

# HAM TIPS



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## 144-Megacycle Transmitter

### Part II: Operation and Adjustment

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A description of this circuit and the schematic diagram and parts list appeared in Part I in the May issue of HAM TIPS. If you missed Part I, ask your RCA distributor for a copy.

#### Operation

After all wiring has been checked, insert RCA's 5763 crystal oscillator-tripler ( $V_3$ ) and 5763 doubler ( $V_4$ ). Use an 8-Mc crystal that will put the final signal near 146 Mc. If the coils are peaked for this frequency there will be adequate drive at both ends of the band. (A grid-dip meter to tune the coils roughly

is a help. It is not essential, however.) Plug a 1 $\frac{1}{2}$  or 2-ma meter into  $J_1$ , apply 250 volts to the oscillator circuit and tune the plate of the oscillator ( $L_6$ ) for a maximum reading. Approximately  $\frac{1}{2}$  to 1 ma should be obtained easily.

Now insert the push-pull tripler 5763's ( $V_5$  and  $V_6$ ) but do not connect them to B+. Move the meter to  $J_2$  and add the doubler ( $V_4$ ) to the B+ line. Tune doubler coil  $L_7$  for maximum reading—between .75 and 2 ma. Spread or squeeze the tripler grid coils ( $L_{10}$ ) for the highest maximum reading. If this reading is

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still too low, it may be necessary to couple link  $L_8$  closer to the doubler coil. Moving this link will necessitate a touch-up of the doubler slug.

Insert the RCA-5894 final without B+ and let it warm up for 2 minutes. While waiting, set the screen bypass trimmer to the middle of its range. B+ should then be applied to all the multipliers but not to the final. Set excitation control  $R_{17}$  to maximum. Tune for maximum final grid-current by adjusting the plate-tank capacitor of the push-pull tripler. At least 5 ma should be indicated. Values of 8 ma have been obtained easily on the transmitter built. Back down  $R_{17}$  to give a reading of 4 to 5 ma.

Before applying high voltage to the final, it is wise to check for parasitics. Remove excitation by pulling out tripler tubes  $V_5$  and  $V_6$ . Apply about 100 volts to the 5894 plate and screen circuit. Tune the final and push-pull tripler tuning capacitors through their ranges. If any combination of settings shows grid current, it indicates parasitic oscillation in the final stage. The usual procedure for hunting parasitics at VHF apply, but first make certain that the rotor of the final tuning capacitor is ungrounded. Adjustment of the screen bypass trimmer also may help. This trimmer setting is not critical, but in the absence of parasitics it should be set for maximum final grid current.

Apply high voltage to the final, then immediately tune tank capacitor  $C_{31}$  for a dip in plate current. Adjust the antenna tuner for a maximum plate-current reading. The load bulb should light brightly.

With 450 volts on the plate, the current should be kept below 160 ma. If plate current is much less than this value, the loading may be increased by moving the antenna link a bit further in on the tank lines (*First, turn off the power.*) Little movement is necessary to obtain full load.

To check the antenna-coil tap spacing, replace the dummy load with the antenna coaxial feed-line and repeat the tuning procedure—starting with minimum coupling to the final tank. Begin with the antenna coil taps about  $\frac{1}{2}$  turn from each end. If peaking the antenna tuner changes plate tuning, move the taps about  $\frac{1}{8}$  turn. Repeat the tuning procedure until the correct tap points are found. You are now “on the air,” crystal controlled.

### VFO Adjustment

To start the VFO, remove power from final and multiplier stages and insert RCA's 6AU6 oscillator and 5763 buffer ( $V_2$ ). Set the panel selector switch to “VFO” and apply B+ to the 6AU6. It should now be oscillating and its range may be checked on any communications receiver. For complete two-meter-band cover-

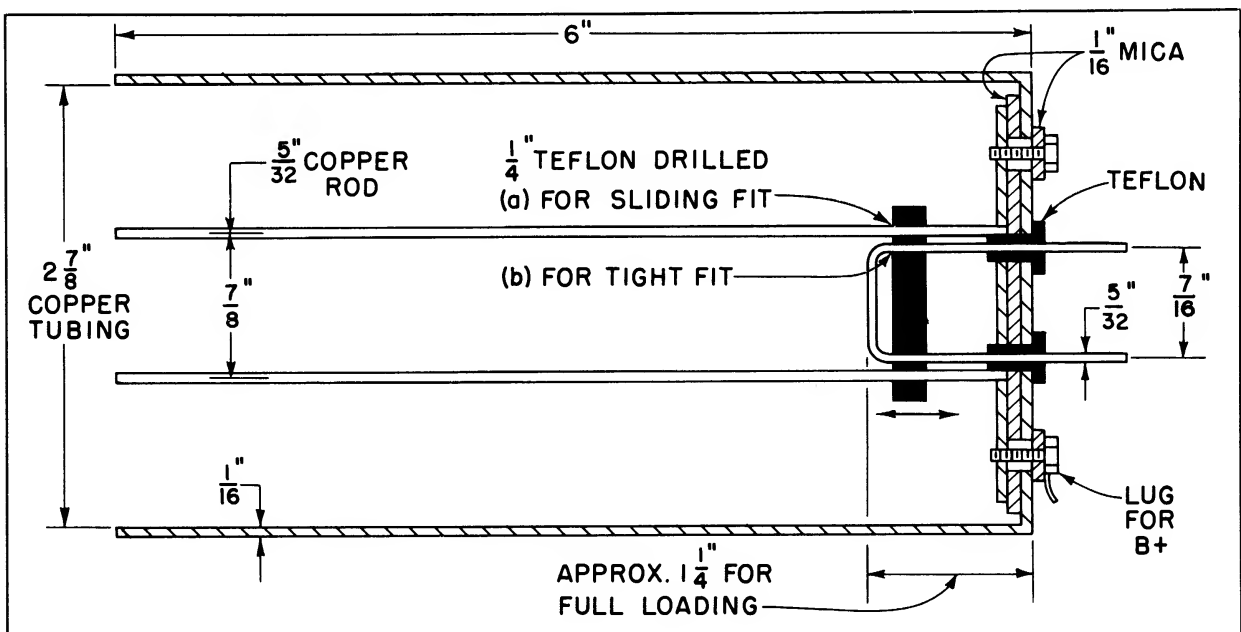


Figure 1. Transmitter tank assembly. Note corrected figure of  $\frac{1}{16}$ " center-to-center for the antenna link.

The tripler tubes may now be reinserted and their plate circuit retuned for maximum final grid current. Next, a 100-watt lamp dummy load should be attached to the antenna tuner output. Pull the coupling link full out and set the antenna tuner for maximum capac-

age, the oscillator should tune from 8.00 to 8.22 Mc. Use  $C_1$  to set the band edge. Calibration may be done either with the fundamental, on the low-frequency receiver or, later, on a two-meter receiver.

With the oscillator running, it is now only

necessary to tune the buffer plate to 8 Mc. Set the VFO to mid-band (8.11 Mc) and apply high voltage to all stages except the final. (The final may not have sufficient excitation until the buffer is adjusted.) Tune the buffer coil for maximum grid current at the final. The 5894 may now be fired up.

There will be a slight drop in final grid current when the VFO is tuned away from the center of the band, but adequate drive (4-5 ma) can always be obtained by proper setting of excitation control R<sub>17</sub>.

Some thought was given to protecting the 5894 against loss of excitation. The use of a clamp tube on a modulated final is difficult at 144 Mc, where wires easily become quarter-wave lines. In the end, no protective devices were added here. No trouble has been encountered—so far.

**Acknowledgment**

The author wishes to thank James A. Shiels, K2DI, and Frank Maraguglio, W2LXB, for their ideas and aid in constructing the final tank and antenna tuner.

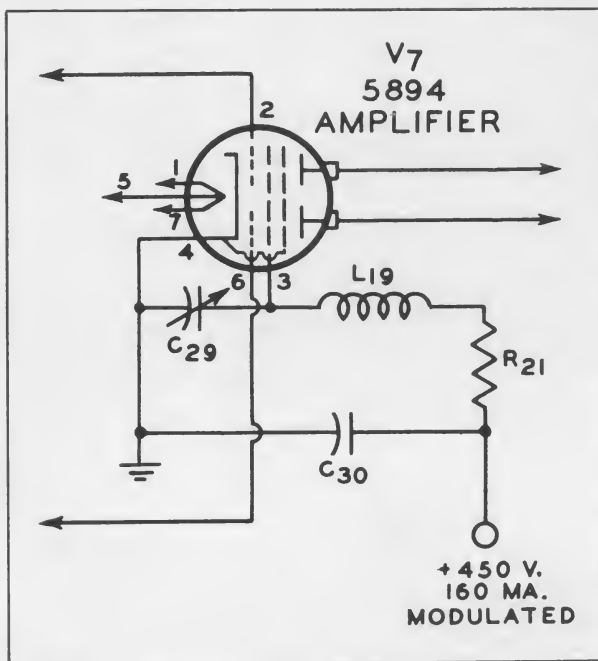


Figure 2. Original circuit used R<sub>21</sub> without additional 5894 screen-lead choke, but addition of L<sub>19</sub> (Ohmite Z-50) allows more complete neutralization of the final.

**Addenda**

In Part I, the center-to-center measurement for the antenna link (L<sub>15</sub>) was incorrectly noted as 19/32". The correct dimension is 7/16".

Also in Part I it was noted that R<sub>21</sub> served

both as resistor and rf choke. It has been found, however, that the addition of an actual rf choke allows more complete neutralization of the final. (See Figures 2 and 3.)

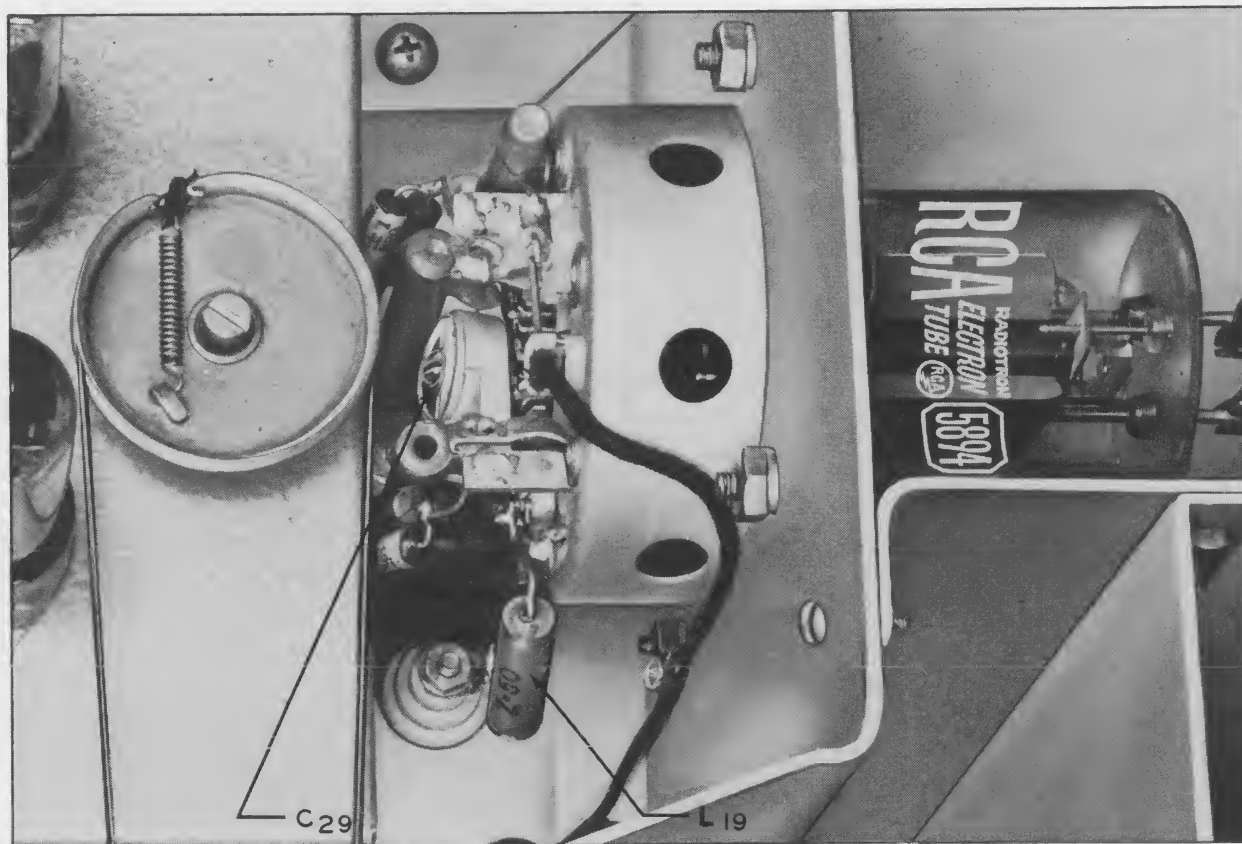


Figure 3. Close-up of the 5894 socket. L<sub>19</sub> runs directly from screen pin to feed-through that connects with R<sub>21</sub>.



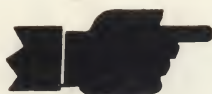
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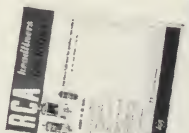
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