  
>instead of gloss black finish) and the other two are almost completely missing the paint.  
>Has anyone done this? What paint type (&etc) is suggested? Any inputs appreciated.

This is a \*very difficult\* thing to do properly. The knobs are pot metal and paint does not adhere to them very well. I understand from Rick Mish that in order to get good results, they must be properly cleaned and primed with zinc chromate primer. The catch is that the EPA has prohibited use of it except by those who are licensed to do so. Rick's knobs are not done that way by the way as he says having them primed is cost prohibitive.

Good luck & 73,

Tony K4KYO

Subject: R390A Knobs

>I need to refinish three knobs on my 390A...one is a replacement (seems to have a flat black  
>instead of gloss black finish) and the other two are almost completely missing the paint.  
>Has anyone done this? What paint type (&etc) is suggested? Any inputs appreciated.

I take the knobs that I want to refinish and soak them overnight in paint remover and the next day scrub them with Scotch-Brite (tm) and Dawn(tm) dishwashing liquid.

I have a bunch of 3/16" bolts pushed up through stiff cardboard that I use to support the knobs for painting and holding while they are baked in the oven which makes the following steps easier:

I then take Krylon(tm) Clean metal Primer and spray a light coat on the knobs. After that has dried for an hour or so, I'll spray on Krylon Semi-Flat in 3 light coats with about 10 minutes between coats. After letting them dry overnight or for a couple of hours in a warm (175 deg F) oven, I'll fill in the indicator lines with Flat White Rustoleum (from a can) and wipe off the excess with a rag barely dampened with mineral spirits... If you are going to do any knobs at all, you might as well do them all, as it takes only a little more effort to do them all...and if you do the meter covers and the Veeder-Root counter window at the same time, the result is a very impressive looking face with all the black parts having a matching lustre....

I get a lot of comments on my "new" R-390/URR receiver and I feel that with an engraved front panel unit at least, one can really make these units look like new again....

I hope to hear more about the gent who was getting paint chips in differing shades of grey....I have a couple of R-390A's and one R-390/URR that have a different front panel color from the R-390/URR that I cosmetically restored... the R-390 I have in here now has a grey that looks like the grey that Navy and Air-Force equipment was painted, Krylon's Soft Shades Dove Grey matches this grey almost exactly, the other radio's grey is darker...this shade of grey is also different from the SP-600JX-17 or SPC-10....

Just my thoughts on the radios....

Rick Blank, KI5SL

Subject: R390A Main power switch

Yes, there was a discussion about the power switches. My 2nd R390A's switch stopped sticking after I used it for a while, but of course it could start sticking again at any time -- anything that fixes itself, can unfix itself. Shouldn't be too hard to get a replacement, but lots of work to get the old one out and install the new one, especially if the body size and shape and screw hole locations don't match. With a Bristol spline wrench you can actually flip down the front panel and make the job much easier.

My 2nd RX did come with the 3 covers. I will probably move them to my nicer, 1st unit. And maybe move the Collins nameplate over too -- nah, that might be fraudulent (might be, since who knows who made the 1st one, whose nameplate is missing).

73, mike k w9nrd

Subject: R390A Main power switch

- >My R390A is "on" all the time - the microswitch mounted on the front panel
- >function switch seems to be permanently closed. I seem to remember someone
- >on BA saying that these switches freeze regularly, but can be fixed. Anyone
- >have any idea how, or where I can get a replacement?

Hollow State News issue #32 contains an article entitled "R-390A Won't Turn Off (Again)?" by Dallas Lankford. The article describes how to fix the microswitch in the function switch. HSN #32 can be purchased for a check or money order payable to "Ralph Sanserino" for US\$1.00 (USA, Canada, and Mexico) US\$2.00 elsewhere.

Hollow State News  
c/o Ralph Sanserino  
P. O. Box 1831  
Perris, CA 92572-1831, USA

Regards, Steve Byan Internet: steve@hi.com

Subject: R390A Main power switch

Yeah, I remember an article on this. You can take the Microswitch off of the rotary switch body, and then you can either replace it or take it apart and clean the contacts and maybe give the spring a little extra curl. I think you can probably get a new Microswitch from somebody like Allied or Newark; or you can look in surplus stores for a suitable replacement Microswitch.

Subject: R390A Main power switch

Years ago my 390A did this. I took a long wooden dowel about 1/4 inch in diameter. I placed one of the dowel on the switch and gently tapped the other end with a very small hammer. I had to repeat this process a couple of days later. Since then, no problems.

I wonder if dirt doesn't get in there and make these things stick.

Subject: R390A Main power switch

I've heard of a lot of people having problems with this. I just looked at the schematic, and the switch is just there, in series with the power transformer primary. And people who have opened them up have talked about the contacts being pitted.

Back when I worked for Teletype it was pretty standard to connect a spark suppressor across switch contacts that make or break an inductive circuit. The thing we used was, as I recall, something like .05 mf capacitor in series with 1K resistor, or maybe .1 mf capacitor in series with 500 ohms. (There were at least two of them, depending on the power level involved.) So maybe there is a need for something like that here to protect the switch contacts.

Subject: R390A Power Switch Repair

- > My R390A is "on" all the time - the microswitch mounted on the front panel
- > function switch seems to be permanently closed. I seem to remember someone
- > on BA saying that these switches freeze regularly, but can be fixed. Anyone
- > have any idea how, or where I can get a replacement?

I just performed a switch repair operation on my 1955 Motorola R390A. It is not that hard. Should take about an hour, or maybe less if you are familiar with front panel removal of the R390A.

Here is how to do it:

1. Remove the front panel. This requires removal of a lot of screws. The main tuning knobs, ant alignment, BW, dial lock, and BFO knobs must be removed.

I may have missed one. The dial lock mechanism must be loosened and rotated so it disengages from the metal disk. Also remove the function knob and remove the nut and lockwasher holding the wafer switch assembly to the front panel.

Use a piece of 2X4 to elevate the front of the radio, and the front panel assembly will lower to the bench without putting too much force on the cable harnesses.

2. Unsolder the two wires from the microswitch. I sure hope you had the radio unplugged ! Remove the 4 bolts, nuts, and washers from the microswitch. The microswitch is now easily removed.

3. Remove the cover from the microswitch. You will notice 2 rivet like things holding the cover on, however, they ain't rivets ! You can pry these 2 pin- like devices out if you get a sharp screwdriver underneath their heads. Don't lose em ! The cover can now be pried off.

4. Make a sketch of the workings of the microswitch to use later in reassembly. Note that the contacts are covered with oxidation, and the surfaces of the contacts are highly pitted and nasty looking. They are probably welded together, but can be easily separated. Note that this switch is normally OPEN. Remove the small beryllium copper strap spring that holds the contacts apart. Don't lose it ! You will now be able to pry the 2 pieces that contain the switch contacts from the switch body.

5. The contacts on my switch appeared to be silver. I took a flat Swiss file and filed the pitting away until the contacts were nice and smooth. The contacts were thick enough that I bet I could do this a couple more times without completely removing the contact. You might want to clean off the oxidation first so you can see the pitting.

6. Reassemble the switch and make sure the contacts mate flush together. If so, put the cover back on and punch the 2 pins back in place. You may want to spray some contact cleaner on the contacts just to make sure they are nice and clean.

7. Reassemble the microswitch to the function wafer switch assembly and resolder the 2 wires. Assemble the switch assembly to the front panel, and the front panel to the radio. You are done. This procedure should be required every 40 years based on my experience.

73 KF5N, Greg Raven, egr002@email.mot.com

Subject: R390A Manual Date

On Wed, 26 Jul 1995 n5off@w5ddl.aara.org wrote:

- > My manual was printed in 1994.
- > The book is TM 11-5820-358-35 8 December 1961
- > However, it is crisp an new looking, and page 189 says
- > \*U.S. GOVERNMENT PRINTING OFFICE: 1994-342-421/81642

That could very well mean that it is available as current stock at the GPO. I will inquire...

Subject: R390A Manuals Available!

Hi gang,

I have just returned from the NTIS and I have the operator's manual, organizational maintenance manual, and the field and depot maintenance manual in my grubby little paws. Total cost (GULP!) \$64.00.

The guy there that helped me, Larry Mills, asked if there had been an announcement somewhere as there have been a flurry of requests for manuals today. I told him about the boatanchors list and gave him the e-mail address, along with mine.

He said that they have a lot of communications manuals there, or they can order them. He said that he would welcome any e-mail inquiries directly to him. I warned him what he might be getting into, but he said no problem. He can do searches on anything in the title, manual number, etc. Larry's e-mail address is <lmills@ntis.fedworld.gov>.

Larry added that the Army is good about keeping available manual lists up to date, with the latest being issued on July 1, 1995, but said the Navy doesn't do nearly as well. He suggested calling them (215-697-2000) for the latest information.

Now the bad news. As of 1:30PM EDST, there was only one R-390A field and depot maintenance manual left in stock at NTIS. They are available in the supply system from St. Louis, but be prepared for a wait.

Go for it!!!

73, Tony, K4KYO

Subject: R390A Manuals: NAVSHIPS/Army TECH

On Wed, 9 Aug 1995, S. Miller wrote:

- > Can someone tell me the difference between the Army tech manuals
- > currently available from NTIS and the 1970 NAVSHIPS manual? Maybe a
- > better question is what do each of the three manuals from NTIS contain?

Hi Steve,

This will be from memory of my active Army days that ended in 1967, and I may not be 100% correct in this, but I'll try to explain. (Maybe somebody will jump in and fill in the holes.) Army technical manuals ("TM") were numbered first by the branch (11 was Signal Corps), second by the federal stock classification, the designated item number, and then by the applicable maintenance level.

For example, the R-390A manual series are numbered TN 11-5820-358-XX, with the "XX" being the maintenance level. Briefly, the Army had five maintenance echelons, numbered 1 to 5. They were (again from memory):

- 1 - Operator
- 2 - Organizational
- 3 - Field
- 4 - (Can't recall what it's called)
- 5 - Depot

Depot maintenance means a the capability rebuild to return the equipment to new specifications and from my experience having been assigned to Tooele Army Depot for two years, that means complete disassembly and remanufacture.

I have no idea what the differences are in the Navships manuals, although I would guess that they relate more toward shipboard installations.

I hope this helps a little.

73, Tony K4KYO

Subject: R390A Manuals: NAVSHIPS/Army TECH

- >>>Can someone tell me the difference between the Army tech manuals currently
- >>>available from NTIS and
- >>>the 1970 NAVSHIPS manual? Maybe a better question is what do each of the
- >>>three manuals from NTIS
- >>>contain?
- >>>thanks Steve Kd2Ed
- >
- >>Good question, and does anyone have a source for the Navy TO- manuals??
- >
- >73 Joe KC6TXU

I have tech manual EE125-AB-OMI-010/P610 R390A/URR, SPAWAR 0913-LP-009-1400. Operation, maintenance, and installation instructions with parts list. The manual is labeled as superseding Navelex 0967-LP-063-2010, 15 April 1970 and is dated 15 May 1985. Content is similar to my 1956 Army manuals. Another number is NAVSHIPS 0967-063-2010 with the source for the Naval tech manual as:

Navy Publications and Forms Center



5801 Tabor Ave.  
Philadelphia, PA, 19120  
Ed Zeranski ejz@marlin.nosc.mil,

Subject: R390A Mechanical Filter

>I can get a filter from Fair, but I have a question about the input/output  
>caps. My manual shows both ends of the filter paralleled by 110pf fixed  
>caps. My set has the output of the three remaining filters paralleled by an  
>82pf cap in parallel with an 8-50pf trimmer. The input is similar, except  
>two of the filters have 82 pf caps, and the third a 51pf cap. All are  
>paralleled by 8-50pf trimmers. Can someone tell me what the fixed cap should  
>be for the missing 4kHz filter, and is the 51pf cap correct?

The difference between the schematic and the way your receiver is constructed reflects the presence of a documented production modification. The fixed input and output capacitors (C509 and C514) for the 4kHz filter are 82 pf. The input and output trimmers are 8-50pf and are designated C566 and C569 respectively. This data from NAVSHIPS manual 0967-063-2010 (15 Apr 1970).

>Also, I assume the trimmers are adjusted for maximum output, but am not sure.

The production mod spec contains no adjustment instructions. However, the \*original\* procedure for replacing a mechanical filter (prior to the trimmer mod) calls for a cut-and-try method using fixed silver-mica caps to establish the correct input and output capacitance. The procedure calls for a signal generator with variable output amplitude and a voltmeter across the diode load terminals on the rear panel. This procedure, as written, is typically abstruse. However, if you decode the hyper-technical gobbledygook, it basically says you tweak it for maximum smoke. Like you said. :) Geez! They make everything much too complicated. Use the crystal calibrator and the output level meter.

Good luck!

Bill VanAlstyne, N6FN, bill@cruz.com

Subject: R390A Mechanical Filter

Dear BA enthusiasts,

Jan wrote about the R-390A filters, and I thought I would pass along some further info. When I aligned my Collins R-390A, I found that the 16 kc filter was down about 5 db from the other filters after peaking all filters for maximum signal at 455 kc. When I rotated the trimmer caps for the 16 kc filter, I noticed there was only ONE peak on the input cap. This meant that there was either too much or too little fixed parallel capacitance across the filter to resonate it. The fix was easy, and now all filters have about the same meter reading. This generally applies to most any tuned circuit. If you get one peak with a single turn trimmer capacitor as it is rotated 360 degrees, you may not be tuned to resonance, and further circuit adjustment may be necessary.

Jack, WB8BFS jackg@xetron.com

Subject: R390A PTOs: Who made them.

I am in the middle of aligning an R390a made by EAC. It came with a COSMOS PTO. It has an external endpoint adjustment and the external linearity adjustment with all the little screws that go by as you tune the unit (about one per 90 deg. of rotation). There is also another adjustable coil inside the unit that is in series with the end point coil to give more range. There is a warning sticker on the inner cover warning about the 15 lb. charge of dry nitrogen (of course mine had outgassed). This unit took a lot of tweaking to get the end point adjustment correct and it still needs the linearly adjustments to get it spot on.

I also have a PTO sitting on the bench made by Progressitron Corp. I checked it and it seems to be spot on as it is and it seems to be more stable than the Cosmos unit. The Progressitron unit uses the metal stack inside for the linearly adjustments and has a single endpoint adjustment. I may swap this in place of the Cosmos unit.

Joe Selkregg

Subject: R390A PTOs: Who made them

Joe:

The linear stack and the single endpoint adjustment are the "normal" adjustments as far as I have seen. The Cosmos PTO's seem to be the exception. Have you tried to do a linearity adjustment on the Cosmos?? I'd be interested to know: 1) if it can be done (that is, is there enough adjustment length on the setscrews to do it), 2) will it hold an adjustment?? (Over an extended period??)

I wonder if Cosmos made the PTO's this way as a cost-cutting measure (easier to align??) or if they thought this was real design improvement?

Also, does anyone know how many contracts Cosmos received?? ( I assume they were just a sub-contractor.) Were PTO's the only thing they ever made?? What company or order numbers were they subcontracting for??

Fascinating discussion.

Shaun P. Merrigan, merrigan@nyquist.ee.ualberta.ca

Subject: R390A Restoration saga- WTB vfo

>Such a deal! It's a good thing I like working on boat anchors, but  
>my shop looks like an R-390A depot with parts from the three units  
>scattered about the floor and work bench. I am really getting  
>motivated, though. I might be able to make two good units out the  
>three!

Hi Jack,

Sorry you got a lemon. Sounds like the turkey who sold it to you was a lemon! "Caveat emptor" only goes so far, at least with me. I'd be rather PO'd.

>I installed my spare vfo, a Cosmos unit (poorly engineered vfo), but  
>the tracking is as much as 2.5 kc off at the 100 kc points.

Well, I have to dispute this allegation and leap to the defense of Cosmos PTOs! Cosmos PTOs not only have a perfectly workable end-point (end-to-end range) adjustment, but also have over 40 externally-accessible 25KHz linearity compensators that can be adjusted without removing the shield can.

Mine was way off when I got it, too, but after a bit of out-of-chassis tweaking with the help of a good digital freq meter, it's now +/- 100Hz at all 100KHz calibrator points. I could get it closer if I wanted to spend more time on it, but you reach a point of diminishing returns. I've also found it to be very stable -- rock-solid stable with the ovens turned on, in fact.

I'm relatively new to R-390As also, so my word on this sure shouldn't be taken as Gospel. Yours or anyone else's opinions to the contrary are welcome.

>Fortunately, up there with a friend of mine Friday to pick up a  
>couple of government refurbished vfo, unless someone has a spare.

You're lucky, I guess. Never been there, since it's 2500 miles away. :) Best of luck getting that lemon back on the air, though, one way or another.

Bill VanAlstyne, N6FN, bill@cruz.com

Subject: R390A-PTO' s: Who made them

This actually is a continuation of a thread that has been on here for the last couple of days but I have retitled it since the earlier posts were titled with R390/mil cont.. What I'd like to know is who made the PTO's and what is the opinion over how well they work. All PTO's for the 390 were not apparently equal. I have a 390A with a PTO from a company in Burlington NJ (Mike, I'm not sure that that is the company you named) and it's Ok in terms of stability and cal between 100Khz points

but certainly could be better from end to end. There is a lot of talk about the COSMOS PTO's and I have a Fair Radio Gov't Reconditioned one of these with a very High serial number and a travel tag that indicates mods were installed. I also have earlier COSMOS PTO's but I have not gotten all the way inside. I think it would be helpful for all to share notes on these PTO's as apparently there are the good, the bad and the drifty out there. So, now that you have looked at the tag to see who made the receiver take a peek underneath and look at the label on the PTO.

Steve Kd2Ed

Subject: R392 Plate Voltage

- > Where does the 392 get plate voltage? Separate dynamotor? There can't be a vibrator
- > supply crammed into that little case, can there? AT least I trust the PS doesn't need
- > those monster 6080 series regulator tubes.

According to an article by Walt Hutchens, ER 12/90:

"Electronically, the one remarkable feature of the R-392 is the plate voltage. Absolutely alone among communications receivers, it uses the 28 volt primary supply as the 'high voltage' for the tubes. This low plate voltage gives lower stage gains, so the R-392 has six IF stages, rather than the three or four which are typical of receivers of this type."

Wally - wa6jpr@qsc.com

Subject: Rack rails for R390A?

One thing you can do is get a one racket unit wide (1 3/4) panel of thick, rugged stock and mount it just below the hole for the heavy unit. This keeps the thing from getting away from you if you slip and crashing to the bottom of the rack. Then get a table, some books, lumber, whatever for spacers and set the unit on the table and lumber or books so it's just slightly higher than the "preventer" panel. Then push it straight back into the rack. Now, go around to the back and insert a proper length 2x4 under the rear of the chassis so that the bottom of the panel comes in and gets at least \*near\* the rack. Then use long rack screws and pull it the rest of the way in. Then remove the "preventer" panel. Even better than the "preventer" panel is to temporarily mount a rack shelf of the rugged variety (old RCA shelves) upside down just below where you want the heavy unit. Then use the table and shims and push straight back. It will hold it horizontal and you just put in the screws and remove the upside down shelf...

Don't try to hold it with muscle power...you could lose some toes!

-Jim , W2XO

Subject: Slug rack cover on R390A

At 03:24 AM 7/26/95 -0500, Rolf Jansson wrote:

- >Hi anyone knowing what the screw-holes on the right on my
- >R-390a are for , I have covers, but are there covers over,
- >coils sub-chassis to ??.

Yes! There is an aluminum shield cover which goes over the entire slug rack assembly, and is secured with five screws. This shield also has coil reference designators and locations printed on it -- for quick reference when doing adjustments, I assume.

My R-390A is an EAC made in 1960 -- assume the others makes are similar or identical in regards to this shield, but I don't know for sure.

Bill VanAlstyne N6FN bill@cruz.com

Subject: SSB-unit for R390A

- >Hi folks just wondering, are there any SSB-unit made for my R-390A ???!

>Regards Rolf

The CV 591 is an SSB converter for the R390A. I have the tech manual but no converter yet, still looking.

Edward J Zeranski NRaD code 841 ejz@marlin.nosc.mil

Subject: SSB Converter

As a SSB Converter for the R-390A I'd suggest the CV-1758 (MSR-9) instead of the earlier CV-591A (MSR-4). I believe Fair Radio sold them at one time...

Subject: SSB Converter

Is the CV-1758 (MSR-9) Tube, or Solid State? Who made it, how big is it, etc.?

Dennis Gibbs dgibbs@rational.com

Subject: SSB Converter

Some information on these is available from the Boatanchors MIL LIST. According to it, both converters were made by Technical Materiel Corp., both use 7 and 9 pin tubes, and both are 19" rack mount, 5.25" high.

Stan K8RPA flegler@pilot.msu.edu

Subject: SSB Converter

Nobody's yet mentioned the all-time heavyweight champion SSB partner for the R390A -- the CV-157. If you can get one working, and put up with the mass and the volume, it's a great box and will let you listen to USB and LSB independently on the signal. Great effects when doing synchronous detection on SW AM broadcasts.

And the motor-driven AFC is fun to watch -- tho you may have to hook up a Super-Pro instead of an R390A to really enjoy it (ducking! :-).

73, mike k

Subject: SSB mod for R390A

I'm currently fiddling with a mod along the lines of one described in Hollow State News over a period of time. The gist of it is that you don't do a product detector. Instead you do a fast-attack AGC and also greatly increase the BFO signal to the diode detector. "It can be shown that" (which means I don't know how to show it but somebody has done it, and here's what he got) [that line stolen from Dr. Rogers of Electronic Associates] if you put enough BFO into a diode detector, basically lots more BFO than signal, you get pretty good SSB detection. What I'm working with now is a simpler description of the mod than was in HSN, and some differences to make the AGC mod easier to do, because I'm lazy. I'm not finished, but for those who don't want to wait, here is what I'm up to.

1. Take out the IF sub-chassis.
2. Locate C535, which runs from pin 5 of the BFO, V505, to a terminal post and winds up at pins 6-7 of V506B diode detector. This is a 12 pf capacitor; shunt it with 47 pf to get the BFO injection up high. The article in HSN says you have to take out the bellows coupling on the BFO shaft; but I just slipped back the sleeving and tack-soldered the added capacitor right across the existing one without having to remove the bellows. Tack-soldering is the key to my lazy method; these parts don't weigh anything, and solder is strong enough to hold them without having the leads wrapped around things or stuck through holes.
3. Locate R546, 180K that runs from pins 1-2 of V509A AGC rectifier to a terminal post. Tack a silicon signal diode across this resistor, cathode to V509A pins 1-2 and anode to the terminal post. (I used diodes from Radio Shack sold as 1N914/1N4154). It's important to use silicon here for low leakage.

4. Locate R547, 220K which runs from pin 2 of V506A to a terminal post. Clip this out and tack a silicon diode with cathode to the terminal post and anode to pin 2 of V506A.

All the above is from the HSN modification, and he goes on to replace C551, the big 2uf capacitor with another value and rewire the AGC speed switch so that the integrator function of V506A is disabled. Well you can

1. put the IF sub-chassis back in now, because the rest of the playing is done at the AGC speed switch.

The HSN article said to take the front panel off for access to the AGC speed switch. Instead

1. take the knob and nut off the AGC speed switch, and you won't be able to get it out but you will be able to rotate it up to where you can get to the wires. At this point

7a. this is how the HSN article would do it: disconnect and tape the wire from terminal 8 of the switch, the contact that is made in the SLOW position. Move the ground wire from terminal 9 of the switch to terminal 8. Connect a capacitor (value to be determined, maybe about 1.0 ufd) between terminals 8 and 9. The result of this change is that in the FAST position you have 0.1uf to ground as always. In the SLOW position you have C551, 2uf to ground. In the MED position you have whatever you get by connecting 2uf in series with the added capacitor. The writer remarks that he discovered the reason for the integrator, that if any of the IF tubes are the least bit gassy they will drain off the AGC voltage faster than you had in mind. Well I guess this is the case with my receiver, because when it was stone cold the AGC attack and release times were about as predicted; but the release time got much shorter as the receiver warmed up. Hence

7b. I'm trying to keep the integrator and adjust the time constants with it in the circuit. The trouble is that with the integrator the SLOW release time is way too long to be good for anything, and the attack time is not very impressive either. So, disconnect the wire from terminal 7 of the switch, the arm of the switch, and insert a capacitor, value to be determined, in series between the wire and the switch. If you want to do a neat job you can screw an insulated terminal post somewhere, like maybe on one of the screws of the switch; or you can just let the connection dangle and hope it doesn't touch anything. Disconnect and tape the ground wire from terminal 9 of the switch, the MED position. Connect a capacitor, value to be determined, between terminals 8 and 9 of the switch. With this circuit the integrator functions all the time in MED and SLOW; the SLOW time is determined by the 2uf C551 in series with the first added capacitor; and the MED time is determined by the result of 3 capacitors in series.

1. When you have the times the way you want them, put the AGC speed switch back in place, and you're done.

The modified main chassis will work fine with an unmodified IF chassis. The AGC timings will be different, that's all. The diodes modification give you fast-attack slow-release AGC that you need for proper AGC action on SSB signals. The added capacitor in the BFO gives you much higher BFO voltage at the detector for fairly undistorted detection. What remains to be learned are the correct capacitor values, and whether keeping the integrator makes any difference in the ability to tolerate slightly gassy tubes in the IF amplifier.

Subject: Who's more sensitive

Randy says . .

>Dear folks,

>Last night I got into an argument with another ham about poor tube performance on 10 &  
>15 meters. I was, admittedly, going on about stacking my R390A up against anything  
>arriving from off shore. In response I was subjected to a technical flurry of data  
>supposedly demonstrating that no way could the R390 or any tube radio have equal  
>performance to the newer solid state rigs on the higher freqs. The gist of the argument  
>centered around internally generated high freq noise. Could someone more  
>knowledgeable than I make some comment on this?

Well, I'm not very knowledgeable in this as some, but I do know that someone in Hollow State Newsletter did a comparison around about 1987 or so of the 390A vs. some of the then "top"

receivers. I believe the 390A still beat out the solid-state models in the areas of noise and dynamic range. That's my 2 cents worth and I hope someone on here will step in and defend the honour of our venerable ol' 390As. It always amazes me how some people just \*must\* prove that 'latest and greatest' also means 'better than before'. As we know, that's not always the case! Semper vacuum,

Joe KC6TXU

Subject: Who's more sensitive

On Wed, 28 Jun 1995 RANDY@sbi.sh2.pdx.edu wrote:

>Last night I got into an argument with another ham about poor tube performance on 10 &  
>15 meters. I was, admittedly, going on about stacking my R390A up against anything  
>arriving from off shore. In response I was subjected to a technical flurry of data supposedly  
>demonstrating that no way could the R390 or any tube radio have equal performance to the  
>newer solid state rigs on the higher freqs. The gist of the argument centered around  
>internally generated high freq noise. Could someone more knowledgeable than I make  
>some comment on this? Is it true? (shudder)

Yes, it is true, but the issue at HF is not usually sensitivity. Tubes in general produce more internal noise than do modern solid-state devices. The amount of internal noise produced by a device is usually measured in either the effective temperature of a thermal noise source or by the noise figure (usually stated in decibels).

The problem is that in the HF portion of the spectrum, natural and man-made noise is high enough that the limiting sensitivity of a receiver is no longer determined by the internal noise but by external noise. At VHF frequencies and above, this background noise level drops considerably. The quickest test to see if your setup is background limited is to disconnect the antenna from the receiver. If the noise level coming out of the speaker drops, the receiver has all the sensitivity needed for your location and a lower noise figure receiver will not help. Losses in the transmission line contribute directly to the system noise figure, but once again at HF these losses are generally not too high.

At two meters, however, things have changed considerably. Background noise is generally in the range of 2 to 3 dB and a hundred feet of good coax cable may have another 3 dB of loss. Only the best vacuum tube RF amplifiers (using Nuvistors or 416's [it's been a while]) could achieve noise figures this low at 144 MHz, and then they required neutralization and tricky adjustment. Only a dedicated weak-signal VHF'er would dare mount his tube pre-amp at the antenna with the constant adjustments needed. At even higher frequencies, the noise figures of tubes increased and the background noise decreased. At UHF and above, parametric amplifiers were therefore in vogue.

Today, inexpensive solid-state devices like GaAs FET's and HEMT's can achieve noise figures of less than 1 dB at frequencies above 1 GHz. Antenna mounted preamps are common in most weak-signal VHF/UHF stations. Para-amps are thankfully almost never used any more.

But back at HF, the background noise still dominates most tube and almost all solid-state devices. Thus receiver sensitivity is rarely a problem except in the oldest of tube receivers. What is usually more important is selectivity and strong-signal performance. The R-390A with its mechanical filters is on par with most modern ham receivers in terms of selectivity (except possibly the 0.1 and 1 kHz bandwidth positions where the skirts are broad by today's standards). Where the R-390A shines, however, is in its strong signal performance. Images, front-end overload, and intermodulation distortion are virtually non-problems in the R-390A's. It takes an exceptionally well designed modern receiver to exceed the strong-signal performance of an R-390A.

So can the average rice-box be more sensitive than the R-390A? Probably - but you have to live in an EXTREMELY quiet radio location to ever use this sensitivity. A better comparison would be to try both receivers at Field Day in a multi-band setup, or try both receivers next to an AM broadcast station. Many years ago, I remember operating in the 5 transmitter category on Field Day. With tube rigs, it was often possible to operate in both the phone and CW portions of some bands simultaneously with careful tune-up and reasonable antenna placement. With the modern rigs, it is not uncommon for the 40 meter station to wipe out 20 and 15 meter stations even with the added selectivity of antenna tuners for each band.

73, Barry WA4VZQ ornitz@emn.com