Southern California Microwave

Tune-up Procedure

LCD Display 12 Watt Transmitter

Model #JR9-VT20SALCD

Test setup:

Power supply capable of providing a clean 12-volt signal at up to 6 amps of current. The current limit should be set at 5.5 amps.

Spectrum analyzer which can be tuned up to 15 GHz.

RF Power meter.

RF directional coupler.

Frequency counter.

Digital volt-ohm meter.

RMS volt meter.

Signal generator which can generate a clean sine wave from 6 Hz to 10 MHz at levels from 8mV p-p to 4 volts p-p.

Attenuators that can handle up to 12 watts, and will reduce the RF signal to a safe level for the spectrum analyzer and frequency counter.

All of the equipment should be in good operating condition, and must be calibrated.

TUNING:

1. Configure the test equipment to allow the unit to be measured by the frequency counter, power meter, and spectrum analyzer. A drawing of a typical test setup is attached.

2. Using the digital volt-ohm meter, check the unit in various places and confirm that there are no shorts.

3. Apply DC power to the unit, and measure the voltages on E4 & E7 are 10V, +/- .2 volts. If not, adjust R3 and R8 to get the proper voltages.

4. Using the keypad, select the lowest RF frequency or channel. Measure the RF output, and confirm that it is between 10 and 12 watts. If not, tune, one at a time, L 2 through 4 in the power amplifier. If the power is above 12 watts, reduce the voltage on E3 of the power amplifier by adjusting R8 of the voltage regulator. Slowly tune the spectrum analyzer from 10 MHz to 15 GHz, and note any spurious outputs greater than what is allowed. Tune L3 and L4 in the power amplifier to reduce harmonics of the output. Check all inductors in the power amplifier, driver, and VCO to reduce spurious outputs that are not a direct harmonic of the output frequency.

5. Once the power and spurs have been tuned on the first channel, repeat step 4 for the rest of the channels. All channels must be rechecked after any adjustments have been made.

6. Set the unit to low power with the keypad, and check each channel to confirm that its output power is between 1.5 and 3 watts. If the power is too low, tune the power amplifier. If it is too high, adjust R3 in the voltage regulator. Confirm that there are no spurious emissions as in step 4 above. Repeat for all channels.

7. With the unit back in high power, and set on the lowest frequency or channel, apply a 761 kHz at 162mv RMS sine wave from the signal generator to the video input. With the keypad, go to the video level screen and adjust the level until the first carrier null is observed on the spectrum analyzer, and press save. Repeat for all channels.

8. With the unit set on any channel, and with no modulation, observe the frequency counter. The unit should be on frequency within the allowable tolerance. If not, replace Y1 on the PLL board.

9. Set the signal generator to the first subcarrier frequency, and 100mV p-p output. Tune L1 of the video board until the subcarrier frequency matches the test signal on the spectrum analyzer. Repeat for subcarrier number 2, adjusting L3.

10. Set the signal generator to 400 Hz and 2.18 volts p-p. Connect to subcarrier number one audio input. With the keypad, set subcarrier number one to line mode. While observing subcarrier number one on the spectrum analyzer, adjust its deviation with the keypad to be exactly 150 kHz p-p. Repeat for subcarrier number two.

11. Set the signal generator to 400 Hz and 8 millivolts p-p. Connect to subcarrier number one audio input. With the keypad, set subcarrier number one to mic mode. While observing subcarrier number one on the spectrum analyzer, adjust its deviation with the keypad to be exactly 150 kHz p-p. Repeat for subcarrier number two.

12. While observing the carrier and subcarriers on the spectrum analyzer, adjust R10 and R21 on the video board to set the subcarriers to the proper levels in relation to the carrier.

13. Apply epoxy to the unit to stake all screws, wires, and components which are apt to move under vibration.

14. Cover the unit, and perform all spurious, power level, and modulation tests again to confirm proper operation.