HOLLOW STATE NEWSLETTER

"For lovers of vacuum tube radios"

Editor
REID WHEELER
5910 BOULEVARD LP SE
OLYMPIA WA 98501-8408

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RALPH SANSERINO
P.O..BOX 1831
PERRIS CA 92572-1831

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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

It's now the heat of a Pacific Northwest summer (mid 80's) and it's hard to force myself to sit at the computer and create this volume. Summer has been a busy time for me - catching up on a ton of yard work as well as straightening up the old shack for another season (it's BCB DXing that initially got me into

this!). A couple of short items: In *HSN #32*, the Short Subject "Pot Problems" article mentions a Russell Scott - it's Scotka. The phone number for NTIS in #31 should be 1-800-553-NTIS. Publisher Ralph has also asked me to clarify the ID number related to renewals. At the beginning of your address label there is a number. This number is the volume number through which you are paid up. On this issue, if your number is 33 (or lower), it's time to renew. Also note that we have reduced the cost down to 4 issues for $5.00, even tho we publish only 3 per year. I would also like to express my appreciation to the many subscribers who have responded to my request for articles and short subjects - sorry I didn't have room for all of them. Your participation is essential!

Please note that the number at the top of your mailing label is the number of the issue for which you are paid up. When that number is the same as the issue number, please renew.

FEATURE ARTICLES

Walter has been working with R390A's for a long time. Many readers have asked about the contract/order numbers so he has graciously provided the latest 'genesis' of the R390A series, some of which was published earlier in Electric Radio....

CONTRACT/ORDER NUMBERS - R390A

Walter M. Chambers, PO Box 241371, Memphis, TN 38124-1371

Over the last 20+ years I have had about 120 R390A's pass through my hands and I began to make notes on the name plate data after I noticed so many different manufacturers. Maybe I can help clear up the order number confusion.

The name plates almost always list the "order number". Most of these order numbers were taken from the name plates of receivers that I have owned or worked on. The following is my reconstruction of the orders:

YEAR	MANUFACTURER	ORDER NUMBER
1954	Collins	14214-PH-51
1954	Motorola	363-PH-54
1954	Collins	375-PH-54
1955	Collins	08719-PH-55
1956	Motorola	14-PH-56
1958	Motorola	14385-PH-58
1959	Stewart-Warner	42428-PC-59
1960	Stewart-Warner	20139-PC-60-A1-51
1960	Electronic Assistance Corp.	23137-PC-60
1961	Capehart Corp.	21582-PC-61
1962	Amelco, Inc.	35064-PC-62
1963	Teledyne/Imperial	37856-PC-63

YEAR	MANUFACTURER	ORDER NUMBER
1963	Stewart-Warner	DA-36-039-SC-81547
1966	Communication Systems	FR-11-022-C-4-26418 (E)
1967	Electronic Assistance Corp.	FR-36-039-N-6-00189 (E)

I also have another number for Stewart-Warner that I cannot verify: DA-36-039-SC-2-48984. I did not list Clavier DAAG05-67-C-0016 because all I have is a brand new crystal deck (this may have been a spare parts contract like order number DAAB-07-77-C-0116 for BFO's, PTO's, etc.). In the case of the 1967 Electronic Assistance Corp., there is a different "contract" - DAAB05-67-C0155. This tells us it was for the Navy in 1967. Likewise, the 1963 Stewart-Warner number is an order number for the Signal Corp. I am not absolutely sure about the 1966 Communication Systems order as all I have of this set are two I.F. decks, an unfinished R.F. deck, two crystal oscillator decks and a Veeder Root counter manufactured for Communications Systems.

I believe some of the first R390A models were made on the 1951 Collins order 14214-PH-51 (I have R390A serial number 105 built on this order number and the internal parts are code dated Nov. 1955). According to Collins reports, they delivered prototypes of the R390A to the Signal Corps in Feb. and March of 1955. Production of the R390A started in 1955, but they made the first R390A on order number 14214-PH-51. (They also made the R389, R390, and R391 on the same purchase order number. Do not confuse this number with the very similar 11424-PH-51-53 which was for the R391 only - notice the same digits in a different order)

It was Signal Corps policy to order 5,000 each on the receiver contracts at that time. So far as I know, all of the contracts that I have listed were for 5,000 units except for the first order (14214-PH-51) which produced probably only 3 or 4 hundred, and the last Electronic Assistance Corp contract which was for 10,000 units. There were about 70,000 R390A's made. A lot of them were left in Viet Nam, a lot were sold in Japan and Germany; maybe half of the total production.

I would appreciate hearing from readers who may have additional or different information than that shown.

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Subscriber Walter Opdycke of Ypsilanti MI brings us an interesting alternative for SSB converters...

TECHNICAL MATERIAL CORPORATION'S RECEIVING MODE SELECTOR MSR-9 (CV-1758/URR)

Walter N. Opdycke

There has been great interest in past issues of **HSN** about the inadequacies of the R-390A in SSB reception. Commercial converters such as the Hammarlund HN-10, government converters such as the CV-158 and the CV-1982 and conversion modifications have all been discussed in past issues.

One converter which has never been mentioned is the TMC MSR-9 (CV-1758/URR). This converter when hooked up to the R-390A or similar receiver, can give improved reception of CW, MCW, FSK, and SSB signals. It does this through the use of a special IF filter unit and a frequency bandspread oscillator (i.e.,

a product detector). It is sideband selectable and for superior stability a crystal oscillator can be switched in. It uses 12 tubes of common types such as the 12AX7 and 6BE6. It fits a standard 19" rack with 5.25" of panel space and weighs about 24 lbs. The construction layout and manual are all typically military in appearance.

Compared with the CV-158, it has many advantages. It is lighter by about 100 lbs. It takes up much less rack space - the CV-158 is larger than the R-390 itself. It uses less tubes and is less complex. The design is about 10 years newer as well - the MSR-9 was designed around 1963. Compared with the CV-1982, it is not quite as sophisticated but comes in the same size package and weight. The surplus MSR-9 is superior to the CV-11982 in that it uses common (i.e. cheap) tubes as opposed to expensive and hard to get nuvistors. These nuvistors can cost up to $30 while the most expensive tube on the MSR-9 is under $10.

I bought an example of the MSR-9 last summer just to see if it really helped SSB reception. It did. SSB signals were much cleaner and less distorted. The improvement was not tremendous but noticeable. The AGC worked well. The controls on the MSR-9 give one a lot of options for receiving.

I am not all that impressed overall, however. This is because the MSR-9 displayed the following drawbacks:

1. The audio response was generally degraded especially on AM signals. The output was a prodigious 2 watts but to me it sounded like the sound was coming out the end of a cardboard tube. True, the SSB signals sounded a touch better but since I primarily listen to AM, the cost outweighed the benefits.

2. Tuning was tedious if you are using the phenomenal mechanical IF filters of the R-390A. It seem like you are constantly twiddling knobs to get the best reception. You can put the R-390A selectivity on 8 or 16 KHz and use the MSR-90 filters (the details of which are not given in the manual) and tuning is fairly easy. However, I prefer to use the superior Collins filters.

3. While the R-390A in tandem with the MSR-9 gives you more flexibility, it is also quite a complex system.

4. My biggest problem with this or any of the other SSB surplus converters is that once hooked up, the R-390A is brain dead after the third IF. I just can't stand to think of all those well designed circuits doing nothing by generating heat.

For most people using the R-390A for AM signals with an occasional tour of the ham bands, the R-390A is fine by itself and needs no modification. Use MGC and vary the RF control for best results. If you listen to a lot of SSB then consider doing the R-390A AGC and BFO Modification described by Dallas Lankford in volume 27 of **HSN**. It is simple, elegant and doesn't make a Zombie of half your radio. If you listen almost exclusively to SSB or other alphabet soup-type signals, then one of the surplus converters might be worth it. If that is the case, the MSR-9 is a good choice.

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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.

??? Does anyone know how to adjust the small trimmer capacitors that are part of the antenna primary tuned circuits of the R-390A? (T201 & T204) These capacitors are mentioned briefly in the technical manual but no information regarding adjustment can be found there. [Gerald Murphy]

??? Is there any published information on the alignment procedure for the Cosmos VFO's with the 3 separate sub-miniature alignment screws? It seems that the center screw is the end-point adjuster, while the other two appear to be linearity adjustments to correct tracking errors over the 1 MHz range of the VFO. [Neil Clyne]

??? Para 73, p 114 of the Army 390A service manual describes the procedure for setting R519, the preset IF gain control in the cathode of the 3rd IF amp, to provide -7 VDC 2nd detector output for an unmodulated input of 150 μV into J513 at 455 KHz. According to figure 60 of the manual, the resistance to ground from the cathode pin of V503 under these conditions is stated to be 300Ω, which infers that the preset resistance of R519 is 200Ω. In practice, I have noticed that the preset resistance of R519 falls into the range of either 300-500Ω or 2k-3kΩ, which must affect the gain of this stage substantially; although I have not checked this out myself, I wonder if these 2 different gain positions correspond to stagger-tuning or fixed-tuning of the IF amp? Any ideas, anyone? [Neil Clyne]

Ans. Some more followup on the 6DC6 RF amp tube substitution (see #31): Gerald Murphy [Scottsville NY] sent me a copy of page 22 of a Collins engineering report which goes into great detail on the reasons for selecting the 6DC6 as well as other 'front end' tubes. In short, the 6DC6 (closely followed by the 6BZ6) provides the best combination of low noise, adequate gain, low cross modulation and good AGC control. Neil Clyne [Middlesex UK] also notes that the cathode and g3 pins on the 5749 are reversed from the 6DC6. The result in the cathode is grounded leaving the original cathode bias resistor and RF gain control attached to g3. Undoubtably there will be plenty of gain but a far greater tendency to cross-modulate and other problems

Ans. As a followup to the 'what good are SSB converters' (see #31), John O'Sullivan [Queensland, Australia) writes "...from my experience with the CV157, it is an excellent tool in cases of poor reception conditions. With AM reception one can switch from USB to LSB in cases of adjacent channel interference. With its own independent carrier, all kinds of fading are under better control, and the audio is far better than that of the R390A. Any drift in transmitter or receiver is taken up by the automatic frequency control. All in all it's a good addition to the shack if you don't mind the weight (100 lbs - I've got it mounted in a cabinet on big casters). Certain adjustments have to be made if you want to use another R390 - this takes time; also the fan is a bit noisy." Neil Clyne [Middlesex, UK] adds his observations: "My own feeling is that unless you're a masochist, there is little advantage to be gained by using an external converter - particularly if your set contains the AGC/BFO mods described in *HSN #27* which in my experience make the R390A very user-friendly on SSB. Best use for the CV157 is an emergency shack heater; it would also be better than most

other things I have here for holding the shack door closed in a gale!" *[I'm sure that this won't be the end of the issue - ed.]*

SHORT SUBJECTS

POT PROBLEMS - CONTINUED - As a followup on the pot situation, the current Newark catalog shows Clarostat peddling Allen-Bradley type J pots, but now, of course, under the Clarostat brand and for triple the price I previously paid in the mid 1980's, namely $22.72 each in small quantities. They have a $25 minimum order. Credit cards are accepted. Orders are supposed to be placed through local branches and there are dozens of them. I'll list a Dallas TX number (actually Richardson TX), 214-235-1998, and they can give you a regional number if they won't fill your order. There are no 800 phone numbers. The pots you want for the R-390A are the 2500 ohm (two) and 5000 ohm (one) values:

	Newark Cat #	Type	Mil #	Unit Price
2500 ohm	10F464	JA1N056S252UA	RV4NAYSD252A	$22.72
5000 ohm	10F466	JA1N056S502UA	RV4NAYSD502A	$22.72

To test for worn pots (and I can guarantee yours will be worn unless they have been replaced) connect an ohmmeter across the outer lugs of the line gain control: the reading should be about 1250 ohms (± 20%) for new/good pots (If you connect one lead of the ohmmeter to the center lug, which is the wiper, then the meter reading will depend on the local gain control setting.) The local and line gain controls are wired in parallel, so the resistance you measure is approximately half the two resistances of the two pots. The two pots have worn unevenly, so this is really not a good test for determining worn pots. If the resistance measurement is above 2000 ohms, you probably have at least one badly worn pot, and both should be replaced. For the RF gain control, set the control to zero (minimum gain) and measure the resistance across the outer lugs: it should be 5000 ohms (± 20%). A measurement of 10,000 ohms would be an indication of a badly worn RF gain control. (The center lug, wiper, is wired to one of the outer lugs, so you have to set the control to zero to measure the full resistance. Other settings of the RF gain control will give other resistances between minimum and maximum resistance.)

I'll write a short note later about replacing these pots. If you are not very skilled at overhauling and repairing R-390A's, don't even try this! Find someone who does first-class repair work to do it for you. [Dallas Lankford]

R-390A GOES 'POP-POP-POP...'? A mysterious popping sound in the audio - I worked on this problem longer than I would like to admit. I had heard similar pop-pop-pop before. In the past it was always a tube in the RF path, maybe the RF amp, a mixer, or even an IF amp or detector tube. My usual approach, replacing tubes (first, one at a time, and then replacing all detector, IF amp, mixer, and RF amp tubes), failed. So it must not be a tube, I thought. I disconnected P213 and P218, i.e., disconnected the RF deck, and injected a 455 KHz signal at J518. No more pop-pop-pop... was heard. The problem must be in the RF deck, I thought, so I removed that RF deck and put in another - no change. Two bad RF decks??? Unlikely, but I couldn't think of anything else. Oh well, the popping wasn't very noticeable and you could hardly hear it with an antenna connected, so I forgot about it for a couple of months until I was measuring reciprocal mixing. There again was the pop-pop-pop... Quite noticeable with the R-390A tuned about 50 KHz away from a strong signal generator signal. All the RF deck tubes were replaced again, but the popping remained. What was it? I thought about it almost every day. A bad silver mica capacitor?

Unlikely, because two RF decks has the pop. Finally, it occurred to me that the popping could be coming in on the plate or screen DC voltage at the RF amp or one of the mixer tubes, and that the popping could be due to arcing in the OA2 regulator tube or one of the 26Z5W rectifier tubes. I replaced the OA2 first and the popping went away. After several 'quiet' hours, I put the old OA2 back in ... and the pop-pop-pop returned. Case closed! [Dallas Lankford]

R-390 POWER CONNECTORS - AC line power connectors for the R-390 (not the R-390A!) are available from Fair Radio Sales as Cable CX-2583 for $7.50. This cable's original application was for the T-195/GRC-19 transmitter, so you have to remove the heavy gauge cable from the connector and solder your own line cord in. Unlike the elusive connector for the R-392, the R-390 power connectors are a four-pin female early GRC/VRC style common to a number of other military radio and electronic items of the Korean War era. [Geoff Fors]

HAMMARLUND SUPER-PRO VARIATIONS - The original Super-Pro was designated the "COMET" PRO and was produced in many variations from 1932 until 1935. The "COMET" prefix was then dropped and the SP-10 Super-Pro was introduced. The SP-10 was produced from 1936; following the SP-10 were the SP-110 and variations. The SP-110 then evolved into the SP-150, SP-210-X, SX, LX, etc. The WW2 versions were the BC-779 (SP-200) and many others. In 1946 the SPC-400X was introduced in several versions for the military and amateur markets. In 1950 the ULTIMATE SUPER-PRO was announced, the famous SP-600 and its many variations which would take too much time and space to list. One notable model was the SP-600JX-21A which had a product detector, separate usb, lsb, cw and am switch, 22 tubes vs. 20 in all other SP-600's. The SP-600 continued to be sold until 1973. I have in my possession a September 1953 issue of *Radio & Television News* which shows a picture of the 10,000th SP-600 coming off the end of the production line. In those "wide open" days of defense spending, the Signal Corps and US Navy routinely ordered 10,000 receivers at a time. It's quite possible that more than 50,000 SP-600's were produced. [Les Locklear]

R-390A LOCAL/LINE AUDIO USAGE - The local audio output (local gain control) is rated at 500 mw output into 600 ohms and provides output to the headphone jack on the front panel. I had been using the local audio to drive my speaker with a matching transformer. Unfortunately, the headphone jack does not open up the speaker when the phones are plugged in. To remedy this I decided to put the speaker on the line audio output (line gain control) and use the local audio just for the headphones. The line audio output is only 10 mw, not enough to drive a speaker very well. The R390A schematic shows that the only significant difference between the two channels is a 14 db attenuator on the line audio output. By merely snipping one end of R113 in the attenuator circuit, located on the resistor board near the top of the front panel, full output is available to drive a speaker. Now either channel can drive a speaker. This mod makes the line level meter reading erroneous but this should not be a problem for most users. [Fred Cunningham]

PUBLICATIONS OF INTEREST

"ELECTRIC RADIO" - Another fine publication for vacuum tube radio enthusiasts is the monthly magazine **Electric Radio**. To quote, "Electric Radio is published primarily for those who appreciate vintage gear and those who are interested in the history of radio. It is hoped that the magazine will provide inspiration and encouragement to collectors, restorers and builders." The main thrust is vintage AM ham gear but the extensive classified ads section is a real delight! If you're looking to buy/sell or swap parts, equipment, manuals, etc for hollow state gear, you owe yourself a subscription (and you get a free, 25-work

ad once a month, too!). Recently increased annual rates for this 50-odd page treasure are: US-2nd class, $28; US-1st class; $38; Canada; $39 U.S. and overseas; $70 U.S. Information requests and subscriptions to ER, P.O.Box 57, Hesperus, CO 81326 or phone/fax (303) 247-4935.

"FINE TUNING" - For the dedicated SWLer, there is probably no finer set of reference material than the series of **Fine Tuning Proceedings**. For hollow state receiver fans, this compendium contain lots of stuff of interest including receiver reviews (R-390A, HQ-150, HQ-180A, 51-J4, Racal RA-17) and bits of history such a pieces on the evolution of the Halli S-38's, the SX38 and the National HRO's. Also lots on antennas, antenna tuners, audio filters, PLL and synchronous detectors, tape recorders, filters, etc. for the serious SWLer. These 'Proceedings' were published annually from 1988 thru 1991 and now biennially (I expect to see the 93-94 issue soon). So....if you use that hollow state receiver for more than a paperweight, you might find these useful. Each issue has been priced at $19.95 + $2 shipping (US) but, like everything else, costs could be rising. For information (and back issue availability) write Fine Tuning Special Publications, c/o John Bryant, RRT #5 Box 14, Stillwater, OK 74074.

"COMMUNICATION RECEIVERS - THE VACUUM TUBE ERA: 50 GLORIOUS YEARS" - Raymond Moore has recently released the Third Edition of this fine compendium of vacuum tube receivers. Changes from the popular Second Edition include better photos, more military sets, and an expanded history section. A very fine, 125-page book. If you are a collector or roam the hamfests, this should be in your library! Several publications are advertising this book - one I know for sure is thru "Electric Radio" (see above for address) for $19.95 plus $3 shipping (CO residents add sales tax).

CATALOGS - The latest **Fair Radio** catalog (WS-94) is out with it's usual huge variety of surplus gear including, of course, R-390's, R-390A's, and R-392's as well as replacement assemblies and parts. Fai Radio Sales Co., PO Box 1105, Lima OH 45802 or call 419-223-2196/227-6573. Another interesting new and surplus parts supplier is **All Electronics**. Prices are reasonable and service is good. Order a free catalog by writing All Electronics, PO Box 567, Van Nuys CA 91408-1567 or call 818-904-0524.

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 doe 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 - Source for the plug-in electrolytic capacitors for the R-390A; Airborn wideband VHF/UHF panoramic receivers of ARR8-A or -B series made by Dynamic Electronics NY (R355/6/7/8,R553). [Neil Clyne, 78 Halford Road, Ickenham, Uxbridge, Middlesex UB10 8QA, UK]

WANTED - HP606B RF Generator for $100. [John O'Sullivan, 32 Hawthorn Grove, Marcus Beach, Queensland 4573, Australia]

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