



--- W8MAQ KWS-1 Neutralization Procedure ---

People often have difficulty with Neutralization of the PA and Driver stages of the KWS-1.

Particularly the 80 Meter neutralization can be very difficult. Jim Young, W8MAQ, passes along these notes that will help you with the neutralization. Particularly, his different approach to the 80 meter neutralization can provide much better (and much more easily accomplished) results.

From Jim:

Having experienced some difficulty in neutralizing the KWS-1 transmitter after re-tubing and restoring the unit made me re-evaluate the original set of instructions that Collins published. I found the instructions in the manual to be somewhat imprecise in that I prefer to see a true peak or dip when adjusting a tuned circuit. Mine would spontaneously oscillate, draw maximum plate current, "growl" and blow the high voltage fuse, right in the middle of a QSO!

So, I reviewed the circuit description and recalled the procedures I used when adjusting 1920's vintage neutralized TRF receivers. I have enclosed the procedure which I devised, and which has worked very well on my transmitter. I should mention that I had coincidentally changed the finals from 4X150's to the newer 4CX250B's which certainly affected the neutralization, but I think the following procedure should be valid in either case. Equipment required: HF signal generator, oscilloscope, 2 old 6CL6 driver tubes.

Mark the space between Pins 9 and 1 of the 6CL6's with tape. Using cutters, cut off pin 4 of each 6CL6 flush with the glass.

CAUTION!!! With Pin 4 removed, the 6CL6 can be inserted in the socket two ways. Having marked the original gap in the pins be certain the modified 6CL6's are correctly oriented when inserted.

15 Meter Neutralization

Remove the good 6CL6's from their sockets and insert the two test units (with pins removed). Observe the cautionary statement above. Place the shields over the tubes. Warm up the KWS-1 in the Calibrate Mode, 15 Meter Band, 21 MHz, HV off. Connect a 10 megohm scope probe to the 6CL6 plate test jack, J201. Increase the Carrier Level pot as required observing a 21 MHz waveform on the scope. The amplitude will be small. Adjust C283, 6CL6 Plate for minimum amplitude

80 Meter Neutralization

Setup equipment as above except 80 Meter band, 3.5 MHz. Adjust C322 (underneath towards front) for minimum displayed amplitude.

PA Neutralization

Connect a signal generator to J401, PA RF output. Carrier Level pot is set to minimum. Set generator to 21 MHz for 2 to 3 volts output. Scope probe remains connected to J201, 6CL6 plates. Adjust PA Tune and Load controls for maximum displayed signal. Loosen the PA neutralization mounting screws and slide up and down to achieve minimum observed amplitude. Tighten the screws.

Note that if the transmitter has been changed over from 4X150 to 4CX250Bs, you should be sensitive to the position of the neutralization “butterfly” capacitor in its slot on the side of the PA cage. Make sure you are getting a true minimum and not just winding up at the top of the slot. Inter-electrode capacitances were reduced in the 4CX250B and in many rigs that still are in their original configuration, the “wings” of the butterfly capacitor will need to be carefully bent back evenly to where they are just parallel to each other. This reduces the neutralization capacitance range. See the “Care and Feeding of Your KWS-1” for more detailed information.

6CL6 Feedback Neutralization

Set up equipment as before. Signal generator output to 2 to 3 volts at 21 MHz. Insert good 6CL6's in the driver sockets, with shields. Carrier Level pot is set to minimum. Signal amplitude at J201, 6CL6 plate will be much larger due to the amplification of the 6CL6's of the feedback signal coming from the PA back into the driver cathode. Adjust C715, driver FB Neutralization, for minimum displayed signal.