DRIVER AND POWER AMP OPTOMIZATION

COMMUNICATIONS TRANSCEIVER

MODEL

SR-160 & SR-500

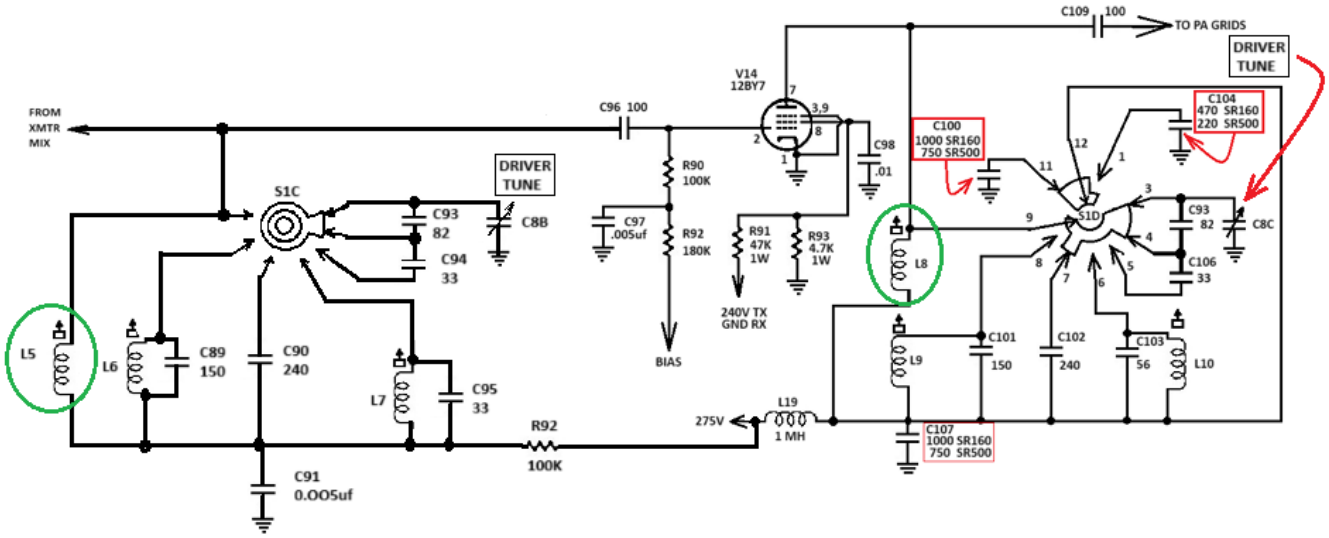
WDØGOF Walt Cates ver 3.0

SR-160/500 driver and PA optimization

Due to the age of the radios, the driver and PA on both the 160 and the 500 are far from optimized. The following is a guide for a simple process to insure your driver and PA are optimized.

The essential assumption is that the receiver, driver input and driver plate alignment have all been done properly and has no faults. Check the counterclockwise and clockwise indexing of the plate tune and driver tune **knobs**. When the index line of the knob is at 12 o'clock the control must be in the center of its rotation.

We will start with the driver. The first thing to take note of is the switching of the driver grid and plate coils. The 80-meter coils in the grid and plate are in the circuit on all bands. Note, the resonating capacitors for L5 and L8 (C90 and C102) are switched out of the circuit on 40-meters and 20-meters. This in effect changes the function of L5 and L8 to RF blocking chokes. However, a combination of minor faults will cause these coils to interfere with normal tuning of the 40 and 20-meter bands. These faults are, component value drift and maladjustment of the DRIVER TUNE control.



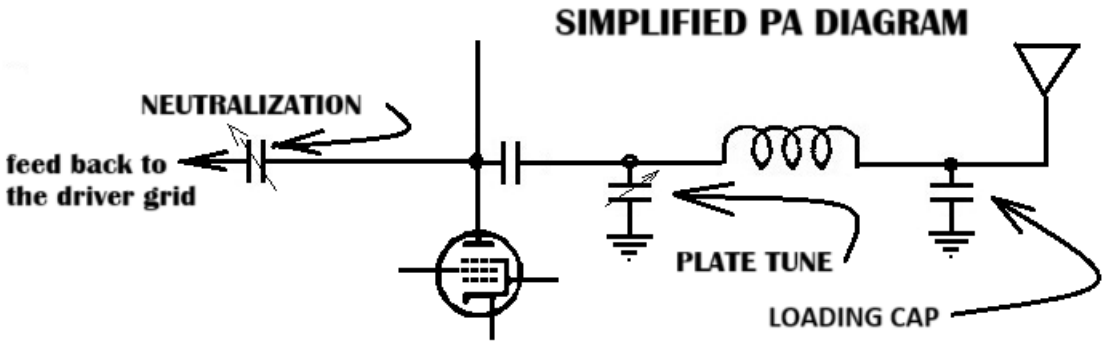
To overcome these faults the following pre-alignment process is recommended.

Start with the 80-meter band. Set the main tuning to the center of the 80-meter band. Set the DRIVER control at 12 o'clock **(This is a critical adjustment)**. The DRIVER TUNE will remain at 12 o'clock (The center of the controls rotation) for all bands throughout this process. Key up in the TUNE function. Adjust the PLATE TUNE for peak power out. *NOTE; you are not looking for spec power output.* Now set the CARRIER control for 20 to 50 watts out. The key here is; not to be at or near PA saturation. Now adjust L5 and L8 for max power out.

Switch to the 40-meter band. Adjust the main tuning for the center of the 40-meter band. Repeat the process above adjusting L6 and L9.

Switch to the 20-meter band. Adjust the main tuning for the center of the 20-meter band. Repeat the process above adjusting L7 and L10.

For those who are new to transmitter HF, PA optimization there are three functions that contribute to PA efficiency; Neutralization, Plate tuning and load adjust.



So, let's look at the three functions.

The following process has been tailored to the SR-160 and the SR-500, However the basic principles can be applied to all HF PA's.

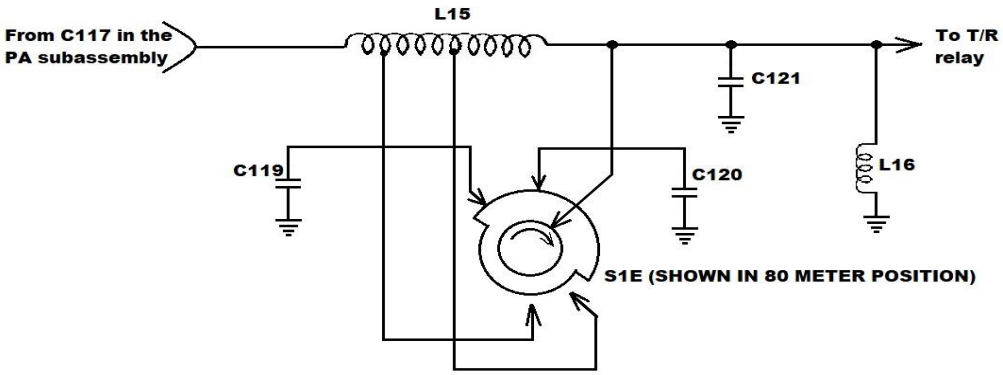
First; Neutralization: Neutralization is the process of nulling out the effect of interelectrode capacitance within the pa tube. Key up and tune up in the center of the 20-meter band, power down. Disconnect the plate and screen voltages from the PA tubes. Key up, turn up the drive to the final. Then adjust the neutralization cap for minimum signal at the antenna.

Second; Plate tuning: Plate tuning matches the plate of the final tube(s) to the tuned output circuits. A properly tuned plate is indicated by a dip in plate current and should coincide with the power output peak. A proper plate current dip will only occur if the PA is properly neutralized.

Third; Load adjustment: The load adjustment matches the plate loading circuits to the antenna. The load is adjusted for max output power. However, the load cap in the 160/500 is not adjustable.

The design concept of the 160 and 500 was to provide a simple to operate and reliable system. The SR-160 and SR-500 when properly aligned and tuned lived up to that concept. Unfortunately, one of the functions that was designed out was the load adjustment. In the first 30 or 40 years of its life that was not a problem. But you can no longer buy matched tubes built to tighter than normal specks from Hallicrafters. And most important, the capacitors in the PA have exceeded their shelf life twice over.

The prerequisites for the optimization process are an otherwise fully operational radio. It must have a well-matched set of final tubes. And finally, it needs to be precisely neutralized.



OK, let's attack C119, 120 and 121. Only C121 is used on 20-meters. C120 and C121 are both used on 40 meters. All three on 80. Therefore, we will start at 20-meters.

Set the main tuning dial to the center of the subject band. Set the FINAL TUNE to the center of the band section for the band you are optimizing.

This is critical and must not be moved until you are finished optimizing that band.

1 Tune up for max power.

2 Power down.

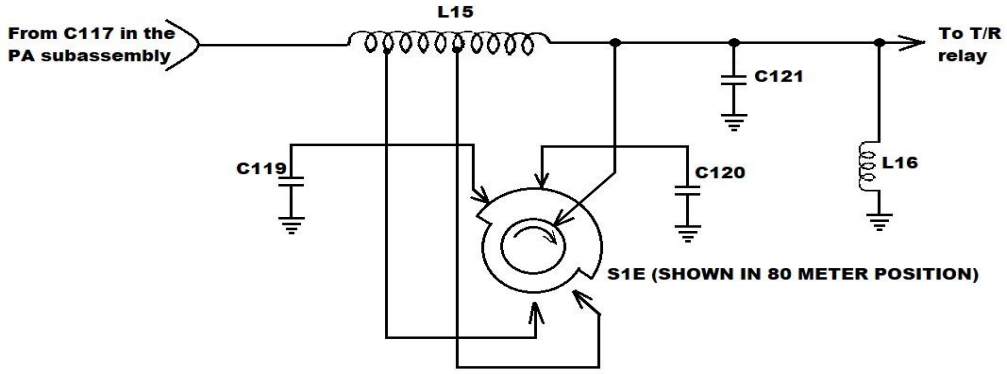
3 Replace cap under test with slightly larger or smaller value. Retune and record power. Repeat with incrementally smaller or larger caps until you find the cap that provides the max power output. If you have access to high voltage (500vrms or higher) variable caps you can tack one in and adjust for max power out. Then pull the variable, measure it and install a fixed cap of that value.

4 KEEP the FINAL TUNE control in the center of its band segment for each band at all times.

So, we will start on 20 meters. Setup: 20-meter band, 14.175 on the dial, FINAL TUNE set to the center of the 20 meter white bar. Now tune up and select C121 for most power out.

Setup: 40-meter band, 7.175 on the dial, FINAL TUNE set to the center of the 40 meter white bar. now tune up and select C120 for max power out.

Setup: 80-meter band, 3.750 on the dial, FINAL TUNE set to the center of the 80 meter white bar. Now tune up and select C119 for max power out.



Now for the low power on 80 meters.

A) Tune up on 3.900MHz and note the power out. Connect the mic and turn up the mic gain, Go to SSB, key up and repeat the words THREE FOUR rapidly 4 or 5 times. If you have considerably more power out than you did in the tune function then you have a problem in T1, T2 or FL1.

B) Prior to V13 (the tx mixer) the ckts for 80 and 20 meters are the same. 80 meters is (VFO -CARRIER) and 20 meters is (VFO + CARRIER). If you look at the signal at test point A* it should be the same on 80meters and 20meters (20 meters may be slightly higher due to mixer efficiencies). If they are not then you most likely have a dirty band switch. If the signal at test point A is not 3.5vpp to 4.5vpp T8 is improperly tuned. If the signal at test point A is too high, you may have spurious receiver responses.

*Test point A is located to the right of S1A on the schematic in the factory manual.

C) If you look at the signal on pin 2, the grid of the driver V14, the signal should be the same level peak to peak on 80 and 20 meters when tuned up. 20 meter may be slightly higher due to mixer efficiencies. If not suspect, dirty band switch.

This completes the optimization process, It is recommended that a complete realignment should be performed at this point.

NOTE: The J 155-000010 version of the SR-160 schematic has an error. It shows a jumper from C92 to the base of L7 (in the TX mixer plate/driver grid ckt). That would connect the negative bias to the 275v line. Make correction as needed.