SR-160 & SR-500
FRONT END RX GAIN IMPROVEMENT

In most receivers, the signal to noise ratio is set by the first RF amp. Therefore, optimization of that RF amp is of primary importance.

Before you continue reading unfold the schematic for either the 160 or 500.

In the SR-160/500 there are several key front end design points that should be noted. V1, the receiver RF amp is a tuned grid/tuned plate circuit. The L1, L2 and L3 circuits tune the grid. L5, L6 and L7 tune the plate. Also note that L5, L6 and L7 serve to tune the plate of V13 the transmit mixer and the grid of the TX driver V14. That means that L5, L6 and L7 will affect both the receiver and transmitter. Also, the 80 meter coils L1 and L5 are not switched out of the circuit on the 40 and 20 meter bands. In addition, look closely at the DRIVER TUNE control. C8B and C8C do in fact tune the driver. But, the C8A portion of that control is the receiver preselector tuning. The schematic should have a dashed line connecting the three sections together. Critical information on the balance of the receiver preselector and the driver tune functions can be found at **https:/wdogof.files.wordpress.com/2018/11/160-500-antenna-driver-tuning.pdf.**

One receiver improvement was made in the redesign from the 160 to the 500. C11 a 47uuf cap was changed to a 22uuf cap and C12, an 8.2uuf cap was changed to a 6.8uuf cap. The SR-160 will benefit from this modification.

The RF amp stage, V1 was designed around the 12AW6. It is running close to and over its design center with today's high line voltages. The 12DK6 is a better choice for V1 today. No component changes are needed, it is truly plug and play. It is highly recommended to hand select the 12DK6 from a group of 3 or more. The 12BZ6 is also a viable substitute. I have achieved better results with the 12DK6. But, I still try a couple 12BZ6's just in case.

It is not a process of just plugging in a tube and checking the output. Internal reactance does affect the operation in the circuit. Therefor the grid and plate coils need adjusting. As the circuit sees more or less gain with the swap-outs, the avc changes to stabilize the output. So here is the tried and true process.

1, First we need to disable the avc. In the plate circuit of V10B locate the junction of R65, R66 and R67. Using a clip-lead ground that point. This will kill the avc action and set the gain of the RF amp and first IF amp to max.

2, Power up. Warm up. Tune up the receiver on 3.900MHz with a 1 microvolt signal input to the antenna jack (Keep the input signal at 1 microvolt throughout the swapping process). Set the RF GAIN to max. Ensure that L1 and L5 are peaked for max audio out. Set the AF GAIN for ½ watt audio output. (An audio output meter and load would be desirable at this point. Then you would have a reliable measurement and would not have to listen to the loud tone. Something like the GR-1840A works well here. You can make a load with three 9.6 ohm 2 watt resistors in parallel and then measure the voltage across the load.) Through out this process do not change either the RF or AF GAIN settings.

3, Remove the 12AW6 from the V1 socket and replace it with the first 12DK6. Do not power down during the swap-out. Re-adjust L1 and L5 for max audio output. Record audio the output.

4, Repeat the swap-out, adjustment of the coils and record the output for however many 12DK6 tubes you have. It is common to achieve from 3 to 8db of improvement in overall gain.

Finally, select the tube that provided the most gain and leave it in the rig. Remove the grounding clip lead. Now do an ALMOST by the book receiver alignment. I recommend one change to the alignment procedure. This change involves T4 and T7.

A, Warm up and tune up on 3.9MHz. Set the RF GAIN to max.
B, Inject a 3.9MHz, 3uv signal into the antenna jack. Set the AF GAIN for ½ watt audio output.
C, Adjust T4 for max audio output.
D, Increase the 3.9MHz signal to 30uv. Set the AF GAIN for ½ watt audio output.
E, Adjust T7 for a dip in the audio output.

Repeat steps B through E until no further improvement is achieved.
HINT: If while tuning T7 you experience a sharp roll-off on one side or the other this indicates an error in the alignment of T1, T2 or T3. Also, the dip in audio output when tuning T7 should coincide with a peak in the S-meter reading.

For more information on the Hallicrafters SR series radios go to wd0gof.com.