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## CONTRIBUTING EDITOR'S CORNER

Skip Arey

You might ask yourself ... How is your humble editor able to bring you all this technical wonderfulness armed only with a BA in Sociology and a Master of Divinity, as opposed to a BSEE or even a certificate from Lincoln Tech?

The answer is simple, bukaroo. All that book learnin' in the humanities taught me that knowledge is power. So when I set my sights on becoming an SWL legend, I simply went out and bought a large dose of knowledge. And here's the kicker ... You can do it too! A trip or two to the bookshelf and you will be able to venture into the wonderful world inside your radio. The neat thing about technical topics is that technical material can usually be presented in a logical manner that lends itself to easy discovery by the uninitiated. And technical stuff becomes all the easier when you discover that you don't really need *everything* an electrical engineer learns. Only a few selected chapters and you are on your way. You won't be able to design you own receivers, but you will be able to diagnose most troubles and even fix some things yourself. This is my lead in for ...

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Uncle Skip's Guide To Electronic Knowledge  
or  
Books You Can Use

*Electronic Communication*  
by Robert L. Shrader

If you can only afford one book in your radio library, this is the one to have. Shrader's work has long been acknowledged as the best single text which can lead you to an understanding of radio. I know several folks who have used this book alone to master the knowledge necessary to acquire a FCC First Class Radiotelephone License. Just pick it up, start on page one, and by the end (with help from little quizzes spaced throughout the book) you will have enough information to pass most amateur exams and sink all but the professional engineers on radio theory. Also, the book's table of contents is set up in a manner that makes it easy to look up individual subjects as needed. Shrader's book is definitely the standard by which all others are judged. I have the fourth edition which suits me just fine, but if Bob is out there reading this, I think this well-deserved plug is worth a copy of his latest edition. Don't you? The book is published by McGraw Hill's Gregg Division, ISBN 0-07-057150-3.

*Radio Handbook*  
by William I. Orr, W6SAI

As the call sign indicates, Bill Orr is a radio amateur. Bill's book, which is in its twenty-third edition, is best known for its antenna theory, but the book is a great source of overall information geared toward the amateur and experimenter. Chapter 13 even includes construction details for a high performance communications receiver. The book is published by Howard W. Sams & Co., a division of Macmillan, Inc., ISBN 0-672-22424-0.

*The ARRL Handbook For The Radio Amateur*  
by The American Radio Relay League

This is probably the most accessible of the useful books in that you can frequently pick up a used copy for a song at almost any hamfest. It has been published for the last sixty-three years, and generally changes slowly, so you don't absolutely need the most recent edition. Each new addition adds just enough new information to make many serious experimenters buy one, but the casual user will be just as happy with the 1984 edition. As most of you know, I am very wrapped up in some old tube type gear. Consequently, I seek out positively antique issues of the handbook. In fact, I would be lost without my 1960 edition. The book is published by The American Radio Relay League, ISBN 0-87259-062-3. [Various editions of this are among my favorites. I have the '79, '77, '72, '62, and '58 editions, plus four or five others available at the local university library. Ed.]

*The Complete Handbook Of Radio Receivers & Transmitters*  
by Joseph J. Carr

If you want to understand your rig, and do serious troubleshooting and repairs, you must add this book to your collection. Originally published in two volumes, it is now available bound in a single volume. It covers all areas of radio theory, taking the reader through the guts of some of the most popular current equipment. The book shows you how to use test gear to bring your tired and broken equipment back into good operating condition. Also, Carr makes some very difficult subjects understandable to the rank novice. The book is published by TAB Books, Inc., ISBN 0-8306-8224-4.

### *Semiconductor Replacement Guide* by Radio Shack

Every now and then a part will go phhffliittt!!! When this happens, Murphy's Law always indicates that the original replacement part is only available from a camel trader in Swaziland. Thus, enter the Semiconductor Replacement Guide ... Actually, you can use anybody's replacement guide, but Radio Shack's is perhaps the easiest to find. If you are interested in tube gear, you will need to scour the hamfests for an old tube substitution guide. Radio Shack used to sell a reasonably good one, catalog # 276-4009.

To order these books, go to your local book dealer and ask for his assistance in ordering. It is probably a good idea for the book dealer to check that the books are still available by consulting a current edition of *Books In Print*. [If you are near a good university library, you may be able to read most of these book for free, or for no more than the price of a library card if you want to read them leisurely at your home or apartment. Ed.]

One final point. If you have not written the manufacturer of your receiver or transmitter to obtain the factory repair manual, you are a very silly person. Even if you never intend to lift the cover of your rig yourself, you will find that this is a very useful [essential Ed.] document to have around when repair or alignment become necessary. If you do intend to repair or modify your gear, you will find such documents invaluable. You can often obtain schematics and service data for older or out of production gear through Howard W. Sams Photofacts system. Ask your local TV repair person about how to get Photofacts. [Any serious radio nut, like me, *must* have the factory manual for any piece of gear I keep. Ed.]

## SHORT CONTRIBUTIONS

SP-600 CAPACITORS: The SP-600 is famous for its large quantity of black tubular capacitors, which in turn are famous for developing leaks and shorts. A few years ago when my SP-600JX-21 "died" I traced the trouble to a shorted black tubular bypass capacitor in the RF module. After reading the manual and seeing what a job it would be to replace it, I decided to replace all the tubular capacitors. I don't remember exactly how many there were of each value (.01 and .022 mfd), but the local parts dealer gave me a quantity discount! I replaced every single one, including those in the coil assemblies on the turret, and inside the 3955 kHz IF "can." *Every* capacitor I took out was either leaky or shorted, and some had split open. I paralleled two .01's to replace each .022's. It was necessary to remove the front end deck, selectivity switch, and 3955 kHz IF transformer shield to get at them all. [A partial SP-600 schematic that I have shows more .022's and a .01 inside T1, T3, T4, and T5, but maybe they are not the infamous black tubulars. Ed.] This project took an entire weekend, but was well worth the time and effort. After realignment, the SP-600 was equal to or better than new specs, and dial accuracy is limited only by my eyesight. I also added a product detector - IC, not tubes [Gasp! Ed.] - and ended up with a superb receiver for both AM and SSB. If anyone wants more information about these jobs, send me a SASE: 17 Elmer Ave., Bernardsville, NJ 07924, or call (201) 766-6181 between 1730 and 2100 Eastern time. (Robert W. Kulow, WA2UEH) [Thanks for the tip on the bad black tubular capacitors. Ed.]

SP-600 RYDER'S MANUAL & ALIGNMENT: I have a copy of John Ryder's manual for the SP-600 if anyone needs a copy. Send me a SASE for details: 154 Intervale Rd., Mountain Lakes, NJ 07046. I got mine from McMahan in CA [full name and address? Ed.] They have an excellent library of service manuals for sale as well as *Flick Of The Switch* and other books on early radio. I have just finished aligning the SP-600 and I can tell you it is a very ticklish and tedious job. You must have an accurately calibrated signal generator that does not drift. An alternative to accurate calibration and stability which I used is to monitor the signal generator frequency with an accurate, stable frequency meter,

preferably digital. Each alignment step must be repeated several times to get best results which is why accuracy and stability are necessary. (Timothy Walker)

**51H & 51N:** Regarding a question from *HSN 13*, in *The First 50 Years - A History Of Collins Radio Company And The Collins Division Of Rockwell International*, there is a seven page list of all Collins products which is not entirely accurate or complete. The 51N-1 is listed there as a fixed tuned HF receiver introduced in 1946 and continued through several production changes to the 51N-5 in 1951-2. No 51H product is listed. The first receiver produced by Collins was the 51Q, a seven tube set covering 1.5-12 mHz in four bands, operated from 12 VDC, made for the military about 1940-44. I am presently completing a book on vacuum tube communications receivers which lists every set from 1931 to 1975, along with a history of the 51 USA companies which manufactured them. My book includes 33 models and variations under Collins alone, and over 675 receivers altogether. It should be available later this year. (Ray Moore) [Please send us more details about your book, such as price and how to order, when it becomes available. Ed.]

**R-390A STAND BY:** The Operator's Manual, TM 11-5820-358-10, warns on page 24 not to leave the R-390A in STAND BY for more than 30 minutes because the life of certain tubes may be shortened. (Bruce Winkelman) [Thanks for sending me this information, Bruce. I also have the operator's manual, yet somehow had never noticed the warning. And many of us have read or heard this warning before, but I don't recall seeing the specific reference to TM 11-5820-358-10 before. If I have read the R-390A schematic correctly, the "certain tubes" above refers to the PTO tube and the audio tubes. I have also discovered that the nominal 240 (RF and IF) and 205 (audio) VDC lines have considerably higher voltages under various signal levels and function settings (STAND BY/AGC/MGC/CAL). The highest voltages occur in STAND BY, namely 271 and 256 VDC respectively for one of my units with a solid state power modification and recommended 200 ohm dropping resistor. This means the 205 VDC line is about 51 volts high, while the 240 VDC line is about 31 volts high when on STAND BY. The potential damage to RF and IF tubes, except the PTO tube, is not great because the function switch turns off the nominal 240 (= 271) VDC line to most RF and IF tubes. But the audio line is not switched, so all audio tubes are operated at 256 VDC when on STAND BY. The audio output tubes are operated far beyond their ratings, which undoubtedly contributes to their reputation for frequent failures. Incidentally, without the 200 ohm dropping resistor, the RF B+ line can easily exceed a whopping 300 VDC. All of these unhappy facts have caused me to reject the solid state power supply conversion, and unmodify my R-390A's back to twin 26Z5W rectifiers. I'll repeat what Al said two issues ago: hollow state forever! Ed.]

**3TF7 SUBSTITUTE:** The 3HTF4 is equivalent to the 3TF7 and Don Roller, 3983 Pine View Lane, Greenwood, IN 46124, (317) 882- 0410 has a supply of new 3HTF4's. (Charles Taylor)

**HAPPY HC-10 OWNER:** I advertised for an HC-10 in the Yellow Sheets and AM Press/Exchange, got several replies, and bought one. The asking price seems to be around \$50. Now that I have used an HC-10, I think it is a must for the R-390A or similar receiver. I connected my HC-10 to the R-390A via a supplied adapter cable and socket which plugs into the 4th IF tube socket. Thinking it would be neater if I used the R-390A IF output jack, I later tried that arrangement [which requires that you homebrew a connecting cable with a BNC plug on one end and an RCA jack on the other, or some similar arrangement with adapter plugs of various kinds Ed.]. However, when using that arrangement, signals were attenuated so much that I returned to the original method. There could be a problem with the IF output of my R-390A; I don't know. [Are you sure that your R-390A cathode follower tube was not bad? Also try checking all of your cathode follower tube pin voltages and resistances. I connect my HC-10 to my R-390A IF output jack and it performs great ... essentially just like my HQ-180A. Ed.] I certainly have been enjoying using the HC-10. The selectivity choices seem better suited to shortwave listening than

those of the stock R-390A. I also listen to CW quite a bit, and so appreciate the 500 kHz position. On the other hand, I miss the R-390A sharp audio filter which is eliminated when using the HC-10. My favorite HC-10 feature is selectable sidebands in AM mode. Nifty! (Jay Mathisrud)

R-390A MINIATURE COAX: Regarding the R-390A IF output jack, the miniature coaxial cable has cracked outer insulation, so it could be cracked on the inside, too. Does anyone know the nomenclature, specifications, and a source for this miniature coax which is use for many other connections in the R-390A. (Jay Mathisrud) [Yep. It is RG-187U according to the NAVSHIPS 0967-063-2010 technical manual. If you ever find any, please let me know. I finally got tired of looking at the cracked insulation and frayed shield on one of my PTO's, so I bought some RG-187AU. The main difference is that the U type has a solid center conductor, while the AU has a stranded center conductor. If memory serves me correctly the RG-187AU is rated as 95 ohms nominal and about 20 pf capacitance per foot. One problem I encountered is that you can only purchase a 100 feet minimum of RG-187AU, which came to about \$100. It is very high quality mil spec: the center conductor is 7 strands of silver plated #38 steel wire, white teflon insulation, silver plated stranded shielding, with two layers of white teflon tape outer insulation. The center stands are *very* easy to cut or break while "dressing" the cable for use, and it helps to use a magnifying glass while you count center strands to make sure you haven't cut any while removing the center insulation. It weighs 1/5 ounce per foot. Ed.]

R-390A NOSTALGIA: I have modified, rebuilt, and sold these receivers for the past ten years. As you may know, the U. S. Navy still uses R-390A's on ships larger than a frigate - solid state doesn't work well on these ships because of the high RF fields which cause front end overloads. I have owned R-390A receivers manufactured by 10 different companies, and I understand they were made by 13 different contractors. The last Collins contract was in 1955. I have a manual on this receiver dated 1972, but the receiver was called R-725/URR, which is a NSA version. Many of the NSA versions have an entirely different IF strip which has yet to be seen on the surplus market. There is also another version manufactured by Manson Labs called the R-1230 or something like that. I have more or less dropped out of the rebuilding business because you just can't get very much for R-390A's nowadays, but I still have a good supply of parts. (Walter Chambers)

TUBE TESTERS: The manager of my local Radio Shack received a memo from Tandy HQ in Fort Worth telling her to dispose of their self-service tube tester (Mercury model 204). Tandy has decided that the testers are under used and taking up valuable display space. The manager tried to sell the tube tester for two weeks, asking \$50, but had no takers, and was prepared to pay a scrap dealer to get it out of the store. Being in the right place at the right time, I ended up with the tester and \$10 in my pocket. The one I got was in excellent condition, and just needed a little cleaning. Check with your local Radio Shack and see if they still have one in the back room which they want hauled away. The manager assured me that Radio Shack will continue to sell tubes. (Frank Orcutt) [Thanks for the tip, Frank. Unfortunately my local Radio Shack had already disposed of their tube tester by the time your letter arrived, and then *HSN 16* was delayed due to my computer problems, so most of our readers may miss this opportunity for free gear. Generally I do not place much faith in the results of tube testers because I have personally observed that they sometimes indicate good tubes are bad and vice versa. In my opinion, the only reliable use for a Radio Shack tube tester is to identify *very* bad tubes for discarding. But I used them frequently enough for this purpose that I decided to invest in a tube tester. My selection was a TV-10A/U tube test set which I purchased from Fair Radio in checked condition for \$79.50 plus \$10 for the manual and \$7.50 for supplemental test data. The unit is housed in a small metal suitcase, which makes it portable, and it operates from 120 VAC power. There were, however, a number of problems. The manual (copy) was incomplete, missing the parts list with components values, and the schematic included

with the manual did not list the values of all components. After inspecting the unit, naturally it was found that some repairs had been made, and some of the parts replaced were those without values on the schematic. Fortunately, Fair Radio apparently had an original complete manual and at my request sent me a copy of the parts list which includes all component values. It is still somewhat annoying to receive an incomplete manual which was not advertised as such. The problems did not end there. One of the lamps (a # 45 lamp used to test for shorts) was an incorrect value, and the main tube (a rather expensive 83 tube at \$7.50) had been replaced with a 5Z4 which my tube substitution book does not show as equivalent to an 83. Fair Radio did not take care of these problems, so apparently I will be out additional expenses. A rather sloppy replacement of a full wave bridge rectifier required the solder work to be re-done, and a lost screw which had bolted one side of one of the tube sockets to the front panel had been replaced with an oversized screw but no bolt – the mounting hole through the tube socket flange had been used as a bolt, if you get my meaning. Because of high wiring density around the tube socket, it was non-trivial to replace the screw with a correct screw and bolt. If that weren't enough, the tube socket contacts were so spread apart that tube pins did not make good contact, causing intermittent loss of meter readings. So I got out my dental probes and carefully bent all of the tube socket contacts back together. I do not know if this problem was a result of *much* use or abuse. On the plus side, the TV-10A/U is considerably more sophisticated than any tube tester I have previously used, and in theory permits the user to do precision tests and measurements on a tube. For openers, you can measure tube transconductance (also called mutual conductance) in micromhos on a large, accurate meter, in four ranges: 0 – 3000 / 6000 / 15,000 / 30,000. A roll chart contains most commonly used miniature seven and nine pin tube data, including minimum acceptable transconductance. There is a gas test, and a multi-step noise test which includes connecting the TV-10A/U to the antenna and ground posts of any radio receiver. I wonder if the manual really means *any* receiver? You can also test rectifiers (they don't have transconductance ... a calibration line on the meter determines minimum acceptable rectifier condition). The manual section on corrective maintenance appears satisfactory, although I have not actually used it yet. If you buy one, and I am quite satisfied with my TV-10A/U, be sure to get the supplementary test data, a 23 page listing of test data for older tubes not listed on the TV-10A/U roll chart. Every tube I have on hand is included on the roll chart or in the supplementary test data, including some old 2.5 volt filament, double digit tubes such as the 27, 35, 45, and 47. Hopefully, some of you will be able to take advantage of Frank's tip and pick up a free tube tester. I would have gladly taken one, as the local Radio Shack tube tester has served my needs adequately since 1977. On the other hand, the TV-10A/U is a more elaborate piece of equipment, and may appeal to those who want or need a more precise tube tester. According to the manual you can even test the reserve life of a tube, which supposedly indicates a high probability that a tube will operate satisfactorily under adverse conditions due to low filament voltage (which may be caused by low power line voltages). Ed.]

## EDITOR'S CORNER

To those that I owe letters, please be patient. After two months a supplier has yet to ship me a toner cartridge for my laser printer, and still has my money. Then one of my hard drives went out last month. While I had backup, it has still been quite a chore to repair and restart my system ... but that's another story.

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