SR-160 SSB
MIC AND BALANCED MODULATOR
DISCUSSION

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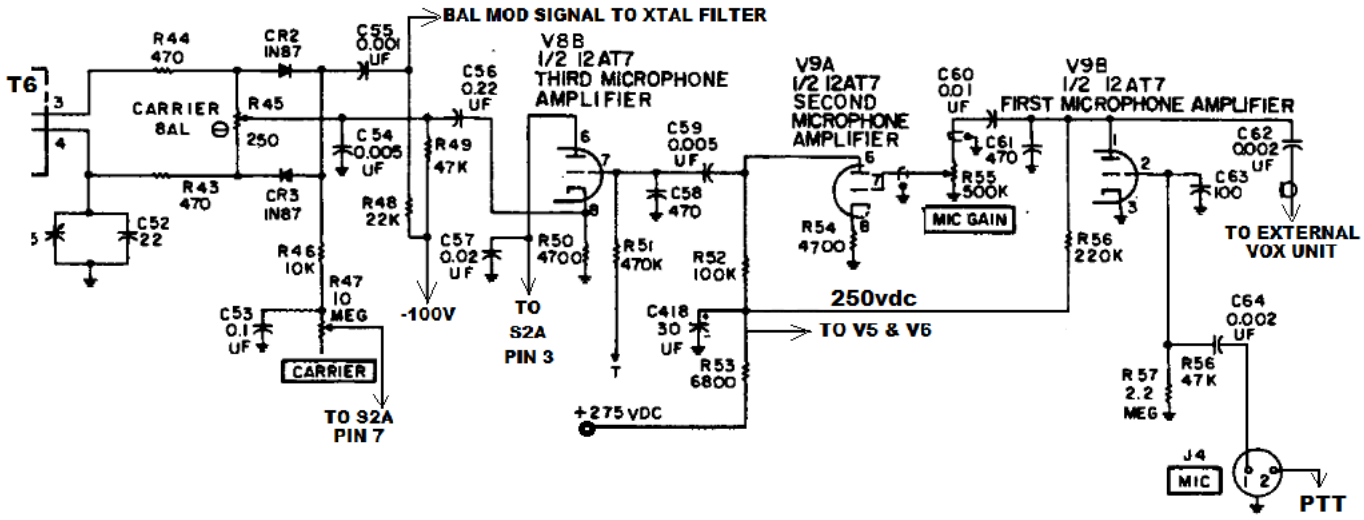
The microphone amplifier train is composed of V9A, V9B and V8B. V9A & B are active in receive (rx) and transmit (tx) modes. V8B is biased OFF in receive mode. V9B has a gain of 20X (not db). V9A has a gain of 10. V8B is a cathode follower with unity gain. With The V9's being active in rx and tx these two stages can be analyzed in rx mode without having to key up the transmitter.



Read the following procedure and follow the flow on the schematic once or twice before you start analyzing the ckt performance.

Inject 1000Hz into pin 1 of the mic jack while monitoring the signal at pin 2 of V9B with an oscilloscope. Adjust the level of the audio until you get 20 millivolts peak to peak on pin 2.

Move the scope to pin 7 of V9A. Insure the mic gain is at max. You should have 400millivolts peak to peak on pin 7 with 20 millivolts into pin 2.

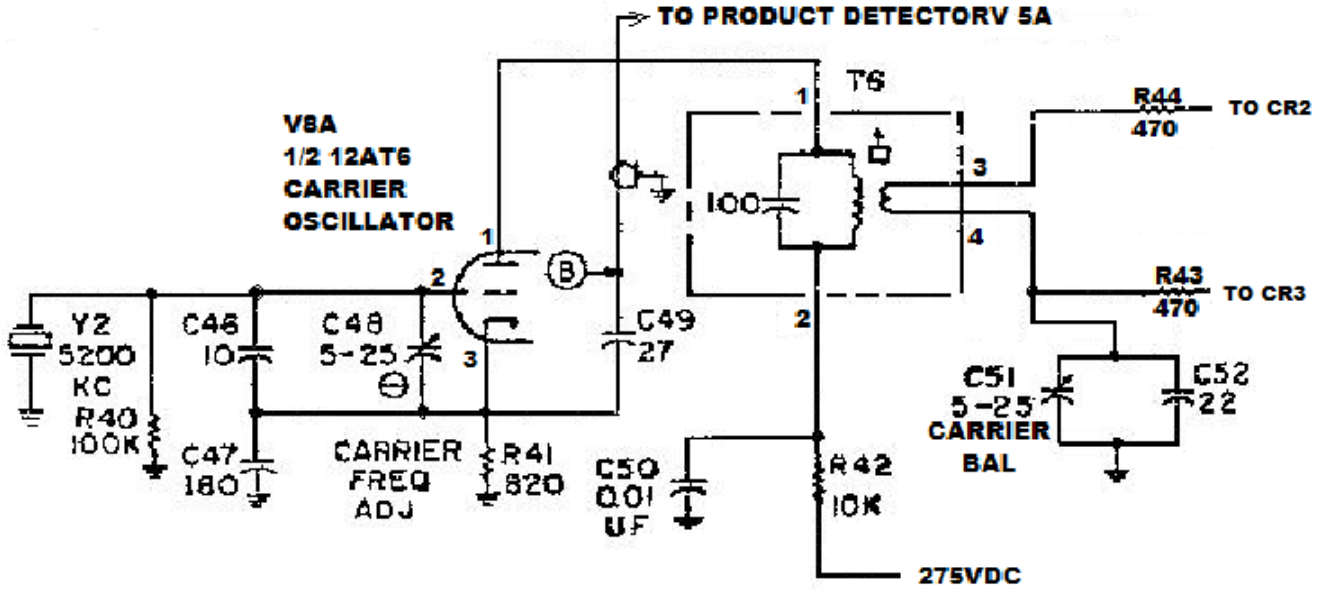
Move the scope to pin 7 of V8B. You should have 4 volts peak to peak.

Move the scope to pin 8 of V8B. V8B should be cut off in rx mode and there should be no signal on pin 8 at this time.

While observing pin 8 of V8B temporarily ground pin 2 of the mic jack. The signal should rise to 4 volts peak to peak.

The basic components of the balanced modulator are; T6, R45, CR2 and CR3.

The first thing is to insure the carrier oscillator is functioning properly.



Connect a 10x scope probe to test point B (top of C49 connected to pin 3 of V8A. The other end of the scope probe will be alternately connected to a scope or a frequency counter.

In the REC ONLY mode you will use C48 to adjust the frequency and T6 to adjust the amplitude.

With the probe connected to the counter adjust C48 for exactly 5.200MHz.

Adjustment of T6 is a little more involved. With the probe connected to the scope adjust T6 for max signal output. Now carefully tune each way from peak. You should note that the signal falls off more slowly in one direction than it does in the other direction. Now retune for peak, and in the direction of the slow fall of, tune for a signal equal to 90% of the peak value.

The minimum voltage will be 3vpp (1vrms)

The adjustments of C48 and T6 do interact somewhat so repeat the adjustments until you are satisfied you have a stable condition.

Now let's consider the CW/TUNE mode. V8B is cut off (no B+) so there is no audio present. With no audio present the carrier signal passed by CR2 is equal in amplitude to the signal passed by CR3, but they are 180^{o} out of phase and thus cancel each other. HOWEVER in CW/TUNE mode by way of R46, R47 and S2-A tabs 7 and 8 a negative bias is applied to the balanced modulator. CR3 is reverse biased. CR2 is switched full on. As a result the circuit does not act as a balanced modulator generating two sidebands and suppressing the carrier. It simply passes the carrier osc signal straight through to the xtal filter.

Now on to SSB mode. In the procedures above we have proven the operation of the audio and carrier osc circuits.

In the SSB receive mode check the signal levels on pins 3 and 4 of T6. They should be between 3.5 to 4.5 volts peak to peak. Too little and you will have low power. Too high and you will have poor carrier rejection. If there is a large difference between the signal on pins 3 and 4 then most likely C51 or C52 is bad.

If you reach this point and have no power in SSB mode and have normal power out in CW/TUNE mode only a few parts remain unproven. Check the following individually; R44, R43, R45, CR2, CR3, C51 and C52.