

7. Tune Up Procedure Description:

Receiver Alignment Procedure:

- a. Connect the transceiver to the test box console. Insure that the applied DC voltage is 14.0 Volts (+/- 0.2 volts). Do not turn on the transceiver yet.
- b. Attach the output of the RF signal generator to the transceiver antenna input jack. Set the signal generator output to 27.205 MHz, 1.0 KHz AM modulation at 30%. Set the RF generator initial output level to 1.0 millivolt. Do not enable the generator RF output yet.
- c. Connect an audio power meter to the audio output of the transceiver through the test box console.
- d. Turn on the transceiver. Set the transceiver to Channel 20 (27.2050 MHz). Measure the VCO tuning voltage at the junction between R511 and R522. Carefully adjust VCO tank coil L4 until this voltage is 2.250 volts (+0.00, -0.05 volt).
- e. Verify that the receiver VCO frequency is correct and locked by connecting a frequency counter to pin 13 of IC3 PLL. The receiver VCO frequency should be 16.505 MHz.
- f. While observing the VCO frequency on pin 13 of IC3, change the transceiver to Channel 40. Verify that the frequency quickly changes and locks on 16.705 MHz. Measure the VCO voltage again at the junction between R511 and R522. This voltage should be approximately 3.50 volts, +/- 0.1 volt.
- g. While observing the VCO frequency on pin 13 of IC3, change the transceiver to Channel 1. Verify that the frequency quickly changes and locks on 16.265 MHz. Measure the VCO voltage again at the junction between R511 and R522. This voltage should be approximately 1.40 volts, +/- 0.1 volt. The VCO is now properly adjusted.
- h. Set the transceiver to Channel 20 (27.205 MHz). Enable the RF generator (level = 1.0 mV) as set up in Step b above. Adjust the following coils in the order listed for peak audio output on the power meter:

L5: First RF Amp Output Filter
L7: First Mixer Input Filter
L9: First Mixer (10.7 MHz) Tank Circuit
L16: Second Mixer (455 KHz) Tank Circuit
L17: AM Detector (455 KHz) Tank
L1: Antenna Input Matching (tunes very broadly)
L11: LO Output Filter

Reduce the signal generator RF level to 1.0 microvolt. Re-peak all of the coils listed above in the same order for maximum output on the audio power meter.

- i. With the RF signal generator set to 1.0 microvolt and 30% AM modulated with the 1.0 KHz tone and all coils peaked, set the audio power meter needle position to the 0 dB level by adjusting the transceiver output volume or rotating the power meter "relative adjust" control. Remove the 1 KHz modulation signal from the RF signal generator carrier and measure the resulting change in audio

power. Verify that the drop in audio power is 10 dB or greater. This completes the receiver alignment procedure.

Transmitter Frequency Lock and Maximum Output Power Alignment:

- a. Connect the radio to the test/control interface box. Apply nominal +14 VDC (+/- 0.2 volt) through the radio rear panel connector.
- b. Connect the antenna output jack to the 30 dB attenuator/50 ohm load and the attenuator output to the combination power level, frequency and modulation measurement meter.
- c. Turn on the radio and select CB mode with the control box switch. Set the transceiver to Channel 40 (27.405 MHz).
- d. Measure the Transmitter VCO DC voltage from the PLL at the junction between R511 and R522. Verify that this voltage is 3.5 volts +/- 0.2 VDC.
- e. Measure the RX operating frequency at pin 13 of PLL IC 3 with a high input impedance frequency counter. Verify that the VCO is locked and oscillating at 16.705 MHz. Measure the active low lock detect signal on pin 5 of IC 3. This voltage should be more than 4.5 VDC to indicate PLL lock. **Note:** The TX VCO automatically shifts to ½ of the actual carrier output frequency on every channel (e.g. when on Channel 40, it shifts to 13.702.5 MHz) when PTT is pressed. Verify this shift by briefly pressing PTT while monitoring the PLL frequency on pin 13 of IC3.
- f. Set the transceiver to Channel 1 (26.965 MHz). Measure the Transmitter VCO DC voltage from the PLL at the junction between R511 and R522 when PTT is pressed. Verify that this voltage is 1.40 volts +/- 0.2 VDC.
- g. Set the transceiver to Channel 20 (27.205 MHz). Briefly press and release the PTT switch while observing the transmitted carrier frequency. If necessary, quickly adjust PLL crystal trimmer capacitor C45 for a precise frequency of 27.2050 MHz.
- h. Insure that the TX B+ voltage is set to 12.0 VDC (-0.0, +0.2 VDC) when measured at the collector of Q703. Adjust VR901 if necessary to obtain 12.0 volts at the collector of Q703.
- i. Engage the PTT switch. While transmitting, QUICKLY adjust the following coils for maximum observed power (output peaking) in the order listed while observing the transmitted power output:
 - L601: Frequency Doubler Collector Tank
 - L603: Frequency Doubler Output Tank
 - L605: Frequency Doubler Output Buffer Tank
 - L703: RF Pre-Amplifier Output
 - L707: RF Power Amplifier Output
 - L709: Carrier Frequency Second Harmonic Filter
 - L711: Carrier Frequency Second Harmonic Filter
- j. If necessary, rotate the TX B+ control potentiometer VR901 counterclockwise (CCW) to reduce the transmitted carrier power to approximately 3.85 watts.

Disengage the PTT switch. Change the transceiver to Channel 1. Press the PTT switch and observe the transmitted carrier power. Change the transceiver to Channel 40. Press the PTT switch and observe the transmitted carrier power. If the power on either Channel 1 or 40 is above 4.0 watts then reset the transceiver to whichever Channel (1 or 40) had the highest power and press PTT. Adjust VR901 CCW slightly until the maximum transmitted power on any channel is no greater than 3.90 watts. Release the PTT switch.

- k. Inject a 1 kHz, 3.3 volt peak-peak (1.17 volts RMS) signal into the “front” microphone input port on the console test box. Return the transceiver to Channel 20. Press the PTT switch while observing the modulation percentage on the modulation meter. Adjust modulation level potentiometer VR801 for a 90% (–0/+5%) modulation level. Release the PTT switch, transmitter alignment is complete.