HOLLOW STATE NEWSLETTER

"For lovers of vacuum tube radios"

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OLYMPIA WA 98501-8408

Issue 36
Summer-Fall 1995

Publisher
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P.O..BOX 1831
PERRIS CA 92572-1831

SUBSCRIPTIONS: $5 for 4 issues (3 issues published per year).
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HSN is produced and published by and for the community of those who appreciate the fine accomplishments of the manufacturers of 'top of the line' vacuum tube communication radios and auxiliary equipment. Originally created by a group of R-390 users, *HSN* has expanded to include industrial, military and consumer grade receivers by Collins, Hammarlund, National, Hallicrafters and others. *HSN* includes tips, modifications, alignment and restoration advice, product reviews, parts. tubes and service sources, and subscriber buy/sell information - all provided by subscribers and friends of *HSN*. All articles and information shared through this newsletter may be reprinted only with permission of the author.

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EDITOR'S AND PUBLISHER'S CORNER

Work on this issue began in June - I don't dare wait as time is precious. As 'promised' in the #35 editorial remarks, both Dallas Lankford's *MOD 3* and *51J-4* articles made it in. I have also just finished the new Vol 1 thru 35 index and have sent it to Ralph for distribution soon. Inquiries and items for publication consideration are still welcome - the backlog materials are starting to get a little thinner. I'm especially looking for items for the "Publications of Interest" section -- plus hearing some answers to the "Questions and Answers" section. For those who occasionally call me, my new phone number here is (360)-786-6756 - pre-paid/early evenings only please.

Reid

R-390A FILTER - MOD 3

Dallas Lankford
(1-1-95)

If you have done my "Collins Torsion Mechanical Filter For the R-390A" mod (**DX News** Vol 61, No 2 - Oct 11, 1993, pgs 23-27; or **Hollow State Newsletter** No 30, pgs 2-8), or have done my improved and simpler "R-390A Filter Mod 2" (to appear in **DXN**, **DXM**, and **HSN**), then my latest R-390A filter mod may be just the thing you have been waiting for.

The purposes of the previous two R-390A filter mods were to establish a 6 KHz BW as the widest BW for the R-390A and at the same time to provide a 6 KHz bandwidth for the R-390A, to increase the R-390A close-in 3rd order intercepts for all non-crystal filter bandwidths, and to protect the R-390A mechanical filters from excessive RF levels due to very strong nearby signals.

The disadvantage of those mods is that the 8 KHz and 16 KHz BW positions of the from panel BW switch provide the same 6 KHz BW. Wouldn't it be nice, I thought, if the 16 KHz mechanical filter was replaced with a 3 KHz BW filter? That would provide 2, 3, 4, and 6 KHz bandwidths for such a modified R-390A, which would be as many bandwidths as a DXer could reasonably wish for. The down side here is that the bandwidths would not be in sequential order, but I just wasn't up to the task of shifting the 8 KHz mechanical filter to the 16 KHz position, the 4 KHz filter to the 8 KHz position, and then installing the 3 KHz filter in the newly vacated 4 KHz position. Anyone who has fiddled around with the R-390A mechanical filters in the IF subchassis knows that such a project would not be a weekend project.

For a 3 KHz filter, I decided to use one of Kiwa Electronics (Craig Siegenthaler, 612 South 14th Avenue, Yakima, WA 98902, phone (509) 453-5492) CLF-D2-K filters. Putting this 3 KHz ceramic filter into an R-390A IF subchassis in place of the 16 KHz mechanical filter turned out to be a toughie. Two problems were encountered: reducing signal levels into the ceramic filter (the ceramic filter has much less loss than R-390A mechanical filters when properly impedance matched), and signal leakage. To equalize signal throughput, a resistor divider network was used ahead of the ceramic filter; see the "After" schematic - Figure 2. To eliminate signal leakage, a flange was fabricated from 0.015 inch copper sheet (copper gutter stock, available at sheet metal shops), tinned, and assembled with two etched PC boards so that the ceramic filter input and output pins were isolated from each other by the flange. The flange was made approximately the same size as an R-390A mechanical filter flange, so that the ceramic filter assembly could be bolted (just like an R-390A mechanical filter) into the vacated 16 KHz IF subchassis hole. The flange, with ceramic filter passing through it, also acts as an RF barrier to help shield the input and output impedance matching transformers T1 and T2 from each other.

As can be seen from the "Before" (Figure 1) and "After" (Figure 2) schematics, the 16 KHz mechanical filter was removed with C507 (51 pF) still attached to the mechanical filter pins. The other 51 pF fixed value (silver mica) capacitor was left in place, attached to the lugs of C571, the output 50 pF variable ceramic trimmer.

This is the "natural" way to remove a mechanical filter from an R-390A IF subchassis in preparation for doing a filter mod using tuned primary impedance matching transformers, as I did. Consequently, a 300 pF silver mica capacitor was added (in parallel) to the lugs of C564 (the input 50 pF variable ceramic

trimmer) to permit the primary of T1 to be tuned to resonance at 455 KHz using C564, and a 250 pF silver mica capacitor (actually 180 pF paralleled with 62 pF) was added (in parallel) to the lugs of C571 (the output 50 pF variable ceramic trimmer) to permit the primary of T2 to be tuned to resonance at 455 KHz using C571; see Figure 2.

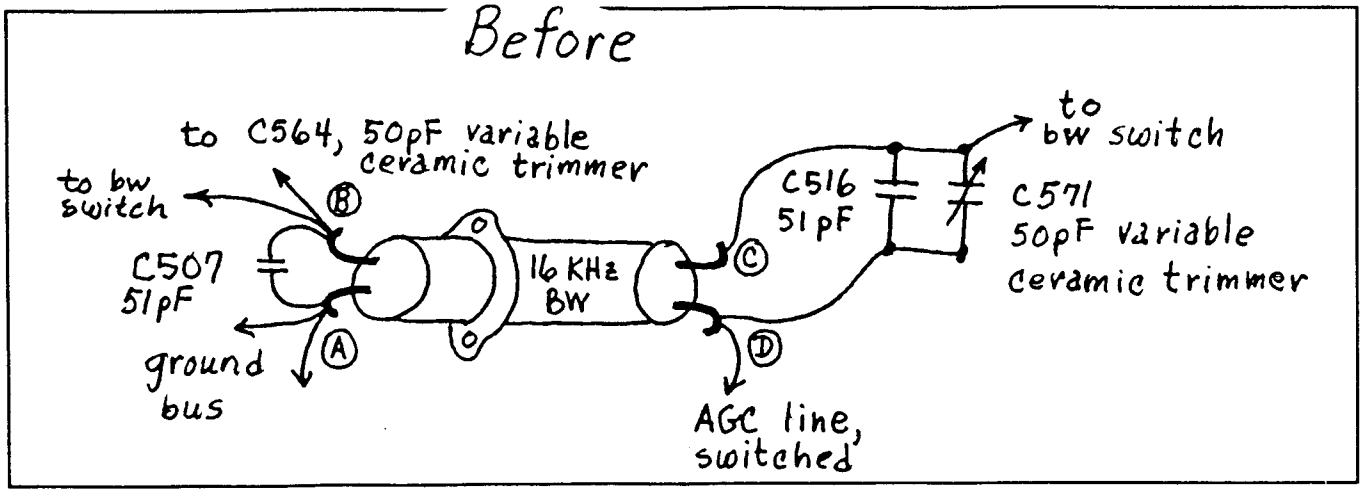


Figure 1

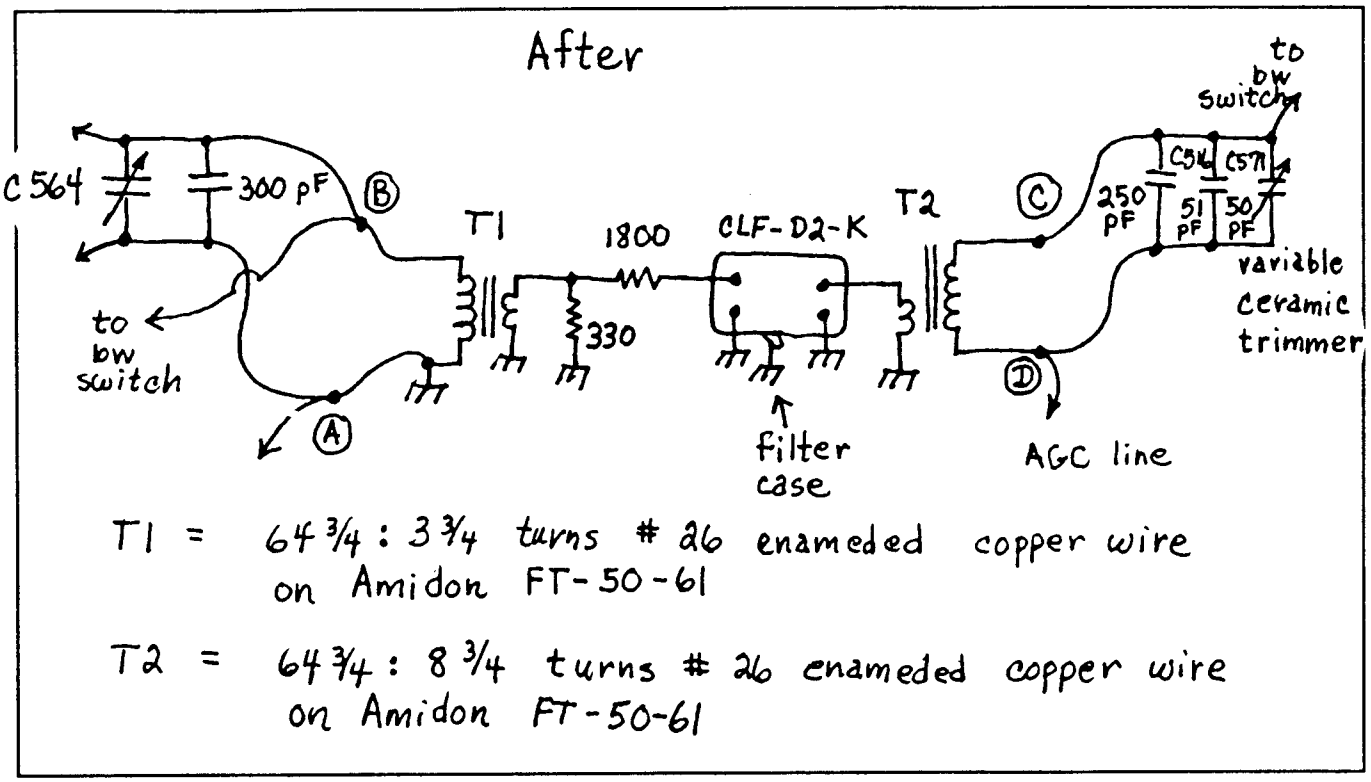


Figure 2

A PC board layout of the filter mod is given in Figure 3. The PC board was etched, and then cut along the dashed line. The short part extends below the IF chassis, and the longer part extends above the IF

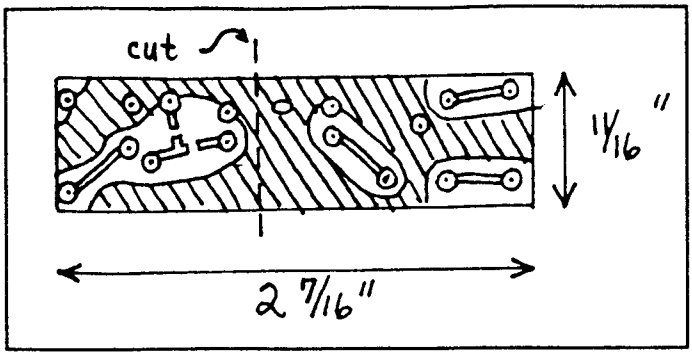


Figure 3

chassis. The ceramic filter was soldered to one of the PC board pieces (it does not matter which one), and then the unsoldered end of the ceramic filter was "Chinese puzzled" through a small rectangular hole in the flange, after which the ground plane of the PC board with filter attached was soldered to the flange. Next, the other PC board piece was inserted onto the unsoldered ceramic filter pins and then soldered at the pins, and along the ground plane and flange boundary. Finally, the remaining parts of the filter were soldered to the completed PC board and flange assembly, the completed assembly was mounted in the vacant mechanical filter hole, the remaining wires were attached (points A, B, C, and D on the schematics - Figures 1 and 2), and the 250 pF and 300 pF fixed silver mica capacitors installed at the lugs of the variable ceramic trimmers. To simplify installation, small pins about the same size as the mechanical filter pins were press-fitted and soldered to the two pairs of PC board pads at each end of the PC board. To conserve space, 330 ohm and 1800 ohm surface mount resistors were used (the PC board is laid out for surface mount resistors).

To align the ceramic filter input and output transformers, the variable ceramic trimmers C564 and C571 must be adjusted. Set the bandwidth shaft to the 16 KHz position, remove the mechanical filter cover (if not already removed), and with the R-390A tuned to a steady signal (one of the 100 KHz calibration points will suffice), adjust C571 (the top trimmer) for maximum signal. To adjust C564 (the side trimmer), tilt the IF subchassis so that C564 is accessible through one of the circular cutouts in the side panel.

During testing of the filter mod, it was observed that signal levels through the ceramic filter slowly decreased for about an hour or so while the R-390A came up to operating temperature. This problem was traced to a "drifty" C516 (the 51 pF silver mica capacitor across the pins of the variable ceramic trimmer C571). Replacement of C516 cured this problem.

The inductance of 64-3/4 turns of #26 enameled copper wire can vary considerably from one Amidon FT-50-61 toroid to another. so it may be necessary for you to vary the value of the 250 pF or 300 pF capacitor (or both) to permit T1 and T2 to be tuned to resonance at 455 KHz. If you do not get two peaks when you adjust them, that is an indication of failure to achieve resonance, in which case you will have to tinker with the value of the 250 pF or 300 pF capacitor (or both).

Is this filter mod worth the effort? Probably not. In fact, this mod is very close to, if not, and "emperor's new clothes" mod because I have yet to find a listening situation where the 2 KHz or 4 KHz BW does not work about equally well. At best, I would not expect to find more than one or two dX situations a month where this mod makes any observable difference. And as for making something hearable that was not hearable before, it'll never happen.

QUESTIONS AND ANSWERS FROM OUR READERS

This section will present questions from subscribers for which responses are solicited. If you can help in providing answers, suggestions or just plain good advice - please send them to the editor for inclusion in

the next issue of HSN.

??? For those of you on the Internet or other services -- how about sending in some info on good sources, etc for info exchange and related stuff? [George Ross at george.ross@canrem.com]

??? Has anybody tried one of the new digital audio processors (i.e. JPS Communications NIR-10 or equivalent model made by MFJ) on the audio of a 390A? [George Ross, 127 Centre St. West, Richmond Hill, Ontario L4C-3P6]

??? In my EAC R390A (s/n 3592) I have replaced the 6DC6 RF amp with the 6GM6. It appears to work quite well but there is a bit of distortion with the RF gain wide open. I am now thinking of changing the cathode and grid resistor values to make it more linear. This mod was done due to poor antenna and is strictly for those down in the mud stations. Comments? [George Ross, address above]

??? As the R-390/390A doesn't do so well on SSB, many of us look around for an outboard converter such as the Hammarlund HC-10. Most that I have seen at the local hamfests are in pretty poor condition and expensive ($150 +/-). As I own both an HQ-170C and HQ-180C I began thinking ... if the HC-10 is essentially the IF and AF sections of an HQ-180 and if the HQ-170 (except for its ham band only coverage) is identical to/sort of/like/close to/has the same knobs as the 180, it seems to me that all I need to do is break into the 170 somewhere after the RF stage, dump the 390's IF output in there, stick in a simple switch to disconnect the 170's RF section and voila, instant HC-10, convertible at the flick of a switch back to a fully functional HQ-170 receiver. Simple, right? or am I missing something here? [Robert Bukovsky, 929 North 4th St., Reading PA 19601]

SHORT SUBJECTS

LANKFORD/CHAMBERS AGC MOD ON THE R-390 - SOME FEEDBACK [Dave Metz] I preface these observations on audio quality only as I do not have the necessary equipment to measure the attack and release times. As the AGC circuits appear to be almost identical between a 390 and a 390A, I thought I would give it a try. Basically, it works very well on slow but is worse on medium and fast. Using the R-390 schematic #'s: put a diode across R-556, replaced R-557 with a diode and put 47 pf cap across C-536. I then disconnected the parallel combination of C-547 and C-546 and put a .22 mfd in parallel with one of them to get the desired 1.22 mfd. At that point, I reinstalled the IF chassis to see how it worked and discovered that the slow seemed excellent with no distortion on even the strongest of SSB signals. I then proceeded to change the AGC switch as per the 390A mod. Unfortunately that introduced noticeable distortion on the slow with the med and fast even worse. So... I changed the switch back to original and just accepted the excellent slow for SSB. However, before changing back I temporarily removed R-555 (100K) as per the earlier Cornelius mod. Result: I could not tell the difference with my ears either way with respect to that resistor. In the end, I put the switch back to original and left R-555 disconnected at one end. Finally, I put the IF gain pot about half way between the stops. I am highly pleased with the performance on slow and would highly recommend this minor change to make SSB sound great without riding the RF gain all the time. There is one anomaly that I discovered. R-554 coming off Z-503 is schematically 2.2K. In four IF decks, the installed value was 470 ohms (and looked original). I temporarily removed this resistor and used a substitution box to experiment. It seemed that the 470 sounded much better than the 2.2K or any other value for that matter.

51J-4 SWITCHABLE AGC [Dallas Lankford - 1/95] When I originally developed my 51J-4 AGC mod (see *HSN #26*), I had hoped to replace the original AGC switch with a multi-section rotary switch to obtain multiple release times. Unfortunately, there is very little space between the 51J-4 front panel and the metal plate which is part of the gear assembly, and most rotary switches require more space than is available. Recently I found that one type of R-390A LINE METER switch would barely fit if the ends of the bandswitch wafer mounting screws were filed flush with the mounting nuts. This particular R-390A LINE METER switch is unlike most such switches I have seen, namely smaller than others, and completely enclosed in plastic. The usual R-390A LINE METER switches are too large for this mod.

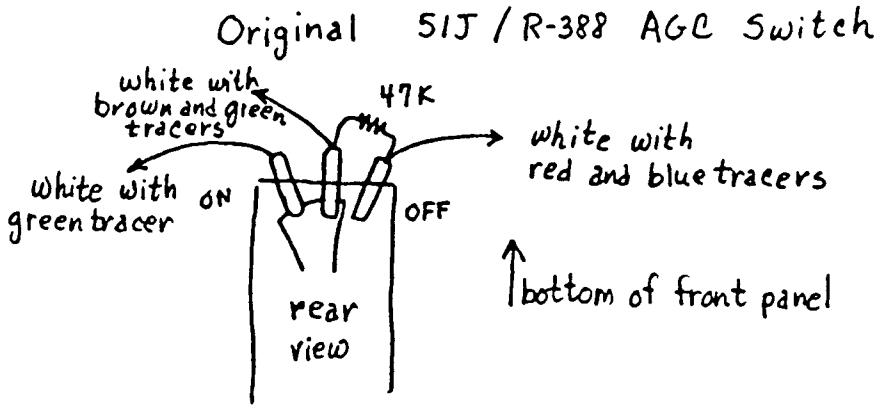
A sketch of this new 51J-4 AGC circuit (and the original) is given in the figure on page 7. The MED release time is approximately the same release time as my original circuit, while the FAST release time is about 5 times faster, and the SLOW release time is about 2 times slower. As with the original mod, the S-meter is pinned briefly when the receiver is turned on, but the meter over-voltage is only about 50% beyond full scale meter indication, and is not harmful to the meter. The meter is also pinned briefly when changing among FAST, MED, and SLOW, but is not harmful for the same reason as above. The placement of the 1N4148 diode in the AGC line following pin 1 of V111 was moved to the new AGC switch to make the space above the audio output terminal strip on the chassis rear available for an added terminal strip for mounting the 0.47 mF MED and 1.0 mF SLOW release time capacitors. While I have not measured the attack and release times of the FAST and SLOW positions, on-the-air listening tests have revealed no problems. I was a bit concerned that the 22K ohm resistor which was chosen to minimize overshoot for the MED time constant would perhaps not be satisfactory for faster and slower time constants, but no overshoot has been observed in the FAST or SLOW positions. In fact, the FAST release time is ideal when multiple SSB signals with wide signal strength variation are present on the same frequency. And the SLOW release time is useful for improving audio quality of strongly fading AM signals in the SW bands and on MW graveyard frequencies. If you can find an appropriately small rotary switch, this mod is well worth doing.

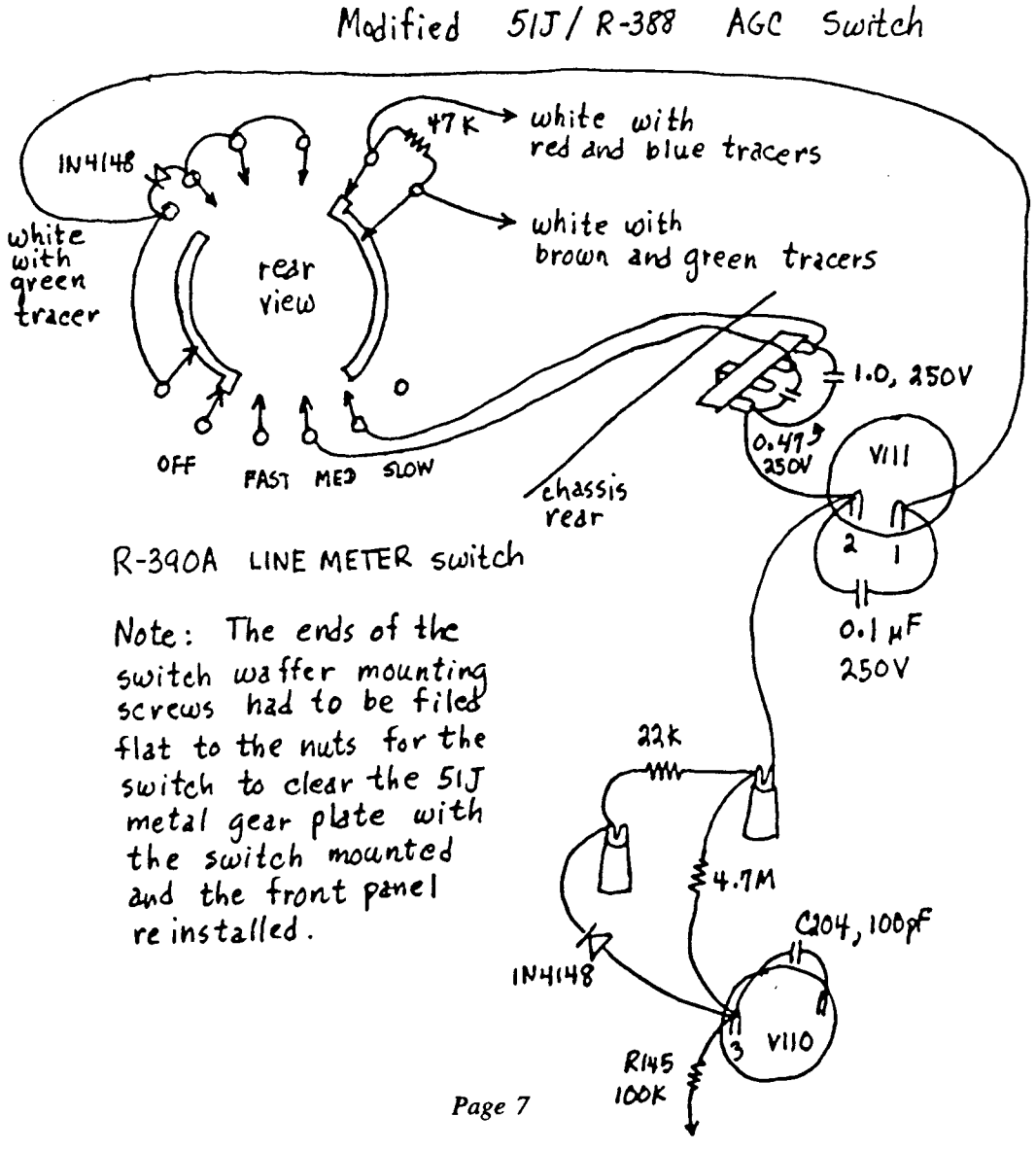
51J-4 PRODUCT DETECTOR UPDATE [Dallas Lankford] In *HSN #28* I remarked that I used a 2pF coupling capacitor from pins 6,7 of V110 to pin 7 of the 6BE6 (see Fig. 2 of that article) and an 8,200 ohm resistor from pin 7 of the 6BE6 to ground in order to equalize the audio levels between AM and SSB modes. Recently, after doing my fourth 51J-4 product detector modification, I found that in some 51J-4's, the 2 pF/8,200 ohm combination is not optimal. To achieve equalization of audio levels between AM and SSB modes for this fourth 51J-4, a variable 1-10 pF ceramic trimmer was used, and the required value turned out to be about 4 pF. Apparently there is enough variation from one 51J-4 to another to make it desirable to use a variable 1-10 pF ceramic trimmer in place of the fixed 2 pF ceramic capacitor so that audio levels between AM and SSB can be equalized.

MORE R-390 TIPS - FAN, REDUCED POWER VOLTAGE, RECTIFIER, LINE FILTER [Dave Metz] Other tidbits with respect to the 390's: I routinely add a 3" muffin fan to cool those red hot 6082's in the power supply. By removing the big round electrolytic just behind the face and replacing it with a newer vintage cap with is very small, there is enough room. Because I usually use 110v fans and they are too noisy at full voltage, I add a 1 mfd cap in line with one side of the power line and that slows it down to just a quiet speed that is barely audible. The only additional item is to take a 25v ct Radio Shack transformer, wire it as an autotransformer to then run the receiver on about 110v instead of the 123v that

[continued on page 8]

51-J4 Switchable AGC figure - Lankford





R-390A LINE METER switch

Note: The ends of the switch waffer mounting screws had to be filed flat to the nuts for the switch to clear the 51J metal gear plate with the switch mounted and the front panel re installed.

is my usual line voltage *[editor note: if you try this, remember that you are working with line voltage and current that is dangerous. Appropriate shielding, enclosure and careful connections with UL-approved components are a must! My best advice is to pay a few bucks at almost any hamfair for a ready-to-go Variac-type unit.]* Because the power supply transformer doesn't have other primary taps, I feel this is mandatory to keep the voltages in the safe range and even a little less. This is non-intrusive as it is outboard of the receiver. I also replaced the metallic rectifier in the power supply with a (gasp!) solid state bridge rectifier. Finally, I usually remove the big AC line filter on the back panel for safety reasons (though I save it to reverse the "operation".) I am morally against this kind of "alteration" but they are all leaky and tend to trip the GFI on my bench as a result. So, from a safety standpoint, I think safety outweighs my purist instincts.

CABINET FOR SP-600 [Les Locklear] Premier Metal Products, who made the original SP-600 cabinets for Hammarlund, has a cabinet with a hinged top lid, louvered side & rear panels, and in the original charcoal gray 'wrinkle' finish - Part # DCR-18100 - $110.52 + $10 shipping. They have plants on the east and west coast. The original cabinet with the square perforations on the cabinet sides $ top cover is available as a non-standard, modified cabinet for $350!! They no longer have the dies for the perforating equipment. To sum it up, order DCR-18100 in color 561 (charcoal gray); other colors are available. Write to Premier at 381 Canal Place, Bronx NY 10451 and ask for Catalog #1193 - it's on pg 32.

PUBLICATIONS OF INTEREST

"POPULAR ELECTRONICS' - DYNAMIC RECEIVER SPECS - For those of you who with somewhat less technical background as some of our contributors, the August 1995 issue of *Popular Electronics* has a nice explanation of both the 1-db compression point and the third-order intercept point with illustrations in Joe Carr's "Ham Radio" column.

WANTED TO BUY / SELL / TRADE / WHATEVER

This section is reserved for HSN subscribers in good standing (i.e., you're paid up according to Ralph) looking to connect with HSN readers for mutual benefit. All deals are between individuals; HSN does not evaluate the accuracy of any statements or claims herein. No 'business' ads, please. Items printed will be on the basis of available space. **Please send all 'ads' to the editor - Ralph just passes them on to me!**

For Sale: Central Electronics 200V - $275; 600L - $400, both in VG condition. Wanted: T-368 transmitter and or manuals, also Amelco or same size R-390 black front panel ID tag. [Ed Deptula, KA3OTT, PO Box 751, Havertown PA 19083-0751; (609) 435-8975]

Wanted: Manual for RACAL RA-217, 1217 or 6217 Receiver; Foreign professional tube tester (such as British AVO CT-160); older catalogs from Marconi, Rohde & Schwartz, Siemens, Telefunken. [Geoff Fors, POB 342, Monterey CA 93942; (408) 373-7636, Fax (408) 373-2345]

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