

Receiver Alignment Instructions

Receiver

Crystal Installation

Soldering of the crystals must be accomplished quickly to avoid damage to the crystal itself.

Oscillator Tuning

Connect VOM (0-3VDS range) at TP1, tune T8 for maximum reading.

Front End Tuning

Connect a SINAD indicating meter across the audio output connections using a CCITT weighted filter. Tune the signal generator to the proper and increase its output until the signal (1/5 KHz deviation, 1KHz audio tone) can be heard. Tune T1, T2, T3, T4, T9 and T10 for best SINAD. Adjust the channel trimmer capacitor for best SINAD at the indicated channel frequency, using the minimum possible output from the signal generator. Go back and touch up the tuning of T1 through T4. The final SINAD reading for any selected channel within the 5MHz permissible spread should be 0.25 micro V or less for 12 dB. T7 is factory tuned and does not normally require adjustment.

Receiver Performance Tests

SINAD Sensitivity

Adjust the signal generator output to the lowest level which will provide a good sinusoidal pattern on the oscilloscope. At 12dB SINAD the signal generator output should be less than 0.25 micro V.

Carrier Detect Switch Sensitivity

With the signal generator set for 1KHz modulation, 1.5K deviation and the RF attenuator at minimum output setting, adjust the control to its threshold, ie. To where Q110 collector just goes high. The collector of Q4 should go low as the output of the signal is increased to 0.25 micro V. Set the control to its maximum clockwise position. Increase the RF attenuator setting until Q110 collector goes low. The point of opening should be 10 to 20 dB greater than 0.25 micro V.

Audio Output

With the signal generator set at 1000 micro V output, Audio output should be approximately 25 to 50 MV.

Standby Current

Squelch the receiver (no signal input) and connect a VOM (0-30mA scale) in series with one of the power supply leads. The meter reading should be less than 20mA at a supply voltage of 11 volts.

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Transmitter Alignment Instructions

Transmitter Performance Tests

Power Output

Power output should be in excess of the advertised specification with a power supply input voltage of the required level (11VDC), measured at the power supply. Reducing the supply voltage 15% should produce a power output of approximately 50% of the advertised specifications.

Audio Response

Connect an audio generator set up for 1KHz to the DATA in. Adjust the generator output to 1 KHz deviation on the deviation meter. Retune the audio generator to 500Hz. The deviation should now be approximately 500Hz as observed on the monitor. Retune the audio generator to 2KHz. The deviation should now be approximately 1KHz.

Limited Test

Adjust the audio generator output to 1KHz deviation at 1KHz audio frequency tone output and observe the waveform on an oscilloscope connected to the communications monitor. Set the attenuator on the audio generator to show slight clipping on the oscilloscope. Increase the generator by 20 dB (twice voltage) and sweep the band from 300 Hz to 3KHz. At any frequency within that band the deviation should not be exceeded plus/minus 2.5KHz.

Splatter Filter Test

With the test equipment set up as for the LIMITING TEST, note the reading on the AC VTVM connected across the audio output deviation meter at 3KHz deviation. Tune the audio generator to 6KHz. The AC VTVM reading should decrease more than 18 dB.

Spectrum Test

With the input attenuator of the spectrum analyzer protected by 20 to 40dB of attenuation. All spurious and harmonics should be down more than 60dB.

Antenna Test

Reassemble the radio into its case and install a fully charged battery pack. Connect a properly trimmed (to frequency) flexible antenna. Key to transmit and check the frequency, deviation and spectral purity. All should be the same as tested with the 50 ohm dummy load.

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Transmitter Alignment Instructions

Transmitter

Crystal Installation

Soldering of the crystals must be accomplished quickly to avoid damage to the crystal itself.

Power Supply Voltage

Set the power supply voltage to the proper level, measured at the radio, not at the power supply. If measured at the power supply, voltage drop in the connecting leads will result in erroneous readings.

Multiplier Tuning

Connect an RF wattmeter (0-5W scale) to the antenna jack and a 0-3VDC voltmeter to tp-4 and press the PTT switch. Tune T11, T12 for maximum. Move the meter to TP-5 and Tune T13 & T14.

Amplifier Tuning

Press the PTT switch and observe some reading on the RF wattmeter. Tune TC9, TC10 and TC11 for maximum RF output as indicated on the wattmeter. While observing the spectrum analyzer to ensure that all spurious emissions are down at least 60 dB relative to the carrier level.

Channel Setting

Adjust the trimmer capacitor for transmitter crystal to the exact channel frequency, as measured on a communications monitor or suitable frequency counter.

Deviation Adjustment

Using an external audio generator connected to the radio's DATA in, set the deviation control VR3 to indicated plus/minus 2.5KHz on the communications monitor, observing the waveform for proper positive and negative peak deviation. Note that when the modulation limiter is overdriven, slight "carrier shift" will result. This will not occur at normal speech levels. Also note that when crystals for more than one channel are installed, there will be a slight difference in maximum deviation for a given setting of VR3. This is caused by slight variation in individual crystal parameters and can be minimized by using crystals from the same manufacturer. Always adjust VR3 for 2.5KHz deviation on the channel which shows maximum deviation.

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