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EDITOR'S CORNER

Well, vacuum tube lovers, as you no doubt have concluded, *HSN* has gone to an irregular publication schedule. I had the best of intentions at the beginning of the summer to produce a summer issue, but considerable traveling during the months of June and August, and an unexpected heavy work load interfered. Please consider that we produce *HSN* in our spare time and for no pay, and that sometimes our real jobs take precedence. There seems to be enough material on hand for a few more issues, so we are not in immediate danger of running out of things to publish. But you should still sit down and write us a card or letter with some useful or interesting information for the newsletter. Remember, this is your publication, and exists only if you send us material for publication. Here is a suggestion which should be worth at least ten letters. Many of you use accessories with your hollow state receivers, such as loop antennas, VLF converters, audio filters, and so on. I'll do my part with a future contribution on my experiences with a two foot square, balanced, air core loop, and several balanced amplifiers.

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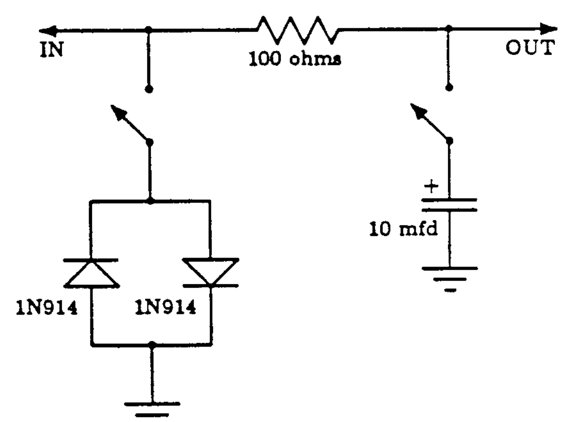
SHORT CONTRIBUTIONS

R-390A EXTERNAL AGC: On page 15 of TM 11-5820-358-20 we find "For external AGC, remove the jumper from AGC/NOR terminals 3 and 4, connect the negative terminal of the AGC source to terminal 4, and the positive terminal of the AGC source to terminal 7 (ground)." Apparently this would be one way to connect two R-390A's for diversity reception. (Dallas Lankford)

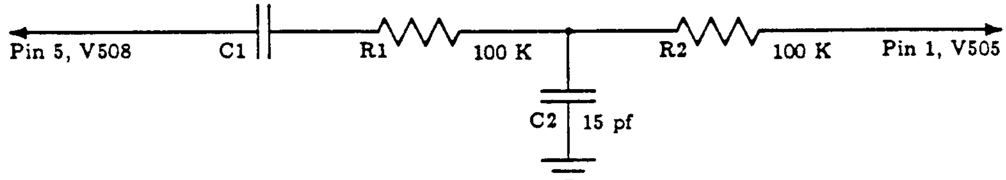
SP-600 BLACK TUBULAR CAPACITORS: The SP-600 is famous for the large quantity of black tubular capacitors in its circuitry. These capacitors are, in turn, famous for getting leaky and shorting out. A few years back. my SP-600JX-21 died, and I traced the trouble to a shorted bypass capacitor in the RF module. After reading the manual, and seeing what a job it would be to replace, I decided to expend a little additional effort and replace all of them , including those in the coil assemblies on the turret and inside the 3955 kHz IF can. I don't remember exactly how many there were of each value (0.01 and 0.022 mfd), but the local parts dealer gave me a quantity discount! My approach turned out to be correct because every capacitor I took out was either leaky or shorted and some had actually split open!! I used 0.01 mfd disk ceramic capacitors, and paralleled two of them to replace the 0.022's. It was necessary to remove the front end deck, selectivity switch, and shield on the 3955 kHz IF can to get at all of them. After replacing all the black tubulars, I carefully aligned the SP-600, and it now works like new. (Bob Kulow)

8 OHM HEADSET MOD: Here is a tip about using 8 ohm headsets with 2000 ohm headset outputs of tube type receivers. I didn't have a matching audio transformer on hand, so I added a 100 ohm half watt resistor in series with the headset output line. The resistor dropped the audio output enough to eliminate hum in the audio. I also used a 10 mfd 25 VDC capacitor from the "hot" side of the audio on the headphone side of the 100 ohm resistor to ground which acts like an audio filter and attenuates audio frequencies above 4000 Hz. Then in front of the 100 ohm resistor I added two paralleled reversed 1N914 diodes between the audio line and ground which could be switched in an out. The diodes act as an audio limiter. The values I used were simply what was in the junk box. I do know that the HQ-180, for example, produces several volts of audio. If the volume is up pretty high, the diode leads will get warm. I often use a light weight headset like the Walkman which is comfortable for long listening periods. I also use an old pair of 8 ohm magnetics if I need more filtering. They may be uncomfortable, and have poor fidelity, but are superior for CW work because they have an inherent frequency response peak which is ideal for CW listening. These mods are mounted in a small metal box with standard quarter inch phone jacks. The output has two jacks, one stereo, the other mono. Usually I keep both the Walkman and the old mag cans plugged in, and change to whichever works best for what I am listening to. (Steve Kennedy)



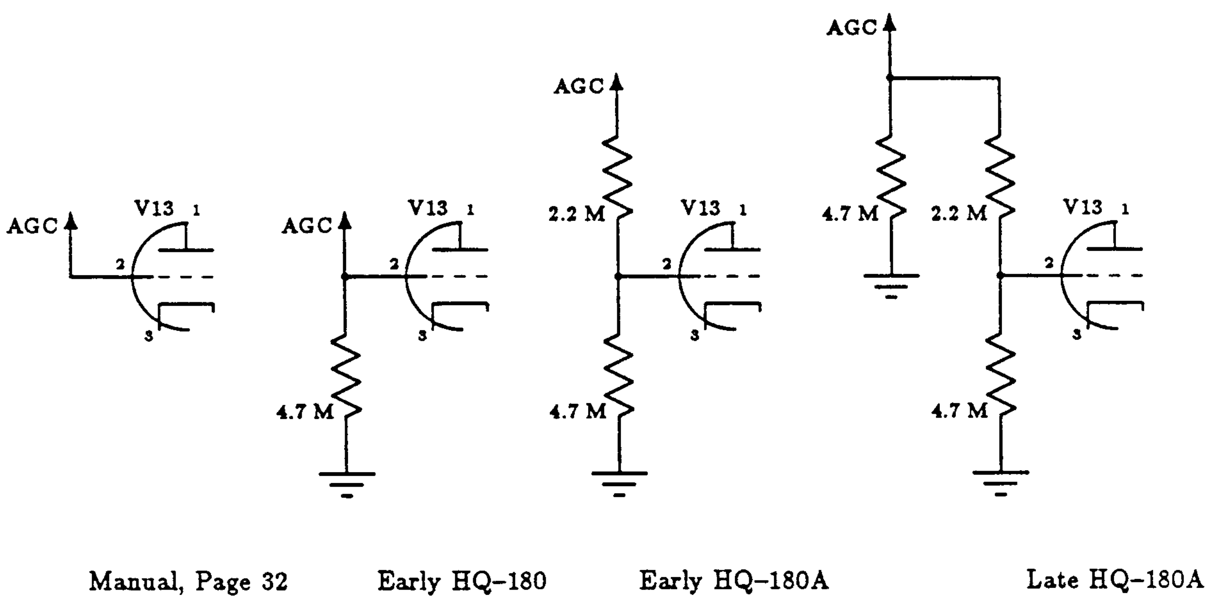
VARIABLE TUNING CAPACITOR NOTCHES: An interesting fact which few ever notice is that the main tuning and bandspread tuning variable capacitors often have several notches cut into the outer rotor plates which divide the edges into "tabs." If one is not careful, and these plates are slightly bent, alignment of the RF circuits may be degraded. Trash and dust may collect in the notches, so it is probably a good idea to clean them occasionally. If a plate is bent out of true parallel with the adjacent stator plate, dial calibration can change considerably, especially the bandspread calibration. The bandspread calibration is usually almost linear across the entire range, and it is possible that the capacitor was designed to provide very accurate calibration by bending the tabs on each plate at the factory. This is only a theory, not based on fact. (Steve Kennedy) [Somewhat against my better judgement I have included you comments, Steve, because this is a topic which has interested me for some time. Fiddling with these tabs can cause a major problem. Suppose you accidentally bend a plate enough or in such a way that you break the plate loose from the shaft. Then you are faced with the problem of removing the main or bandspread tuning capacitor and replacing it with a new variable capacitor. Removal is merely difficult and time consuming, but finding a replacement is probably impossible. Now I must confess that I have indeed fiddled with the tabs on my and other HQ–180's. I wanted to see if I could improve calibration on the BCB, and indeed you can if you are willing to spend *hours* bending the tabs on the oscillator section plates. Unfortunately, improving the linearity on some bands may and usually does degrade the calibration on other bands. If anyone knows more about this curious topic, please let me hear from you. Ed.]

R–390A SYNCHRONOUS AM DETECTION: Champ. That's what I put it down to! *Champ* is an appetizing dish of boiled potatoes, mashed with chopped spring onions and a dab of butter. After a days toil there's little more satisfying than to settle in front of the radio with a plate of champ, a crust and a cuppa. Feeling particularly tired one night I left an unfinished plate atop my R–390A, switched off and retired early. Dreams were vague and barely recollectable, stark contrast to the incredible scene that greeted my eyes next morning. The champ was gone. Gone, just disappeared into thin air. And? Yes, two green wires were hanging from one of the receiver's large side plate holes. Top cover removal showed that these were cutoffs of 10 by 0.1 mm used in an internal fabrication with two 100 K resistors and a 15 pf capacitor. Only two wires had a direct electrical connection with the set; an end of the wire attached to one of the 100 K resistors was pushed down pin hole no. 1 of the BFO oscillator socket, V505, and one lead of the 15 pf capacitor was grounded beneath a screw which secures the BFO PTO mounting bracket. The resistors were connected in series, and the other capacitor lead was soldered to the junction of the two resistors. A wire from the other end of the series resistors was neatly wrapped 7 times around the AGC amplifier tube V508 and knotted in place. The set and BFO were turned on. "Wow, what a circuit!" I had in front of me a fully syncronous AM receiver, that locked onto weak carriers long before they could otherwise be detected, and rejected adjacent channel signals. It was less effected by splatter and impulse noise, did not suffer carrier related propagation or receiver passband filter distortions and had a useful noise limiter. The BFO was both AM resolver and SSB CIO; tune first then BFO resolve. Bit of Irish? Don't doubt me, the circuit works. It is non-intrusive and a real champ. The 7 turn wrapping of V508 creates C1. C1 taps the carrier, C2 shifts phase. (G. S. Maynard, 16 Woodford Ave., Newtonabbey, N. Ireland, BT36 6TL) [I must admit, Graham, that I doubted you. But I was so intrigued by your circuit that I rushed home and added one to an R–390A. By golly, it works, and works very well indeed! I didn't have a 15 pf capacitor on hand, so I used a 10 pf 500 VDC NPO. I also used half watt resistors, and no. 22 stranded insulated wire. Instead of grounding the 15 pf capacitor beneath the nut of the carrier meter zero adjust control as you indicated, I took a slight liberty with your design and grounded it at a screw on the chassis which secures the BFO PTO mounting bracket. At first I had a little difficulty replacing the BFO tube with the wire inserted in pin no. 1 of the BFO socket – I had twisted the strands making insertion of tube pin 1 difficult, and I initially ran the wire between the tube and the tube socket skirt, which caused binding. After a few moments thought, I untwisted the strands (about 5/16 inch insulation removal allows complete insertion of the strands into the pin hole), and ran the wire through a small cutout on the side of the tube socket skirt. The tube then inserted easily, and though the tube did not seat completely because of the insulated wire between its bottom and the tube socket base, good contact was made with all tube pins. The stranded wire to pin 1 was 6 inches long (it could have been shorter), and the stranded wire to the 7 turn wrapping of V508 was 24 inches (including a couple of extra inches which can be removed after wrapping). The resistors and capacitor were soldered in a "T" configuration, with short leads. The resistor leads which attached to the stranded insulated wires were also cut short. But the ground lead of the capacitor was kept full length, with a hook bent into the end for sliding under the grounding screw. I tested the circuit first on strong local and semi-local MW stations about 3 pm local time. Adjusting the BFO to zero beat was delicate, but not excessively so, and long term stability was found to be very good, on the order of 5 – 10 minutes or longer. Both DSB (BFO frequency in the center of the mechanical filter passband) and SSB (BFO frequency at either edge of the mechanical filter passband) were tried. For SSB mode it seemed that best results were obtained when the signal carrier was no more than 20 db down on the mechanical filter skirt. Next, I tuned around the SW broadcast bands, listening mainly to weak signals with strong fading. In those cases the synchronous detector seemed to give the most improvement in DSB mode because DSB minimized audio variations due to fading. But I really don't have enough experience with the synchronous detector yet to draw any firm conclusions, and there are likely instances where USB or LSB would be better. All of my R–390A IF's have the Cornelius SSB modification, which may or may not cause performance differences between your receiver and mine. For example, I did not observe the noise limiting effect that you mentioned. However, your synchronous circuit is definitely a winner and certainly improves AM reception on strongly fading signals and on signals where SSB reception is desired because of interference on one sideband. I was so excited by the excellent results with this circuit that the next morning I dropped off a schematic at my colleague's office. Dr. Tom Williams, currently an electrical engineering professor here at Louisiana Tech University, has many years experience as a radio design engineer for some of the major USA electronic firms, including Collins Radio (now a division of Rockwell) and E Systems. Tom tells me that this circuit is called an injection locked oscillator, and that he played with the idea some years ago in a more sophisticated form using external transistor circuitry to implement a phase locked loop in a National NC–183D to which he had also added mechanical filters. Based on hints from Tom, and a peek at my copy of Radiotron Designer's Handbook, it seems to me that the circuit is essentially a low pass RC filter with parameters selected to pass a 455 kHz signal. That afternoon I tried a direct connection using tube test sockets and a 10 pf 500 VDC NPO for C1. It worked as well as the original. I also tried moving the RC filter input to the 4th IF, V504. It did not seem to work as well – BFO tuning seemed more critical. This means that to make the original circuit a permanent addition to an R–390A will require running a wire from the "AGC compartment" of the IF subchassis to the "IF amp compartment," a non-trivial task because you must either drill a hole in the metal plate that separates the compartments or pass the wire through the dificult-to-access existing hole that passes the existing wires. Miniature coax should probably be used. The next day I tried the injection locked oscillator circuit with an HC–10 converter to determine the feasibility of using it in an HQ–180A. It worked well, with one exception. The HC–10 drifted so badly that signals lost lock after a very short period, say 15 seconds. Oh, well... This indicates that the remarkable stability of the R–390A is a crucial factor in the success of the injection locked oscillator circuit. It also suggests that you should use this circuit with the crystal oven switch turned off. Ed.]



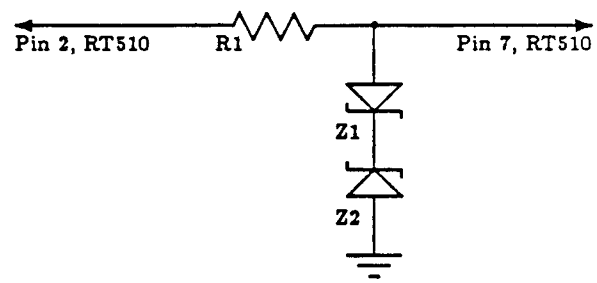
<u>HELP WANTED</u>: Could someone please sell me a 2.5 mH RF choke which I need to repair my HQ–180. I don't want to buy $10 or $20 worth of other parts that I don't need, and there are no electronic parts stores nearby. I also need the complete manual for the Hallicrafters SX–71 receiver. A Xerox copy would be satisfactory. (Edward McFadden, P. O. Box 248, Glenns Ferry, ID 83623)

<u>HQ–180 S-METER AMP VARIATIONS</u>: Page 32 of my HQ–180 manuals (series 1 and series 3), which is an enlargement of the AVC and S-meter circuitry, has a number of incorrect labels: C145 (should be C75), C146 (C139), C147 (C140), R89 (R90), R90 (R89), R91 (R105), and R99 (R91). Also, in my HQ–180 the input to V13B (12AU7), the S-meter amp, is not as shown in the schematic as shown on page 32. After checking other receivers it was determined that there were at least three S-meter input circuits used in various production runs. After trying the variations I have concluded that these S-meter mods were made to "linearize" S-meter readings. With the early circuits, even moderately strong signals give near maximum meter readings. The latest circuit is more nearly linear, with approximately 6 db per S unit and nearly linear db over S-9 readings as compared to an R–390A. In early circuits, the meter zero adjust, R20, was 300 ohms, while in later circuits R20 was changed to 1500 ohms, and in early circuits R22 was 820 ohms, while in later circuits R22 was changed to 470 ohms. Another mystery which I accidentally solved recently is why the sensitivity control, R18 (1500 ohms), does not permit one to adjust the meter for full scale readings on strongest signals. The answer is that the meter amp cathode resistor, R88 (2700 ohms), is too high. Replacing R88 with a 2200 ohm resistor permits you to adjust the meter for full scale readings. The solution came about when a '180 was recently brought to me for repair. The meter indicated only S-9 on the strongest signals, and could not be adjusted higher. The problem was traced to a bad R88 which measured 9000 ohms. I didn't have a 2700 ohm resistor on hand, so I used a 2200. I haven't changed R88 in my own '180 yet, but I intend to. (Dallas Lankford)

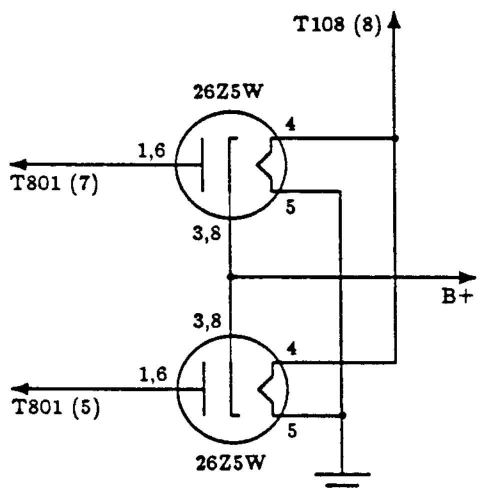


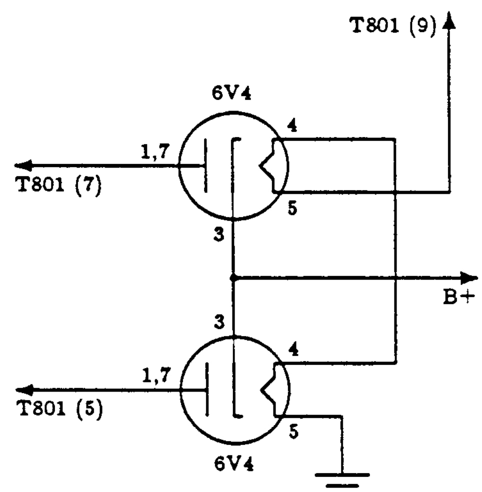
<u>3TF7 SUBSTITUTE</u>: There have been a number of suggestions in the past for replacing the expensive 3TF7/RT510 current regulator tube in the R–390A. Here is one which uses zener diodes. R1 is a 40 ohm 5 watt resistor, and Z1 and Z2 are 13 volt 5 watt zener diodes, 1N5350 or equivalent. The unused pin lugs on the RT510 socket can be used to mount the components. (Irving Megeff) [This is certainly one of the simplest substitutes for the 3TF7 that we have seen in *HSN*. If you have been living without a 3TF7 since your last

one died, using only a dropping resistor, you may want to give Irving's circuit a try. To make an almost plug-in version, use a 9 pin tube test socket with lugs around the top to mount the components. For a ground, solder a short length of stranded, insulated wire to an internal tooth ground lug and mount the lug to a nearby screw on the top of the IF subchassis, such as one of the screws which secures the BFO PTO mounting bracket. This is one that I intend to try. Ed.]



<u>26Z5W</u> <u>SUBSTITUTE</u>: The 6V4/EZ80 can be used as an inexpensive substitute for the scarce 26Z5W rectifiers in the R–390A when a simple wiring change is made to the rectifier sockets. I have a stock of about 60 of these tubes which I can supply for $5.00 a pair including shipping. Usually the power supply subchassis wiring connects pins 4 of the rectifier socket with a wire, and then from one pin 4 another wire runs to lug 8 of T801. Also, pins 5 are connected with a wire, and one pin 5 is connected to a nearby ground lug. To rewire the 26Z5W sockets for 6V4's, remove the wire which connects pin 4 and lug 8 of T801, remove the wire which connects the two pins 5, run a new wire from the ungrounded pin 5 to lug 9 of T801, and add two new wires connecting pins 1 and 7 on each tube. (Irving Megeff, 50-15 Weeks Lane, Flushing, NY 11365) [The increasing cost and scarcity of 26Z5W's makes this suggestion attractive. The 6V4 filament is rated at 6.3 VAC 0.6 A, which means it dissipates about half the power of a 26Z5W rated at 25.0 VAC and 0.3 A. The 6V4 also has a higher maximum plate voltage rating, 350 vs. 325 VAC, and a higher maximum DC current rating, 90 vs. 75 ma. Ed.]





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