

WR-89A CRYSTAL CALIBRATED MARKER GENERATOR ADJUSTMENTS

General

The WR-89A Crystal-Calibrated Marker Generator is manufactured, tested, and calibrated under strict engineering supervision. If the instrument should require adjustment or repairs, the procedures outlined below should be followed.

A schematic diagram of the WR-89A is shown on pages 16 and 17. Locations of internal calibration adjustments are shown in Figure 22. If it becomes necessary to replace any of the component parts, only RCA replacement parts or their equivalents should be used. When ordering replacement parts for the generator, consult the Replacement Parts List on page 18 and specify the code and serial numbers of the instrument as well as the stock number of the replacement part.

The instrument may be removed from the case by removing four screws from the bottom of the case

and four screws from the corners of the front panel. Slide the instrument out the front of the case.

If trouble is encountered, voltage readings should be taken and compared with the operating voltages shown on the schematic diagram. If any alignment adjustments are made, the line voltage should be 117 volts at 60 cps.

Alignment of Variable-Frequency Oscillators

Alignment of the two variable-frequency oscillators requires use of another oscillator which will cover the frequency range from 19 Mc to 260 Mc with known accuracy. Another WR-89A or a laboratory oscillator is suitable. Procedure is as follows:

1. Turn on all equipment and allow 20 minutes for warm-up.
2. Set the MODULATION control of the WR-89A

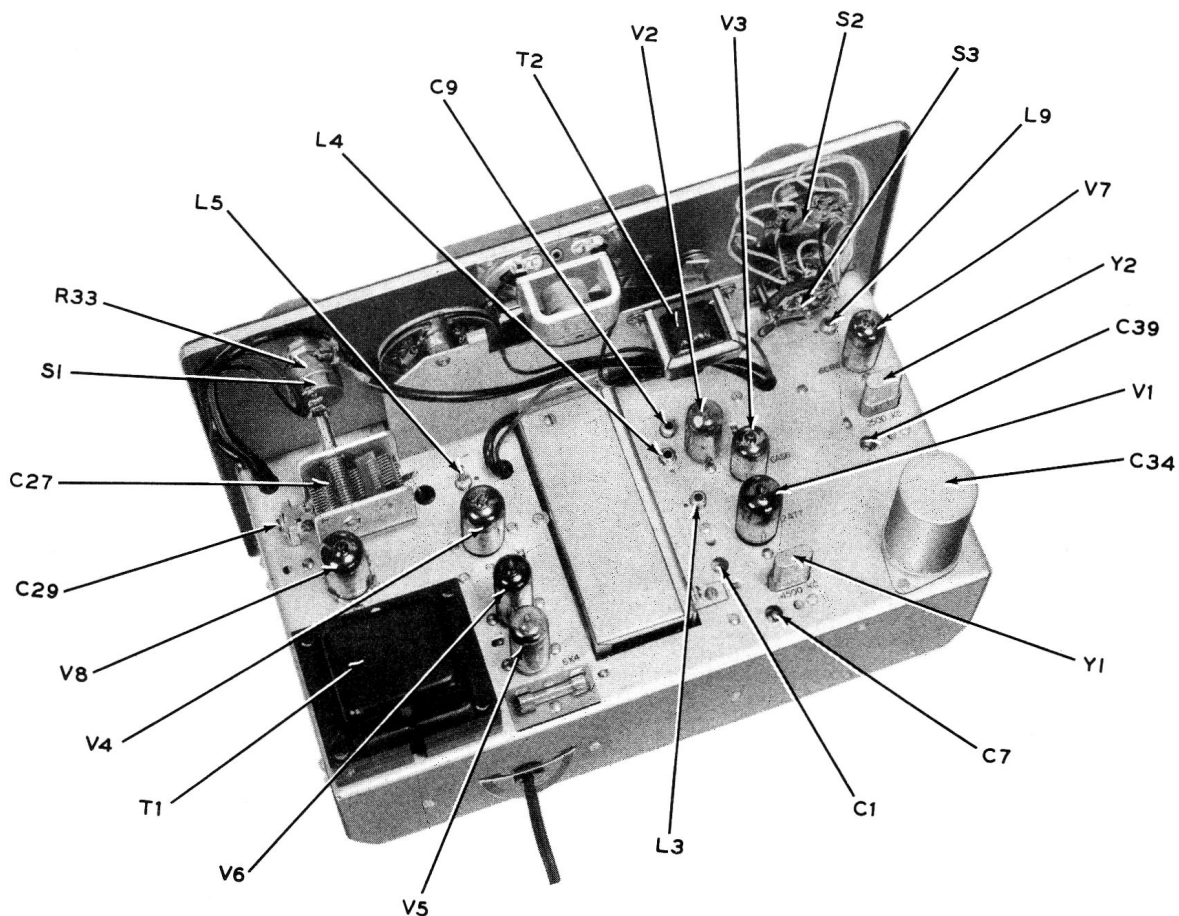


Figure 22. Top of chassis view of WR-89A showing locations of tubes, components, and alignment adjustments

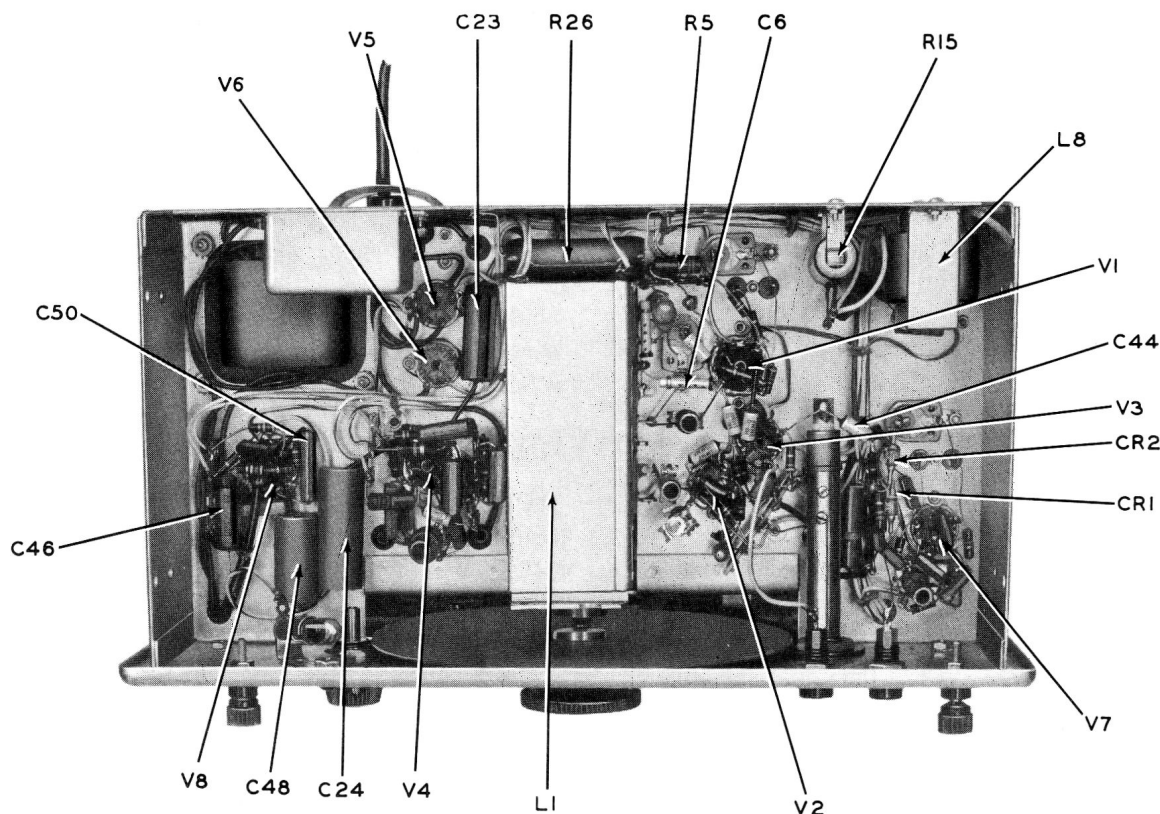


Figure 23. Under-chassis view of WR-89A

to "OFF", RF RANGES to "19-55Mc", and AF GAIN nearly fully clockwise. Set the dial to the 19-Mc mark.

3. Connect the rf-output cable from the RF ATTEN-OUTPUT connector to the RF IN connector of the standard oscillator. Connect a good ground cable between all equipment to minimize hum.

4. Tune the standard oscillator to exactly 19 Mc. With an alignment screw driver, adjust C1 for zero beat with the standard oscillator.

5. Tune the WR-89A and the standard oscillator to 55 Mc. Adjust for zero beat by varying L3. Recheck the 19-Mc and 55-Mc adjustments.

6. Disconnect the output cable at the standard oscillator. Turn the MODULATION control to "2.5 MC CAL". Readjust C1 and L3 until the beat note occurs exactly at the dial marks, using C1 for the 19-Mc point and L3 for the 55-Mc point.

7. The procedure for aligning the 55 to 260-Mc oscillator is the same as described in steps 1 through 6 except that the RF RANGES control should be turned to "55-260 Mc", C9 should be adjusted for zero beat at 55 Mc and L4 should be adjusted for zero beat at 260 Mc.

Alignment of 100-150 Kc Oscillator

The test setup required for alignment of the 100-150-

Kc oscillator is shown in Figure 24. A cathode-ray oscilloscope, such as the RCA WO-88A, an audio oscillator of good accuracy and stability, and a demodulator are required. The demodulator may be constructed as shown. Procedure is as follows:

1. Connect the output from the audio oscillator to the horizontal input terminals of the oscilloscope to provide the reference sweep frequency.

2. Set the MODULATION control on the WR-89A to "100-150 KC". Set RF RANGES to either of the VFO ranges. Turn on all equipment and allow at least 20 minutes for warm-up.

3. Set the audio oscillator to exactly 100 Kc. Set the 100-150 KC TUNING on the WR-89A to 100 Kc.

4. With an alignment screw driver, adjust L5 until a circular pattern appears on the screen. Reset the audio oscillator and the WR-89A to read 150 Kc and adjust C29 for a circular pattern. Recheck alignment at 100 Kc and readjust L5 if necessary. Both settings should be rechecked and adjusted until calibration is correct.

An alternate method of calibration uses a communication's receiver which has been calibrated accurately. Procedure is as follows:

1. Turn on the receiver and WR-89A and allow at least 20 minutes for warm-up.

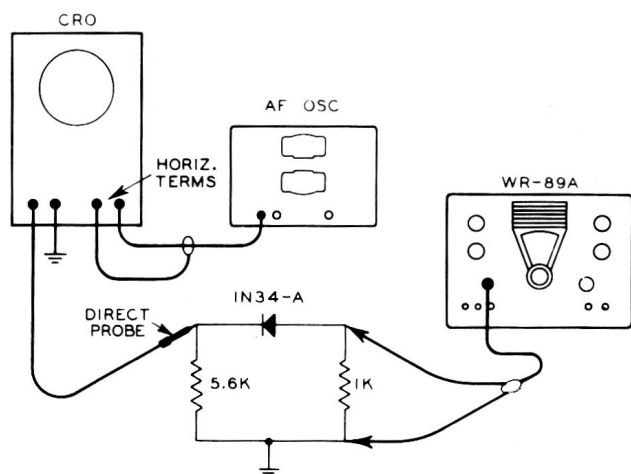


Figure 24. Test setup for alignment of 100-150 Kc oscillator. Demodulator should be constructed as shown

2. Calibrate the receiver with a crystal standard at the following points: 600, 700, 750, 800, and 900 Kc. Attach a short piece of wire to the antenna terminals and loosely couple the wire to the 100-150 Kc oscillator in the WR-89A.

3. Turn the MODULATION control of the WR-89A to "100-150 Kc" and set the 100-150 Kc TUNING control to 100 Kc. Tune the receiver to 600 Kc with the beat-frequency oscillator turned on.

4. With an alignment screw driver, adjust L5 for zero beat in the receiver. Then, check to see that beat notes are also heard exactly at 700 and 800 Kc. No other beat notes should be heard from 600 to 800 Kc. If other beat notes are heard, readjust L5 until zero beat is obtained at 600, 700, and 800 Kc points only.

5. Set the 100-150 KC TUNING to 150 Kc. Tune the receiver to 750 Kc. Adjust C29 for zero beat in the receiver. Check for beat notes at 600, 750, and 900 Kc. No other beat notes should be heard from 600 to 900 Kc.

6. Recheck alignment by retuning the receiver to 600 Kc and checking alignment at 100 Kc. If necessary, readjust L5. Switch the WR-89A to 150 Kc; if calibration is off, readjust C29. Repeat the checks at these points until both the 100 and 150-Kc signals zero beat with 600 Kc. Recheck calibration of the 150 Kc oscillator at 600, 750, and 900 Kc on the receiver. Recheck the 100 Kc oscillator at 600, 700, and 800 Kc on the receiver.

Alignment of 4.5-Mc and 2.5-Mc Oscillators

The 4.5-Mc and 2.5-Mc crystal oscillators may be aligned by use of the zero beat method. A communications receiver of good stability, which has an avc meter, and a crystal standard, such as a 100-Kc harmonic oscillator, are required. Procedure is as follows:

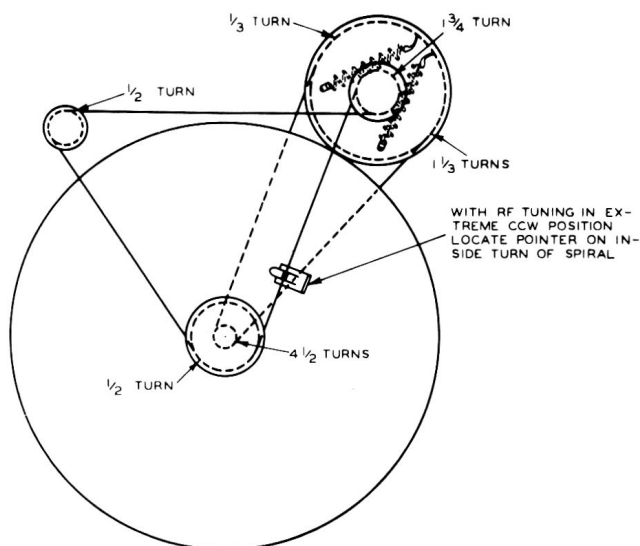


Figure 25. Dial-stringing diagram for WR-89A

1. Turn on the WR-89A, the receiver and crystal standard, and allow 20 minutes for warm-up.

2. Tune the receiver to 4.5 Mc.

3. Set MODULATION switch of WR-89A to "OFF" and RF RANGES to "4.5 MC".

4. Loosely couple the signals from the WR-89A and crystal standard to the antenna terminals of the receiver.

5. With an alignment screw driver, adjust C7 in the WR-89A to obtain a zero-beat note in the receiver. Take care to produce a note as low pitched as possible. Location of C7 is shown in Figure 22.

6. Tune the receiver to 2.5 Mc.

7. Set MODULATION to "2.5 MC CAL" and adjust C39 for zero beat signal in the receiver.

8. Tune the receiver to 7.5 Mc. Tune L9 for a maximum reading on the avc meter.

9. Connect a VoltOhmyst through a crystal probe (WG-264) to pin 5 of V7. Set the meter to read "DC" volts. Optimum performance is obtained when the meter indicates an rf voltage of 18-20 volts.

10. Disconnect the crystal probe to eliminate loading effects and repeat step 8.

Tube Replacement

Except for V1, V2, and V4, tubes may be replaced when necessary with no special precautions or realignment.

When V1 and V2, the variable-frequency oscillators, are replaced, realignment as described under "Alignment of Variable-Frequency Oscillators" may be necessary.

When V4 is replaced, a slight readjustment of C-29 at 150 Kc may be required.