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PUBLISHER'S AND EDITOR'S CORNER

One of our subscribers sent us a clipping from the December 1988 issue of *Popular Communications*. A *PopComm* subscriber had written the editor for information about R–390A's, and in response, among other things, the editor said, "For all its mystique, modern solid-state communications receivers in the $500 price range will outperform the R–390A by a mile." As anyone knows who has compared a R–390A side by side with solid state communications receivers, including the very best in the $1000 price range, that is not true. The *PopComm* editor also said, "Within the military, the R–390A was ditched long ago ...," but apparently that is not true either. Although we have not actually seen a R–390A in current use by the military with our own eyes, we have been told (*HSN* **16**) that the R–390A is still used by the military, especially on large ships where high RF levels are encountered. Also, it would not surprise us if the military has kept R–390A's on hand for WW III. EMP (electromagnetic pulse) would probably disable every piece of solid state

communications equiplemt in the first few minutes of WW III. But unless it was melted by a fireball, or made inoperative from the stress of a nearby blast, a R–390A would continue to function as long as there was AC power.

SHORT CONTRIBUTIONS

WANTED: Are there PL-259 to C male connector adapters, or SO-239 to C male connector adapters, and if so, where can I buy them and how much do they cost? (Felipe Flosi, Rua Senador Vergueiro 232/504, Rio de Janeiro - RJ, CEP 22230, Brazil) [Did I paraphrase your question understandably? Anyway, I don't know of any such connector adapters. If anyone does, please contact Felipe and me. Ed.]

WANTED: I find the R–390A to be one of the best receivers ever made, and will never replace it with one of the Japanese day-flies. But investigations have been made showing that the radium coating of the instrument pointers is *dangerously* radiating. [Who made these investigations? Did they measure the radiation? Ed.] Can you give me a hint where to obtain meter that fit into the front panel which are not radiating? (Reinhart Mazur, D-8133 Feldafing, Am Kirchplatz 7a, West Germany) [First, the meters are not dangerous according to measurements I made; see the article in *HSN* **19**. Next, I don't know how to dispose of the meters safely, so it is best to leave them in your R–390A. Finally, I have searched almost every electronics catalog for the last 10 years, and I can't find any replacements. I'll list the meters specifications below in case others want to join in the search for new replacement meters for the R–390A. If anyone knows anything more, please contact Reinhart and me. Ed.]

R–390A METERS SPECIFICATIONS: The R–390A line meter is 250 microamps full scale, 3360 ohms internal resistance. The R–390A carrier meter is 1 milliamp full scale, 17.7 ohms internal resistance. These parameters were measured using a DVM with 2% accuracy. You should not try to measure the internal resistances directly because your ohm meter will almost certainly pin the meters, which may damage them. To determine the internal resistances, I measured the voltages across the meters at full scale, using a 9 volt battery in series with a 500 K ohm pot to adjust the meters to full scale. Then I measured the currents at full scale. The internal resistances were calculated using Ohm's Law. For example, one of my carrier meters measured 17.7 millivolts and 1.00 milliamps at full scale. Ohm's Law is $V = IR$, from which we get $0.0177 = 0.001R$, and solving for R gives $R = 17.7$ ohms. A carrier meter in one of my R–390A's which gave readings 20 db below normal on strong signals measured 19.2 ohms. So even a small error (high or low) in the internal resistance of a carrier meter will cause rather large errors in carrier meter readings. (Dallas Lankford)

WANTED: Does anyone know where I can purchase the book *50 Years of Collins Radio*, or would someone loan me a copy? (Walter Hann, Neubaugasse 23/9, A-9300 St. Veit/Glan, Austria, Europe)

51J4 MODS ?: The following is taken from my 10 page article "Collins 51J4 Technical Notes" and is available from me for two $1 bills and a SASE with enough stamps for two ounces. Please do not send me a $2 check, or a money order, or foreign currency, or stamps without an envelope, or an envelope without your name, address, and stamps on it. The article includes alignment, PTO end point adjustment, replacement of dial cords, and more.

I don't use my J4 as a backup for a solid state RX as Fritz does because I don't own any solid state communications receivers at present. I have temporarily owned or used some very good solid state RXes, including a SPR–4 with 5–NB noise blanker, and a NRD–515 with Collins mechanical filter mod. But none of them had quite as good weak signal performance as top of the line tube receivers. So it doesn't surprise me that a J4 would outperform an ICOM R–71A in some difficult listening situations as Fritz observed.

Fritz mentions that performance figures may prove the R–71A is a better RX than the J4. But performance figures often do not tell the complete story. For example, several years ago as part of their catalog Sherwood Engineering included a large number of laboratory measurements for many top RXes. There it was pointed out that receiver manufacturers typically measure dynamic range with two signals spaced 20 kHz apart. However, in difficult AM listening situations the carriers are much closer together, sometimes as little as 2 kHz apart. So Sherwood Engineering measured dynamic range twice for each receiver, once at 20 kHz and a second time at 2 kHz test signal separations, and called these measurements wide and narrow dynamic ranges. The results were revealing. For a R–390A the wide and narrow dynamic ranges were 81 and 79 db respectively, while for a NRD–515 they were 95 and 77 db respectively. Both a R–70 and a R–71A measured 86 and 62 db respectively. The J4 was not included in Sherwood's list. But in any case, I agree with Fritz that a J4 is generally the equal of any solid state RX, and perhaps slightly superior to any solid state RX for DXing foreign splits. Similar comparisons have been made with other receivers, such as Chuck Hutton's comparison of a Drake R7 and R–390A in *DX News* **47**, 1 (Oct. 8, 1979), with similar conclusions.

In my review I mentioned that many J4 users, including me, have complained about insensitivity, especially on band 1, and I described two simple modifications for improving both band 1 and overall sensitivity. The band 1 mod was my own idea, while the R149 mod to improve overall sensitivity was originally suggested by William I. Orr in his February 1978 *Ham Radio* article, "Modifying the Collins 51J receiver for SSB reception." I began to have doubts about these mods several weeks ago when I noticed that both of my J4's had cross modulation from KRUS 1490 on WLAC 1510.

To learn more about the J4 cross modulation problem, I built a hybrid coupler so that I could measure the dynamic ranges of my receivers. The definitive article on measuring dynamic range is Wes Hayward's July 1975 *QST* article, "Defining and measuring dynamic range." The hybrid coupler which I built is described in Hayward's article, except I used an Amidon FT-82-61 ferrite torroid core with 17 bifilar turns to extend the coupler frequency range to include the BCB. One of my R–390A's measured 82 db (which is within 1 db of the value reported by Sherwood), one J4 (with only the R149 mod) measured 72 db and the other (with band 1 mod and R149 mod) measured 67 db, and my HQ–180A (the surprise winner) measured 88 db dynamic range. I used a pair of URM–25D signal generators with test signals at 1200 kHz and 1220 kHz for these measurements. Curiously, I got much lower narrow dynamic range measurements for my R–390A than reported by Sherwood. Perhaps my home made hybrid coupler does not have the high port isolation required for narrow dynamic range measurements.

Next, I removed the band 1 mod from one J4 (the other J4 did not have the band 1 mod) and restored R149 to the original 680 ohm half watt resistor in both J4's. The measured resistances of the resistors I used were 705 and 715 ohms, and the measured AGC bias was about –1.80 VDC in both cases. After *carefully* realigning band 1 of the J4 which had previously been insensitive on band 1 (see my comments on band 1 alignment below), I measured the sensitivity of both J4's as better than 3 microvolts for a 10 db S-meter indication. This was quite incouraging, and not at all what I expected. Apparently I was not careful enough the first time I aligned band 1 in the "insensitive" J4. Several hours of nighttime listening on the BCB with an 85 foot inverted L antenna revealed no cross modulation, and sensitivity was excellent, with man-made (power line, et al.) noise clearly audible between beacons below 530 kHz and above 1600 kHz. Comparison listening tests with the J4's and a R–390A showed virtually no difference in sensitivity among the three. So it is a mystery to me why the J4 has a reputation for being insensitive on the BCB. Perhaps others made the same mistake I made and did not align band 1 as well as possible, or perhaps they did not use an antenna which is suitable for J4's. The manual states that the J4 is designed for use with a single wire or whip antenna, and that the J4 has a high impedance antenna input. J4's do give lower S-meter readings on band 1

as compared to band 2 on the same same signals where comparisons can be made in the frequency range overlap for bands 1 and 2. But this merely suggests that J4's are more sensitive than necessary on band 2.

To confirm what my ears already told me, I remeasured the dynamic ranges of both J4's on band 1. The results were gratifying. A two tone dynamic range test at 1200 kHz with test signals spaced 20 kHz apart gave 80 db for one J4 and 83 db for the other. Most of the dynamic range reduction appears to have been caused by the R149 mod, but I would still recommend against the band 1 mod because it is simply not necessary or desirable. On band 1 a J4 is triple conversion, with tuned IF's of 10.5–11.5 mHz and 2.5–3.5 mHz which track the front end. There are, consequently, two mixers for band 1. Collins was apparently very careful to distribute the J4 gain so that the mixers would receive the lowest possible signal levels (maximum dynamic range) while maintaining adequate sensitivity.

Therefore, I would like to retract my previous words. Collins did not do a terrible thing and desensitize band 1. I did a stupid thing and reduced band 1 dynamic ranges of my J4's by more than 10 db with the band 1 mod and R149 mods. Of course, Orr and other hams who did the R149 mod reduced the dynamic ranges of their 51J's. Fortunately, it is relatively simple to undo the band 1 and R149 mods. These mods do improve 51J sensitivity. But in my opinion there is no need to improve the sensitivity of 51J's provided they are aligned *carefully*, and the price you pay for improved sensitivity is significantly reduced dynamic range, especially on band 1 (the BCB). The price seems unacceptable to me. (Dallas Lankford)

SP–600 MOD: Being a Hammarlund SP–600 fan I made an interesting conversion, and it worked beautifully. I had the following to work with: one completely restored and working SP–600 VLF receiver, 10 kHz – 540 kHz (a very rare model), and three SP–600 junkers. I was determined not to permanently change or destroy the rare VLF model. Because I live in a very noisy location, the VLF model was almost useless to me except as a collectors item.

A perusal of both schematics showed the VLF and regular models to be almost identical from the antenna to the first mixer, except for the individual antenna, two RF, and VFO coil assemblies for each band. The main ganged tuning capacitor is identical physically and electrically in both models. All I had to do was change all the individual ceramic mounted coil and trimmer assebblies. Anyone familiar with the SP–600 will know how that is accomplished, so I won't bother to describe the procedure. The I did the usual alignment, including setting the VFO for the first IF of 705 kHz. [? Ed.] That is all it took. From the first mixer on the receiver operated like normal.

So that you Hollow State subscribers don't think I am a heretic let me hasten to add that I also love my R–390A, and also have a R–390 and R–392 restored and sitting in the racks.

While I have this opportunity let me extend an invitation to any Hollow State subscriber who would like to trade or talk hollow state equipment to give me a call (714) 827-4282. (John Browning, Buena Park, CA) [On the conversion of your SP–600 VLF to a regular SP–600 did you also change the dials? I would presume you did. In any case, it is interesting that a SP–600 VLF can be converted to a SP–600 so easily, and without permanent damage to the SP–600 VLF. I would assume the reverse conversion is equally easy. So if someone has a junker SP–600 VLF with a complete set of ceramic coil and trimmer assemblies and a good dial, it would appear that all they need is a nice working SP–600 and a few hours of their time to produce a nice working SP–600 VLF. Ed.]

SP–600 REBUILT: I picked up my SP–600 last year (1987) for $100 (Canadian). It worked fairly well, but did not compare with my R–2000 or R–390A. Then one evening a black tubular (BT) inside T5 expired. Thinking that this was the beginning of a bad trend, and keeping in mind previous comments and discussions about the BT's in *HSN* **16** and **19**, I set out to replace all of the BT's and electrolytics. The project took 50 hours of labor, including alignment time, and 22 feet of Chem-Wick Lite 0.15". I used Mallory PVC type

600 for the 0.01's and 0.02's, and replaced the electrolytics with modern counterparts. The SP–600 is now very impressive. Dial accuracy is plus or minus the pointer width on all bands except the top band near 54 mHz. Anything heard on the R–390A or NRD–525 can also be heard on the SP–600, except were selectivity under the *toughest* conditions is a factor. (Shaun Merrigan)

HC–10 COMMENTS: In early 1988 I obtained a Hammarlund HC–10 Converter through the Ham Trader Yellow Sheets for $75. The unit was in excellent condition, and came with the original manual. The previous owner had thoughtfully added a front panel headphone jack. After using the HC–10 for most of the spring and summer, primarily with my R–390A, I noticed distortion in the upper sideband AM mode, no matter how carefully I tuned the R–390A. In addition, I had to fiddle with the vernier fine tuning and BFO to get good SSB reception. I finally decided to align the HC–10 in accordance with the manual instructions. The alignment is very simple, but requires a 60 kHz source. I used my trusty URM–25F, a digital frequency counter, and a digital multimeter. [A frequency counter is not required. The 25F could be set to 60 kHz by tuning the R–390A to 540 kHz and adjusting the 25F for zero beat with the R–390A BFO. Ed.] The procedure took a couple of hours, including one hour for HC–10 warmup. There were six 60 kHz IF transformers and a BFO coil to be aligned. The HC–10 input circuit must also be tuned to the IF center frequency the receiver it is to be used with. After I completed the alignment, the USB AM distortion was gone, and I could use the HC–10 for SSB without having to fiddle with the vernier fine tuning and BFO. I now have two HC–10's, one for my R–390A and one for my recapacitored SP–600. I find the HC–10 adds a great amount of flexibility to both receivers in terms of sideband selection, AVC times, slot filter, and product detector in SSB mode. The HC–10 is a very worthwhile and relatively inexpensive accessory. If anyone would like high quality photocopies from an original manual, just drop me a line. (Shaun Merrigan, 14203 - 72 Street, Edmonton, Alberta, Canada, T5C 0R4)

USING A HC–10 WITH A 51J: The first time I used a HC–10 with a J4 the resulting SSB performance was disappointing. SSB signal quality could at best be described as poor, and at worst unacceptable. I disconnected the HC–10, put it away, and did not think about it again until recently. One evening as I was reading the J4 manual I noticed that the J4 IF output impedance was specified (as 50 ohms), but the IF output level was not specified. So I borrowed a scope and measured it. The IF output measured a whopping 12 volts peak-to-peak! No wonder the HC–10 sounded terrible when connected to my J4. It was being overloaded. Using the scope I determined that a 2700 ohm half watt resistor in series with the HC–10 input dropped the voltage to an acceptable level, namely 200 millivolts at the input of the HC–10. With the dropping resistor in place the J4 and HC–10 combination was excellent for SSB and CW, not to mention AM. The same mod would probably be required for any 51J series receiver, including the R–388, although I have not tried it. For those of you who are not familiar with the HC–10, it is essentially the IF strip of a Hammarlund HQ–180, and includes a notch filter, bandwidths of 6, 4, 3, 2, 1, and 0.5 kHz, three AGC release times, IF vernier fine tuning, and a product detector. I wanted to use my HC–10 with either a J4 or R–390A, so I added a second IF input directly below the original IF input on the chassis rear. I used a fancy ceramic RCA jack almost identical in design to the original which I bought from RF Connection. A previous owner had already drilled the required holes, so I merely bolted the second jack in place and ran a 2700 ohm resistor from the new jack to the old jack. This provides low level (original) and high level (new) IF inputs. Of course, I still have to change the IF input frequency and realign the slot filter when switching between a J4 (500 kHz IF) and R–390A (455 kHz IF). (Dallas Lankford)

USING A HC–10 WITH A SP–600: A HC–10 seems to work well with a SP–600. But after Dallas had problems using a HC–10 with a 51J4 because of high IF output voltage, he asked me to determine the SP–600 IF output voltage. The SP–600 IF output voltage is

not specified in the manual. Using a URM–25F and a scope the SP–600 IF output voltage was measured and found to be 3.5 volts peak-to-peak maximum. I did not determine a suitable value for a dropping resistor. [The 2700 ohm value I used to reduce the 51J4 IF level would probably be suitable. Ed.] The SPC–10 converter was made specifically for the SP–600, so it probably has a higher IF input voltage range. (Shaun Merrigan)

MIL-COM EXCHANGE ELECTRONICS: P.O. Box 982, Orange Park, FL 32067-0982. Their catalog is free. They sell some of the same kinds of military surplus gear as Fair Radio, but not as many components. They also list several hundred technical manuals, such as the R–390A operator's manual TM 11-5820-358-10 for $9 (which Gerald Murphy asked about in a previous *HSN*), and schematics. (Shaun Merrigan)

51J AND SP–600 MODS: If your read my contribution "51J4 Mods ?" earlier in this issue, or were one of the unfortunate persons who rushed out and bought a large number of 3HTF4's (see *HSN* **19**), you may wonder why we continue to publish untested mods. Sometimes I do too. But we do get requests for mods, and you can usually undo a mod if it is not satisfactory. So in that spirit, here are some articles from ham radio publications which you might find interesting. "The single tube product detector," by Commander Paul H. Lee, W3JHR, *CQ* (Apr. 1961), pages 50–51, 118–119, describes a 6BE6 product detector, a crystal controlled BFO, and AGC mod for the 51J2 which would be applicable to all 51J receivers and the R–388. "A product detector for military receivers," by Joe H. Owings, K0AHD, *CQ* (Mar. 1967), pages 68–68, 102, describes a 1N67 diode product detector and AGC mods, including installation instructions, for a SP–600 or R–388. "Further improvements for the 51J," by Commander Paul H. Lee, W3JHR, *CQ* (Apr. 1968), pages 68–70, 118, describes a crystal lattice bandpass filter mod using FT-241-A crystals and a 6DJ8 dual triode first mixer mod for improved sensitivity. [Does this sound familiar? Ed.] "More on updated improvements for the 51J receivers," by Wilfred M. Scherrer, W2AEF, *CQ* (Dec. 1968), pages 64–69, 116, describes a variation of the W3JHR product detector (see above), a different AGC mod, a VFO regulated heater supply, a 6AL5 SSB type noise limiter, a 500 kHz IF output mod for the 51J2, and a panel bearing mod for the KCS tuning shaft. "Modifying the Collins 51J receiver for SSB reception," by William I. Orr, W6SAI, *HR* (Feb. 1978), pages 68–70, 118, describes the R149 mod which improves sensitivity (but decreases dynamic range as I learned to my dismay), a variation of the W3JHR product detector (see above), and a different AGC mod. All of these articles are concerned with SSB (or CW) mods, and mainly involve adding a product detector and changing the AGC circuit. I have not tried tried any of the product detectors described in the articles above, but I did spend considerable time prototyping and testing some of the AGC mods. The results were uniformly disappointing because all of the AGC mods changed the AGC line voltage and introduced severe audio distortion on AM signals. The AGC mods might be fine for SSB when used with a product detector, but they ruin AM audio quality. In my opinion you are better off adding an outboard converter like the HC–10 because the only mod required is a dropping resistor to reduce the IF signal level to an acceptable value for the HC–10. (Dallas Lankford)

$500 SOLID STATE RX OUTPERFORMS R–390A BY A MILE: That's what the *Pop-Comm* editor said in the December 1988 issue. What kind of receiver is it, and where do I buy it? The only solid state RXes I know of for under $500 are portables. I have a top rated DX–400 (essentially a Uniden CR–2021). With stock 10 kHz wide and 6 kHz narrow bandwidth filters the DX–400 is barely adequate for casual listening on the SW bands. Friends of mine who own Sony 2010's complain about overloading on the BCB and the unsuitability of the stock filters. Even with filter mods neither will come close to the performance of a R–390A. To come close to the performance of a R–390A you will need a highly modified R–71A which retails for about $1100 or a NRD–525 with stock filters replaced by Collins F455FD mechanical filters which retails for about $1600. (Dallas Lankford)