RECEIVER ADJUSTMENTS

RF PREAMPLIFIER ALIGNMENT

STEP	ADJUST	SELECTOR SWITCH POSITION	OSC. & METER REV. SWITCH	PROCEDURE
1				If radio is equipped with optional preamplifier, disconnect and bypass the preamplifier. Align the receiver then reconnect the preamplifier.
2	L3, L2, L1	5	METER REV.	Adjust L3, L2, and L1 in that order for maximum test set meter indication. Repeat.
3				Tune L2 for maximum quieting.

EPS-7249-O

RECEIVER ALIGNMENT PROCEDURE

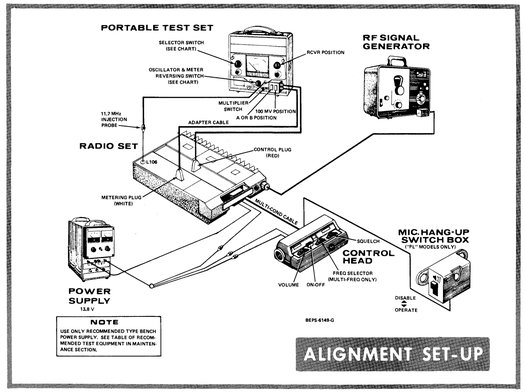
STEP	ADJUST	SELECTOR SWITCH POSITION	OSC. & METER REV. SWITCH	STAGE AND PROCEDURE
1	L108, L109	3	METER REV.	CHANNEL ELEMENT OUTPUT (3RD HARMONIC) - Adjust L108 and L109 for maximum test set meter indication. On multi-frequency radios make this adjustment with frequency selector switch in F1 position.
2	L107	11 4	A or B (Test Set must be equipped with 11.7 MHz crystal in corresponding socket).	DISCRIMINATOR - Unsquelch the radio set by turning the squelch control on the control head fully counterclockwise. "Private-Line" radios must also be PL disabled by removing the microphone from the hang-up box or placing the PL monitor switch on the box in the off position. Note test set meter indication in position 11 (multiplier switch in 2 V AC position). Insert 11.7 MHz injection probe of test set into L106 opening of receiver shield being careful not to contact circuit board. Insert probe into hole far enough to obtain reading 1/10 of that noted at beginning of this step (signal is "sprayed" into radio). Adjust L107 for 0 center reading on top scale with selector switch of test set in position 4. Adjustment is critical and should be exactly on 0. Remove probe.
3	L110, L111	5	METER REV.	MULTIPLIER - Connect signal generator to antenna input and apply a carrier frequency signal. Adjust L110 and L111 for maximum meter indication. If two peaks are observed, use peak with slugs farthest from circuit board. If a meter 5 indication cannot be obtained, connect center conductor of signal generator cable directly to the mixer gate.
4	L101, L102, L103, L104, L105, L106	5	METER REV.	RF PRESELECTOR AND MIXER - Turn out L101 thru L105 slugs until tip of each tuning screw extends approx. 1/4 inch beyond spring (parts list code 8). Connect signal generator to antenna input and apply carrier frequency signal. Tune L101 thru L105 for peak on meter position 5. Turn L103, L104, and L105 slugs in one turn. Peak L106 thru L101, in that order, on meter position 5. Decrease signal generator output as necessary to maintain indication between 10 and 25 uA.
5	L108, L110, L111	5	METER REV.	Adjust signal generator output for 25 uA meter indication. Detune L108 until meter indication decreases to 15 uA. Repeak L110 and L111 for maximum meter indication. Repeat entire step.
6	L108, L109	3	METER REV.	Repeak L108 and L109 for maximum meter indication.
7	L101, L102, L103, L104, L105	5 11	METER REV. OFF	Repeak L101 through L105 for maximum meter indication. Repeat. Peak L103 thru L105 for minimum indication on meter 11 (maximum quieting).
8	F1, F2, F3, F4	5 4	METER REV.	ON-FREQUENCY ADJUSTMENT - Disconnect signal generator and transmit carrier signal from transmitter normally received. If transmitter is known to be on frequency test set meter position 5 should indicate rise when transmitter is keyed (if necessary connect antenna). Check test set position 4 reading with transmitter keyed. 0 indicates on-frequency condition. Adjust F1, F2, F3 and F4 receiver warp capacitors for exact 0 reading in corresponding frequency selector switch positions. DO NOT READJUST L108 OR L109 AFTER THESE ADJUSTMENTS ARE MADE. If radio is equipped with AFC, short the AFC DISABLE contact while adjusting F1, F2, F3 and F4.
9	-	-	-	Perform 20 dB quieting sensitivity measurement as check of alignment.

EPS-7250-O

NOTES:

1. Approved bench power supplies:
   Motorola S1303A or S1305A Regulated Power Supply
   Motorola T1261A Transistorized 24-Volt to 12-Volt Converter driven by Motorola T1012A Power Supply
   12-Volt Automotive battery with Motorola T1012A Power Supply used as a battery charger

EPS-7251-O



ALIGNMENT SET-UP

20 DB QUIETING SENSITIVITY CHECK

1. Unsquelch the radio set by turning the SQUELCH Control on the control head fully counterclockwise. "Private-Line" radios must also be PL disabled by removing the microphone from the hang-up box or placing the PL monitor switch in the off position.
2. Connect the red "control" plug of the adapter cable to the control receptacle on the radio set.
3. Set the multiplier switch on the test set in the 2 V AC position.
4. Adjust the VOLUME control on the control head until 2 volts is obtained on meter position 11. To silence the speaker during the test, set the speaker switch of the tset set in the LOAD position and disconnect the speaker.
5. Connect the signal generator to the radio set antenna receptacle and adjust it to the receiver frequency. Set the rf output to minimum.
6. Increase the signal generator output until the meter reading drops to .2 volt in meter position 11 (place the multiplier switch in the .2 V AC position). The generator output level now indicates the 20 dB quieting sensitivity and should be 0.5 microvolt, or less (0.25 microvolt with preamplifier).

EPS-7253-O

FREQUENCY CALCULATIONS

Where:

f_o = channel element frequency

f_c = carrier frequency

132-150.8 MHz

$$f_o = \frac{f_c + 11.7\ \text{MHz}}{9}$$

150.8-174 MHz

$$f_o = \frac{f_c - 11.7\ \text{MHz}}{9}$$

EPS-7252-O

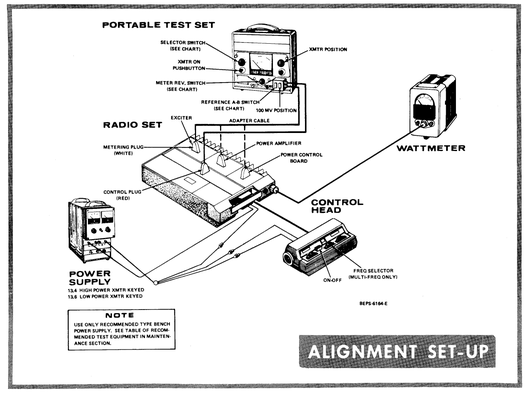
EXCERPTS FROM FCC REGULATIONS

FCC Regulations state that:

1. Radio transmitters may be tuned or adjusted only by persons holding a first or second class commercial radiotelephone operator's license or by personnel working directly under their immediate supervision.
2. The power input to the final radio frequency stage shall not exceed the maximum figure specified on the current station authorization. This power input shall be measured and the results recorded:
   a. When the transmitter is initially installed.
   b. When any change is made in the transmitter which may increase the power input.
   c. At intervals not to exceed one year.
3. Frequency and deviation of a transmitter must be checked:
   a. When it is initially installed.
   b. When any change is made in the transmitter which may affect the carrier frequency or modulation characteristics.
   c. At intervals not to exceed one year.

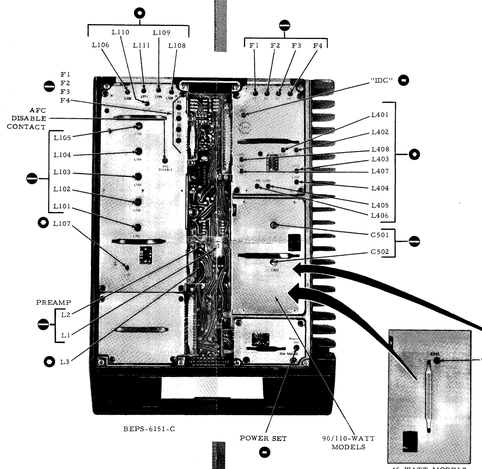
EPS-7254-O

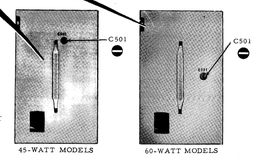
TRANSMITTER ADJUSTMENTS



ALIGNMENT SET-UP

ADJUSTMENT LOCATIONS





OSCILLATOR FREQUENCY ADJUSTMENT

1. Set up the test equipment as shown for frequency measurement. Disconnect the audio oscillator from the portable test set.
2. Key the transmitter with no modulation, Key the transmitter with the XMTR ON pushbutton on the portable test set rather than with the microphone. On "Private-Line" radios, unplug the "Vibrasender" resonant reed from the PL tone generator.
3. Adjust the channel element warp capacitor for the selected channel to the exact desired frequency. On single-frequency models, adjust the F1 channel element warp capacitor. On multi-frequency models, adjust the warp capacitor which corresponds to the frequency selector switch setting on the control head; repeat for each frequency.

EPS-7255-O

"IDC" ADJUSTMENT PROCEDURE

1. Set up the test equipment as shown for deviation measurement. Connect the audio oscillator to the portable test set.
2. Set the audio oscillator to 1000 Hz and 1 volt. On "Private-Line" models, replace the "Vibrasender" resonant reed.
3. Key the transmitter and adjust the IDC control for ±5 kHz deviation.
4. Reduce the tone oscillator output to .25 volt. Essentially full deviation should still be indicated.

EPS-7256-O

FREQUENCY CALCULATIONS

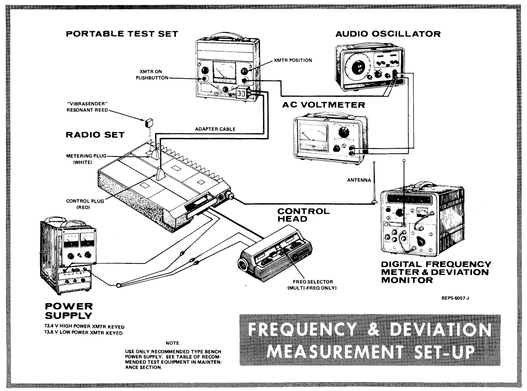
Where:

f_o = channel element frequency

f_c = carrier frequency

$$f_o = \frac{f_c}{12} \qquad f_c = 12\ f_o$$

EPS-7257-O



FREQUENCY & DEVIATION MEASUREMENT SET-UP

EXCITER ALIGNMENT PROCEDURE

(SEE "EXCERPTS FROM FCC REGULATIONS" ON THIS SHEET)

STEP	ADJUST	METERING PLUG LOCATION	TEST SET SELECTOR SWITCH POSITION	OSC. & METER REV. AND ADAPTER CABLE REF. SWITCHES	STAGE AND PROCEDURE
1					SET UP - Connect the test equipment and set switches as shown. Key the transmitter with the XMTR ON pushbutton on the portable test set.
2	POWER SET				OUTPUT - Turn the POWER SET control fully counterclockwise.
3	FREQUENCY SWITCH	EXCITER	2	OFF REF A	CHANNEL ELEMENT - Select the desired frequency on multi-frequency radio sets. Key the transmitter. The test set meter 2 should indicate at least 10 uA.
4	ALL EXCITER COILS	EXCITER	3	OFF REF A	PRE-ALIGNMENT - If the exciter is completely untuned and shows no meter 3 reading, set cores of all tuning coils to the top of their coil forms (away from circuit board) and proceed with step 5. If the exciter shows meter 3 readings, set cores of all tuning coils except L401 and L402 to the top of their coil forms (away from the circuit board). Tune L401 and L402 in that order for maximum meter indication. Go to step 7 of the procedure.
5	L401	EXCITER	2	OFF REF A	MODULATOR OUTPUT - Tune L401 for minimum meter reading.
6	L401, L402	EXCITER	3	OFF REF A	MODULATOR OUTPUT - Tune L402 then L401 for peak meter reading.
7	L403	EXCITER	3	OFF REF A	TRIPLER OUTPUT - Tune L403 for minimum meter reading.
8	L403, L404	EXCITER	4	OFF REF A	TRIPLER OUTPUT - Tune L404 and then L403 for peak meter reading.
9	L405	EXCITER	4	OFF REF A	FIRST DOUBLER OUTPUT - Tune L405 for minimum meter reading.
10	L405, L406	EXCITER	5	OFF REF A	FIRST DOUBLER OUTPUT - Tune L406 and then L405 for peak meter reading.
11	L407	EXCITER	5	OFF REF A	EXCITER OUTPUT - Tune L407 for minimum meter reading.
12	L407, L408	PA	1	METER REV. REF A	EXCITER OUTPUT - Move the metering plug to the PA. Tune L408 and then L407 for peak meter reading.
13					Repeat steps 6, 8, and 10.
14					Align the power amplifier.

EPS-7258-A

POWER AMPLIFIER ALIGNMENT PROCEDURE

(45/60/90/110 WATTS)

NOTE: Portable Test Set Meter sensitivity switch should be on 100 mV for all readings.

STEP	ADJUST	METERING PLUG LOCATION	TEST SET SWITCH POSITION	REF. & METER REV. SWITCH POSITION	PROCEDURE
1					Turn the POWER SET control fully counterclockwise (minimum power output). If the power amplifier is to be realigned less than ±1 MHz, proceed with step 2. Otherwise, prealign the board by setting C501 fully clockwise and C502 fully meshed.
2	POWER SET	POWER CONTROL BOARD	Wattmeter or 1	METER REV, REF. A	Key transmitter and slowly turn POWER SET control clockwise until rated power is attained or until no further increase in power output is observed.
3	POWER SET C501 C502*	POWER CONTROL BOARD	5	METER REV, REF. B	Adjust C501, then C502, for a dip on meter 5. If a dip cannot be found, reduce POWER SET until meter 5 is less than 20 uA.
4		POWER CONTROL BOARD	Wattmeter or 1	METER REV, REF. A	Repeat steps 2 and 3 until rated power is reached. Proceed to step 7 when rated power is attained and meter 5 is less than 30 uA. If rated power cannot be reached and meter 5 is less than 30 uA proceed with step 5. If at this point meter 5 is greater than 30 uA and rated power has not been attained, refer to the power control troubleshooting chart.
5	R610	POWER CONTROL BOARD	Wattmeter or 1	METER REV, REF. A	Remove the power control board shield. Use tuning tool #66A82846D01, or equivalent, to adjust R610. Access to this control is provided by a small slot located approximately 3/4-inch from the POWER SET hole, toward the rear of the radio. Use the tuning tool to rotate the outer edge of the serrated knob toward the heat sink until either rated power is attained or no further increase in power output is observed. Replace power control shield.
6					Repeat steps 3 and 4.
7		PA	5	METER REV, REF. B	FINAL COLLECTOR CURRENT - Move the metering plug to the PA. Measure the final collector current (Ic). Ic, in amperes, is the meter 5 reading (10 A full scale) for 45- and 60-watt models; meter 5 reading (25 A full scale) for 90/110-watt models.
8		PA	6	METER REV, REF. B	FINAL COLLECTOR VOLTAGE - Measure the final collector voltage (Vc). Vc is the meter 6 reading (0-30 V scale).
9					Determine the final input power (Pin). Pin equals Vc x Ic. Pin should be less than: 90 W for 45 W models 120 W for 60 W models 180 W for 90 W models 200 W for 110 W models If Pin exceeds these levels, refer to Power Amplifier Troubleshooting Chart.

*C502 is used only on 90/110 watt models.

EPS-6543-B

SERVICE SHEET

MOTOROLA

132-174 MHZ "MICOR"®

FM Two-Way RADIO SETS

T43RTN-1100A	T53RTN-1100A	T63RTN-1100A	T73RTN-1100A
T43RTN-1190A	T53RTN-1190A	T63RTN-1190A	T73RTN-1190A
T43RTN-3100A	T53RTN-3100A	T63RTN-3100A	T73RTN-3100A
T43RTN-3190A	T53RTN-3190A	T63RTN-3190A	T73RTN-3190A

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