THE HOLLOW STATE NEWSLETTER

FALL 1988 No. 20

SUBSCRIPTIONS: $5 for 4 issues, nominally 3 or 4 issues per year.
BACK ISSUES: $1.25 each, numbers 9–19 currently available.
SELECTED REPRINTS: The best of *The Hollow State Newsletter* from numbers 1–4, $3.00.
PAYMENT: Send check or money order payable to Chris Hansen, address below. Prices apply to the U.S.A., Canada, and Mexico. Double quoted prices to other areas. Checks must be in U.S.A. funds payable in U.S.A. clearing house format.

PUBLISHER: Chris Hansen, P. O. Box 1226, New York, NY 10159.
EDITOR: Dallas Lankford, P. O. Box 6145, Ruston, LA 71272–0018.
CONTRIBUTING EDITOR: Skip Arey, P. O. Box 644, Waterford Works, NJ 08089.

EDITOR'S CORNER

It is curious how much misinformation and how many myths there are about hollow state gear. For example, in the *WRTH* **86** best and worst equipment article we find that among the best of the boat anchors are the "— R-390 series of military-surplus receivers and their civilian counterparts. Those manufactured by Collins are usually the pick of the liter. Parts are scarce, but available." Well, one thing was almost right. The R-390A (and only the A model) was then and remains now the best of the boat anchors by almost any reasonable criteria you care to use. However, there are significant differences among the R-390 series receivers, and I doubt that many knowledgable hollow staters would trade an R-390A for, say, an R-392. Do you know of any civilian counterparts for any of the R-390 series receivers? I don't. The R-390 (non-A model) does not have mechanical filters, and spare parts are scarce. The R-391 also does not generally have mechanical filters (although at least one R-391 did according to a picture of the R-391(XC-2)/URR in the

Collins engineering report "Cost reduction program for radio receivers R-390 / R-391( ) / URR"), few were produced, the autotune feature frequently caused excessive gear wear, and spare parts are scarce. The R-392 does not have mechanical filters, requires a 24 VDC power source and special power plug, and parts are scarce. Also, the Collins R-390A's are usually not the pick of the liter, because only a few R-390A's were manufactured by Collins, mainly in 1956, which means they are among the oldest and often the most used R-390A's. From personal experience, some of the best R-390A's in terms of physical appearance and quality of components and construction, especially the critical BFO PTO and VFO PTO, were manufactured by Motorola and Electronic Assistance Corporation (Hammarlund's military division). And dare I utter the heresy that Motorola PTO's are even better than Collins PTO's? R-390A parts have been and remain plentiful, for example, from Fair Radio, Baytronics, through the Ham Trader Yellow Sheets, or at local ham fests. It is often more cost effective and convenient to buy an entire R-390A as your source of spare parts. A second R-390A can also help you isolate tube problems and component failures by trading subchassis.

SHORT CONTRIBUTIONS

NOSTALGIA: *Communications Receivers, The Vacuum Tube Era: 50 Glorious Years, 1932 - 1981*, by Raymond S. Moore, available from RSM Communications, P.O. Box 218, Norwood, MA 02062, for $14.95 plus $2 shipping and handling, MA residents add $0.75 sales tax, is definitely a book for collectors, connoisseurs, and admirers of communications receivers with 112 glossy pages which cover over 700 receivers and 51 companies. [Ed.]

WANTED: I collect manuals for old valve receivers, particularly the R-300 series, and would like to purchase manuals or reproductions for these receivers, except the R-388 and R390A which I already have. I would also like to buy a Hammarlund HC-10 converter. (Terry Robinson, 21 Russell Ave., Woodend, Vic., 3422, Australia)

HELMUT SINGER ELECTRONIK: Feldchen 16-24, 5100 Aachen, West Germany. On your next trip to Europe, Deutschlands größtes Surplus-Versand-Angebot (Germany's greatest surplus mail-order house) might be a must-see . Among other things, they have 26Z5W's for only DM36, which is about $30 Australian. (Terry Robinson) [DM36 is $21.40 at current exchange rates. And we complain about $20 ballast tube prices! I wonder what they charge for a 3TF7 in West Germany? Ed.]

SP-600 REBUILT: This is a continuation of my SP-600 comments begun in *HSN* 19. Without Bob Kulow's help, I might not have reassembled the SP-600 correctly. My SP-600-JX-14 was an R-274C/FRR, which is actually a family of receivers depending on the serial number. After Bob kindly sent me the correct schematic, reassembly went smoothly. Well, almost. One of the RF deck contacts broke while cleaning it. Fortunately, there are one or two unused contacts on the ceramic bases of the RF deck which can be removed from the ceramic base provided any and all solder is removed and you pry it out carefully. Was it worth the effort? I suppose that is a matter of opinion. A friend of mine who has observed my radio hobby for years with mild amusement lost his head over the SP-600 and wanted it so badly that I let him have it. One reason he likes it is because it reminds him of a console AM/SW receiver his parents had when he was a child. The single, slow, flywheel tuning is easy to use and convenient for scanning the SW bands. The absence of an antenna trimmer also simplifies tuning, and does not seem to degrade sensitivity, which is about as good as any other top-of-the-line receiver. I don't like the selectivity options of 13, 8, 3, 1.3, .5 amd .2 kHz because of the non-optimal voice bandwidths. But the 8 kHz LC bandwidth is O.K. for strong signals, and the 3 kHz crystal filter bandwidth is acceptable for weaker signals in the crowded SW bands. There is no built-in calibrator, which seems like an oversight. With an outboard 100 kHz crystal calibrator, accurate frequency determination should be possible using the bandspread dial which is geared directly to the main tuning dial. The crystal phasing control seems virtually useless to me, not nearly as good for

notching hets as some crystal filters I have used. I have been unable to locate a cabinet (new or used) for the SP–600 because of its greater than normal depth. Its 66 pound weight makes it difficult to work on, especially for someone with back trouble. But if you collect classic tube receivers, the SP–600 is a must-have item because there is nothing else like it. The turret bandswitch assembly and RF subchassis are truly remarkable. I also like the R–274C/FRR appearance, especially the large tuning and bandswitch knobs and smaller knobs with engraved metal skirts. A Hammarlund data sheet shows an SP–600 with different (smaller) knobs that are not as attractive, and perhaps not as functional. The data sheet also shows the SP–600 mounted in a matching cabinet with dimensions 21.5" wide, 12.75" high, 17.25" deep, and 87.5 pounds total weight. (Dallas Lankford)

HAMMARLUND HQ–120: The HQ–120X is the granddaddy of many post WWII Hammarlund receivers. It was introduced circa 1939–40, retailing for $280 plus $6.50 for the matching SC–10 speaker. [The December 1938 *QST* contains an advertisement announcing the HQ–120. In the April 1939 *QST* the "X" suffix was mentioned for the first time. Apparently the 120 and 120X are the same receiver. In the January 1939 *QST* the HQ–120 list price was given as $215.00, including tubes, crystal, and speaker. By the end of 1939 the discount price was as low as $129. Ed.] The HQ–120X is perhaps best described as a pre-war HQ–129X with several significant differences. The 120X used grid cap tubes, including 6S7, 6K8, 6F6, 6V6-G, VR150, 6F8G, 6J7, and 6SF5. I have obtained spares for all at $2. The 6SF5 and 6F8G are scarce. The front panel is painted flat black. A gray front panel was optional, but I have never seen one. Such was the apparent popularity of the black beauty. In my opinion, the 120X has a better S-meter than the 129X. In performance, the 120X crystal filter is virtually the same as the crystal filter in my HQ–150. [Hammarlund used the same crystal filter design in almost all their receivers from 1938 until they quit making receivers, see "Full-range selectivity with 455-Kc quartz crystal filters," by D. Oram, *QST* **XXII**, 12 (Dec. 1938), 33–36, 56–62. Ed.] Using the 120X for a main receiver would be kind of like using a Bugatti T101C as your main car, but the 120X does outperform many current solid state receivers. A digital readout and high-Q preselector or antenna tuner would make it unbeatable in most situations. The 120X was the receiver of choice by the top BCB DXers of the era. [This means it was probably popular among hams and SWL's, too. Ed.] Many 120X's were sold to the government during WWII, which may explain the low survival rate of these fine pre-war communications receivers. My 120X was purchased at Dayton a few years ago. Shortly thereafter a transformer lead arced (old brittle insulation) and took a filter choke with it. The 120X fuse was too high, my second bad experience with an improperly fused receiver. [Let this remind us all that the *first* thing you should do with a newly arrived piece of gear is determine if it is fused correctly. Ed.] I eventually rebuilt the power supply and replaced all of the old wax impregnated tubular capacitors. But there are obstacles to restoring any similar set, including difficulty of obtaining high voltage transformers and chokes, and spatial problems when rebuilding a power supply. (W. T. Farmerie) [Based on *QST* ads, the 120 has 12 tubes, tunes 0.54–31 mHz continuously in 6 bands with 310 degrees of bandspread calibrated for the 80–10 meter ham bands, is single conversion, has a 6 position 455 kHz crystal filter with phasing control, and has a diode noise limiter. Ed.]

COLLINS 51J-4: The Collins 51J series of communications receivers were designed in the late 1940's and built from about 1949 until the early 1960's. The R–388 military version of the J3 was produced from about 1952 onward. The J4 is a J3 with a mechanical filter conversion kit. Conversion kits are still available throught the Yellow Sheets, but converting a J3 is not a cost effective way to get a J4. The earliest date I have seen on a J4 instruction book (manual) is 1957 (maybe the start of J4 production); it was a 3rd edition, 1 February 1958. Another J4 instruction book I have seen had no dates, but perhaps was missing some pages. The cutoff date for J4 production was about 1962. I do not know how meany J4's were produced, or if serial numbers are an accurate indication of the total number produced. I have personally inspected two J4's, one a 1960 model

based on date codes with serial number 1998, and the other a 1959 model based on date codes with serial number 5001D. The serial numbers were stamped on a small metal tag mounted with screws to the front panel, so tags could have been switched. This is not as unlikely as it might seem. For example, I know that tag switching has been done on R-390A's, having seen Collins tags on R-390A's made by other companies. Of course, the owner or seller looks silly claiming to have a Collins R-390A when all the subchassis have another name painted on them (Motorola, Electronics Equipment Corp., et al.). I am not sure what motive there would be for tag switching on J4's. Perhaps a premium is placed on high serial number J4's like is done with 75A4's. The 51J design is directly related to the 75A series of ham band only receivers, and evolved indirectly into the Collins S-line. It takes only a glance to see that the 51J design also evolved into the R-390 series of military receivers. The gears, cams, and racks are laid out differently, the 51J VFO PTO is smaller, the 51J has no quick release subchassis, and the 51J IF frequency is 500 kHz rather than 455 kHz as in the R-390 series, but the family resemblance is unmistakable.

The 51J series receivers tune 0.5 to 30.5 mHz in 30 bands of 1 mHz each with about 30 kHz of over range at each end, beginning with band 1, 0.5–1.5 mHz, and ending with band 30, 29.5–30.5 mHz. The 51J series receivers weigh about 43 pounds sans cabinet, and require 10.5" high and 13.5"deep mounting space. The width is standard 19" rack mount. The tubes are (2) 6AK5, (3) 6BE6, (8) 6BA6, (2) 12AX7, 12AU7, 6AQ5, 5V4, and OA2. The front panel controls are RF GAIN, AUDIO GAIN, BFO ON-OFF, CALIBRATE ON-OFF, BFO PITCH, AVC ON-OFF, LIMITER IN-OUT, ANT. TRIM, CRYSTAL FILTER SELECTIVITY 0(off)-1-2-3-4, CRYSTAL FILTER PHASING, OFF-ON-STANDBY, BAND CHANGE, KILOCYCLE TUNING, ZERO ADJ., METER INPUT(signal level)-OUTPUT(audio level), CAL.(100 kHz calibrator screwdriver adjust), and in the J4 a filter selector 1–3–6 (1.4, 3.1, and 6.0 kHz bandwidths) for optional mechanical filters. The J1 did not have an antenna trimmer or front panel calibrator screwdriver adjustment. I do not know about the J2. The J3 and R-388 controls are identical to the J4 except for the mechanical filter selector. There is a mechanical filter conversion kit which may be used to convert a J3 or R-388 to a J4. Collins rated the sensitivity of the J4 as 6 to 10 microvolts on band 1, and between 2 and 4 microvolts for the remaining 29 bands for a 10 db signal to noise ratio. The 51J used three different conversions schemes, one for band 1, a second for bands 2 and 3, and a third for bands 4 through 30. I won't try to explain the conversion schemes here, but refer you to the R-388 manual, Department of the Army Technical Manual TM 11-854, or Department of the Air Force Technical Order TO 16-35R-388-5, "Radio Receiver R-388/URR," April 1952. J4 manuals do not have an adequate description of the conversion schemes.

Collins did a terrible thing with their design of band 1, at least if you are a BCB DXer like me. They desensitized it. You only have to glance at the RF-mixer tuning for band 1 and compare it to the other bands to see that something strange has been done to band 1. The 10K ohm resistor R105 and 3pf capacitor C117 stand out like sore thumbs. There is, fortunately, an easy to describe cure, although not so easy to actually do. Add a 0.01 mfd, 1KV disc ceramic capacitor in parallel with C117. Anyone interested in this mod may drop me a SASE with a note requesting details of the mod and I'll send a complete description. With this mod my J4 came alive on band 1. If you want to try out the mod before you go to the trouble to do it permanantly, run down to Radio Shack, buy a pair of mini test clips, catalog number 270-372A, solder the leads of a 0.01mfd, 1KV disc ceramic capacitor to them, and clip them across C117 with your J4 on its side. Either insulate the capacitor leads, or be sure that they do not touch any nearby switch lugs.

A potential cause of 51J insensitivity on all bands, especially on the higher SW bands, is R149, 680 ohms on my schematics, which runs from one side of R148, the 10K pot RF gain control, to ground. The DC voltage drop from the junction of R148 and R149 to ground should be -1.40 VDC under no signal conditions (antenna disconnected) with AVC on. If it is not, and if the voltage is significantly greater, say in the -1.70 to -2.00 VDC

range or higher, then your 51J will probably be insensitive on all bands, and your 51J S-meter will probably read low, say not above 80 db on even the strongest signals with an 80 to 100 foot long wire antenna. The cure for this problem is to replace R149 with a resistor which gives a -1.40 VDC voltage drop. Remove R149 (it should be on a three lug terminal strip near where the power cord enters the chassis rear), temporarily wire in a suitable variable resistor, say a 1K pot, 1/2 watts or more, adjust the pot for a -1.40 VDC voltage drop, remove the pot, measure the resistance, and install a fixed carbon resistor, 1/2 watt or greater, as close to the measured value as possible. In my experience the voltage can be anywhere between -1.30 and -1.50 VDC. I used two 1K ohm, 1/2 watt resistors in parallel, with measured resistance of 517 ohms, and measured voltage drop of -1.30 to -1.35 VDC depending on the time of day (power line voltage varies rather widely here in Ruston). It is probably better to be a little on the low side rather than on the high side.

Another potential cause of insensitivity on all bands is R187, a 10K ohm screwdriver adjustable pot with lock nut beside the BFO pitch shaft, which determines the gain of the 3rd IF amplifier. My manuals have no instructions for setting R187. I have assumed the correct setting is determined by the J4 (500 KC) IF performance test per paragraph 5.3.7. In my experience, the 500 KC IF performance criterion is met with R187 set near minimum resistance (nearly maximum gain of the 3rd IF amplifier). For J3's and R-388's this setting may be considerably different because the J4 has mechanical filters which in turn have considerable insertion loss. If anyone has any information or opinions on this, please write me so that we can share the information with other hollow staters.

Measured sensitivity of a modified J4 using a URM-25D precision RF signal generator after the band 1 mod and R149 mod was 3 microvolts for band 1, 0.7 microvolts for bands 2 and 3, and between 1 and 3 microvolts for bands 4 through 30 for a 10 db signal to noise ratio. I did not measure band 1 sensitivity before the band 1 mod, but I doubt the sensitivity was anywhere near the 6 to 10 microvolts specified by Collins, and probably more like 25 to 100 microvolts or worse. As J4 users I have talked with have said, and I agree, (unmodified) J4 band 1 sensitivity is usually lousy. It could be that the band 1 sensitivity figures stated by Collins in the J4 manual are actually for the J3 and Collins never bothered to measure the J4 band 1 sensitivity. The insertion loss of the mechanical filters could easily degrade band 1 sensitivity to the degree observed. This would also explain why DXers judge band 1 sensitivity as perfectly acceptable for a J3 or R-388. Curiously, another J4 I have used does not seem to have significant band 1 insensitivity, so it may not be a problem with all J4's.

How does the J4 stack up against our favorite boat anchor, the R-390A? Quite well, and in some cases slightly ahead. The J4 has no expensive and difficult to find ballast tube. Based on my experience with a sample of two J4's, the J4 seems to have somewhat less warm up drift than R-390A's I have used. Once warmed up, both are rock solid. The 43 pound J4 weight is a definite plus, about half that of an R-390A. J4 audio output is 4 ohms for speakers or 600 ohms for line output, and J4 audio quality seems better than R-390A audio quality. One J4 I have used has annoying spurs which seem to be IF feedthrough and harmonics at 0.5, 1.0, 1.5 mHz, and so on, with decreasing intensity up to about 4.5 mHz. The 500 kHz harmonic spurs seem to be caused by missing top and bottom dust covers. Another J4 I have used has both dust covers and does not have significant 500 kHz harmonics, only a weak het at 500 kHz. So I would recommend that you avoid J4's or any other 51J series receiver without dust covers. Neither the J4 nor the R-390A has a clear win with regard to selectivity bandwidths. The 6.0 kHz filter in the J4 seems optimal for pleasure listening on the SW bands. But I don't have enough experience yet to know if the 3.1 kHz filter in the J4 is adequate for for difficult DX situations. The J4 crystal filter may be switched off (position 0) or set to bandwidths of approximately 3–4 kHz, 1.25–1.6 kHz, 0.5–0.7 kHz, or 0.3–0.5 kHz (positions 1–4) in conjunction with the 6.0 kHz mechanical filter. Narrower bandwidths are obtained with the 3.1 kHz and

1.4 kHz mechanical filters. For example, with the 3.1 kHz mechanical filter, Collins rates the J4 selectivity in crystal position 1 as 2.25–2.75 kHz. So you have a wider choice of selectivity options than you might think. The J4 crystal phasing control is the best I have used, better than the standard Hammarlund crystal filter, just like a notch filter, which gives the J4 an edge over the R–390A in some situations. The J4 BFO pitch knob is not calibrated, as it is on the R–390A. The J4 has only one AVC attack and release time, so it is not easy to convert it into a SSB receiver and retain its AM capabilities. And the J4 does not have a narrow audio filter, though one could be added outboard. Thus, an R–390A with Cornelius SSB mod is a clear winner in the CW and SSB categories. Both J4's I have used have a slight amount of backlash in the KILOCYCLE tuning which I believe is due to the coupler which connects the KCS and PTO shaft. The coupler resembles an R–390A Oldham coupler, but without anti-backlash spring (or spring shafts in case you wanted to add a spring), and with set screws rather than non-mar clamps. So for ease of PTO adjustment with no backlash, the R–390A comes out ahead. The J4 has a 500 kHz IF output, so you can add external IF processing like the Hammarlund HC–10 converter, which would give you more bandwidths and SSB with a product detector. I haven't tried this, so I don't know if just connecting an HC–10 provides effective SSB reception. You may still need to modify the J4 AVC. There is an AVC attack and release time mod described in W. I. Orr's *Ham Radio* article (Feb. 1978, pp. 66–69), "Modifying the Collins 51J receiver for SSB reception," which can be developed into a switched AVC mod. The J4 has plastic knobs, plactic KCS dial, and a bakelite drum covered with a decal which flakes off for the MCS dial. The J4 MCS dial is difficult to read because of poor #47 bulb positioning and glare reflected from the glass window. For viewing ease and dial durability the R–390A is by far the winner. Most J4 front panels are St. James gray (it looks black to me) with white silk screened lettering. The paint is finely textured, somewhat like black wrinkle varnish which the military used on much of its gear. The J4 was also available in a light gray, "FAA green," and perhaps other special order colors. I have not seen any of the other colors, but I doubt they are as appealing to the eye as the St. James gray.

Collins made a matching cabinet for the J4, but apparently few J4's were originally purchased with one. Most J4's nowadays will be without a cabinet. I liked my first J4 so much that I bought it a new Bud cabinet, called a Delux Cabinet Rack, Bud type CR–1740, 14.75" by 22" by 12.3125" (D by W by H) with 10.5" panel height, painted metalic gray, louvered sides, with hinged liftable lid and sliding flush latch, including special 10-32 large head diameter Phillips screws. This J4 came with special 10-32 rack mounting screws which I used, but the fancy mounting screws Bud included show attention to detail. The cabinet rear had a spot welded metal plate which restricted air flow and limited access to the J4 chassis rear. It had to go. So I drilled through the spot welds and removed it. Also, the tapped cabinet rack mounting rail holes did not align with the J4 front panel cutouts. Fortunately, they were uniformly too high. So I raised the J4 slightly by installing two 1.5" wide by 3/32" thick aluminum strips bolted to the cabinet bottom. After slightly repositioning the J4 front panel (by loosening the front panel mounting screws), it all fit perfectly. At first I was irritated at having to modify my brand new Bud cabinet, but now I like the the aluminum plates because they prevent paint from being scratched off the cabinet bottom when the J4 is removed from or placed in the cabinet. If you take this approach to getting a cabinet for your J4, be sure to measure the alignment of the rack mount cutouts before you select the aluminum strips thickness. I cannot guarantee that 3/32" is the correct thickness for all Bud cabinets and J4's. I used drill bits and a micrometer to determine the required thickness. I would probably use 2" wide plates if I did it again because the 1.5" plate widths leave little tolerance for errors. You can do without the strips if you don't bother to bolt the J4 in the cabinet. Because of the cost, about $150 for a new Bud CR–1740 Delux Cabinet Rack, and because of the labor involved, you are better off getting a J4 with a matching cabinet even if it means paying a premium price. (Dallas Lankford)