70-0671 Alignment Procedure

SETUP

1 Remove the six securing screws from the bottom cover , and the cover itself.

2 Connect a resistive 50 Ω RF load and wattmeter to Antenna Connector J502.

3 Connect 13.4V DC power to transceiver J505.

4 Connect a 3.2 Ω, 20W resistor to pins 4 and 6 of the Accessory Plug. The jumper between pins 5 and 6 must be temporarily removed to make this connection. The resistor serves as a constant load to replace the speaker's inconsistencies.

CAUTION:Both speaker terminals are LIVE. Never ground either one. Connect grounded receive-audio measuring-equipment to only one side of the speaker, and chassis ground. Normally, voltage measurement will be half of true values.

5 Turn the radio on (Push on and Push off switch), set the VOLUME control to a mid-position.

Connect the Programmer to Programming Port Mic Jack J302.
Upload the radio programming Data-Packet into the Programmer and initiate its Remote Control Mode. Refer to the appropriate manual for details.

SYNTHESIZER ALIGNMENT

●VCO Resonance

1 Select the Remote Control Mode of the Programmer and enter the following test frequencies:

	A-Band	B-Band	C-Band	
RX Frequency	30.00	36.00	42.00	MHz
TX Frequency	30.00	36.00	42.00	MHz

2 Adjust Channel RX Tank L713 for 1.5V DC at VC (VCO Steering) .

3 Active transmit mode (using the programmer) and adjust TX Tank L702 for 1.5V DC at VC (VCO Steering) .

●Reference Oscillator

4 Initiate transmit on any channel. Measure transmitted RF carrier frequency without modulation and, if necessary, adjust REFERENCE OSCILLATOR X701 for carrier frequency to within ±30Hz of channel frequency.

PA MODULE ALIGNMENT

The 70-0671 should be adjusted to have a 6 MHz channel spread (8 MHz C-Band) at 110W. To do so :

1 Change the TX test frequency to the desired frequency.

2 Activate transmit mode and measure RF power at Antenna connector J502. Set RF output power to 110W at J502 using the programmer.

MODULATOR ALIGNMENT

●Modulation Limiting

1 Disconnect the hand microphone from its front panel Mic Jack J302. Apply 3Vrms of 1000Hz signal to pin 1 of Mic Jack J302, then initiate transmit.

2 Measure total carrier deviation and, if needed adjust modulation limiting to obtain ±5KHz (wide) or ±2.5KHz (narrow) using the programmer.

●Microphone Gain

3 No alignment for Microphone gain is required.

●CTCSS/DCS

4 Remove the 1KHz audio signal from Mic Jack J302.

5 Add 250.3Hz CTCSS tone to the transmit test by testing frequency using the programmer.

6 Adjust CTCSS deviation to ±750 Hz ± 10 Hz (wide) or ± 375 Hz ± 10 Hz (narrow) deviation using the programmer.

7 Change 67.0 Hz CTCSS tone to the transmit test b y testing frequency using in the programmer.

8 Adjust RV401 for ±750 Hz ±100 Hz (wide) or ± 375 Hz ±100 Hz (narrow) deviation.

9 Change the transmit DCS code +023 to the transmit test by testing frequency using the programmer.

10 Adjust RV401 so that modulation waveform from modulation analyzer matches the correct waveform shown in Figure 2-1.

11 Change 250.3 Hz CTCSS tone to the transmit test by testing frequency using the programmer. Carefully adjust RV401 for ±750 Hz ±10 Hz (wide) or ± 375 Hz ± 10 Hz (narrow) deviation.

CORRECT INCORRECT INCORRECT

Figure 2-1 Modulation Waveforms

- DTMF

12 Clear the CTCSS tone, then initiate transmit test by testing frequency using the programmer.

13 Adjust DTMF deviation to ± 2.0KHz ± 10 Hz (wide) or ± 1KHz ± 10 Hz (narrow) deviation using the programmer.

RECEIVER ALIGNMENT

1 Change the RX test frequency to 33.0 MHz for A-Band radios, 39.0 MHz for B-Band , 46.0 MHz for C-Band.

●First Injection

2 No adjustment for first injection is required.

●Preselector Alignment

3 No adjustment for the preselector (L201, L202, L203, L204, L205, L206, L207,and L208) is required.

●Quadrature Detector

4 No adjustment for the quadrature is required.

●First IF

5 Apply enough modulated (by 1KHz tone at ± 3KHz (wide) or ± 1.5KHz (narrow) deviation) on-channel RF signal to maintain 12 to 15 dB SINAD. Adjust L215, and L217, L803 and L804 for maximum SINAD, reducing the RF signal generator output as necessary to stay between 12 and 15 dB SINAD.

NOTE: Do not adjust L801 or L802 unless appropriate test equipment is available for performing the "Noise Blanker Tuning'' steps below. Normally, these coils are tuned for optimum sensitivity as are L803 and L804, then are retuned slightly for optimum noise blanker effectiveness. If the required test equipment is not available, skip steps 6 through 14. If coils L801 or L802 were replaced, they may be tuned for best sensitivity after adjustment of L215, L217, L803 and L804. Noise blanker performance specifications, however, may not be met.

●Noise Blanker Tuning

This procedures requires the additional test equipment shown in Table 2-2.

6 Adjust the pulse generator to obtain a 10 nsec wide pulse, as shown in Figure 2-2. Set the pulse period controls to obtain 200 u secbetween pulses(the pulse period is easier to observe on an oscilloscope if the pulse width is temporarily increased by about 10 times.)

7 Temporarily disable the pulse generator.

8 Using coax cable of minimum convenient length, connect the pulse generator, the RF signal generator, and the radio to the two-way power divider.

9 Disable the noise blanker by placing SW801 to the OFF position.

10 Apply an on-channel signal to obtain12dB SINAD, then increase the RF generator output by 40dB.

11 Enable the pulse generator to produce the 10nsec pulses. Adjust pulse amplitude to return SINAD reading to 12 dB.

12 Switch SW801 to the ON position. The SINAD reading should improve.

13 Reduce the RF generator output until a 12 dB SINAD reading is obtained.

14 Using a non-metallic tool, slowly tune L801(clockwise or counter-clockwise, as required) for best SINAD. The amount of L801 adjustment required should be slight. Tune L802 in the same manner. Repeat this step. Noise blanker tuning is complete.

Table 2-2----Noise Blanker Test Equipment

TEST INSTRUMENT	CAPABILITIES
Pulse Generator	Pulse Rate: 5000 pulses per second Pulse Width: Adjustable to 10 ns at 1/2 amplitude. Output: Continuously variable from 0.1 to 10V peak into 50 Ω
Power Divider,3 port:	50 Ω each port, 6 dB attenuation, DC to 50 MHz as defined in EIA Standard RS-204C or RS-204D Appendix A.

● Tight Squelch

15 Squelch level set maximum (80). by using the front UP / DN switch

16 Apply 0.95 uV of modulated standard deviation on-channel RF signal to the 50 Ω antenna connector.

Adjust Squelch range RV201 counter-clockwise just until squelch opens (audio on).

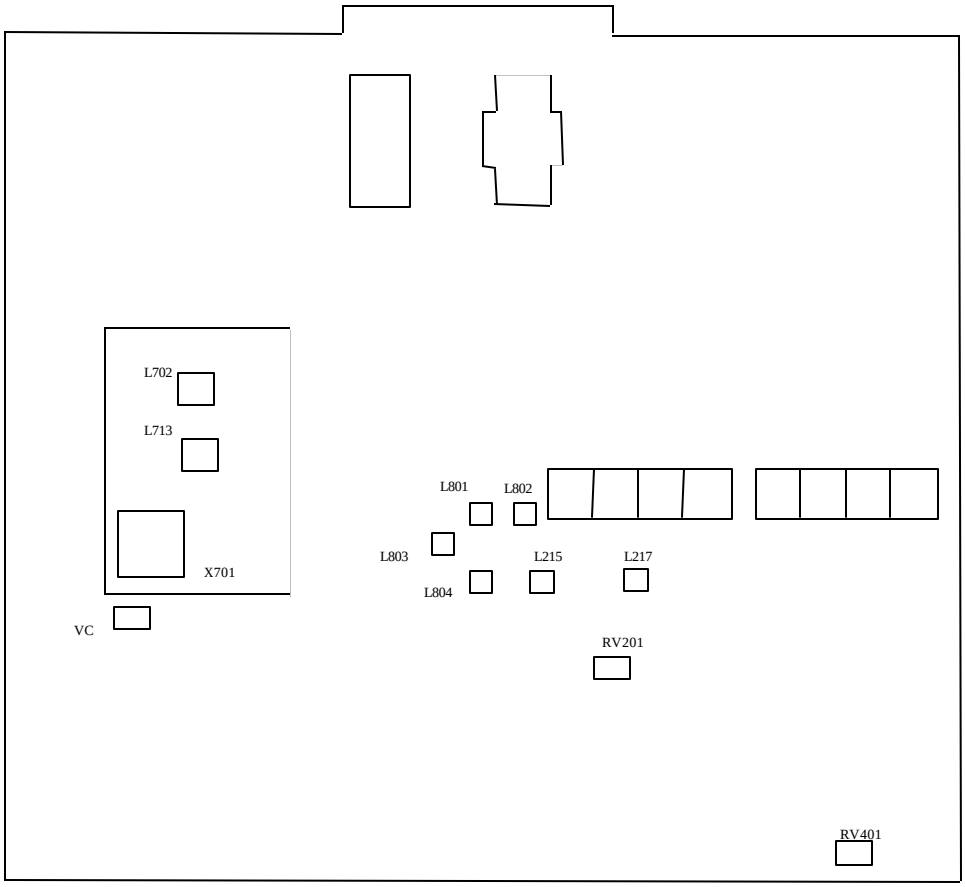

Figure 2-2 Adjustment Map TR-055 Board

COMPLETE REALIGNMENT

Complete realignment is only needed when a component that affects alignment has been replaced. RADIO REPROGRAMMING WITH TEST FREQUENCIES IS REQUIRED.

Table 2-1 TEST EQUIPMENT REQUIRED

TEST INSTRUMENT	INSTRUMENT CAPABILITIES	USE
Regulated DC Power supply	13.4 V DC, 30 A, adjustable voltage	Radio power source
RF Wattmeter	150 W, 30 - 50MHz, 50 Ω circuit	Transmitter power measurements
RF Load Resistor	50 Ω, 200 W	Antenna dummy load
Frequency Modulation Meter	30 - 50 MHz, peak - responding, +/- 5KHz range	Modulation level measurements
Frequency Meter or Frequency Counter	30 - 50 MHz, 1.0 ppm accuracy	Carrier frequency measurements
Audio Generator	1,000KHz sine-wave 0-4 Vrms output	Modulation level measurements
RF Signal Generator	30 - 50 MHz range, 0.1 - 1 KuV output, 3KHz FM mod. With 1 KHz tone	All receiver measurements
Distortion Analyzer	1 KHz notch, 1% measuring range	Receiver performance test and IF alignment
Load Resistor (audio)	3.2 Ω, 20 W	Speaker load for all receiver measurements
AC Voltmeter	10mV to 10 Vrms	Audio level adjustments
Oscilloscope	DC to 500KHz bandwidth	
Digital Multimeter	0.1 to 20 V DC	Test point measurements and power supply setup
Programmer	PC Programming Software	Manual radio control