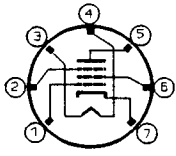


HOLLOW STATE NEWSLETTER

"For lovers of vacuum tube radios"



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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

#33 has been issued but has not appeared to generate much in the way of enthusiastic new articles or commentary. I still have a fair supply of material - some new, some old - but I am hoping to get some comprehensive, technical stuff from you veterans of the hollow state era, especially regarding overhauling and major renovations. As the age of the hollow state equipment increases so does the age of those who grew up with them. Please consider sharing your knowledge with our subscribers... and if you know someone who just might become a contributor, share your *HSN's* with him (or her).

Like many other seasoned R-390A owners, Mr. Taylor has been around these beloved units many years and currently works for the VOA in North Carolina. He has graciously granted reprinting permission for this updated article which was originally made available thru the International Radio Club of America and the National Radio Club, both MWDX publications....

R-390A ALIGNMENT CHART & OPTIMIZATION

Charles A. Taylor

(Reprinted courtesy of the author)

(excluding 455 KHz, fixed-frequency IF)

1. Initial Setup - Set all front-panel controls as follows:

A. FUNCTION switch : CAL	I. BANDWIDTH KC : 8
B. BREAK IN switch : X	J. BFO ON/OFF switch : OFF
C. LIMITER control : OFF	K. LOCAL GAIN : CCW
D. AGC switch : FAST	L. DIAL LOCK : CCW
E. ANT TRIM : "0"	M. ZERO ADJ. : CCW
F. LINE GAIN : CCW	N. RF GAIN : CW
G. AUDIO RESPONSE : WIDE	O. MEGACYCLE CHANGE: X
H. BFO PITCH : "0"	P. KILOCYCLE CHANGE: X

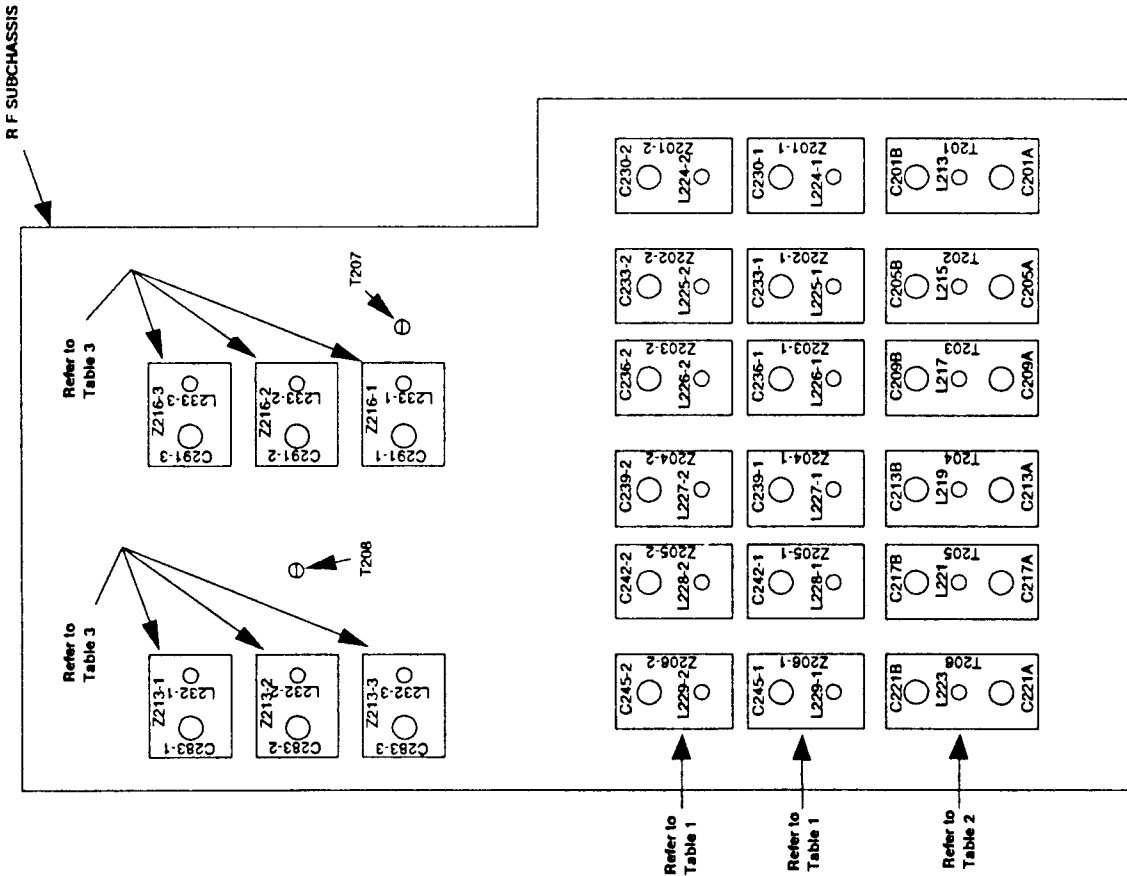
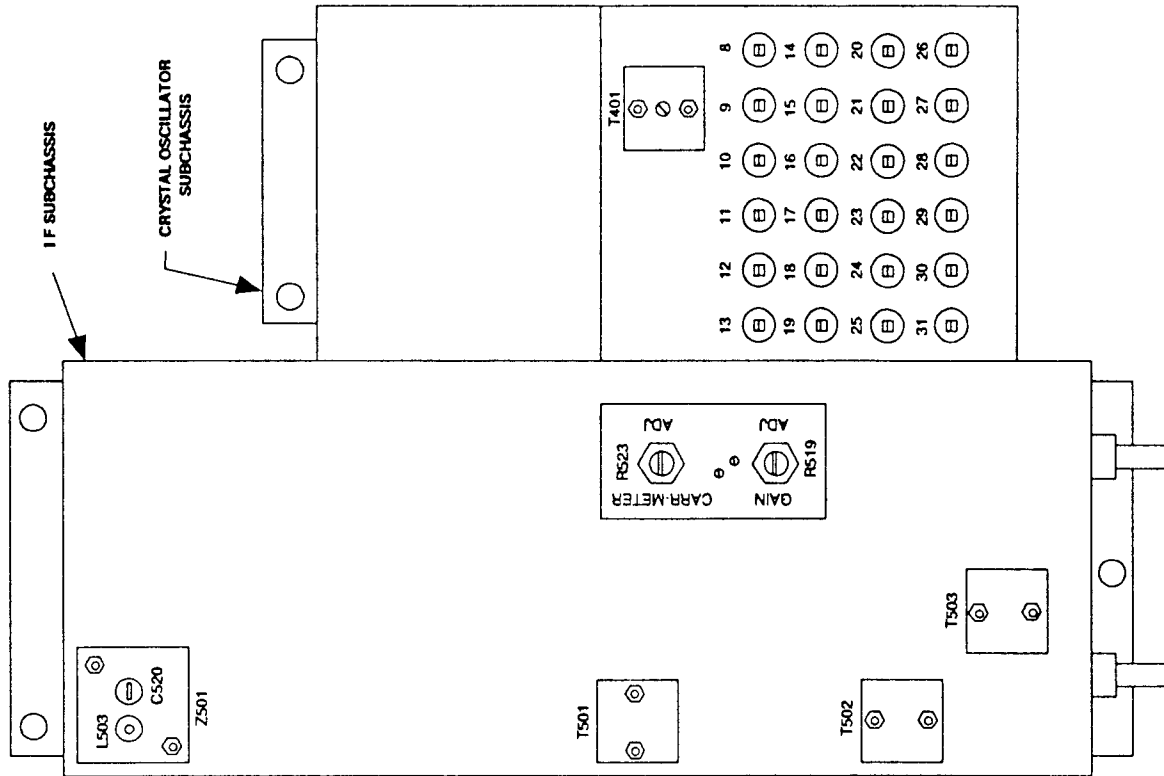
X = irrelevant; CCW = counter clockwise

2. Allow about 30 minutes warmup before proceeding. *A small, insulated screwdriver and the appropriate Bristol wrench will be necessary.*
3. Set receiver in turn to each frequency specified below, in column A of Table 1. Adjust the corresponding inductors (L-) specified in column B of Table 1, and then the corresponding trimmer capacitors (C-) specified in column C of Table 1. Rock the KILOCYCLE CHANGE back and forth for a maximum indication on each frequency on the CARRIER LEVEL meter. Refer to Chart 1 for the location of adjustments (*Charts 1 and 2 are on page 3*).

Table 1

A (kHz)	B	C
600	L224-1 L224-2	
900		C230-1 C230-2
1100	L225-1 L225-2	
1900		C233-1 C233-2
2200	L226-1 L226-2	
3800		C236-1 C236-2

A (kHz)	B	C
4400	L227-1 L227-2	
7600		C239-1 C239-2
8800	L228-1 L228-2	
15200		C242-1 C242-2
17600	L229-1 L229-2	
30400		C245-1 C245-2



Charts 1 & 2 - Adjustment Points on RF and IF Subchassis/Crystal Oscillator

4. Set the receiver FUNCTION switch to AGC. Assure that the regularly used antenna is connected to the receiver input.
5. Received signals are used to make the following alignment. Reception of a relatively stable-intensity signal is indicated for alignment, so it may be necessary to seek such a signal at a frequency slightly at variance with those specified in the following Table 2, however, the alternate chosen frequency should not differ from the specified frequency by more than 10%. When aligning on alternate frequencies, chose a HIGHER alternate frequency when aligning inductors (L-), and choose a LOWER alternate frequency when aligning capacitors (C-).

NOTE: A signal generator may be used to good effect in the following alignment. Do not make a direct connection from the signal generator to the antenna wire. Using a few feet of wire connected directly to the generator's output, radiate a signal at the frequencies specified in the following Table 2 to the receiving antenna. Use the least output from the generator that just produces a usable indication on the CARRIER LEVEL meter. Note that Table 1 adjustments may be "touched up" (as may all following adjustments in all tables) using the radiated signal from the generator.

Table 2

A (khZ)	B	C
600	L213	
900		C201B
1100	L215	
1900		C205B
2200	L217	
3800		C209B

A (khZ)	B	C
4400	L219	
7600		C213B
8800	L221	
15200		C217B
17600	L223	
30400		C221B

6. Set the receiver FUNCTION switch to CAL, the align the inductors and capacitors specified in Table 3.

Table 3

A (khZ)	B	C
1300	L232-1 L232-2 L232-3	
7300		C283-1 C283-2 C283-3

A (khZ)	B	C
1900	L233-1 L233-2 L233-3	
1100		C291-1 C291-2 C291-3

7. Set the receiver KILOCYCLE CHANGE to any 100 KHz calibration point between 500 KHz and 7900 KHz, and align the following adjustments: **T207** and **T208**.
8. Referring to Chart 2, set the receiver KILOCYCLE CHANGE and MEGACYCLE CHANGE controls for a dial reading of 8100 KHz, and adjust the trimmer labeled "8" on the Crystal Oscillator subchassis for a peak indication on the CARRIER LEVEL meter. Next, tune the receiver to 9100

KHz, and likewise adjust the trimmer labeled "9". Then, tune the receiver to 10100 KHz and adjust the trimmer labeled "10". Continue this to 31100 KHz for the trimmer labeled "30". Note that the trimmer labeled "17" also aligns the 00 MHz band, the trimmer labeled "16" also aligns the 01 MHz band, and so on. Therefore, those bands are aligned in the above procedure.

9. Rotate the RF GAIN control fully CCW. Loosen the locking nut on the CARR-METER adjustment potentiometer, R532, on the IF subchassis. Using a flat-blade screwdriver, rock R532 back and forth across its present setting about ten times. This is to clear the pot of noise and dirt. Then, carefully reset this pot such that the CARRIER METER comes to rest on zero. This will probably require several tries.

NOTES:

R519 (GAIN ADJ) on the IF subchassis is not critical to adjust, and generally only needs to be readjusted when the set is retubed. An approximately correct setting can be made thusly: (set up)

- | | | | |
|----|-----------------------|----|-------------------------|
| A. | FUNCTION switch : AGC | I. | BANDWIDTH KC : 8 |
| B. | BREAK IN switch : X | J. | BFO ON/OFF switch : OFF |
| C. | LIMITER control : OFF | K. | LOCAL GAIN : CCW |
| D. | AGC switch : X | L. | DIAL LOCK : CCW |
| E. | ANT TRIM : X | M. | ZERO ADJ. : CCW |
| F. | LINE GAIN : fully CW | N. | RF GAIN : CW |
| G. | AUDIO RESPONSE : WIDE | O. | MEGACYCLE CHANGE: 05 |
| H. | BFO PITCH : X | P. | KILOCYCLE CHANGE: 500 |
- Q. LINE METER switch: -10
R. DISCONNECT ALL ANTENNAS
X = irrelevant

With all controls thusly set, adjust the ANT TRIM control for a peak reading on the LINE LEVEL meter. What is being registered at this stage is "front end" noise of the set. The reading should be no less than "VU" on the -10 to VU scale of the LINE LEVEL meter (note that "VU" is to the right - upscale - of the physical center of the meter scale). It should also be no more than "VU" on the LINE LEVEL meter with the LINE METER set to "0". R519 (GAIN ADJ) may be varied to bring the indication within this range. BEFORE varying the setting of R519, however, carefully SCRIBE A MARK ON THE POT TO INDICATE PRESENT POT SETTING! The pot can then be returned to its former position.

If you are unable to attain a "VU" reading on the LINE LEVEL meter with the LINE METER set to -10, and after adjusting R519, this probably indicates a need to retube the receiver. Note, however, that if the set has been functioning normally otherwise, don't be quick to test tubes. Refer the set to someone who has some experience on these rigs.

Depending on the characteristics of your longwire antenna, once your R-390A is optimized for that antenna, you may find that the set "front end" does not resonate exactly for such as an amplified loop. This is evidenced by the lack of a sharp, well-defined peak in signal and noise level when the ANT TRIM control is rotated. Since most amplified loops are tuned, and possess considerable "Q", this shouldn't be a problem (as far as cross-modulation is concerned). It is therefore advantageous to optimize your R-390A for the antenna that will be most likely to induce cross-modulation in your set.

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.

- ???
- Regarding the URM-25 signal generator - were there A, B or C models? How many contractors made D models, other than Trad Television? My URM-25F was made by New London Instrument Co. and is a total redesign. The only code dated component seems to be 1955. Is this right? My J Model, made in 1968, is practically a carbon copy of a D. Why did the Navy abandon the F, which was considerably improved over the previous D model? Because New London was out of business and had lost the tooling? Or was the D really better? [Alan Douglas, Pocasset MA]
- ???
- Why did the US military adopt carbon pots with reverse log tapers for the RF gain control in [R-390A] receivers? (by way of comparison, the British Racal RA17/117 have wirewound linear pots in this position which seem to give little trouble.) [Neil Clyne, Middlesex UK]
- ???
- After performing the AGC/BFO mod on several R-390A's [see HSN #27], I tried it on a R-390. Even after temporarily reinstating the grid leak in the RF stage (corresponding to R201/R234 in the R-390A), the AGC performance did not equal that of the R-390A. I suspect that the AGC bias was possibly excessive but I did not research the problem further and later returned the R-390 AGC system to standard. Has anyone else tried these AGC mods on an R-390? [Neil Clyne, Middlesex UK]

SHORT SUBJECTS

BALKY MODULATION OSCILLATOR IN THE URM-25 - Does your URM-25 modulation oscillator not work at one of the two frequencies? Do you have to kick-start it with the front-panel pot and then back off to an on-scale reading? Does it only work with a really hot 12AU7?

There are two feedback paths working at "cross purposes": negative feedback through the front-panel pot, and positive feedback through a T network. At one magic frequency the positive feedback is supposed to peak and overpower the negative allowing the oscillator to run. But if the two R-C networks in the T aren't exactly alike, it never peaks.

The cure is to pad one network until it's just equal to the other. Since neither frequency in my URM-25J was working, I found it easier to parallel C160 (1000 pf mica) with a 39 pf mica, though trimming the precision resistors would probably have been better (resistors are switch-selected for each frequency, capacitors are the same for both). In any event, slightly reducing the value of one or more T-network components should bring everything back to normal. It would be a good idea to watch the waveform on a scope, and trim for the least distortion, too; it can get pretty bad if you twiddle the wrong component.

Incidentally, those pesky black molded paper .1 and .2 mf capacitors were absolutely perfect in my unit, made in 1968. That was not the case in the 1952-vintage model I sometimes use. [Alan Douglas, Pocasset MA]

MORE ON RELAY SUPPLY RECTIFIERS - Back in HSN #24/25, I noted some correspondence regarding replacement of unserviceable or worn-out copper-oxide relay rectifiers CR801 in the R398/390 by silicon bridge units, then fitting a 25 Ω 25W voltage dropper to absorb the excess voltage apparently produced by this new arrangement. One correspondent was having difficulty in finding a suitable resistor. Why not keep things simple? Having met with, or installed silicon bridges in place of the original CR801 in several 390's over the last 3 years, I have yet (touch wood - *an apparent reference to our American 'knock on wood' - editor*), to burn out any relays in these sets despite not having fitted a voltage dropper. The DC produced by this system is pretty rough, with a high AC component, and I would guess that on load, the effective DC voltage available is not much higher than that produced by the original rectifier. [Neil Clyne, Middlesex UK]

IMPEDANCE VS RESISTANCE - A followup to "BETTER AUDIO FROM THE R-390A" (HSN #32): Using the 5-watt tap of a 70.7 volt line transformer to match the 600 ohm R-390A audio output impedance is a pretty good match. Actually, the 5-watt tap is also the 1,000 ohm impedance tap which is different from the 625 ohm resistance value. The ohm meter will only measure resistance; as the transformer is essentially a large inductor, the impedance of which is dependent upon the frequency of the applied voltage. As the frequency goes up, the difference between impedance and resistance also increases. Consult a basic electronics book for more details. [courtesy Dallas Lankford]

R-390A WEAK SENSITIVITY ON SOME BANDS - If, after alignment and tube testing, your R-390A still has weak or no sensitivity on some bands, check the applicable crystal on the main crystal oscillator deck under the oven cover. I have found that although a suspected crystal tested good in a crystal tester, it failed to oscillate in the R-390A and knocked the associated band or bands out of commission. Weak sensitivity or no sensitivity on bands below 8 mHz is often caused by a faulty crystal located in the round plug-in oven which also houses the calibration crystal. That crystal is only used for the bands below 8 mHz, so everything above that will be normal. Substitution with a known good crystal seems to be the only reliable test. Finally, if the crystal oscillator subchassis has every been removed, don't rely on the megacycle numbers which show through the hole on top to tell you what position the switch is set to. Make sure the wafer switch wiper is directly aligned with the contact fingers for a particular megacycle setting before reinstalling the chassis, and try to avoid any movement of the shaft when reattaching the shaft coupling from the megacycle switch gear train. [Geoff Fors]

NAMEPLATE SCREWS - The small screws which hold the front panel nameplates of the R-390, 390A, 388, 392 and SP-600 military receivers are not likely to be found at your local hardware emporium. I have found that one source of these screws is a defunct 360K floppy disk drive, full height, from an old IBM PC type computer. Most computer repair shops have piles of these old drives, removed due to failure or upgraded with more advanced replacements, and they can usually be had for the asking. Careful disassembly will reveal several of the needed nameplate screws as well as other useful screws, washers, springs, clips and so forth. [Geoff Fors]

AN ALTERNATIVE TO THE UG-970/U CONNECTOR - An alternative to the UG-970/U (which connects an antenna cable with the SO-236 connector to J-104 on the R-390A) makes use of the UG-421. The threads of the PL-258 barrel connector will mate with the UG-421. With a little ingenuity in routing the ground wire, it should work. If you are looking for the UG-421, contributor Paul Tice says write him at 5992 Beverly Hills Road, Coopersburg PA 18036.

AGC TIME CONSTANT CAPACITORS - While currently operating two R-390A's, one with the HSN #27 AGC/BFO mods and one without, the modified set recently started to produce excessively long release times (over 10 sec. in the 'long' position), while the AGC action itself did not seem very effective. Acting on a hunch I removed P112 from the IF unit and checked across pins 4 and 13 of J512 with a digital capacitance meter. I followed this up with an analog ohmmeter measurement which confirmed my suspicions - C551 (the 2 μ F time-constant capacitor) was reading less than 500K DC resistance at an applied potential of 9V! As it is well-nigh impossible to physically extract this capacitor from the IF amp without causing damage, I simply snipped off the terminals and left it in situ, replacing it with a 2 μ F, 250V polycarbonate tied to a nearby cableform. It doesn't look very elegant, but normal AGC operation has been restored. [Neil Clyne]

HAMMARLUND SPC-10 CONVERTER - The SPC-10 converter was specifically designed for use with the SP-600. It can be used with any receiver having an IF output between 450-500 khz. When used with any other receiver, the sidebands become reversed, i.e., USB becomes LSB, etc. The owners manual explains this. I believe the SPC-10 is the best accessory that can be used with the SP-600. The SPC-10 was produced in the mid 1960's. Most of the production was purchased by the military and the FAA. [Les Locklear]

PUBLICATIONS OF INTEREST

"FINE TUNING" - PART 2 - In HSN #33 I indicated that the 93-94 "Proceedings" were expected. Well, it's actually entitled "Proceedings 1994-95" and is now available for \$20.50 + \$4 shipping in North America - back issues are also available. Good stuff!

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.

Wanted - Hallicrafters SX-117 and Hammarlund HC-10. Non-workers ok, but must be complete and clean. Shipping to San Diego required. Contact Lloyd Anderson, 19A Tui Glen Rd, Birkenhead, Auckland 10, New Zealand. Ph (64-9)480-5652 or Fax (64-9)415-6683 (call collect OK).

Wanted - Info on a R-649A receiver built by Hallicrafters for the US Coast Guard. Need schematic and alignment info. Leonard Meeks, 2265 Komo Mai Dr., Pearl City HI 96782.

Wanted - Hammarlund HC-10 in good condition. Jon Williams, 5877 Carvel Ave., Indianapolis IN 46220.

Help available - Subscribers who may have WW2 German radios (such as the Telefunken E-52) and are in need of technical information, schematics, etc. are invited to write to Neil Clyne, 78 Halford Road, Ickenham, Uxbridge, Middlesex UB10 8QA, UK.

FLASH - The 3-cent postal increase just announced will not have any effect on the HSN subscription price!

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