MOTOROLA

68P81010C06-B

PAC•RT

PORTABLE AREA COMMUNICATIONS • REPEATER

Portable / Mobile Vehicular Repeater System

MODEL
H13TTY3110A
150.8 - 174MHz
250mW RF POWER OUTPUT

SUPPLEMENT TO
INSTRUCTION MANUAL 68P81010C05

SPECIFICATIONS

GENERAL

Dimensions:	2½"H x 10½"W x 12½"D (64 x 263 x 318 mm)
Weight:	10 lbs. (4536g) less cables and charger
Attack Time: (Priority Unit)	300 msec. maximum
Temperature Range:	-30° C to +60° C, +25° C reference
Power Input:	13.8 V dc, ± 15%
Single-tone Encoder/ Decoder:	Plug-in element: 800-1400 Hz
Time-Out Timer:	Two minutes ±0.5 minute
Channel Capability:	C1R1

RECEIVER

Frequency Range:	150.8-174 MHz
Frequency Stability:	±0.0015%
Channel Spacing:	30 kHz
Current Drain:	225 mA
Sensitivity	
20 dB Quieting:	0.75 uV
12 dB Sinad:	0.50 uV
Squelch Sensitivity:	1.0 uV (adjustable)
Modulation Acceptance:	7 kHz
Intermodulation:	-70 dB
Spurious and Image Response:	-70/60 dB
Selectivity:	-80 dB
PL Decoder:	Plug-in reed: 67-192.8 Hz
Audio Distortion:	5%
Audio Level:	1.0 V rms (nominal) into 100 ohms
Audio Response:	+2, -8 dB referenced to 6 dB/octave pre-emphasis

TRANSMITTER

Frequency Range:	150.8-174 MHz
RF Power Output:	250 mW minimum
Modulation:	16F3
Frequency Stability:	±0.002% standard ±0.0005% optional
Current Drain:	375 mA
Audio Distortion:	5%
Audio Response:	+1, -3 dB referenced to 6 dB/octave pre-emphasis
Conducted Spurious:	-40 dB
Deviation:	Continuously adjustable to ±5 kHz

MONITOR RECEIVER (Optional)

Frequency Range:	30-50 MHz	450-512 MHz
Number of Channels:	1 to 4	1 to 4
Modulation Acceptance:	7 kHz	6.5 kHz
Frequency Stability:	+0.005%	±0.001% from -30° to +60° C (25° C reference) ±0.0005% from -10° to 60° C
Selectivity:	-40 dB	-60 dB
Spurious Response:	-40 dB	-60 dB (-50 dB for Image)
Squelch Sensitivity:	1 uV	1 uV
Sensitivity: (20 dB Quieting)	1 uV	1 uV

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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INSTALLATION

1. CABLE ROUTING

Determine convenient locations for the PAC•RT vehicular repeater, the vehicular charger or holder, and the antenna. The vehicular repeater may be located in an out-of-the-way place close to the mobile unit (within six feet). The vehicular charger or holder mounts to the dash on a trunnion bracket and the antenna is a trunk lip mount type.

With the vehicular repeater, charger or holder, and antenna in place (not mounted) in their approximate positions, the cable should be routed between them. Allow enough slack cable to permit the plug to be easily connected or disconnected from the vehicular repeater, charger or holder, and antenna.

2. "PAC•RT" VEHICULAR REPEATER INSTALLATION

Choose a location for the vehicular repeater where the mounting screws are not directly above the gas tank, gas line, brake line, electrical cable, or other vital parts if possible. If the unit must be mounted over a gas tank, gas line, brake line, or electrical cable, care must be taken that the mounting screws will not pierce nor interfere with these parts. NEVER MOUNT ABOVE A MUFFLER, CATALYTIC HEATER, OR OTHER HEAT PRODUCING DEVICE.

Always make a preliminary check to see how far the screws will extend below the vehicle floor. If it appears that they may interfere with parts mounted under the floor, thick spacers may be used.

1 • SET UNIT UPRIGHT ON FIRM SUPPORTING SURFACE.

• INSERT KEY AND TURN CLOCKWISE. HANDLE WILL SPRING OPEN.

• SWING HANDLE OUT TO FULL OPEN POSITION.

2 • HOLDING CASE AND BOTTOM PLATE TOGETHER WITH LIGHT PRESSURE AND SIMULTANEOUSLY PRESSING DOWN ON MOUNTING HOLE BLISTER, PULL UNIT UP BY HANDLE. PLATE IS FREE TO FALL AWAY.

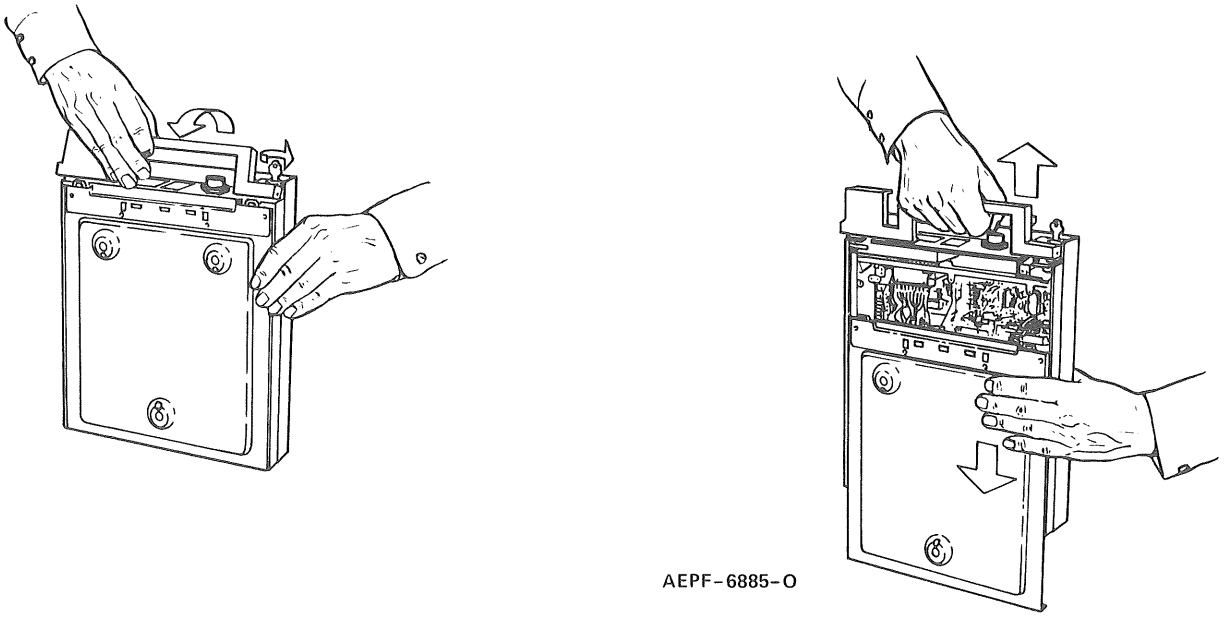

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Figure 1. Bottom Plate Removal

In some vehicles, the bottom of the handle will be pressed against the floor or floor cushioning when the unit is securely mounted to the floor. This will prevent opening the handle far enough to release the unit from its mounting. If this is the case, use thick spacers for mounting.

The unit should be mounted to a level surface to prevent the bottom plate from buckling. For uneven trunk or under-seat areas, a sheet of plywood may be used to mount the bottom plate. The raised shelf in some trunk compartments is a good mounting location. Leave at least three inches of clear space in front of the unit so that the handle can be opened and the main assembly can be removed from the bottom plate.

When the final position has been determined, remove the bottom plate from the unit as shown in Figure 1. Be sure to lift the unit straight up at least one inch before separating the plate to avoid bending the guide pins.

Place the plate in the desired position, and use it as a template to mark the location for drilling the three mounting holes. Drill the holes using a 3/16" drill. Mount the bottom plate, with or without thick spacers as desired; see Figure 2.

Once the bottom plate is mounted, replace the unit assembly onto the bottom plate following the procedure in Figure 3. For removing the unit, reverse the procedure.

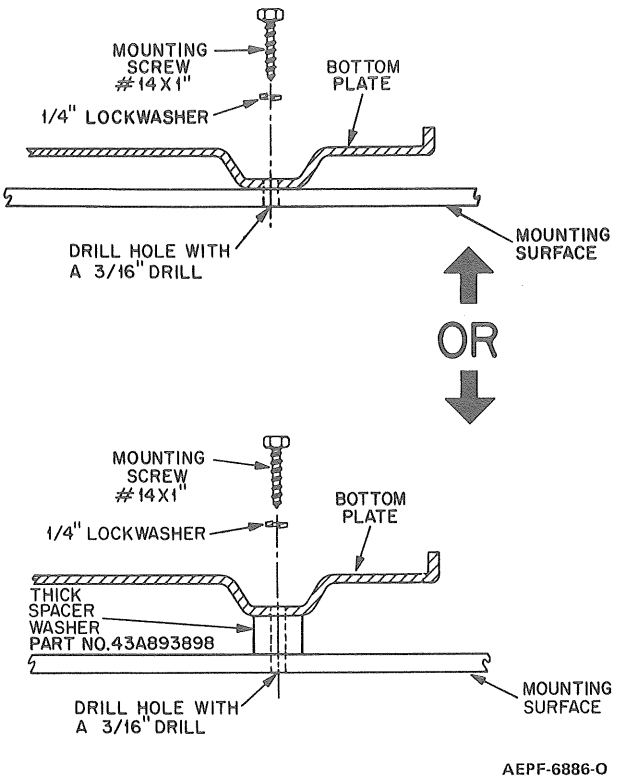
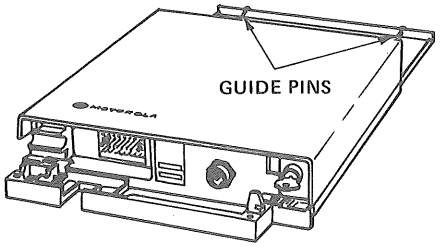


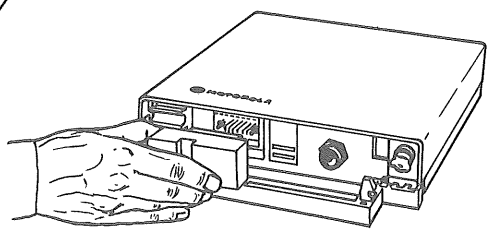
Figure 2. Bottom Plate Installation Detail



1 • SET OR SLIDE UNIT ONTO BOTTOM PLATE. WHEN PROPERLY SEATED, IT WILL SLIDE FREELY.

2 • PUSH UNIT BACK AS FAR AS IT WILL GO. EXTRA PRESSURE WILL BE REQUIRED AS UNIT ENGAGES GUIDE PINS.

3 • PUSH CABLE PLUG FIRMLY INTO PLACE.



4 • TURN KEY COUNTER-CLOCKWISE TO VERTICAL POSITION.

• CLOSE HANDLE. LISTEN FOR LOCKING "CLICK."

• TRY HANDLE TO BE SURE IT IS LOCKED AND UNIT IS LATCHED INTO PLACE.

• REMOVE KEY.

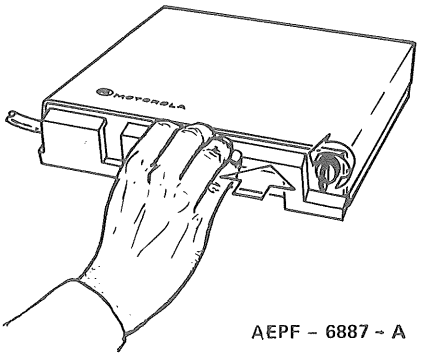


Figure 3. Unit Reassembly

3. ANTENNA INSTALLATION, TRUNK LIP TYPE

Refer to Figure 4 and install the trunk lip mount antenna as follows:

a. Locate and insert two 10-32 UNF-3 x 3/8" set screws into the bracket of the antenna base.

b. Attach the antenna base to the rear lip of the trunk lid and tighten the set screws.

NOTE

Mount the repeater antenna as far from the mobile antenna as possible, never less than three feet.

c. Uncoil the supplied antenna cable and attach the pin plug connector to the antenna connector.

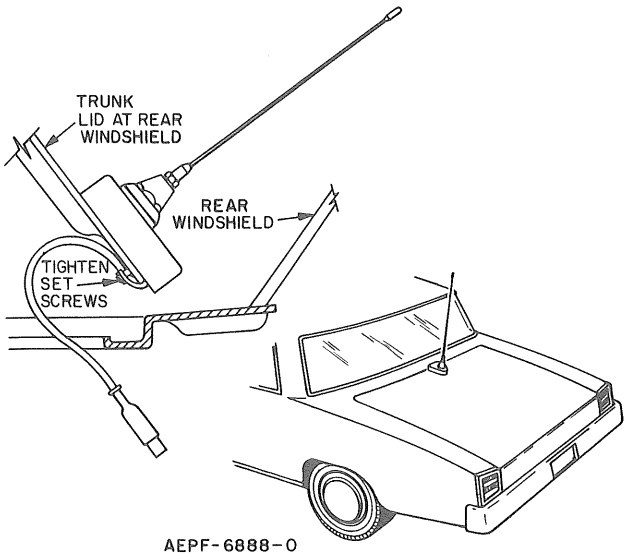


Figure 4. Antenna Installation

d. Connect the antenna cable uhf connector to the "PAC●RT" vehicular repeater.

e. Cut the antenna to length in accordance with the antenna cutting chart in Figure 5. for the specific frequency of operation.

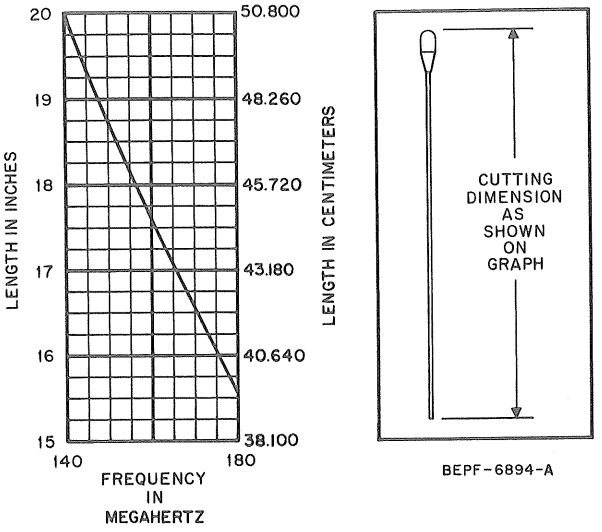


Figure 5. Antenna Cutting Chart

f. Loosen the antenna clutch nut (topmost nut) on the antenna base. Do not remove the nut (a small sleeve inside could be lost).

g. Insert the cut-to-length antenna rod through the clutch nut and clutch sleeve until it is firmly seated in position in the antenna base. Tighten the clutch nut.

4. CONTROL UNIT INSTALLATION

The PAC●RT vehicular repeater control unit may be a control unit/vehicular charger, a control unit/holder, or a control unit only. Mounting hardware is supplied with each unit for mounting the control unit below the dashboard. Refer to Figure 6 for the control unit/vehicular charger or the control unit/holder mounting details. Refer to Figure 7 for the control unit mounting details.

a. Using the control unit mounting bracket as a template, drill the appropriate size holes in a convenient place on the under side of the dash.

b. Mount the control unit mounting bracket to the dash using the mounting hardware designated in Figure 6 or 7 as applicable.

c. Mount the charger or holder to its bracket using the four 1/4-20 bolts, lockwashers, and flat washers provided. The flat washer MUST be placed between the lockwasher and the bracket to ensure proper locking action of the lockwasher. Do not tighten the four bolts.

d. Rotate the charger or holder to a position that provides about a 45-degree mounting angle. This angle provides operational convenience for the operator and physical security for the portable radio under rough traveling conditions. Tighten the four mounting bolts holding the charger to the bracket.

e. Attach the cable from the repeater to the rear of the control unit.

5. FINAL CABLE INSTALLATION

Refer to Figure 8 or 9 for the interfacing of the cable assembly between the existing mobile radio and control head and the PAC•RT vehicular repeater and charger. Note the different cable lengths of the cable assembly being added; they will be used as a means of identification. Perform the following procedure:

a. Disconnect the plug from the existing mobile radio and connect it to the male plug as shown in Figure 8 or Figure 9 for the specific mobile radio used. In Figure 8, the plug is on a two-foot piece of cable; in Figure 9, it is a feed-through connector.

b. On the same cable or feed-through connector, connect the female plug to the existing mobile radio.

c. Locate the female plug on the end of the six-foot section of cable, and connect it to the vehicular repeater.

d. The charger or holder and antenna cables should already be connected (see paragraphs 3. d. and 4. 3.).

e. To minimize pinching or crushing of the cables by boxes or equipment being set upon them, dress the cables in an out-of-the-way place.

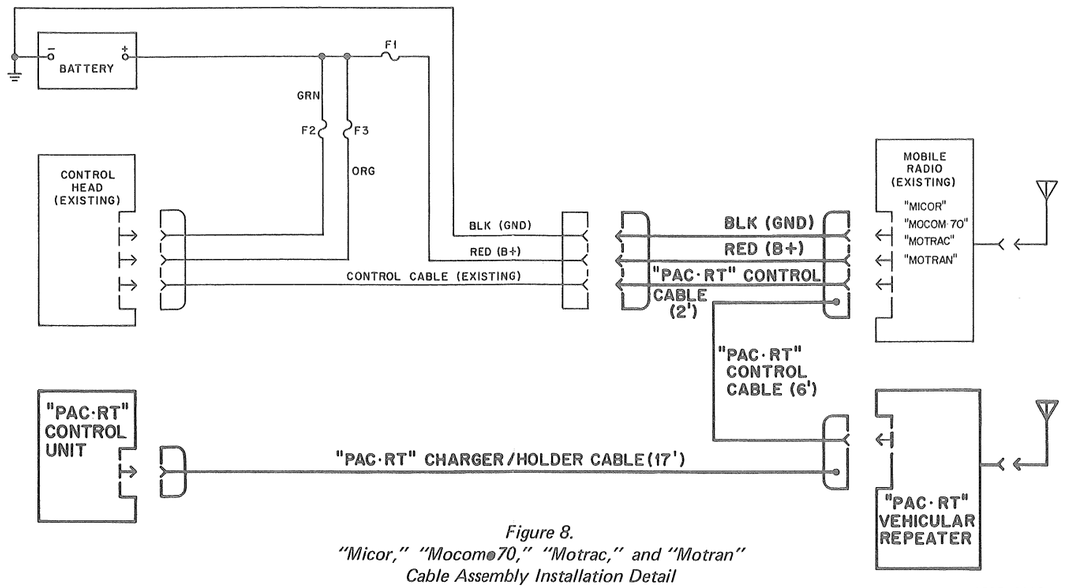


Figure 8.
"Micor," "Mocom•70," "Motrac," and "Motran"
Cable Assembly Installation Detail

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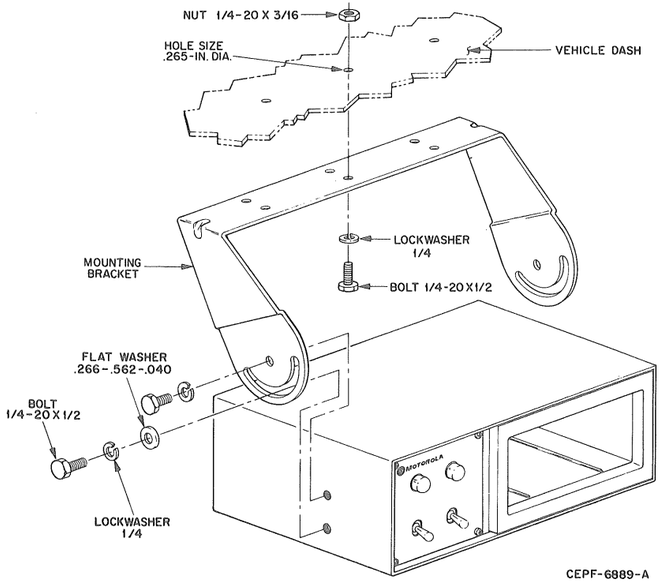

Figure 6. Vehicular Charger or Holder Installation Detail

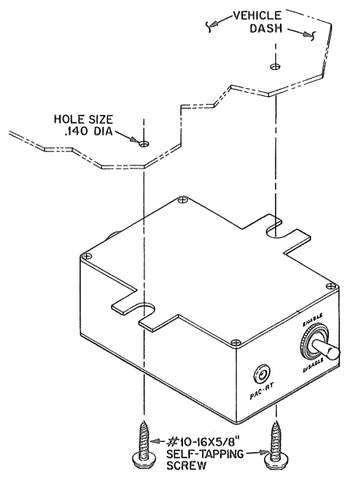

Figure 7. Control Unit Installation Detail

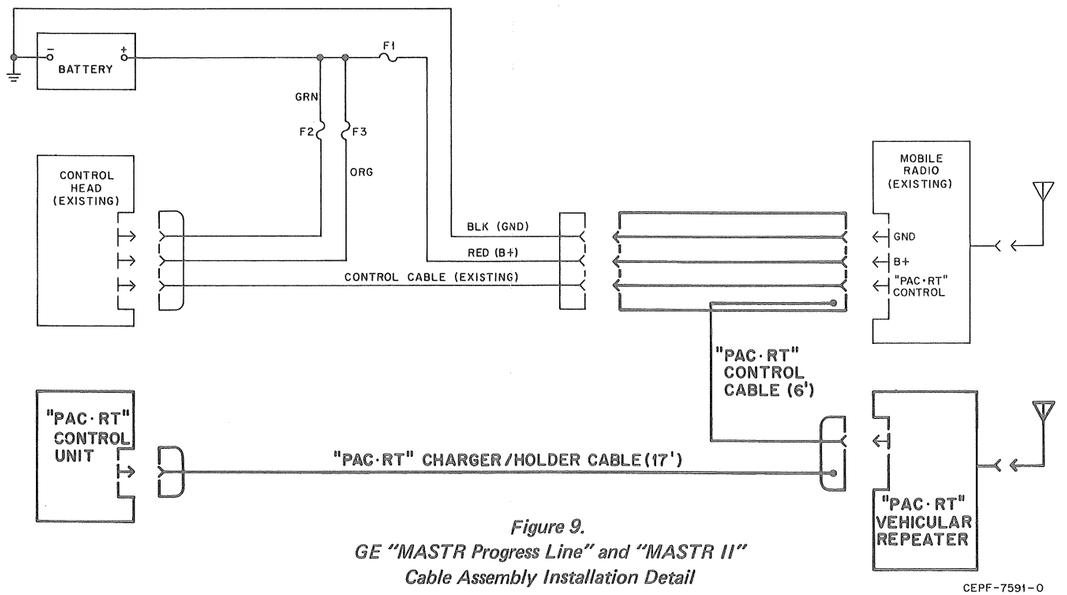

Figure 9.
GE "MASTR Progress Line" and "MASTR II"
Cable Assembly Installation Detail

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"PAC•RT" SYSTEM ALIGNMENT

1. GENERAL

After the "PAC•RT" vehicular repeater has been completely connected into the existing mobile radio installation, several adjustments must be made in the repeater. The REPEATER DEV ADJ control and the MOBILE DEV ADJ control must be set. Also, the MOBILE PL ADJ control (if applicable) and the MOBILE SQ ADJ control must be set. These controls, located on the "PAC•RT" main circuit board, must be adjusted with the actual mobile radio being used with the repeater due to the variations between mobile radios.

The transmitter - receiver and the optional monitor receiver circuit boards are aligned at the factory and should not need realignment. Realignment may be required if components are replaced or have aged. If necessary, refer to the specific alignment procedures for the transmitter - receiver circuit board and the monitor receiver circuit board.

The vehicular repeater can be aligned more readily on the bench or it can be aligned in the vehicle. The only adjustments that MUST be made in the vehicle are the mobile squelch, mobile deviation, repeater deviation, and the mobile PL in the repeater.

NOTE

No adjustments are required to the existing mobile radio.

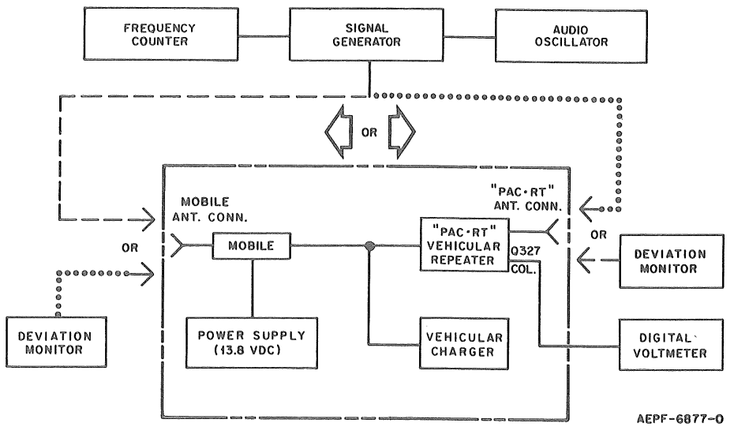
2. "PAC•RT" VEHICULAR REPEATER ALIGNMENT

a. Remove the vehicular repeater unit from its base; reverse the procedure in Figure 3.

b. If the vehicular repeater is to be aligned in the mobile unit, position the repeater so that the circuit board adjustments are exposed and reconnect the cables. If the vehicular repeater is to be aligned on the bench with a comparable mobile setup, position the repeater so that the circuit board adjustments are exposed and connect the cables to the repeater. Refer to "Alignment Setup."

c. Perform the following alignment procedure:

"PAC•RT" VEHICULAR REPEATER ALIGNMENT SETUP



"PAC•RT" VEHICULAR REPEATER ALIGNMENT PROCEDURE

NOTE: Steps 1-4 are not required for installation alignment, and should be performed only if components are replaced or have aged.

STEP	TEST EQUIPMENT	METER POINT	ADJUSTMENT	PROCEDURE
1	DC Power Supply, Digital Voltmeter	Q327 Collector	R379	REGULATED VOLTAGE--Connect the power supply positive terminal to pins 1 and 9 of vehicular repeater jack J301 and the power supply negative terminal to pin 8 of J301. Adjust power supply voltage for 13.8 V. Connect the digital voltmeter to Q327 collector. Adjust REG VOLT ADJ R379 for 10.5 V on the digital voltmeter.
2	Deviation Monitor	PAC•RT Antenna Jack	R116	SINGLE-TONE DEVIATION -- Transmit a single-tone burst by depressing and then releasing the switch in the charger or holder pocket or supply regulated B+ to pin 15 of J301. Adjust R116 on the transmitter-receiver circuit board for ±5 kHz deviation at the antenna jack.
3	Frequency Counter, Signal Generator, Digital Voltmeter or VOM	Q416 Collector	R450	VEHICULAR REPEATER SQUELCH -- Apply a 0.75 uV on-channel, high-band, unmodulated signal to the repeater antenna jack. Adjust REPEATER SQ ADJ R450 until the collector of Q416 switches from 0 V dc to regulated B+ (10.5 V).
4	Frequency Counter, or Oscilloscope	U11E-12	R512	PRIORITY CLOCK -- Ground test points A (U9D-13) and E (U9B-6) on the repeater circuit board. Momentarily depress the mobile PTT switch or momentarily ground pin 20 of J301. Monitor the 300-500 msec clock at U11E-12. Adjust CLK ADJ R512 for a 500 msec period.
				NOTE If the preceding steps were performed on the bench, reinstall the vehicular repeater in the mobile unit. Position it to expose the circuit board adjustments. Connect the control cable.
				CAUTION Because of the "priority-interrupt," it is possible that the mobile radio can be "keyed" if the repeater receives a properly PL encoded high-band signal. To prevent this from happening and damaging the signal generator, it is essential that PL reed E302 be removed anytime a signal generator is directly connected to the mobile radio.
5	Frequency Counter, Deviation Monitor, Signal Generator, Audio Oscillator, Digital Voltmeter		R303	VEHICULAR REPEATER DEVIATION -- If the PAC•RT repeater is equipped with the mobile PL option, set the channel selector on the control head to channel 1, and ground the collector of Q313. Remove PL reed E302 to prevent keying the mobile unit, and to protect the signal generator from damage. Apply a 1000 uV on-channel signal modulated with a 1 kHz tone at ±3 kHz deviation to the mobile antenna jack. Adjust REPEATER DEV ADJ R303 to provide ±3 kHz deviation on the high-band channel. Remove signal generator from the mobile antenna jack. DO NOT REINSTALL PL REED E302 UNTIL SPECIFICALLY INSTRUCTED.
6	Frequency Counter, Deviation Monitor, Signal Generator, Audio Generator		R481	MOBILE DEVIATION -- Ground Q312 collector (S1 on relay K1). Apply a 1000 uV, on-channel, high-band signal modulated with a 1 kHz tone at ±3 kHz deviation to the PAC•RT antenna jack. Adjust MOBILE DEV ADJ R481 to provide ±3 kHz deviation on the mobile channel. Remove the ground from Q312 collector (S1 on relay K1).
7	Frequency Counter Signal Generator, Digital Voltmeter or VOM	Q303 Collector	R305	MOBILE SQUELCH -- Apply a 20 dB quieting signal to the mobile antenna jack. Adjust MOBILE SQ ADJ R305 until the PAC•RT unit begins to transmit. Remove the signal and verify that the repeater stops transmitting. Remove the ground from Q313 collector (grounded in step 5).
8	Frequency Counter, Signal Generator, Deviation Monitor, Audio Oscillator, Digital Voltmeter or VOM	Q307 Collector	R304	MOBILE "PL" SQUELCH -- Set channel selector to a PL position. Apply a 10 dB quieting signal to the mobile antenna jack. Modulate the signal at the PL frequency at ±0.5 kHz deviation. Adjust MOBILE PL ADJ R304 until the PAC•RT unit begins to transmit. Remove the signal and verify that the repeater stops transmitting.
9				Disconnect all test equipment, and reinstall PL reed E302. Reassemble the vehicular repeater to its base plate.

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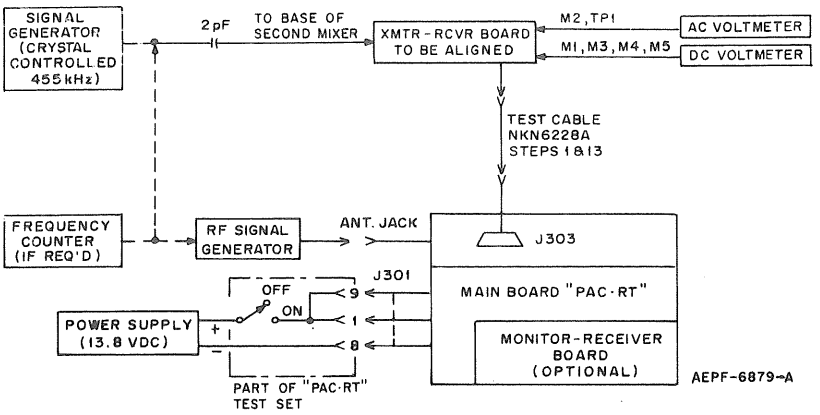
3. TRANSMITTER-RECEIVER ALIGNMENT

Alignment of the transmitter - receiver circuit board is not necessary unless components are replaced or have aged. If necessary, remove the vehicular repeater unit from its base (reverse the procedure in Figure 3) and perform the following procedures in the transmitter and receiver setup and alignment procedures.

RECEIVER ALIGNMENT SETUP



RECEIVER ALIGNMENT PROCEDURE

STEP	TEST EQUIPMENT	METER POINT	ADJUSTMENT	PROCEDURE
1	Test Cable NKN6228A			Remove transmitter-receiver circuit board from main circuit board and chassis. Connect test cable between P303 on transmitter-receiver circuit board and J303 on main circuit board. If used, the monitor receiver circuit board must be in position on the main circuit board.
2	AC Voltmeter, Signal Generator (455 kHz crystal-controlled)	M2 -40 dB scale	T1, T4	LOW I-F FREQUENCY -- Connect the 455 kHz signal generator to 2nd mixer base (use a 2 pF isolation capacitor). Increase and maintain a signal level of about -40 dBm on meter point M2. Tune for peak. Peak T4, T1, and repeak T4. Do not repeat.
3	DC Multimeter, Signal Generator (455 kHz crystal-controlled), AC Voltmeter	M5 +3 V dc scale & -40 dB scale	T5	LIMITER -- Adjust the signal generator output for an indication of -40 dBm on meter point M2. (If T5 has been completely misaligned, position T5 slug so that it is 1/16" above the solder side of the board. Adjust T5 for maximum positive voltage (approximately 1.4 V dc) at M5.
4	DC Multimeter, Signal Generator (455 kHz crystal-controlled), AC Voltmeter	M4 0.3 V dc scale & -40 dB scale	T6	DISCRIMINATOR -- Adjust the signal generator output for an indication of -40 dBm on meter point M2. If T6 has been completely misaligned, position T6 slug so that it is 1/16" above the solder side of the board. Adjust T6 for discriminator zero (0 ±.05 V). Adjust for the first zero at M4.
5				Repeak T5 at M5 (step 4). Then rezero T6 at M4 (step 5).
6		TP1	L6, L14	HIGH I-F FILTER -- If the I-F filter has been completely misaligned or the frequency is being changed, position the slugs so that they are 1/16" above the solder side of the board. With no signal input tune L6 & L14 for maximum audio noise at TP1.
7	DC Multimeter	M3 10 V dc scale	T2, L13	OSCILLATOR OUTPUT -- Tune T2 and L13 for a dip at M3.
8	DC Multimeter, .002 uF Cap.	M1 3 V dc scale	T2, L13, T3	INJECTION -- Tune T3 for a peak at M1. Retune T2, L13 and T3 for a peak at M1. Short oscillator transistor base to ground with a .002 uF capacitor. The change in voltage at M1 should be greater than 0.1 V dc.
9	AC Voltmeter, Signal Generator	M2 -30 dB scale	L2, L3, L4, L5	RF AMPLIFIER -- Connect the signal generator to the "PAC•RT" antenna jack. Adjust signal generator output for -35 dBm at M2. Adjust signal generator frequency for M4 reading within ±.05 V dc. Tune L2, L3, L4, and L5 for a peak at M2. Keep the reading below -30 dBm by reducing generator output.
10	DC Multimeter	M4 0.3 V dc scale	L7	RECEIVE FREQUENCY -- Use the base station transmitter or a frequency standard as a signal source and adjust L7 for zero at M4 (±.05 V dc).
11	AC Voltmeter, Signal Generator	M2 -30 dB scale	L2, L3, L4, L5, L6, L13, L14, T1, T2, T3, T4	RF AMP & HIGH I-F FILTER -- Retune L2, L3, L4, L5, T2, L13, T3, L6, L14, T1 and T4 in that order to ensure a peak at M2. Keep the reading below -30 dBm at M2 and at zero ±.05 V dc at M4.
12	AC Voltmeter, Signal Generator (Modulate with 1000 Hz Tone ±5 kHz deviation)	M2, M4 -30 dB scale	L6, L14	Check for ±.05 V dc discriminator zero at M4, then carefully peak L6 and L14 at M2. Do not retune.
13				Remove test cable. Reassemble transmitter-receiver circuit board onto main circuit board.
14				Repeat Step 9.
15	AC Voltmeter Signal Generator	TP1		20 dB QUIETING SENSITIVITY -- Perform 20 dB quieting sensitivity measurement as a check of alignment.

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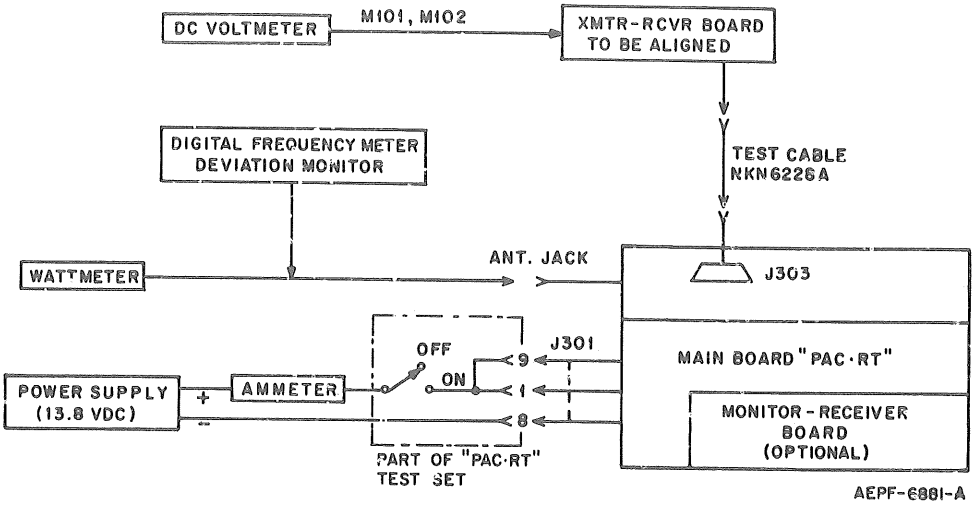
TRANSMITTER ALIGNMENT SETUP



TRANSMITTER ALIGNMENT PROCEDURE

STEP	TEST EQUIPMENT	METER POINT	ADJUSTMENT	PROCEDURE
1				Adjust power supply voltage for 13.8 V dc.
2				Ground collector of Q309 and Q421.
3				OSCILLATOR -- Y101 is preset to assigned frequency at the factory. Do not readjust unless the crystals are replaced or the setting was accidentally changed. If it is necessary to readjust Y101, (a) Complete steps 4 thru 6. (b) Set up the frequency monitor for frequency measurement and adjust warp coil Y101 to assigned frequency. (c) Complete step 7. **NOTE** If Y101 does not need to be adjusted, continue with steps 4 through 7.
4	DC Multimeter, Ammeter	M101	L101, L102	Tune L102 for maximum current (500 mA range). Tune L101 and L102 for maximum negative voltage on M101 (-1.2 V dc, typical).
5	DC Multimeter, Ammeter	M102	L103, L105 L101, L102	Preset L103 to center of coil. Tune L105 for maximum current. Tune L101, L102, L105, L103 in that order for minimum positive voltage on M102. Repeak once to ensure dip (+0.05 V dc, typical).
6	Ammeter, RF Wattmeter		L106, L109, L110	Preset all coils flush with solder side of board. Tune L106, L109, L110 in that order towards center of coil for maximum current until power can be read on wattmeter; then repeak all coils above for maximum power (0.25 watt minimum).
7				DEVIATION CHECK -- See Single-Tone Deviation adjustment in the "PAC•RT Vehicular Repeater Alignment Procedure" for adjustment of R116.

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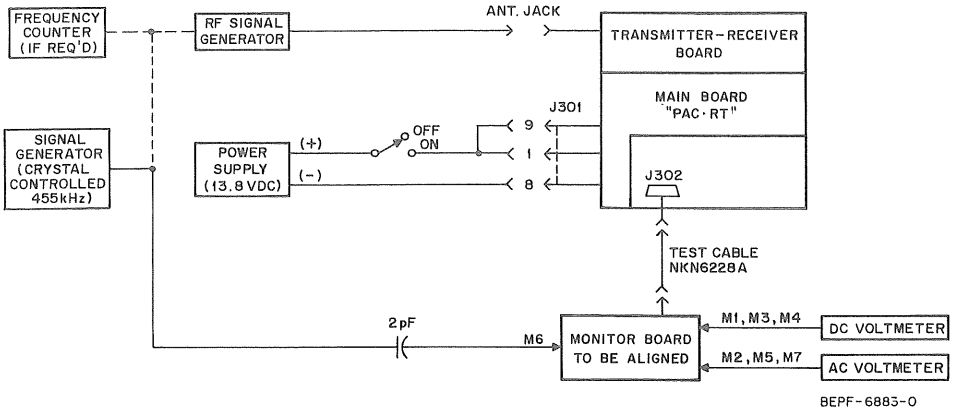
4. MONITOR RECEIVER ALIGNMENT (OPTIONAL CIRCUIT BOARD)

Alignment of the monitor receiver circuit boards is not necessary unless components are replaced or have aged. If alignment is necessary, remove the vehicular repeater unit from its base; reverse procedure in Figure 3, and perform the following procedures found in the monitor receiver setup and alignment procedures for either the 30-50 MHz monitor receiver or the 450-512 MHz monitor receiver.

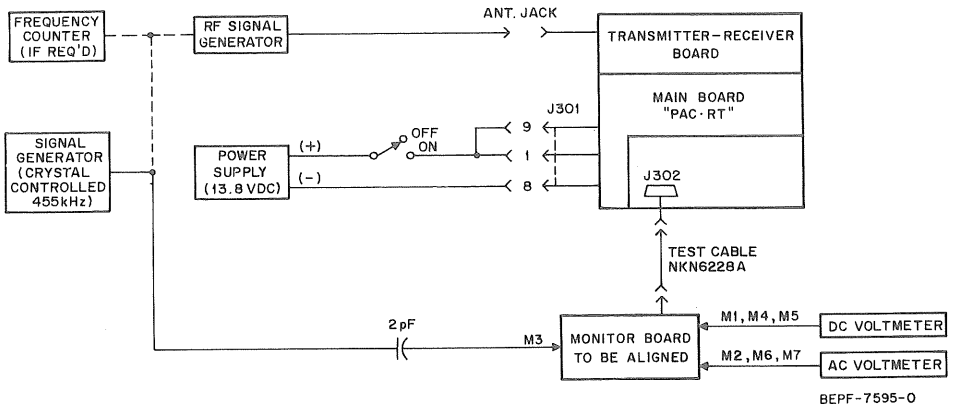
30-50 MHz MONITOR RECEIVER ALIGNMENT SETUP



30-50 MHz MONITOR RECEIVER ALIGNMENT PROCEDURE

STEP	TEST EQUIPMENT	METER POINT	ADJUSTMENT	PROCEDURE
1	Test Cable NKN6228A			Remove monitor receiver circuit board from main circuit board and chassis. Connect test cable between P302 on monitor receiver circuit board and J302 on main circuit board. The transmitter-receiver circuit board must be in position on the main circuit board.
2				Locate TP1, TP2, TP3, TP4, and TP5 on the monitor receiver circuit board. Ground TP1 to activate the F1 oscillator. (TP2 for F2, TP3 for F3, etc.)
3	AC Voltmeter, Signal Generator (455 kHz crystal-controlled)	M2 -40 dB scale	T2, T3	LOW I-F FREQUENCY -- Connect the 455 kHz signal generator to 2nd mixer base (use a 2 pF isolation capacitor). Increase and maintain a signal level of about -40 dBm on meter at point M2. Tune for peak. Peak T3, T2, and repeak T3. Do not repeat.
4	DC Multimeter, Signal Generator (455 kHz crystal-controlled), AC Voltmeter	M4 +3 V dc scale & -40 dB scale	T4	LIMITER -- Adjust the signal generator output for an indication of -40 dBm on meter point M2. If T4 has been completely misaligned, position the slug so that it is 1/16" above the solder side of the board. Adjust T4 for maximum positive voltage (approximately 2.2 V dc).
5	DC Multimeter, Signal Generator (455 kHz crystal-controlled), AC Voltmeter	M3 0.3 V dc scale & -40 dB scale	T5	DISCRIMINATOR -- Adjust the signal generator output for an indication of -40 dBm on meter point M2. If T5 has been completely misaligned, position the slug so that it is 1/16" above the solder side of the board. Adjust T5 for discriminator zero (0 ±.05 V). Adjust for the first zero.
6		M3	L7, L8	HIGH I-F FILTER -- If the I-F filter has been completely misaligned or the frequency is being changed, position the slugs so that they are 1/16" above the solder side of the board. With no signal input tune L7 & L8 for maximum audio noise at M3.
7	DC Multimeter, .002 uF Cap.	M1 3 V dc scale	T1	INJECTION -- Tune T1 for a peak at M1. Short oscillator transistor base to ground with a .002 uF capacitor. The change in voltage at M1 should be greater than .02 V dc.
8	AC Voltmeter, Signal Generator	M2 -30 dB scale	L1, L2, L3	RF SELECTIVITY -- Adjust signal generator output for -35 dBm at M2. Adjust signal generator frequency for M3 reading within ±.05 V dc. Tune L1, L2, and L3 for a peak at M2. Keep the reading below -30 dBm by reducing generator output.
9	DC Multimeter	M3 0.3 V dc scale	L4 (L9, L10, L11, & L16 if used)	RECEIVE FREQUENCY -- Use the base station transmitter or a frequency standard as a signal source and adjust L4 for zero at M3 (±.05 V dc). MULTIPLE FREQUENCY MODELS -- Remove ground from TP1 and repeat steps 3 through 9 for each of the remaining points noted in step 2. Adjust the appropriate coil for each channel for zero reading at M3: F2-L9, F3-L10, F4-L11, and F5-L16.
10	AC Voltmeter, Signal Generator	M2 -30 dB scale	L1, L2, L3, T1, L7, L8, T2, T3	RF SELECTIVITY & HIGH I-F FILTER -- Ground TP1, TP2, TP3, TP4, or TP5 that is associated with the lowest frequency channel. Retune L1, L2, L3, T1, L7, L8, T2, and T3 in that order to ensure a peak at M2. Keep the reading below -30 dBm at M2 and at zero ±.05 V dc at M3.
11				Remove test cable. Reassemble monitor receiver circuit board onto main circuit board.
12	AC Voltmeter, Signal Generator	M2 -30 dB scale	L1, L2, L3	RF SELECTIVITY -- Adjust signal generator output for -35 dBm at M2. Adjust signal generator frequency for M3 reading within ±.05 V dc. Tune L1, L2, and L3 for a peak at M2. Keep the reading below -30 dBm by reducing generator output.
13	AC Voltmeter, Signal Generator	M5		20 dB QUIETING SENSITIVITY -- Perform 20 dB quieting sensitivity measurement as a check of alignment (13.75 uV maximum at the antenna input corresponds to 1 uV at the rf input to the monitor-receiver).
14	DC Multimeter, Signal Generator	M7 15 V scale	R18	SQUELCH SETTING -- Set R18 fully counterclockwise. Set signal generator at the level set in step 13. Slowly turn R18 clockwise until M7 just switches to approximately 9.5 volts.

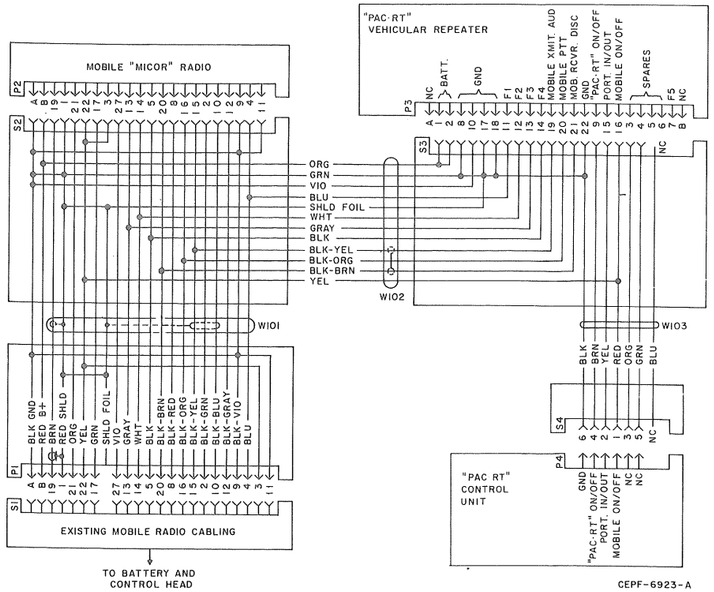
450-512 MHz MONITOR RECEIVER ALIGNMENT SETUP



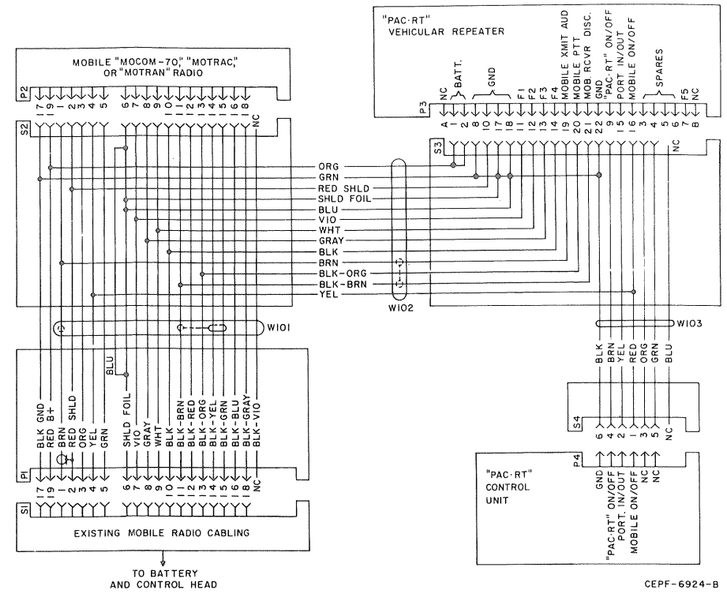
450-512 MHz MONITOR RECEIVER ALIGNMENT PROCEDURE

STEP	TEST EQUIPMENT	METER POINT	ADJUSTMENT	PROCEDURE
1	Test Cable NKN6228A			Remove monitor receiver circuit board from main circuit board and chassis. Connect test cable between P302 on monitor receiver circuit board and J302 on main circuit board. The transmitter-receiver circuit board must be in position on the main circuit board.
2				Locate TP1, TP2, TP3, and TP4 on the monitor receiver circuit board. Ground TP1 to activate the F1 oscillator (TP2 for F2, TP3 for F3, etc).
3	AC Voltmeter Signal Generator (455 kHz crystal-controlled)	M2, -40 dB scale	T1, T2	LOW I-F FREQUENCY -- Connect the 455 kHz signal generator to 2nd mixer base (use a 2 pF isolation capacitor). Increase and maintain a signal level of about -40 dBm on meter at point M2. Tune for peak. Peak T2, T1, and repeak T2. Do not repeat.
4	DC Multimeter, Signal Generator (455 kHz crystal-controlled), AC Voltmeter	M5 +3 V dc scale & -40 dB scale	T3	LIMITER -- Adjust the signal generator output for an indication of -40 dBm on meter point M2. If T3 has been completely misaligned, position the slug so that it is 1/16" above the solder side of the board. Adjust T3 for maximum positive voltage (approximately 2.2 V dc).
5	DC Multimeter Signal Generator (455 kHz crystal-controlled), AC Voltmeter	M4, 0.3 V dc scale & -40 dB scale	T4	DISCRIMINATOR -- Adjust the signal generator output for an indication of -40 dBm on meter point M2. If T4 has been completely misaligned, position the slug so that it is 1/16" above the solder side of the board. Adjust T4 for discriminator zero (0 ±.05 V). Adjust for the first zero.
6	AC Voltmeter	M4	L11, L12	HIGH I-F FILTER -- If the I-F filter has been completely misaligned or the frequency is being changed, position the slugs so that they are 1/16" above the solder side of the board. With no signal input tune L11 & L12 for maximum audio noise at M4.
7	DC Multimeter	M1 3 V dc scale	L6	INJECTION -- Tune L6 for a dip at M1.
8	AC Voltmeter, Signal Generator	M2, M8 -30 dB scale	FL1, (Z1, Z2, Z3, Z4), L8, & L9	RF SELECTIVITY -- Set signal generator at carrier frequency and inject into rf input. Adjust signal generator output level for -35 dBm reading at M2. Tune preselector cavities Z1, Z2, Z3, and Z4 for a peak at M2. Tune L8 and L9 one turn at a time for a dip at M8. Keep the reading below -30 dBm by reducing generator output.
9	AC Voltmeter, DC Multimeter, Signal Generator	M2, M4 -30 dB scale	L6, L4	RF SELECTIVITY -- With an on-channel signal, adjust signal generator output for -40 dBm at M2. Inject the signal at the rf input. Tune L6 for a peak reading at M4. Slowly tune L4 for a reading of ±0.05 Vdc at M4. Retune L6 again.
10	AC Voltmeter, Signal Generator	M2, M4 -40 dBm scale	L3, L2, L1	RECEIVE FREQUENCY -- MULTIPLE FREQUENCY MODELS -- Remove ground from TP1 and repeat step 9 for each of the remaining points noted in step 2. Adjust the appropriate coil for each channel for zero reading at M4: F2-L3, F3-L2, and F4-L1.
11	AC Voltmeter, Signal Generator	M2 -30 dB scale	FL1 (Z1, Z2, Z3, & Z4), L6, L8, L9, L11, L12, T1, & T2	RF SELECTIVITY & HIGH I-F FILTER -- GROUND TP1. Retune FL1 (Z1, Z2, Z3, & Z4), L6, L8, L9, L11, L12, T1, & T2 in that order to ensure a peak at M2. Keep the reading below -30 dBm at M2 and at zero ±0.5 V dc at M4.
12				Remove test cable. Reassemble monitor receiver circuit board onto main circuit board.
13	AC Voltmeter, Signal Generator	M2 -30 dB scale	FL1 (Z1, Z2, Z3, & Z4)	RF SELECTIVITY -- Adjust signal generator output for -35 dBm at M2. Adjust signal generator frequency for M4 reading within ±.05 V dc. Tune FL1 (Z1, Z2, Z3, & Z4) for a peak at M2. Keep the reading below -30 dBm by reducing generator output.
14	AC Voltmeter, Signal Generator	M6		20 dB QUIETING SENSITIVITY -- Perform 20 dB quieting sensitivity measurement as a check of alignment (13.75 uV maximum at the antenna input corresponds to 1 uV at the rf input to the monitor-receiver).
15	DC Multimeter, Signal Generator	M7 15 V scale	R56	SQUELCH SETTING -- Set R56 fully counterclockwise. Set signal generator at the level set in step 14. Slowly turn R56 clockwise until M7 just switches to approximately 9.5 volts.

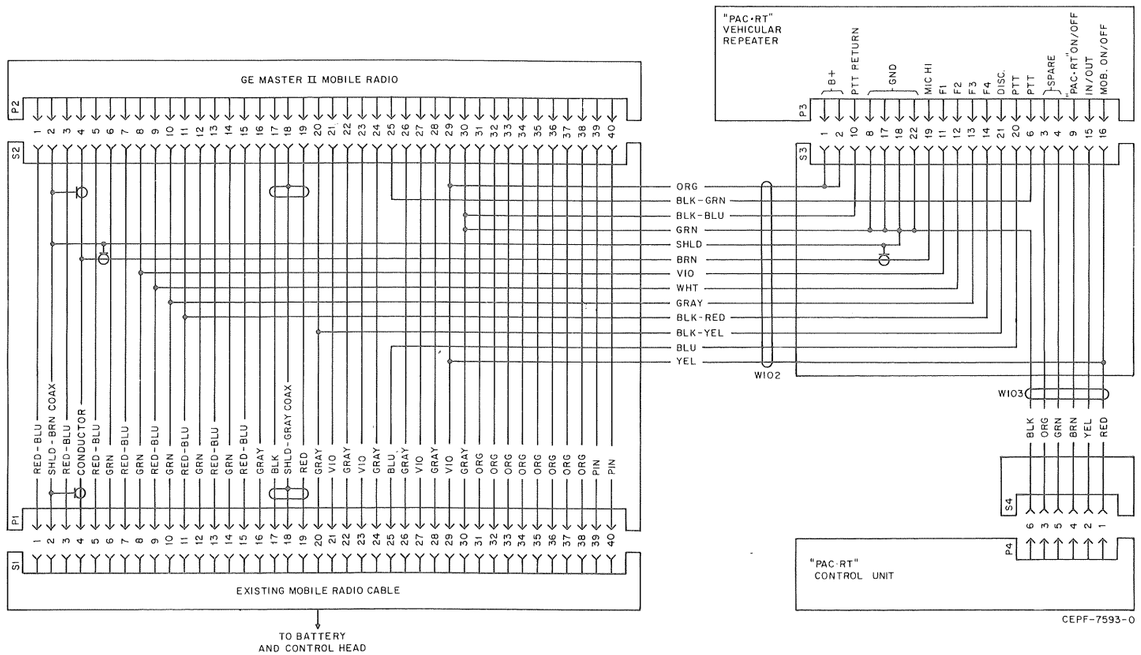
EPF-7596-O



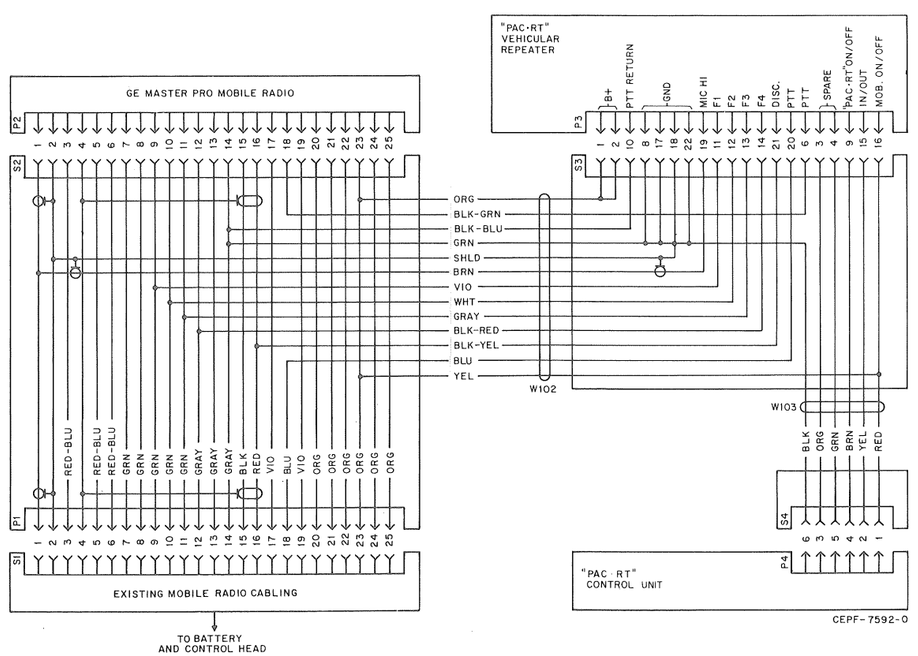
"Micor" System



"Mocomo70," "Motrac," & "Motran" System



GE "MASTR II" System



GE "MASTR Progress Line" System

Monitor Parts List PLF-1085-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: pF ±10%; 50 V unless stated
C1	2184511B13	33 (30-40 MHz)
	or 2184511B10	18 (40-50 MHz)
C2	2184511B28	270 (30-40 MHz)
	or 2184511B25	120 (40-50 MHz)
C3	2184511B03	1.5 ±0.25 pF
C4	2184511B12	27 (30-40 MHz)
	or 2184511B09	15 (40-50 MHz)
C5	2184511B03	1.5 ±0.25 pF
C6	2184511B12	27 (30-40 MHz)
	or 2184511B09	15 (40-50 MHz)
C7	2105529B10	40 ±5%
C8	2182428B62	.01 uF -20+80%; 500 V
C9	2184511B01	100; N750
C10	2182428B62	.01 uF -20 +80%; 500 V
C11	2182358G22	8 ±0.25 pF
C12	2184511B01	100; N750
C13	2182428B62	.01 uF -20+80%; 500 V
C14	2182213E09	.002 uF
C15, 16	2184511B01	100; N750
C17	2182213E09	.002 uF
C18	2184511B24	100 (30-40 MHz)
	or 2184511B20	68 (40-50 MHz)
C19	2182428B62	.01 uF -20+80%; 500 V
C20, 21	2184511B01	100; N750
C22	2184008H03	0.15 uF -20+80%
C23	0882905G05	0.15 uF
C24	2184511B01	100; N750
C25	2382256J08	22 uF -10+50%; 40 V
C26	0882096J16	1000; 250 V
C27	0882096J06	1500; 250 V
C28	2184511B01	100; N750
C29	2384762H08	3.9 uF ±20%; 15 V
C30	2382256J08	22 uF -10+50%; 40 V
C31	2382213E08	1000 ±5%; 100 V
C32	2184511B01	100; N750
C33	2183162H24	650 ±5%
C34	0882905G01	.01 uF
C35	2382256J07	4.7 uF -10+50%; 63 V
C36	0882905G12	0.22 uF
C37	2184511B86	30
C38	0882905G12	0.22 uF
C39	2184511B01	100; N750
C40	2182358G03	5.6 ±0.25 pF
C41	2184511B01	100; N750
C42	2382256J03	10 uF -10+50%; 25 V
C43	2182372C07	.05 uF -20+80%; 25 V
C44	2100847065	500
C45	2184511B23	91
C46	2184511B26	150
C47	2184511B48	180
C48	2182372C07	.05 uF -20+80%; 25 V
C49	2184511B33	1.3 ±0.25 pF
C50	2182372C07	.05 uF -20+80%; 25 V
C51	0882163J06	300 ±5%; 63 V
C52	2182372C07	.05 uF -20+80%; 25 V
C53	2182877B53	300
C54	2182877B54	500; N750
C55	0882163J07	400 ±5%; 63 V
C56	2182213E08	1000 ±5%; 100 V
C57	2182372C07	.05 uF -20+80%; 25 V
C58	2184511B25	120
C59	2184511B13	33
C60	2383441B27	10 uF ±20%; 15 V
C61	2182213E08	1000 ±5%; 100 V
C62	2383441B29	1 uF ±20%; 20 V
C63	2383441B28	22 uF ±20%; 15 V
C64	2184008H13	.05 uF ±20%; 25 V
C65	2182213E08	1000 ±5%; 100 V
C66	2182372C07	.05 uF -20+80%; 25 V
C67	2182213E08	1000 ±5%; 100 V
C68	2182372C07	.05 uF -20+80%; 25 V
C69	2182187B14	1000; 100 V
C70	2182372C07	.05 uF -20+80%; 25 V
C71	2182213E08	1000 ±5%; 100 V
C72	2182372C07	.05 uF -20+80%; 25 V
C73	2182428B10	3300; 100 V
C74	0882163J09	2000 ±5%; 33 V
C75	2182428B36	2000; 200 V
C76	0882096J14	.015 uF; 250 V
C77	2184511B24	100
C78	2323441B28	22 uF ±20%; 15 V
C79	2184511B24	100
C80, 81, 82	2105529B10	40 ±5%
C83 thru 88	2182428B62	.01 uF -20+80%; 500 V
C89, 90, 91	2184511B01	100; N760
C92, 93, 94	2182358G22	8 ±0.25 pF
C95, 96, 97	2182358G03	5.6
C98, 99, 100	2184511B01	100; N750
C101 thru 105	2182213E09	.002 uF
C106	2184511B01	100; N750
C107	2182428B62	.01 uF -20+80%; 500 V
C108	2105529B10	40 ±5%
C109	2182358G03	5.6
C110	2182358G22	8 ±0.25 pF
C111	2182428B62	.01 uF -20+80%; 500 V
C112	2184511B01	100; N750
C113, 114	2182213E09	.002 uF
C115	0882096J04	.047 uF; 250 V
C116	2105529B08	30 (30-33 MHz)
	or 2105529B05	20 ±5% (40-45 MHz)
C117	2184511B01	100; N750
		DIODE: See Note I
CR1, 2	4882139G01	Germanium
		INTEGRATED CIRCUIT:
IC1	5184267A09	Squelch Detector; type M6709

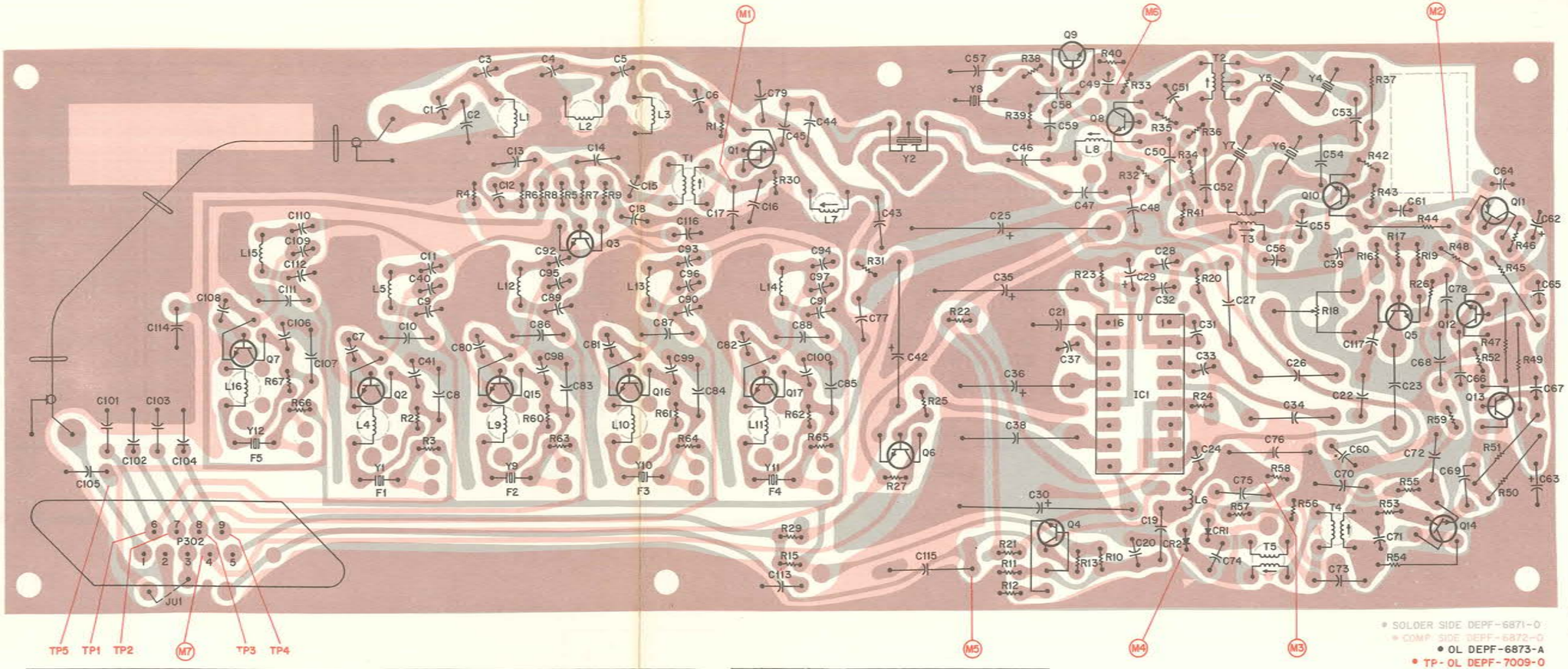
		COIL, RF:
L1, 2, 3	2482273J01	Coded CLEAR, 12-1/4 turns closewound
L4	2482944J12	Coded ORANGE, 15-1/4 turns closewound
L5	2482723H07	10 uH choke
L6	2482723H20	0.29 uH choke
L7, 8	2482827J08	Coded GREEN, 36-3/4 turns closewound
L9, 10, 11	2482944J12	Coded ORANGE, 15-1/4 turns closewound
L12 thru 15	2482723H07	10 uH choke
L16	2482944J12	Coded ORANGE, 15-1/4 turns closewound
		PLUG:
P302	2882846E02	Connector, 9-pin
		TRANSISTOR: See Note I
Q1	4800869726	NPN, type M9726
Q2	4800869662	NPN, type M9662
Q3 thru 6	4800869570	NPN, type M9570
Q7	4800869662	NPN, type M9662
Q8	4800869494	NPN, type M9494
Q9, 10	4800869570	NPN, type M9570
Q11	4800869571	PNP, type M9571
Q12	4800869570	NPN, type M9570
Q13	4800869571	PNP, type M9571
Q14	4800869570	NPN, type M9570
Q15, 16, 17	4800869662	NPN, type M9662
		RESISTOR, Fixed: ±5%; 1/4 W unless stated
R1	0600124A73	10 k
R2	0600124A47	820
R3	0600124A73	10 k
R4	0600124A57	2.2 k
R5	0600124A09	22
R6	0600124A85	33 k
R7	0600124A67	5.6 k
R8	0600124A51	1.2 k
R9	0600124A25	100
R10	0600124B12	390 k
R11	0600124A89	47 k
R12	0600124A57	2.2 k
R13	0600124A73	10 k
R15	0600124A25	100
R16	0600124B12	390 k
R17	0600124A89	47 k

R18	1884944C03	Pot., 10 k
R19	0600124A45	680 k
R20	0600124A81	22 k
R21	0600124A05	15
R22	0600124A97	100 k
R23	0600124B04	180 k
R24	0600124A83	27 k
R25	0600124A89	47 k
R26	0600124A73	10 k
R27	0600124A79	18 k
R29	0600124A19	56
R30	0600124A51	1.2 k
R31	0600124A31	180
R32	0600124A97	100 k
R33	0600124A73	10 k
R34	0600124A49	1 k
R35	0600124A81	22 k
R36	0600124A43	560
R37	0600124A17	47
R38	0600124A75	12 k
R39	0600124A69	6.8 k
R40	0600124A53	1.5 k
R41	0600124A59	2.7 k
R42	0600124A83	27 k
R43	0600124A95	82 k
R44, 45	0600124A65	4.7 k
R46, 47	0600124A97	100 k
R48	0600124A55	1.8 k
R49, 50	0600124A65	4.7 k
R51	0600124A97	100 k
R52	0600124A49	1 k
R53	0600124B04	180 k
R54	0600124A37	330
R55	0600124A49	1 k
R56, 57	0600124A83	27 k
R58	0600124A65	4.7 k
R59	0600124A55	1.8 k
R60, 61, 62	0600124A47	820
R63 thru 66	0600124A73	10 k
R67	0600124A47	820
		TRANSFORMER:
T1	2482827J11	Coded YELLOW; Pri: 5-1/4 turns, Sec: 2-1/4 turns; includes 7682451B04 CORE
T2, 3	2482045J07	455 kHz
T4	0105957A62	ASSEMBLY, Includes: coil 2484235H02, shield 2684800H11, core 7682686D06

T5	0105957A64	ASSEMBLY, Includes: coil 2484235H01 shield 2684800H11 core 7682686D06
		FILTER: See Note II
Y1	KXN6126AA	40.7-43.7 MHz
	or KXN6126AB	43.7-57.1 MHz
	or KXN6126AC	57.1-60.7 MHz
Y2	9105898C02	10.7 MHz Ceramic
Y4	4883192C13	Resonator, 450.3 kHz
Y5, 6	4883192C22	Resonator, 459.4 kHz
Y7	4883192C13	Resonator, 450.3 kHz
Y8	4884806C01	10.245 MHz
	or 4884224C02	11.155 MHz
Y9 thru 12	KXN6126AA	40.7-43.7 MHz
	or KXN6126AB	43.7-57.1 MHz
	or KXN6126AC	57.1-60.7 MHz
		NONREFERENCED ITEMS
	3083361G01	CABLE, Coax
	2684800H11	SHIELD, Coil; 30-40 MHz (for L4, L9, L10, L11, L16)
	or 2684800H03	SHIELD, Coil; 40-50 MHz (for L4, L9, L10, L11, L16)
	2684800H07	SHIELD, Coil; for L1, L2, L3, L7, L8, & T1
	7682686D06	SLEEVE, Ferrite; for L4, L9, L10, L11, L16 (30-40 MHz models only)
	7682686D09	CORE, Ferrite; for L1, L2, &L3
	1405525D01	PAD, Insulator; for T2, T3,
	1483485A01	PAD, Insulator; for Y1, Y8, Y9, Y10, Y11, Y12
	0705121D01	BRACKET, Connector; for P302

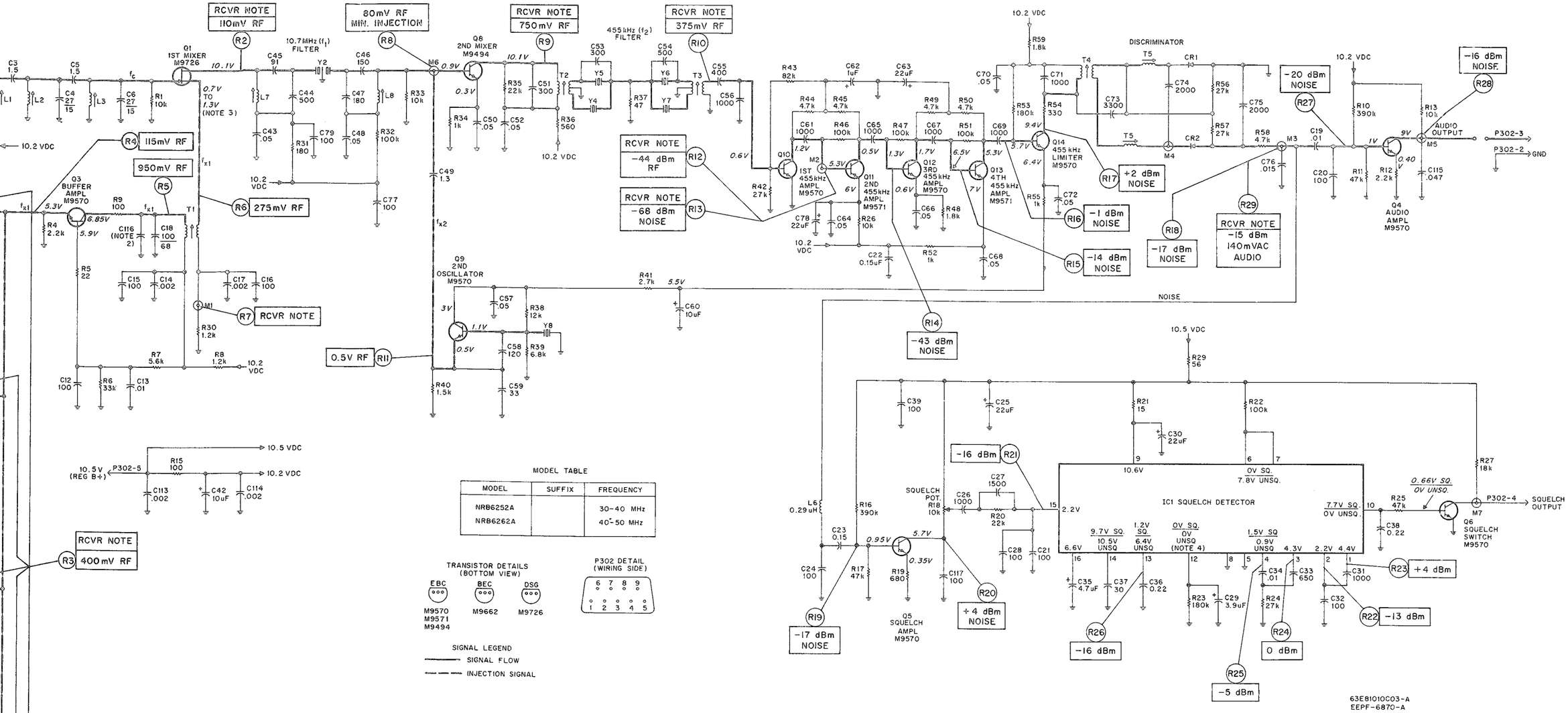
NOTES: I. For optimum performance, order replacement diodes and transistors by Motorola part number only.

II. When ordering crystal units, specify carrier frequency(s), crystal frequency(s), and crystal type number. Proper oscillator frequency and crystal type will be found stamped on crystal can.



* SOLDER SIDE DEPF-6871-O
* COMP. SIDE DEPF-6872-O
• OL DEPF-6873-A
• TP-OL DEPF-7009-O

30-50 MHz MONITOR RECEIVER CIRCUIT BOARD DETAIL AND PARTS LIST



MODEL TABLE

MODEL	SUFFIX	FREQUENCY
NRB6252A		30-40 MHz
NRB6262A		40-50 MHz

TRANSISTOR DETAILS (BOTTOM VIEW)

P302 DETAIL (WIRING SIDE)

SIGNAL LEGEND

SIGNAL FLOW

INJECTION SIGNAL

63E81010C03-A
EEPF-6870-A

SCHEMATIC AND CIRCUIT BOARD NOTES

1. VOLTAGE READINGS ARE TAKEN WITH THE OSCILLATOR RUNNING.
2. CAPACITOR C116 IS 30 pF FOR 30-33 MHz RANGE AND 20 pF FOR 40-45 MHz RANGE. C116 IS OMITTED FOR ALL OTHER RANGES.
3. VOLTAGE VARIES WITH FREQUENCY AND DRIVE.
4. SQUELCH IC1 PIN 12, +5.6 VOLTS DC WHEN THRESHOLD SIGNAL JUST OPENS SQUELCH.
5. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, k = 1000;
   CAPACITOR VALUES EQUAL TO OR GREATER THAN ONE (1) ARE IN PICOFARADS (pF) AND VALUES LESS THAN ONE (1) ARE IN MICROFARADS (uF).
6. WHERE TWO COMPONENT VALUES ARE SHOWN, TOP VALUE IS FOR 30-40 MHz RANGE AND BOTTOM VALUE IS FOR 40-50 MHz RANGE.
7. DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CHASSIS GROUND USING MOTOROLA DC MULTIMETER OR EQUIVALENT.
8. WHERE TWO VOLTAGE VALUES ARE SHOWN, I.E. 2V / 6V,
   TOP VALUE IS FOR SQUELCHED OPERATIONAL MODE AND BOTTOM VALUE IS FOR UNSQUELCHED MODE.
9. FREQUENCY LEGEND:
   f_c = CARRIER FREQUENCY (30-50 MHz)
   f_{x1} = 1ST OSCILLATOR CRYSTAL FREQUENCY (40.7-60.7 MHz)
   f_{x2} = 2ND OSCILLATOR CRYSTAL FREQUENCY (10.245-11.155 MHz) (SEE CRYSTAL FREQUENCY TABLE)
   f_1 = HIGH INTERMEDIATE FREQUENCY (10.7 MHz)
   f_2 = LOW INTERMEDIATE FREQUENCY (455 kHz)
   f_c = f_{x1} - 10.7 MHz
   f_1 = f_{x2} + f_2 (FOR f_{x2} = 10.245 MHz)
   f_1 = f_{x2} - f_2 (FOR f_{x2} = 11.155 MHz)

EPF-6874-O

STAGE GAIN MEASUREMENT NOTES

GENERAL

1. 0 dBm = 1 mW INTO 600 OHMS.
2. REFER TO APPLICABLE MONITOR-RECEIVER SCHEMATIC AND MONITOR-RECEIVER GAIN MEASUREMENTS SECTION IN INSTRUCTION MANUAL FOR RECOMMENDED TEST EQUIPMENT AND ADDITIONAL INFORMATION.
3. MAKE THE FOLLOWING MEASUREMENTS:

(R1) CONNECT RF SIGNAL GENERATOR TO RF INPUT AND LEAVE CONNECTED FOR ALL RECEIVER MEASUREMENTS.

(R2) SET RF SIGNAL GENERATOR LEVEL TO 10 mV FOR THIS READING.

(R3) READING WITH ONE OSCILLATOR RUNNING. GROUND TP1, TP2, TP3, TP4, OR TP5 AS APPLICABLE.

(R7) SHORT Q3 (BUFFER AMPL) COLLECTOR TO GROUND WITH A 0.002 uF CAPACITOR. THE CHANGE IN VOLTAGE AT (R7) SHOULD BE GREATER THAN 0.02 V DC.

(R9), (R10) SET RF SIGNAL GENERATOR LEVEL TO 1.0 mV FOR THESE READINGS.

(R12) SET RF SIGNAL GENERATOR LEVEL TO 3.0 uV FOR THIS READING (USE AC VOLTMETER FOR MEASUREMENT).

(R13) thru (R28) SET RF SIGNAL GENERATOR LEVEL TO MINIMUM AND FREQUENCY OFF CHANNEL. FOR SOME OF THESE TEST POINTS THERE IS AN ADDITIONAL REQUIREMENT GIVEN BELOW.

(R19) thru (R26) ADJUST SQUELCH CONTROL FOR FULL SQUELCH.

(R29) SET RF SIGNAL GENERATOR LEVEL TO 1.0 mV AND MODULATE WITH 1 kHz TONE AT 3.3 kHz DEVIATION.

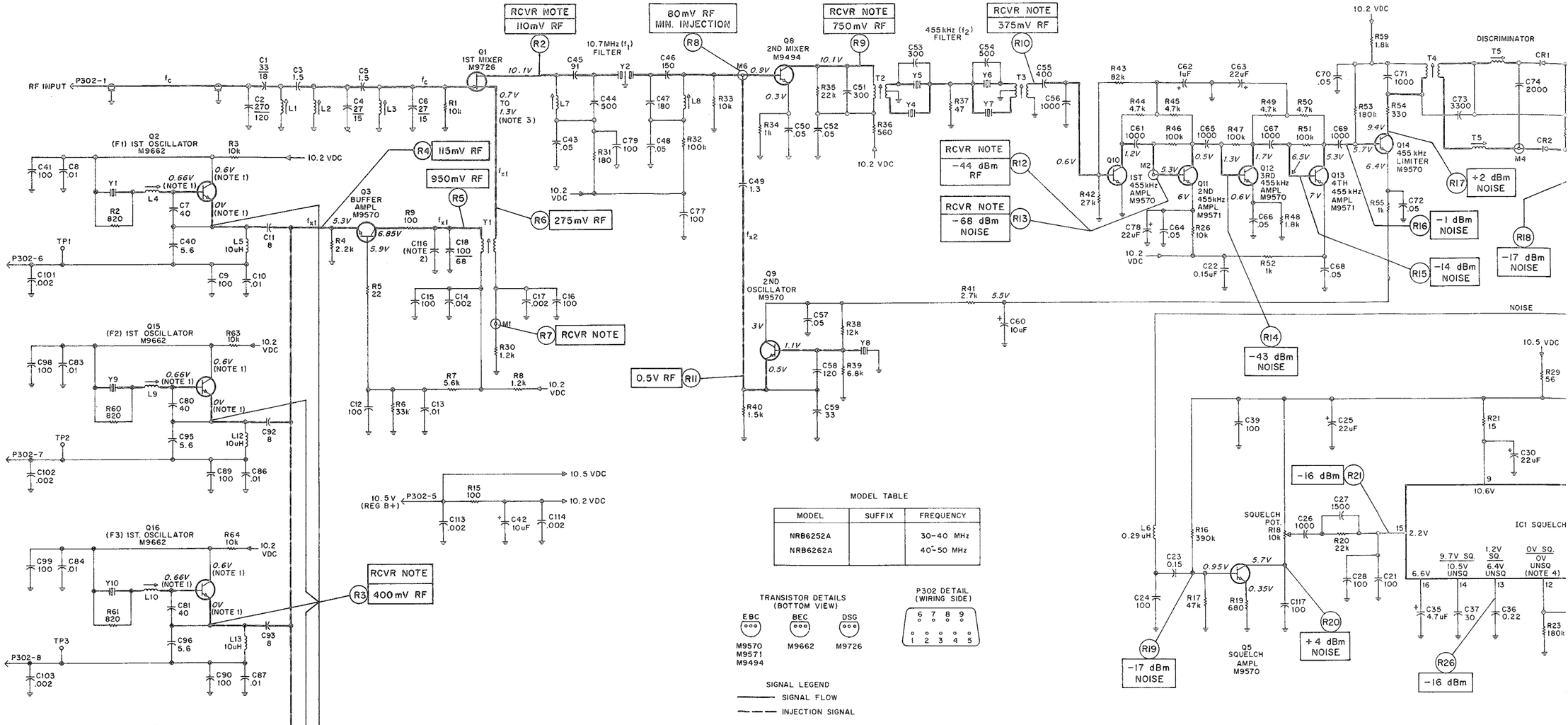
EPF-6973-A

CRYSTAL FREQUENCY TABLE

CARRIER FREQUENCY (f_c)	1ST OSCILLATOR CRYSTAL FREQUENCY (f_{x1})	2ND OSCILLATOR FREQUENCY (f_{x2})
30.000 - 30.760 MHz	40.700 - 41.460 MHz	11.155 MHz
30.761 - 34.440 MHz	41.461 - 45.140 MHz	10.245 MHz
34.441 - 37.260 MHz	45.141 - 47.960 MHz	11.155 MHz
37.261 - 39.760 MHz	47.961 - 50.460 MHz	10.245 MHz
39.761 - 41.000 MHz	50.461 - 51.700 MHz	11.155 MHz
41.001 - 45.600 MHz	51.701 - 56.300 MHz	10.245 MHz
45.601 - 48.320 MHz	56.301 - 59.020 MHz	11.155 MHz
48.321 - 50.000 MHz	59.021 - 60.700 MHz	10.245 MHz

EPF-6974-O

30-50 MHz MONITOR RECEIVER SCHEMATIC DIAGRAM



MODEL TABLE

MODEL	SUFFIX	FREQUENCY
NRB6252A		30-40 MHz
NRB6262A		40-50 MHz

TRANSISTOR DETAILS (BOTTOM VIEW)

P302 DETAIL (WIRING SIDE)

SIGNAL LEGEND

SIGNAL FLOW

INJECTION SIGNAL

SCHEMATIC AND CIRCUIT BOARD NOTES

1. VOLTAGE READINGS ARE TAKEN WITH THE OSCILLATOR RUNNING.
2. CAPACITOR C116 IS 30 pF FOR 30-33 MHz RANGE AND 20 pF FOR 40-45 MHz RANGE. C116 IS OMITTED FOR ALL OTHER RANGES.
3. VOLTAGE VARIES WITH FREQUENCY AND DRIVE.
4. SQUELCH IC1 PIN 12, +5.6 VOLTS DC WHEN THRESHOLD SIGNAL JUST OPENS SQUELCH.
5. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, k = 1000;
   CAPACITOR VALUES EQUAL TO OR GREATER THAN ONE (1) ARE IN PICOFARADS (pF) AND VALUES LESS THAN ONE (1) ARE IN MICROFARADS (uF).
6. WHERE TWO COMPONENT VALUES ARE SHOWN, TOP VALUE IS FOR 30-40 MHz RANGE AND BOTTOM VALUE IS FOR 40-50 MHz RANGE.
7. DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CHASSIS GROUND USING MOTOROLA DC MULTIMETER OR EQUIVALENT.
8. WHERE TWO VOLTAGE VALUES ARE SHOWN, I.E. 2V / 6V,
   TOP VALUE IS FOR SQUELCHED OPERATIONAL MODE AND BOTTOM VALUE IS FOR UNSQUELCHED MODE.
9. FREQUENCY LEGEND:
   f_c = CARRIER FREQUENCY (30-50 MHz)
   f_{x1} = 1ST OSCILLATOR CRYSTAL FREQUENCY (40.7-60.7 MHz)
   f_{x2} = 2ND OSCILLATOR CRYSTAL FREQUENCY (10.245-11.155 MHz) (SEE CRYSTAL FREQUENCY TABLE)
   f_1 = HIGH INTERMEDIATE FREQUENCY (10.7 MHz)
   f_2 = LOW INTERMEDIATE FREQUENCY (455 kHz)
   f_c = f_{x1} - 10.7 MHz
   f_1 = $f_{x2} + f_2$ (FOR f_{x2} = 10.245 MHz)
   f_1 = $f_{x2} - f_2$ (FOR f_{x2} = 11.155 MHz)

EPF-6874-O

STAGE GAIN MEASUREMENT NOTES

GENERAL

1. 0 dBm = 1 mW INTO 600 OHMS.
2. REFER TO APPLICABLE MONITOR-RECEIVER SCHEMATIC AND MONITOR-RECEIVER GAIN MEASUREMENTS SECTION IN INSTRUCTION MANUAL FOR RECOMMENDED TEST EQUIPMENT AND ADDITIONAL INFORMATION.
3. MAKE THE FOLLOWING MEASUREMENTS:

(R1) CONNECT RF SIGNAL GENERATOR TO RF INPUT AND LEAVE CONNECTED FOR ALL RECEIVER MEASUREMENTS.

(R2) SET RF SIGNAL GENERATOR LEVEL TO 10 mV FOR THIS READING.

(R3) READING WITH ONE OSCILLATOR RUNNING. GROUND TP1, TP2, TP3, TP4, OR TP5 AS APPLICABLE.

(R7) SHORT Q3 (BUFFER AMPL) COLLECTOR TO GROUND WITH A 0.002 uF CAPACITOR. THE CHANGE IN VOLTAGE AT (R7) SHOULD BE GREATER THAN 0.02 V DC.

(R9)(R10) SET RF SIGNAL GENERATOR LEVEL TO 1.0 mV FOR THESE READINGS.

(R12) SET RF SIGNAL GENERATOR LEVEL TO 3.0 uV FOR THIS READ ING (USE AC VOLTMETER FOR MEASUREMENT).

(R13) thru (R28) SET RF SIGNAL GENERATOR LEVEL TO MINIMUM AND FREQUENCY OFF CHANNEL. FOR SOME OF THESE TEST POINTS THERE IS AN ADDITIONAL REQUIREMENT GIVEN BELOW.

(R19) thru (R26) ADJUST SQUELCH CONTROL FOR FULL SQUELCH.

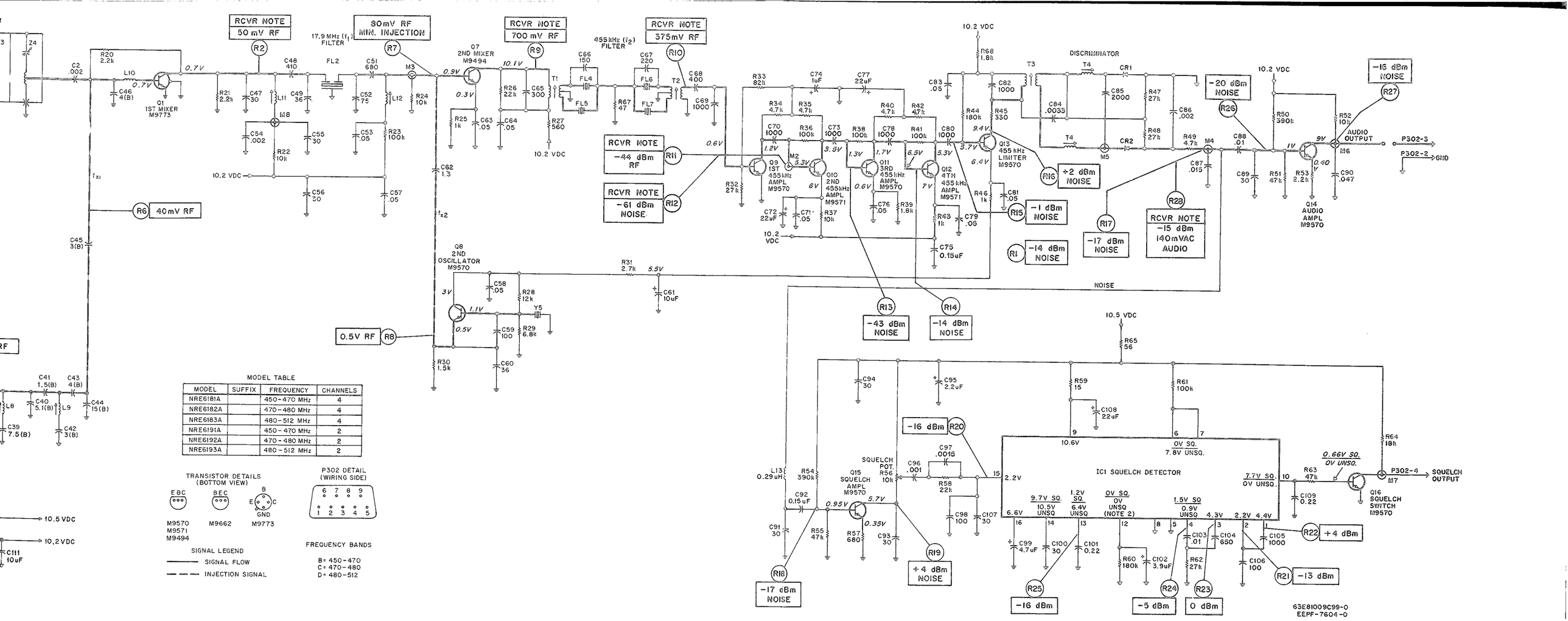
(R29) SET RF SIGNAL GENERATOR LEVEL TO 1.0 mV AND MODULATE WITH 1 kHz TONE AT 3.3 kHz DEVIATION.

EPF-6973-A

CRYSTAL FREQUENCY TABLE

CARRIER FREQUENCY (f_c)	1ST OSCILLATOR CRYSTAL FREQUENCY (f_{x1})	2ND OSCILLATOR FREQUENCY (f_{x2})
30.000 - 30.760 MHz	40.700 - 41.460 MHz	11.155 MHz
30.761 - 34.440 MHz	41.461 - 45.140 MHz	10.245 MHz
34.441 - 37.260 MHz	45.141 - 47.960 MHz	11.155 MHz
37.261 - 39.760 MHz	47.961 - 50.460 MHz	10.245 MHz
39.761 - 41.000 MHz	50.461 - 51.700 MHz	11.155 MHz
41.001 - 45.600 MHz	51.701 - 56.300 MHz	10.245 MHz
45.601 - 48.320 MHz	56.301 - 59.020 MHz	11.155 MHz
48.321 - 50.000 MHz	59.021 - 60.760 MHz	10.245 MHz

EPF-6874-O



MODEL TABLE

MODEL	SUFFIX	FREQUENCY	CHANNELS
NRE6181A		450-470 MHz	4
NRE6182A		470-480 MHz	4
NRE6183A		480-512 MHz	4
NRE6191A		450-470 MHz	2
NRE6192A		470-480 MHz	2
NRE6193A		480-512 MHz	2

TRANSISTOR DETAILS (BOTTOM VIEW)

M9570 M9571 M9494 — M9662 — M9773

SIGNAL LEGEND

SIGNAL FLOW

INJECTION SIGNAL

P302 DETAIL (WIRING SIDE)

FREQUENCY BANDS

B= 450-470
C= 470-480
D= 480-512

STAGE GAIN MEASUREMENT NOTES

GENERAL

1. 0 dBm = 1 mW INTO 600 OHMS.
2. REFER TO APPLICABLE MONITOR-RECEIVER SCHEMATIC AND MONITOR-RECEIVER GAIN MEASUREMENTS SECTION IN INSTRUCTION MANUAL FOR RECOMMENDED TEST EQUIPMENT AND ADDITIONAL INFORMATION.
3. MAKE THE FOLLOWING MEASUREMENTS:

(R1) CONNECT RF SIGNAL GENERATOR TO RF INPUT AND LEAVE CONNECTED FOR ALL RECEIVER MEASUREMENTS.

(R2) SET RF SIGNAL GENERATOR LEVEL TO 10 mV FOR THIS READING.

(R3) READING WITH ONE OSCILLATOR RUNNING. GROUND TP1, TP2, TP3, OR TP4 AS APPLICABLE.

(R9) (R10) SET RF SIGNAL GENERATOR LEVEL TO 1.0 mV FOR THESE READINGS.

(R11) SET RF SIGNAL GENERATOR LEVEL TO 3.0 uV FOR THIS READING (USE AC VOLTMETER FOR MEASUREMENT).

(R12) thru (R27) SET RF SIGNAL GENERATOR LEVEL TO MINIMUM AND FREQUENCY OFF CHANNEL. FOR SOME OF THESE TEST POINTS THERE IS AN ADDITIONAL REQUIREMENT GIVEN BELOW.

(R19) thru (R25) ADJUST SQUELCH CONTROL FOR FULL SQUELCH.

(R28) SET RF SIGNAL GENERATOR LEVEL TO 1.0 mV AND MODULATE WITH 1 kHz TONE AT 3.3 kHz DEVIATION.

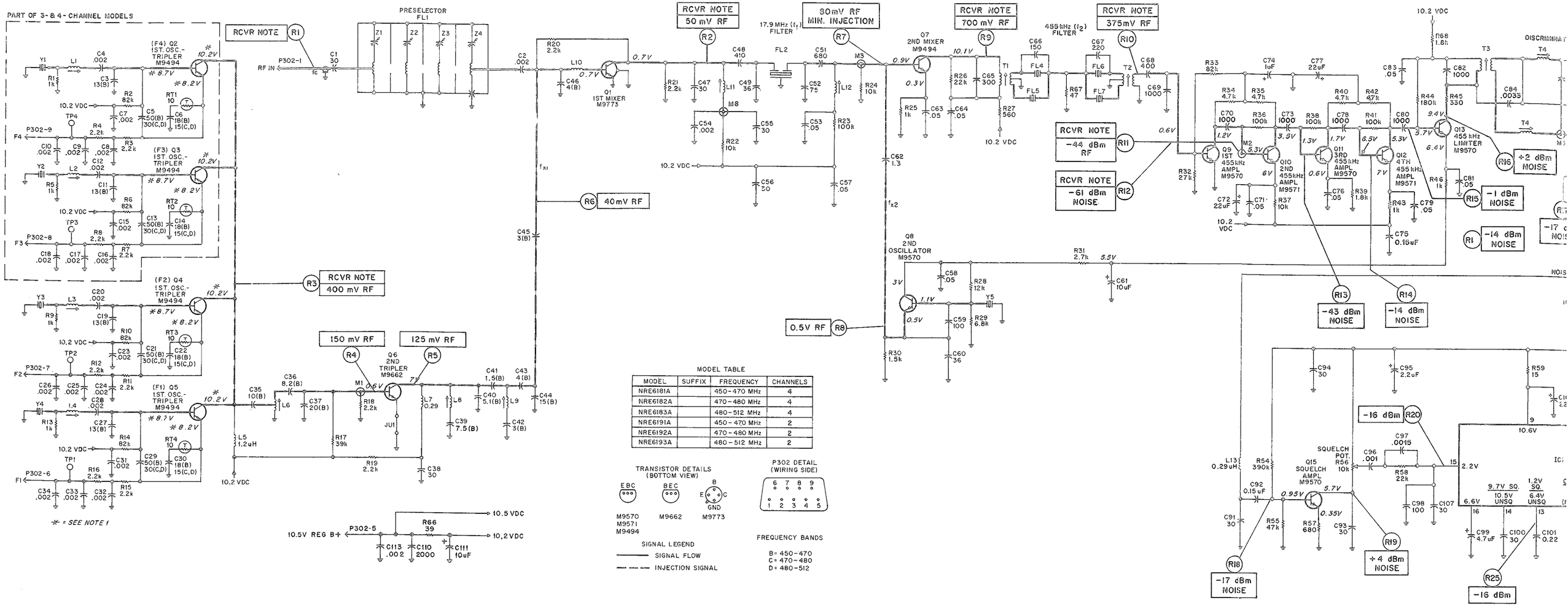
EPF-7598-O

CRYSTAL FREQUENCY TABLE

CARRIER FREQUENCY ($f \times_c$)	1st OSCILLATOR CRYSTAL FREQUENCY ($f \times_1$)	2nd OSCILLATOR CRYSTAL FREQUENCY ($f \times_2$)
450.000 - 456.000 MHz	48.0111 - 48.6777 MHz	18.355 MHz
456.001 - 458.000 MHz	48.6778 - 48.9000 MHz	17.445 MHz
458.001 - 470.000 MHz	48.9001 - 50.2333 MHz	18.355 MHz
470.001 - 484.000 MHz	50.2334 - 51.7888 MHz	17.445 MHz
484.001 - 509.000 MHz	51.7889 - 54.5666 MHz	18.355 MHz
509.001 - 512.000 MHz	54.5667 - 54.9000 MHz	17.445 MHz

EPF-7599-O

450-512 MHz MONITOR RECEIVER SCHEMATIC DIAGRAM



MODEL TABLE

MODEL	SUFFIX	FREQUENCY	CHANNELS
NRE6181A		450-470 MHz	4
NRE6182A		470-480 MHz	4
NRE6183A		480-512 MHz	4
NRE6191A		450-470 MHz	2
NRE6192A		470-480 MHz	2
NRE6193A		480-512 MHz	2

CIRCUIT BOARD NOTES

1. VOLTAGE READINGS ARE TAKEN WITH THE OSCILLATOR RUNNING.
2. SQUELCH IC1 PIN 12, +5.6 VOLTS DC WHEN THRESHOLD SIGNAL JUST OPENS SQUELCH.
3. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, k = 1000;
   CAPACITOR VALUES EQUAL TO OR GREATER THAN ONE (1) ARE IN PICOFARADS (pF) AND VALUES LESS THAN ONE (1) ARE IN MICROFARADS (uF).
4. WHERE MORE THAN ONE COMPONENT VALUE IS SHOWN, (B) IS FOR 450 - 470 MHz RANGE, (C) IS FOR 470 - 480 MHz RANGE, AND (D) IS FOR 480 - 512 MHz RANGE.
5. DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CHASSIS GROUND USING MOTOROLA DC MULTIMETER OR EQUIVALENT.
6. WHERE TWO VOLTAGE VALUES ARE SHOWN, I.E. 2V / 0V
   TOP VALUE IS FOR SQUELCHED OPERATIONAL MODE AND BOTTOM VALUE IS FOR UNSQUELCHED MODE.
7. FREQUENCY LEGEND:
   f_c = CARRIER FREQUENCY (450-512 MHz)
   f_{x1} = 1ST OSCILLATOR CRYSTAL FREQUENCY (48.01-54.90 MHz)
   f_{x2} = 2ND OSCILLATOR CRYSTAL FREQUENCY (17.445-18.355 MHz) (SEE CRYSTAL FREQUENCY TABLE)
   f_1 = HIGH INTERMEDIATE FREQUENCY (17.9 MHz)
   f_2 = LOW INTERMEDIATE FREQUENCY (455 KHz)
   f_c = 9 f_{x1} + 17.9 MHz
   f_1 = f_{x2} + f_2 (FOR f_{x2} = 17.445 MHz)
   f_1 = f_{x2} - f_2 (FOR f_{x2} = 18.355 MHz)

EPF-7597-O

STAGE GAIN MEASUREMENT NOTES

GENERAL
1. 0 dBm = 1 mW INTO 600 OHMS.
2. REFER TO APPLICABLE MONITOR-RECEIVER SCHEMATIC AND MONITOR-RECEIVER GAIN MEASUREMENTS SECTION IN INSTRUCTION MANUAL FOR RECOMMENDED TEST EQUIPMENT AND ADDITIONAL INFORMATION.
3. MAKE THE FOLLOWING MEASUREMENTS:

(R1) CONNECT RF SIGNAL GENERATOR TO RF INPUT AND LEAVE CONNECTED FOR ALL RECEIVER MEASUREMENTS.

(R2) SET RF SIGNAL GENERATOR LEVEL TO 10 mV FOR THIS READING.

(R3) READING WITH ONE OSCILLATOR RUNNING. GROUND TP1, TP2, TP3, OR TP4 AS APPLICABLE.

(R9) (R10) SET RF SIGNAL GENERATOR LEVEL TO 1.0 mV FOR THESE READINGS.

(R11) SET RF SIGNAL GENERATOR LEVEL TO 3.0 uV FOR THIS READING (USE AC VOLTMETER FOR MEASUREMENT).

(R12) thru (R27) SET RF SIGNAL GENERATOR LEVEL TO MINIMUM AND FREQUENCY OFF CHANNEL. FOR SOME OF THESE TEST POINTS THERE IS AN ADDITIONAL REQUIREMENT GIVEN BELOW.

(R19) thru (R25) ADJUST SQUELCH CONTROL FOR FULL SQUELCH.

(R28) SET RF SIGNAL GENERATOR LEVEL TO 1.0 mV AND MODULATE WITH 1 kHz TONE AT 3.3 kHz DEVIATION.

EPF-7598-O

CRYSTAL FREQUENCY TABLE

CARRIER FREQUENCY ($f_x c$)	1st OSCILLATOR CRYSTAL FREQUENCY ($f_x 1$)	2nd OSCILLATOR CRYSTAL FREQUENCY ($f_x 2$)
450.000 - 456.000 MHz	48.0111 - 48.6777 MHz	18.355 MHz
456.001 - 458.000 MHz	48.6778 - 48.9000 MHz	17.445 MHz
458.001 - 470.000 MHz	48.9001 - 50.2333 MHz	18.355 MHz
470.001 - 484.000 MHz	50.2334 - 51.7888 MHz	17.445 MHz
484.001 - 509.000 MHz	51.7889 - 54.5666 MHz	18.355 MHz
509.001 - 512.000 MHz	54.5667 - 54.9000 MHz	17.445 MHz

EPF-7599-O

450-512 MHz MONITOR RECEIVER SCHEMATIC DIAGRAM

Receiver Kits:
NRE6181A 450-470 MHz 4-Freq. (B)
NRE6182A 470-480 MHz 4-Freq. (C)
NRE6183A 480-512 MHz 4-Freq. (D)
NRE6191A 450-470 MHz 2-Freq. (B)
NRE6192A 470-480 MHz 2-Freq. (C)
NRE6193A 480-512 MHz 2-Freq. (D)

PLF-1169-O

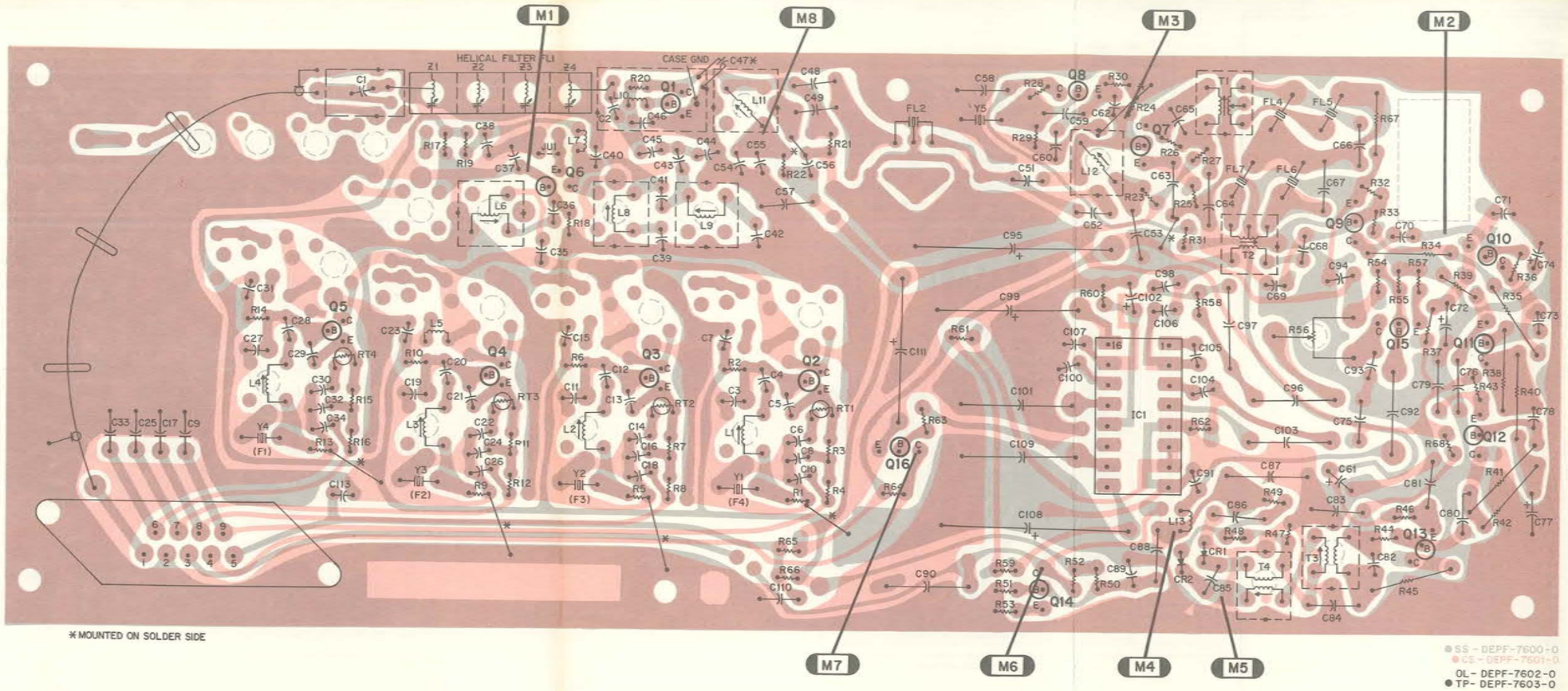
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: pF ±10% 75 V; N150 unless stated
C1	2182358G95	30; N750
C2	2182213E21	.002 uF -20+100%
C3	2184511B41	13; 50 V (B)
C4	2182213E21	.002 uF -20+100%
C5	2182877B03	50; N750 (B)
	or 2182358G95	30; N750 (C, D)
C6	2182877B39	18; N750 (B)
	or 2100859203	15 ±5%; N750 (C, D)
C7 thru 10	2182213E21	.002 uF -20+100%
C11	2184511B41	13; 50 V (B)
C12	2182213E21	.002 uF -20+100%
C13	2182877B03	50; N750 (B)
	or 2182358G95	30; N750 (C, D)
C14	2182877B39	18; N750 (B)
	or 2100859203	15 ±5%; N750 (C, D)
C15 thru 18	2182213E21	.002 uF -20+100%
C19	2184511B41	13; 50 V (B)
C20	2182213E21	.002 uF -20+100%
C21	2182877B03	50; N750 (B)
	or 2182358G95	30; N750 (C, D)
C22	2182877B39	18; N750 (B)
	or 2100859203	15 ±5%; N750 (C, D)
C23 thru 26	2182213E21	.002 uF -20+100%
C27	2184511B41	13; 50 V (B)
C28	2182213E21	.002 uF -20+100%
C29	2182877B03	50; N750 (B)
	or 2182358G95	30; N750 (C, D)
C30	2182877B39	18; N750 (B)
	or 2100859203	15 ±5%; N750 (C, D)
C31	2182213E09	.002 uF ±5%
C32, 33, 34	2182213E21	.002 uF -20+100%
C35	2184511B85	10 ±0.25 pF; 50 V (B)
C36	2184511B07	8.2 ±1 pF; 50 V (B)
C37	2100861432	20 (B)
C38	2182358G96	30
C39	2100861428	6 (B)
C40	2184511B06	5.1 ±0.5 pF; 50 V; NPO (B)
C41	2182450B27	1.5; 500 V (B)
C42	2184511B70	3 ±0.25 pF; 50 V; NPO (B)
C43	2100861427	4 ±0.5 pF (B)
C44	2100861462	15 (B)
C45	2100861603	3.3 ±0.25 pF; NPO (B)
C46	2100861427	4 ±0.5 pF (B)
C47	2182358G96	30
C48	2183596E06	410 ±5%; 250 V; Y5D
C49	2184511B17	36; 50 V
C51	2183162H13	680; 100 V; NPO
C52	2184511B22	75; 50 V
C53	2182372C07	.05 uF -20+80%; 25 V; Y5U
C54	2182213E21	.002 uF -20+100%
C55, 56	2182358G96	30
C57, 58	2182372C07	.05 uF -20+80%; 25 V; Y5U
C59	2182358G93	100; N750
C60	2100861433	36
C61	2383441B27	10 uF ±20%; 15 V
C62	2184511B33	1.3 ±0.25 pF; 50 V; NPO
C63, 64	2182372C07	.05 uF -20+80%; 25 V; Y5U
C65	0882163J06	300 ±5%; 63 V
C66	2184511B26	150; 50 V
C67	2184511B49	220; 50 V; N750
C68	0882163J07	400 ±5%; 63 V
C69, 70	2182213E08	1000 ±5%; 100 V; Y5D
C71	2184008H13	.05 ±20%; 25 V; Y5R
C72	2323441B28	22 uF ±20%; 15 V
C73	2182213E08	1000 ±5%; 100 V; Y5D
C74	2383441B29	1 uF ±20%; 20 V
C75	2184008H03	0.15 uF -20+80%; 200 V
C76	2182372C07	.05 ±20%; 25 V; Y5R
C77	2383441B28	22 uF ±20%; 15 V
C78	2182213E08	1000 ±5%; 100 V; Y5D
C79	2182372C07	.05 ±20%; 25 V; Y5R
C80	2182187B14	1000; 100 V
C81	2182372C07	.05 ±20%; 25 V; Y5R
C82	2182213E08	1000 ±5%; 100 V; Y5D
C83	2182372C07	.05 ±20%; 25 V; Y5R
C84	2182428B10	.0033 uF; 100 V; X5R
C85	0882163J09	2000 ±5%; 33 V
C86	2182428B36	.002 uF; 200 V; Y5R
C87	0882096J14	.015 uF; 250 V
C88	2182428B62	.01 uF -20+80%; 200 V; X5U9
C89	2182358G96	30
C90	0882096J04	.047 uF; 250 V
C91	2182358G96	30
C92	0882905G05	.15 uF; 50 V
C93, 94	2182358G96	30
C95	2382256J08	22 uF -10 +50%; 40 V
C96	0882096J16	.001 uF; 250 V
C97	0882096J06	.0015 uF; 250 V
C98	2184511B01	100; 50 V; N750
C99	2382256J07	4.7 uF -10+50%; 63 V
C100	2184511B86	30 ±5%; 100 V; N470
C101	0882905G12	0.22 uF; 50 V
C102	2384762H08	3.9 uF ±20%; 15 V
C103	0882905G01	.01 uF; 50 V
C104	2183162H24	650 ±5%; 50 V; NPO
C105	2182213E08	1000 ±5%; 100 V; Y5D
C106	2184511B01	100; 50 V; N750
C107	2182358G96	30
C108	2382256J08	22 uF -10+50%; 40 V
C109	0882905G12	0.22 uF; 50 V
C110	2182213E09	2000 ±5%; 100 V; Y5D
C111	2382256J03	10 uF -10+50%; 25 V
C112	2182358G95	30; N750
C113	2182213E21	.002 uF -20+100%
		DIODE: See Note 1
CR1, 2	4882139G01	Germanium
		FILTER: See Note 2
FL1	0105951C98	Helical, Preselector; includes TUNING SCREW 0305701B01 (B, C)
	or 0105952C01	Helical, Preselector; includes TUNING SCREW 0305701B01 (D)
FL2	4805712B01	17.9 MHz
FL4	4883192C22	Series Resonant Freq. 459.4 kHz
FL5	4883192C13	Series Resonant Freq. 450.3 kHz
FL6	4883192C22	Series Resonant Freq. 459.4 kHz
FL7	4883192C13	Series Resonant Freq. 450.3 kHz
		INTEGRATED CIRCUIT:
IC1	5184267A09	Squelch Detector
		COIL, RF: unless stated
L1 thru 4	2482827J10	Coded: BRN, 9-3/4 turns; includes: 7682451B02 CORE
L5	2482723H01	1.2 uH choke
L6	2405636B02	Coded: RED, 5-3/4 turns, 2-1/4 tap; includes: 7682451B04 CORE
L7	2482723H20	0.29 uH choke
L8	2484237H02	2-1/4 turns, #20 AWG wire
L9	2484237H01	4-1/4 turns, #20 AWG wire
L10	2482723H02	.039 uH choke
L11, 12	2405262E06	Coded: YEL, 22-1/2 turns, includes: 7605374B02 CORE
L13	2482723H20	0.29 uH choke
		PLUG:
P302		See NONREFERENCED ITEMS
		TRANSISTOR: See Note 1
Q1	4800869773	NPN; type M9773
Q2 thru 5	4800869494	NPN; type M9494
Q6	4800869662	NPN; type M9662
Q7	4800869494	NPN; type M9494
Q8, 9	4800869570	NPN; type M9570
Q10	4800869571	PNP; type M9571
Q11	4800869570	NPN; type M9570
Q12	4800869571	PNP; type M9571
Q13 thru 16	4800869570	NPN; type M9570

		RESISTOR, Fixed: ohm ±5% 1/4 W unless stated
R1	0600124A49	1 k
R2	0600124A95	82 k
R3, 4	0600124A57	2.2 k
R5	0600124A49	1 k
R6	0600124A95	82 k
R7, 8	0600124A57	2.2 k
R9	0600124A49	1 k
R10	0600124A95	82 k
R11, 12	0600124A57	2.2 k
R13	0600124A49	1 k
R14	0600124A95	82 k
R15, 16	0600124A57	2.2 k
R17	0600124A87	39 k
R18 thru 21	0600124A57	2.2 k
R22	0600124A73	10 k
R23	0600124A97	100 k
R24	0600124A73	10 k
R25	0600124A49	1 k
R26	0600124A81	22 k
R27	0600124A43	560
R28	0600124A75	12 k
R29	0600124A69	6.8 k
R30	0600124A53	1.5 k
R31	0600124A59	2.7 k
R32	0600124A83	27 k
R33	0600124A95	82 k
R34, 35	0600124A65	4.7 k
R36	0600124A97	100 k
R37	0600124A73	10 k
R38	0600124A97	100 k
R39	0600124A55	1.8 k
R40	0600124A65	4.7 k
R41	0600124A97	100 k
R42	0600124A65	4.7 k
R43	0600124A49	1 k
R44	0600124B04	180 k
R45	0600124A37	330
R46	0600124A49	1 k
R47, 48	0600124A83	27 k
R49	0600124A65	4.7 k
R50	0600124B12	390 k
R51	0600124A89	47 k
R52	0600124A73	10 k
R53	0600124A57	2.2 k
R54	0600124B12	390 k
R55	0600124A89	47 k
R56	1884944C03	Pot. 10 k
R57	0600124A45	680
R58	0600124A81	22 k
R59	0600124A05	15
R60	0600124B04	180 k
R61	0600124A97	100 k
R62	0600124A83	27 k
R63	0600124A89	47 k
R64	0600124A79	18 k
R65	0600124A19	56
R66	0600124A15	39
R67	0600124A17	47
R68	0600124A55	1.8 k
		THERMISTOR:
RT1 thru 4	0682769A01	10 ohm ±10%
		TRANSFORMER:
T1, 2	2482045J07	455 kHz
T3	2484235H02	Coil, Coded: CLEAR, pri: 6 turns, sec.: 170 turns
T4	2484235H01	Coil, Coded: GRN, pri: 48 turns, sec: 48 turns
		CRYSTAL: See Note 2
Y1 thru 4	KXN6054A	48.011 - 54.900 MHz
Y5	KXN6116AA	2nd Oscillator Crystal; 17.445 MHz or 18.355 MHz; YNR

NONREFERENCED ITEMS

	0105953C99	ASSEMBLY, Bracket & Connector; includes: CONNECTOR (P302) 2882846E02 BRACKET 0705121D01 SCREW 0300136772
	0300001926	SCREW
	1405525D01	INSULATOR, Pad; for T1 & T2
	1405798B01	INSULATOR, Pad; for Q1
	2605654B01	SHIELD, for Q1
	2605650B01	SHIELD, for FL1 & C1
	2605820D05	SHIELD, for L11 & L12
	2684800H01	SHIELD, for L8 & L9
	2684800H07	SHIELD, for L6
	4284452H02	CLAMP, Plastic
	7505295B01	PAD, Crystal; for FL2
	7683419G02	CORE, for L8 & L9
	8405507E01	CIRCUIT BOARD

NOTES:
1. For optimum performance, order replacement diodes and transistors by Motorola part number only.
2. When ordering crystal units, specify carrier frequency(s), crystal frequency(s), and crystal type (part number).



*MOUNTED ON SOLDER SIDE

SS - DEPF-7600-O
CS - DEPF-7601-O
OL - DEPF-7602-O
TP - DEPF-7603-O

*TEMPERATURE CHARACTERISTIC CHART

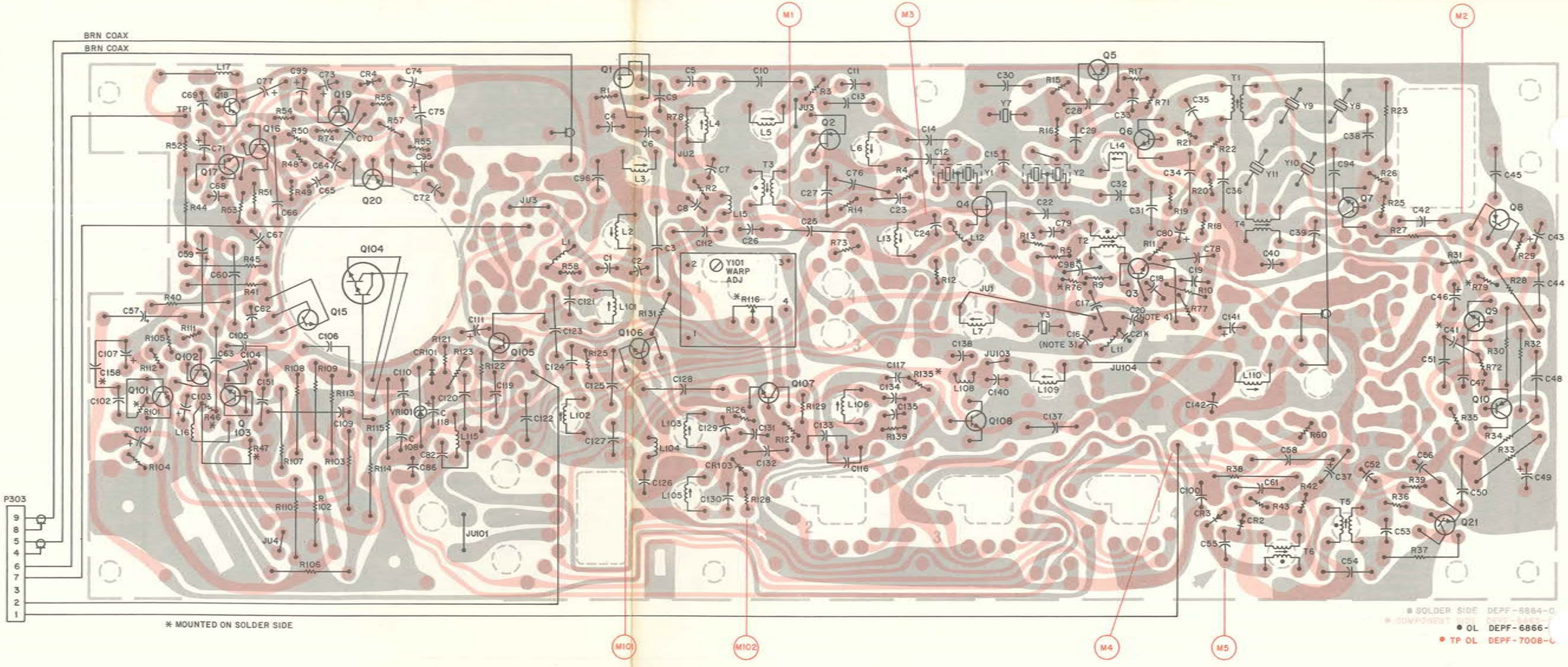
TEMPERATURE RANGE	MAXIMUM CAPACITY CHANGE OVER TEMPERATURE RANGE	
G5 = -20°C to +85°C	Suffix A = ±1.0%	Suffix P = ±10.0%
W5 = -35°C to +110°C	Suffix B = ±1.5%	Suffix R = ±15.0%
X5 = -35°C to +85°C	Suffix C = ±2.2%	Suffix S = ±22.0%
Y5 = -30°C to +85°C	Suffix D = ±3.3%	Suffix T = +22-33%
Z5 = +10°C to +85°C	Suffix E = ±4.7%	Suffix U = +22-56%
	Suffix F = ±7.5%	Suffix V = +22-82%

EPF-5275-O

450-512 MHz MONITOR RECEIVER CIRCUIT BOARD DETAIL AND PARTS LIST

Transmitter-Receiver Circuit Board PLF-1077-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: pF ±10%; 50 V unless stated
C1	2182358G85	1.9 ±0.1 pF
C2	2184511B75	5.6 ±0.25 pF
C3	2182450B21	0.39; 500 V
C4	2184511B70	3 ±0.25 pF
C5	2184511B01	100
C6	2182358G77	1 ±0.1 pF
C7	2184511B65	20 ±5%
C8	2184511B01	100
C9	2184511B09	15
C10	2182450B21	0.39; 500 V
C11	2184511B36	3.9 ±0.25 pF
C12	2184511B74	300
C13	2182372C07	.05 uF +80-20%; 25 V
C14	2184511B47	150
C15	2184511B06	5.1 ±0.5 pF
C16	2184511B84	7.5 ±0.25 pF
C17	2184511B27	220
C18	2184511B51	51
C19	2184511B12	27
C20	2184511B36	3.9 ±0.25 pF
C21	2184511B41	13
C22	2184511B83	33 ±5%
C23	2184511B01	100
C24	2184511B84	7.5 ±0.25 pF
C25	2182450B24	0.47
C26	2184511B85	10 ±0.25 pF
C27	2182428B36	.002 uF; 200 V
C28	2184511B25	120
C29	2184511B13	33
C30, 31	2182372C07	.05 uF +80-20%; 25 V
C32	2182358G12	100 ±5%; 100 V
C33	2184511B33	1.3 ±0.25 pF
C34	2182372C07	.05 uF +80-20%; 25 V
C35	0882163J06	300 ±5%; 63 V
C36	2182372C07	.05 uF +80-20%; 25 V
C37	2383441B27	10 uF ±20%; 15 V; tantalum
C38	2184511B26	150
C39	0882163J07	400 ±5%; 63 V
C40	2182213E08	.001 uF ±5%; 100 V
C41	2184008H03	0.15 uF +80-20%
C42	2182187B14	.001 uF; 100 V
C43	2383441B29	1 uF ±20%; 20 V
C44	2182187B14	.001 uF; 100 V
C45	2182372C07	.05 uF +80-20%; 25 V
C46	2383441B28	22 uF
C47	2182372C07	.05 uF +80-20%; 25 V
C48	2182187B14	.001 uF
C49	2383441B28	22 uF
C50	2182213E08	.001 uF ±5%; 100 V
C51, 52	2182372C07	.05 uF +80-20%; 25 V
C53	2182213E08	.001 uF ±5%; 100 V
C54	2182428B10	.0033 uF; 100 V
C55	0882163J09	.002 uF ±5%; 33 V
C56	2182372C07	.05 uF +80-20%; 25 V
C57, 58	0882096J14	.015 uF; 250 V
C59, 60	0882096J19	.0068 uF; 250 V
C61	2182428B36	.002 uF; 200 V
C62	2184511B01	100
C63	2184008H04	.0082 uF
C64	2383441B27	10 uF ±20%; 15 V
C65	2184511B01	100
C66, 67	2383441B29	1 uF ±20%; 20 V; tantalum
C68, 69	2184511B01	100
C70	0882096J07	.0056; 250 V
C71	2383441B13	47 ±20%; 6 V
C72	2184511B01	100
C73	2383441B20	0.1 uF ±20%; 35 V
C74	2100861442	.002 uF
C75	2383441B31	22 uF ±20%; 20 V
C76	2184511B01	100
C77	2383441B32	47 uF ±20%; 20 V
C78	2182428B36	.002 uF
C79	2184511B78	15 ±5%
C80	2383441B27	10 uF ±20%; 15 V
C94	2184511B49	220
C95	2383441B20	0.1 uF ±20%; 35 V
C96	2184511B01	100
C98	2100861442	.002 uF
C99	2383441B18	4.7 uF ±20%; 20 V
C100	2184511B01	100
C101	2383441B06	0.22 uF ±20%; 20 V
C102	2184511B01	100
C103	2383441B06	0.22 ±20%; 20 V
C104	2184511B01	100
C105, 106	0882096J03	.01 uF
C107	2383441B28	22 uF ±20%; 15 V
C108	2184511B01	100
C109	0882096J01	.0033 uF; 250 V
C110	2184511B01	100
C111	2383441B06	0.22 uF ±20%; 20 V
C112	2182372C07	.05 uF +80-20%; 25 V
C116	2184511B01	100
C117	2100861442	.002 uF; 75 V
C118	2383441B28	22 uF ±20%; 15 V
C119	2182133G03	100 ±5%; 500 V
C120	2100840812	200 ±5%; 500 V
C121	2184511B43	43
C122	2100832501	.01 uF
C123	2182450B27	1.5; 500 V
C124	2184511B20	68
C125	2184511B24	100
C126	2184511B15	47
C127	2184511B01	100
C128	2182428B36	.002 uF; 200 V
C129	2184511B31	1 ±0.25 pF
C130	2184511B42	24
C131	2182877B19	15 ±5%; 75 V
C132	2184511B23	91
C133	2184511B01	100
C134	2182877B47	12; 75 V
C135	2184511B78	15
C137	2182213E12	.01 uF ±20%; 100 V
C138	2100861442	.002 uF; 75 V
C140	2184511B73	10
C141	2383441B28	22 uF ±20%; 15 V
C142	2184511B78	15
C151	2184511B01	100
C158	2100861437	100
		DIODE: See Note I
CR2, 3	4882139G01	Germanium
CR4, 101	4882392B03	Silicon
CR103	4882392B12	Silicon
		COIL:
L1	2482723H01	Choke, 1.2 uH
L2 thru 5	2482827J09	Coded: BLU, 5-1/4 turns, includes 7682451B04 CORE
L6	2482827J08	Coded: GRN, 36-3/4 turns, closewound; includes 7600861425 CORE
L7	2482827J10	Coded: BRN, 9-3/4 turns, closewound, includes 7682451B02 CORE
L11, 12	2482723H05	Choke, 0.41 uH
L13	2482827J09	Coded: BLU, 5-1/4 turns, includes 7682451B04 CORE
L14	2482827J08	Coded: GRN, 36-3/4 turns, closewound; includes 7600861425 CORE
L15, 16, 17	2482723H01	Choke, 1.2 uH
L101, 102	2482827J01	Coded: GRAY, 8-1/4 turns, closewound; includes 7600861425 CORE
L103	2482827J07	Coded: RED, 7-3/4 turns, closewound; includes 7600861425 CORE
L104	2482723H06	Choke, 6.2 uH
L105	2482827J02	Coded: GRN, 5-1/4 turns, includes 7600861425 CORE
L106	2432827J03	Coded: BRN, 2-3/4 turns, includes 7600861425 CORE
L108	2482723H01	Choke, 1.2 uH
L109, 110	2482827J05	Coded: YEL; 4-3/4 turns, includes 7682451B04 CORE
L115	7683960B03	Bead, Coded: WHT
		PLUG:
P303	2882846E02	Connector, 9-pin

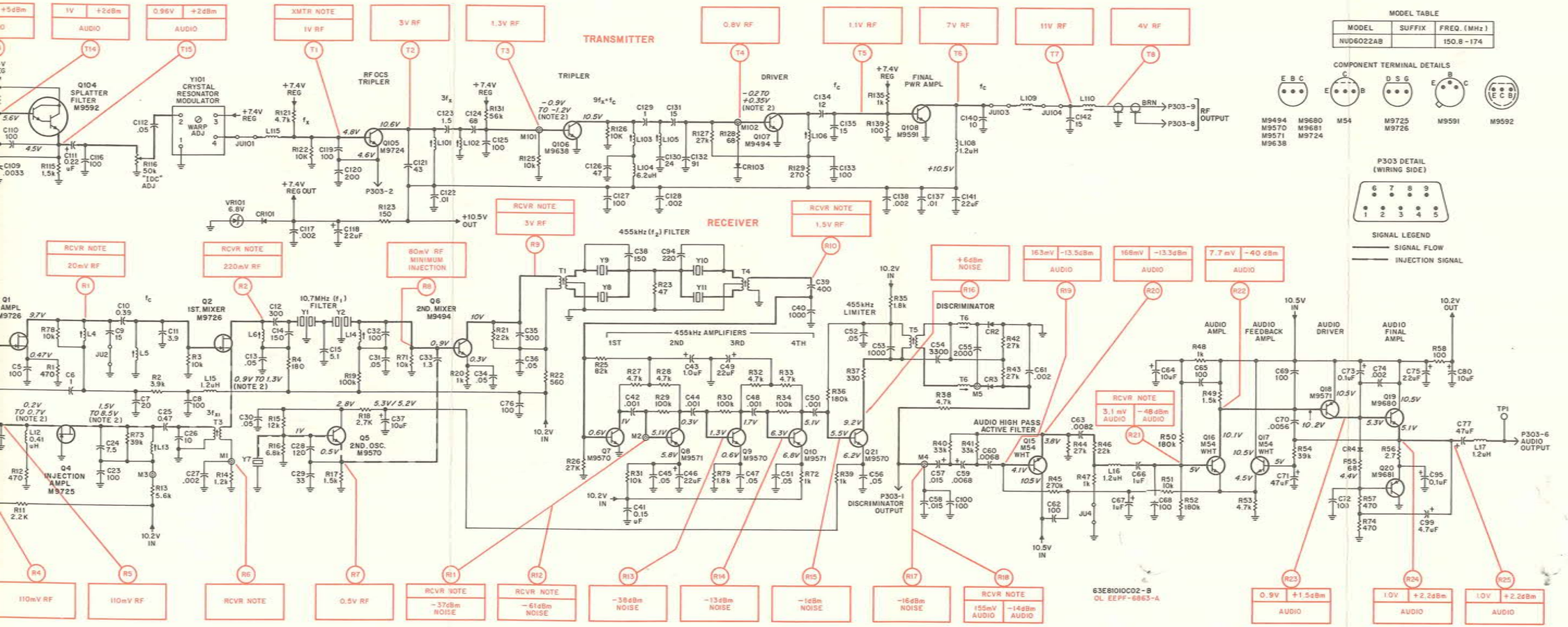


		TRANSISTOR: See Note I
Q1, 2	4800869726	N-Channel FET, type M9726
Q3	4800869494	NPN; type M9494
Q4	4800869725	N-Channel FET, type M9725
Q5	4800869570	NPN; type M9570
Q6	4800869494	NPN; type M9494
Q7	4800869570	NPN; type M9570
Q8	4800869571	PNP; type M9571
Q9	4800869570	NPN; type M9570
Q10	4800869571	PNP; type M9571
Q15, 16, 17	4800134674	NPN; type M54 (wht dot)
Q18	4800869571	PNP; type M9571
Q19	4800869680	NPN; type M9680
Q20	4800869681	PNP; type M9681
Q21	4800869570	NPN; type M9570
Q101, 102, 103	4800134667	NPN; type M54 (grn dot)
Q104	4800869592	NPN; type M9592
Q105	4800869724	NPN; type M9724
Q106	4800869638	NPN; type M9638
Q107	4800869494	NPN; type M9494
Q108	4800869591	NPN; type M9591
		RESISTOR, Fixed: ohms ±5%; 1/4 W unless stated
R1	0600124A41	470
R2	0600124A63	3.9 k
R3	0600124A73	10 k
R4	0600124A31	180
R5	0600124A47	820
R9	0600124A79	18 k
R10, 11	0600124A57	2.2 k
R12	0600124A41	470
R13	0600124A67	5.6 k
R14	0600124A51	1.2 k
R15	0600124A75	12 k
R16	0600124A69	6.8 k
R17	0600124A53	1.5 k
R18	0600124A59	2.7 k
R19	0600124A97	100 k
R20	0600124A49	1 k
R21	0600124A81	22 k
R22	0600124A43	560
R23	0600124A17	47
R25	0600124A95	82 k
R26	0600124A83	27 k
R27, 28	0600124A65	4.7 k
R29	0600185A97	100 k; 1/8 W
R30	0600124A97	100 k
R31	0600124A73	10 k
R32, 33	0600124A65	4.7 k
R34	0600124A97	100 k
R35	0600124A55	1.8 k
R36	0600124B04	180 k
R37	0600124A37	330
R38	0600124A65	4.7 k
R39	0600124A49	1 k
R40, 41	0600124A85	33 k
R42, 43, 44	0600124A83	27 k
R45	0600124B08	270 k
R46	0600185B95	22 k ±10%; 1/8 W
R47, 48	0600185A49	1 k; 1/8 W
R49	0600185A53	1.5 k; 1/8 W
R50	0600185B04	180 k; 1/8 W
R51	0600124A73	10 k
R52	0600185B04	180 k; 1/8 W
R53	0600124A65	4.7 k
R54	0600124A87	39 k
R55	0600185A21	68; 1/8 W
R56	0600124D55	2.7 ±10%
R57	0600185A41	470; 1/8 W
R58	0600124A25	100
R71	0600124A73	10 k
R72	0600124A49	1 k
R73	0600124A87	39 k
R74	0600185A41	470; 1/8 W
R76	0600185B95	22 k ±10%; 1/8 W
R77	0600185B55	10 ±10%; 1/8 W
R78	0600185B91	10 k ±10%; 1/8 W
R79	0600185B82	1.8 k; ±10%; 1/8 W
R101	0600185A95	82 k; 1/8 W
R102	0600124A75	12 k
R103	0600124A65	4.7 k
R104	0600124A33	220
R105	0600124A61	3.3 k
R106	0600124A75	12 k
R107	0600124A73	10 k
R108, 109	0600124A71	8.2 k
R110	0600124A47	820
R111	0600124A37	330
R112	0600124A59	2.7 k
R113	0600124A71	8.2 k
R114	0600124A85	33 k
R115	0600124A53	1.5 k
R116	1805923C02	Var. 50 k; 1/2 W @70°C
R120	0600124A61	3.3 k
R121	0600124A65	4.7 k
R122	0600124A73	10 k
R123	0600124A29	150
R125, 126	0600124A73	10 k
R127	0600124A83	27 k
R128	0600124A21	68
R129	0600124A35	270
R131	0600124A91	56 k
R135	0600185A49	1 k; 1/8 W
R139	0600124A25	100
		TRANSFORMER:
T1	2482045J07	Output; 455 kHz
T2, 3	2482827J11	Coded: YEL, pri: 5-1/4 turns; sec: 2-1/4 turns
T4	2482045J07	Output; 455 kHz
T5	01V05957A62	Clear Form, pri: 6 turns; sec: 170 turns
T6	01V05957A64	Grn Form, pri: 48 turns; sec: 48 turns
		DIODE: See Note I
VR101	4883696E01	6.8 V Zener
		CRYSTAL, Quartz: See Note II
Y1, 2	4884895A01	Coupled Resonator (FYB)
Y3	KXN6034A	150.8-174 MHz
Y7	4884806C01 or 4884806C02	YNZ 10.245 MHz YNZ 11.155 MHz
Y8	4883192C13	Resonator (450.3 kHz)
Y9, 10	4883192C22	Resonator (459.4 kHz)
Y11	4883192C13	Resonator (450.3 kHz)
Y101	KXN1013B	150.8-174 MHz, includes: transmitter control crystal, modulator diode, and compensation components (field replacement of these components not recommended)
	NONREFERENCED ITEMS	
	2683379H01	HEATSINK (for Q108)
	7684800H14	SHIELD, Coil
	7505295B01	PAD, Insulator (for Y1-Y2)
	1482392E05	INSULATOR
	1400861196	INSULATOR (for Q108)
	0705121D01	BRACKET, Connector; for P303

NOTES:

I. For optimum performance, order replacement diodes and transistors by Motorola part number only.

II. When ordering crystal units, specify carrier frequency(s), crystal frequency(s), and crystal type number. Proper oscillator frequency and crystal type will be found stamped on crystal can.



MODEL TABLE

MODEL	SUFFIX	FREQ. (MHz)
NUD6022AB		150.8 - 174

COMPONENT TERMINAL DETAILS

P303 DETAIL (WIRING SIDE)

SIGNAL LEGEND

SIGNAL FLOW

INJECTION SIGNAL

TRANSMITTER-RECEIVER SCHEMATIC DIAGRAM

SCHEMATIC AND CIRCUIT BOARD NOTES

1. VOLTAGE VARIES WITH FREQUENCY AND DRIVE.
2. CAPACITOR C16 USED ON 150.8 TO 167 MHz MODELS; REMOVED ON 167 TO 174 MHz MODELS.
3. CAPACITOR C20 USED ON 150.8 TO 160 MHz AND 167 TO 174 MHz MODELS; REMOVED ON 160 TO 167 MHz MODELS.
4. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE ON OHMS, k = 1000.
   ALL CAPACITOR VALUES EQUAL TO OR GREATER THAN 1 ARE IN PICOFARADS (pF), AND VALUES LESS THAN 1 ARE IN MICROFARADS (uF).
5. DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CHASSIS GROUND USING MOTOROLA DC MULTIMETER OR EQUIVALENT.
6. WHERE 2 VOLTAGE VALUES ARE SHOWN, i.e. $\frac{10\ V}{12\ V}$,
   TOP VALUE IS FOR UNSQUELCHED OPERATIONAL MODE, AND BOTTOM VALUE IS FOR SQUELCHED MODE.
7. CIRCUIT BOARD LEGEND:
   P9 ↑ INDICATES CIRCUIT BOARD PIN CONNECTION (NUMBER ARBITRARY)
   (B) INDICATES WIRE OR PLATING CONNECTION (LETTER ARBITRARY)
   * INDICATES COMPONENT MOUNTED ON SOLDER SIDE.
8. FREQUENCY LEGEND:
   GENERAL
   f_c = CARRIER FREQUENCY (150.8-174 MHz)
   TRANSMITTER
   f_x = CRYSTAL FREQUENCY (16.7-19.5 MHz)
   $f_c = 9f_x$, $f_x = \frac{f_c}{9}$
   RECEIVER
   f_{x1} = 1ST OSCILLATOR CRYSTAL FREQUENCY (46.700 - 54.433 MHz)
   f_{x2} = 2ND OSCILLATOR CRYSTAL FREQUENCY (10.245 - 11.155 MHz)
   SEE TABLE 1
   f_1 = HIGH INTERMEDIATE FREQUENCY (10.7 MHz)
   f_2 = LOW INTERMEDIATE FREQUENCY (455 kHz)
   $f_c = 3f_{x1} + 10.7\ MHz$, $f_{x1} = \frac{f_c - 10.7\ MHz}{3}$
   $f_1 = f_2 + f_{x2}$ (for $f_{x2} = 10.245$ MHz)
   $f_1 = f_{x2} - f_2$ (for $f_{x2} = 11.155$ MHz)

EPF-6867-B

CRYSTAL FREQUENCY TABLE

CARRIER FREQ (f_c)	1ST OSC CRYSTAL FREQ (f_{x1})	2ND OSC CRYSTAL FREQ (f_{x2})
150.8 - 153.3 MHz	46.7 - 47.533 MHz	10.245 MHz
153.33 - 154.8 MHz	47.543 - 48.033 MHz	11.155 MHz
154.83 - 162.69 MHz	48.043 - 50.663 MHz	10.245 MHz
162.72 - 166.2 MHz	50.673 - 51.833 MHz	11.155 MHz
166.23 - 174 MHz	51.843 - 54.433 MHz	10.245 MHz

EPF-5723-O

STAGE GAIN MEASUREMENT NOTES

1. 0 dBm = 1 mW INTO 600 OHMS.
2. CIRCUIT BOARD PLATING SHOWN IN SIDE OPPOSITE THE COMPONENTS.
3. TRANSMITTER MEASUREMENTS TAKEN WITH PTT SWITCH KEYED.
4. REFER TO APPLICABLE TRANSMITTER AND RECEIVER GAIN MEASUREMENTS SECTION IN INSTRUCTION MANUAL FOR RECOMMENDED TEST EQUIPMENT AND ADDITIONAL INFORMATION.

TRANSMITTER:

(T1) → (T8) TAKE MEASUREMENTS WITH TRANSMITTER ALIGNED PER TRANSMITTER ALIGNMENT PROCEDURE.

(T9) CONNECT AUDIO OSCILLATOR TO PIN 7 OF P303 AND ADJUST OUT LEVEL FOR -45 dBm AT 1 kHz. READ LEVELS AT TEST POINTS.

(T10) - (T15)

RECEIVER:

CONNECT RF SIGNAL GENERATOR TO EXTERNAL ANTENNA JACK ON "PACeRT" RADIO AND LEAVE CONNECTED FOR ALL RECEIVER MEASUREMENTS.

(R1) (R2) SET RF SIGNAL GENERATOR LEVEL TO 10 mV FOR THESE READINGS.

(R6) SHORT Q3 (1ST OSC.) BASE TO GROUND WITH A 0.002 uF CAPACITOR. THE CHANGE IN VOLTAGE AT (R6) SHOULD BE GREATER THAN 0.05 V DC.

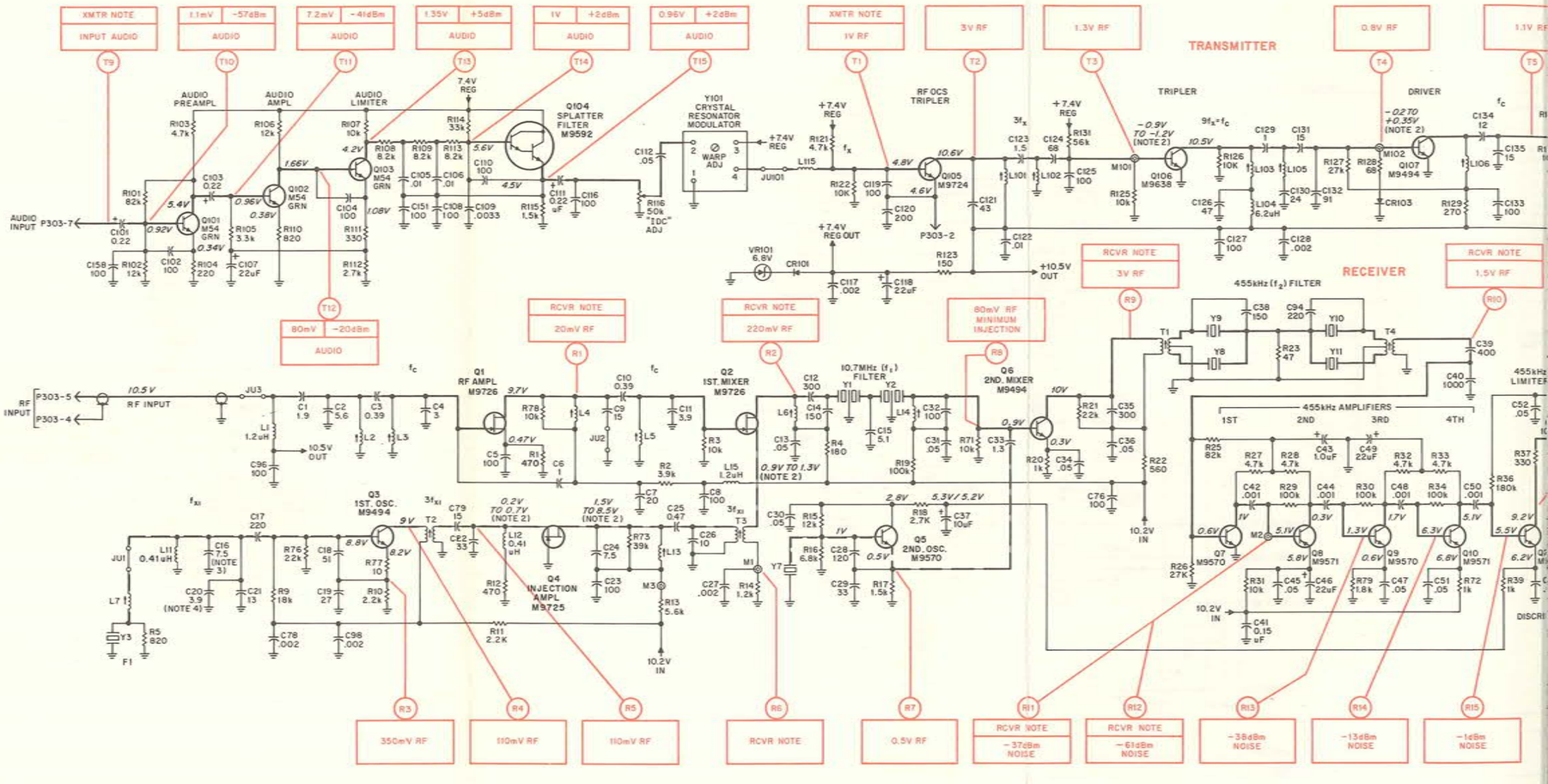
(R9) (R10) SET RF SIGNAL GENERATOR LEVEL TO 1.0 mV FOR THESE READINGS.

(R11) SET RF SIGNAL GENERATOR LEVEL TO 3.0 uV FOR THIS READING (USE AC VOLTMETER FOR MEASUREMENT).

(R12) → (R17) SET RF SIGNAL GENERATOR LEVEL TO MINIMUM AND FREQUENCY TO OFF CHANNEL. FOR SOME OF THESE TEST POINTS THERE IS AN ADDITIONAL REQUIREMENT GIVEN BELOW.

(R18) → (R25) SET RF SIGNAL GENERATOR LEVEL TO 1.0 mV AND MODULATE WITH 1 kHz TONE AT 3.3 kHz DEVIATION.

EPF-6869-A



SCHEMATIC NOTES

NOTES:

1. WHEN USED WITH B+ SWITCHING MOBILE RADIOS, REPLACE CR302 WITH A JUMPER.
2. USED FOR MOBILE "PL" OPERATION ONLY.
3. CONNECT JUMPER JU2 FROM POINT "H" TO "K" FOR MOTOROLA AND OTHER GROUND SWITCHING MOBILES.
   CONNECT JUMPER JU2 FROM POINT "H" TO "J" FOR B+ SWITCHING MOBILE RADIOS.
4. CONNECT R552 FROM POINT 1 TO 5 FOR MOBILE TRANSMITTER AND "PAC•RT" TRANSMITTER TIME-OUT-TIMER OPERATION.
   CONNECT R552 FROM POINT 1 TO 3 FOR "PAC•RT" TRANSMITTER TIME-OUT-TIMER OPERATION.
   CONNECT R552 FROM POINT 1 TO 2 FOR MOBILE TRANSMITTER TIME-OUT-TIMER OPERATION.
   CONNECT R552 FROM POINT 1 TO 4 FOR OPERATION WITHOUT TIME-OUT-TIMER.
5. ADD JUMPERS JU502 AND JU503 AND CUT COMPONENT SIDE PLATING AT U6A AND U18A WHEN NOT USING "INHIBIT SINGLE-TONE TRANSMISSION" OPTION.
6. UNLESS OTHERWISE STATED:
   RESISTOR VALUES ARE IN OHMS, k = 1000;
   CAPACITOR VALUES ARE IN MICROFARADS (uF);
   INDUCTOR VALUES ARE IN HENRYS (H).
7. WHERE COMPONENTS ARE FREQUENCY SENSITIVE, "V" AND "U" ARE USED. "V" DESIGNATES COMPONENT VALUE FOR 150.8-174 MHz RANGE AND "U" IS FOR 450-470 MHz RANGE.
8. ALL LOGIC IC CIRCUITRY IS 500 LEVEL REFERENCE SYMBOL DESIGNATION.
9. LEGEND:
   - * INSTALLED FOR B+ SWITCHING ONLY.
   - ** INSTALLED FOR GROUND SWITCHING ONLY.
   - Δ INSTALLED FOR TWO-FREQUENCY SIMPLEX CHANNEL ONLY.
   - ΔΔ INSTALLED FOR "PL" CHANNEL S ONLY.

EPF-6861-B

"PAC•RT" "PL" AND MOBILE "PL" TEST MEASUREMENTS

PROBE POINT	DC VOLTS	AC VOLTS		
	DECODE	DECODE		
	VOLTS	mV	dBm	
BASE OF Q329/Q305	3.4	16.0	-33.6	
EM. OF Q329/Q305	3.0	16.0	-33.6	
BASE OF Q330/Q306	2.8	11.5	-36.5	
EM. OF Q330/Q306	2.2	11.5	-36.5	
IC CHIP PIN 1	6.5	10.5	37.4	
IC CHIP PIN 2	5.4	650	-2	
IC CHIP PIN 3	10.5	3.0	-43.6	
IC CHIP PIN 4	1.3	75	-20	
IC CHIP PIN 5	10.5	3.0	-48.5	
IC CHIP PIN 6	6.5	20	-31.8	
IC CHIP PIN 7	7.2	.8	-59.7	
IC CHIP PIN 8	.7	2.0	-42.2	
IC CHIP PIN 9	-	-	-	
IC CHIP PIN 10	1.3	65	-21.5	
IC CHIP PIN 11	.8	65	-21.5	
IC CHIP PIN 12	.05	14.5	-34.5	
IC CHIP PIN 13	.1	-	-	
IC CHIP PIN 14	.5	-	-	
IC CHIP PIN 15	.5	-	-	
IC CHIP PIN 16	0	-	-	

INPUT SIGNAL 14 mV. (-35 dB) OF "PL" TONE AT R317/R386.

(0 dBm IS 1 mW ACROSS 600 OHMS)

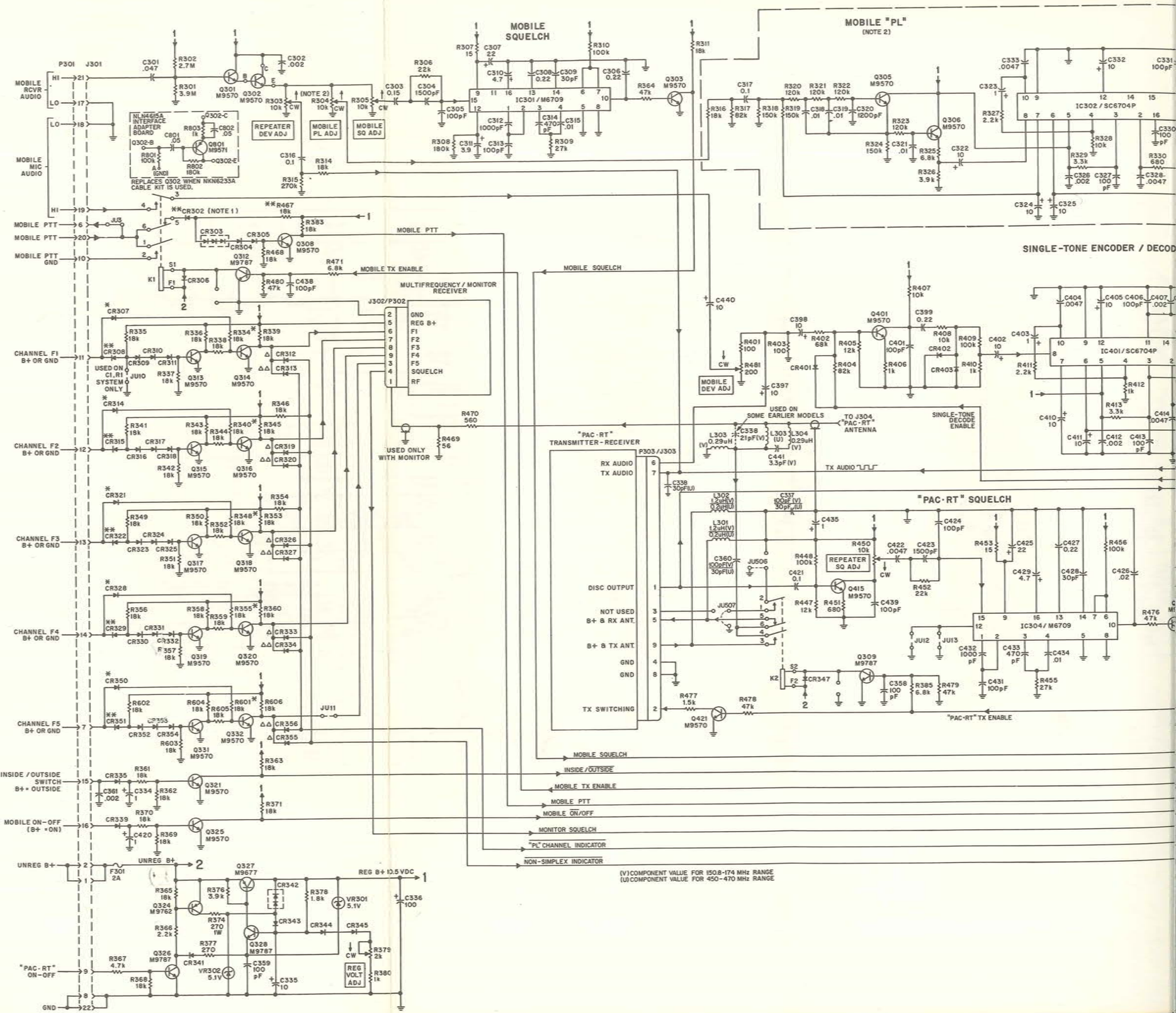
EPF-7305-O

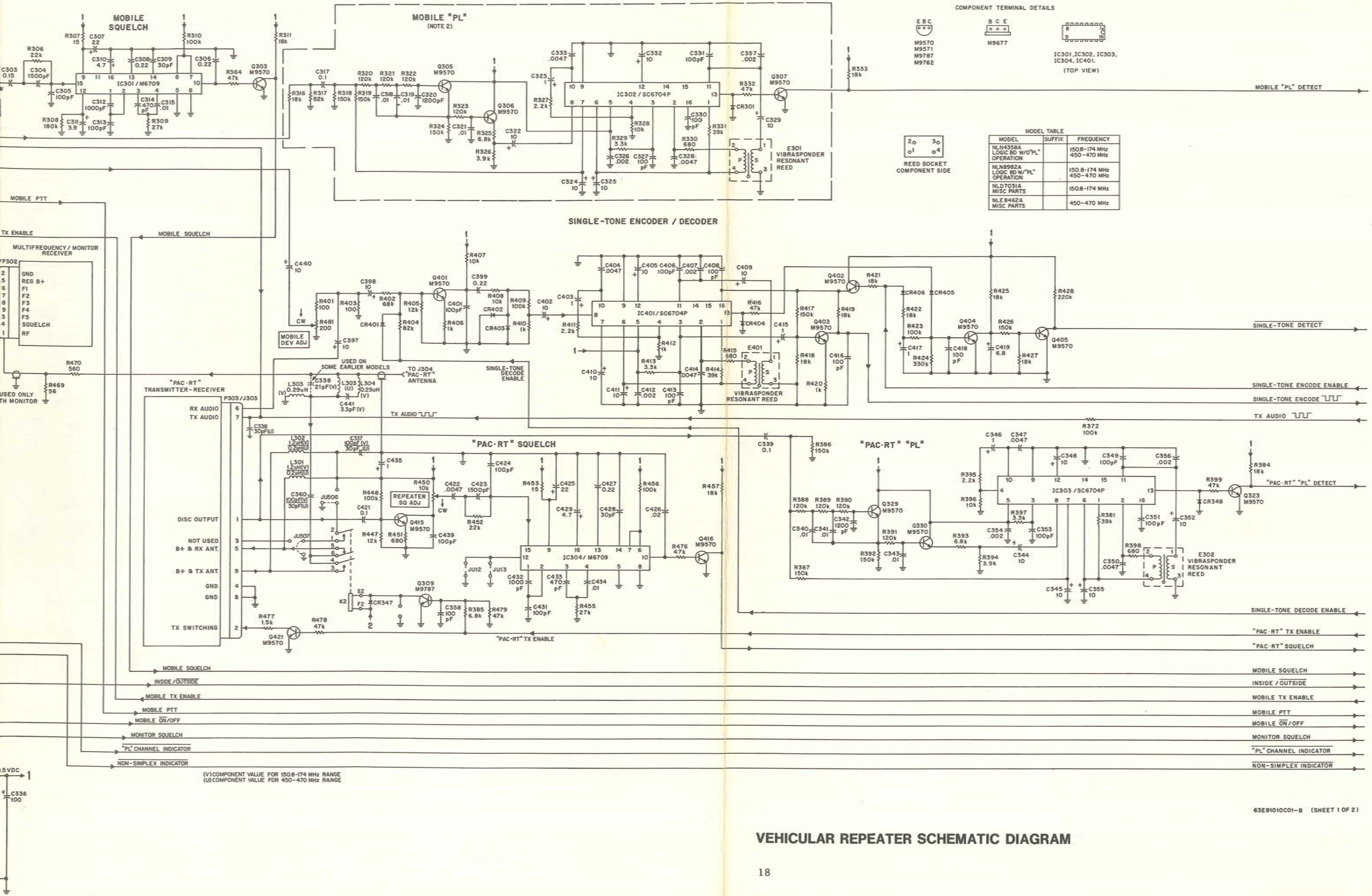
SINGLE-TONE ENCODER/DECODER TEST MEASUREMENTS

PROBE POINT	DC VOLTS		AC VOLTS			
	DECODE	ENCODE	DECODE		ENCODE	
	VOLTS	VOLTS	mV	dBm	mV	dBm
IC CHIP PIN 1	6.5	6.5	10.5	-37.4	-	-
IC CHIP PIN 2	5.4	2.9	650	-2	140	-14.7
IC CHIP PIN 3	10.5	6.0	3.0	-43.6	.6	-2
IC CHIP PIN 4	1.3	1.7	75	-20	390	-6
IC CHIP PIN 5	10.5	10.5	3.0	-48.5	-	-
IC CHIP PIN 6	6.5	3.0	20	-31.8	-	-
IC CHIP PIN 7	7.2	7.1	.8	-59.7	-	-
IC CHIP PIN 8	.7	.3	2.0	-42.2	-	-
IC CHIP PIN 9	-	-	-	-	-	-
IC CHIP PIN 10	1.3	1.4	65	-21.5	340	-7.3
IC CHIP PIN 11	.8	.8	65	-21.5	19	-32.2
IC CHIP PIN 12	.05	1.0	14.5	-34.5	-	-
IC CHIP PIN 13	.1	5.0	-	-	-	-
IC CHIP PIN 14	.5	.8	-	-	-	-
IC CHIP PIN 15	.5	.9	-	-	-	-
IC CHIP PIN 16	0*	10.5	-	-	-	-

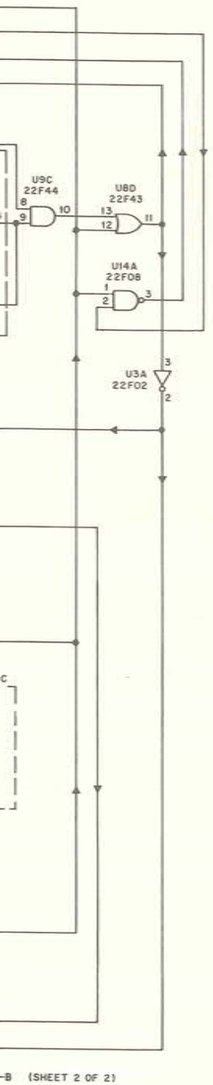
(0 dBm IS 1 mW ACROSS 600 OHMS)

EPF-7306-O

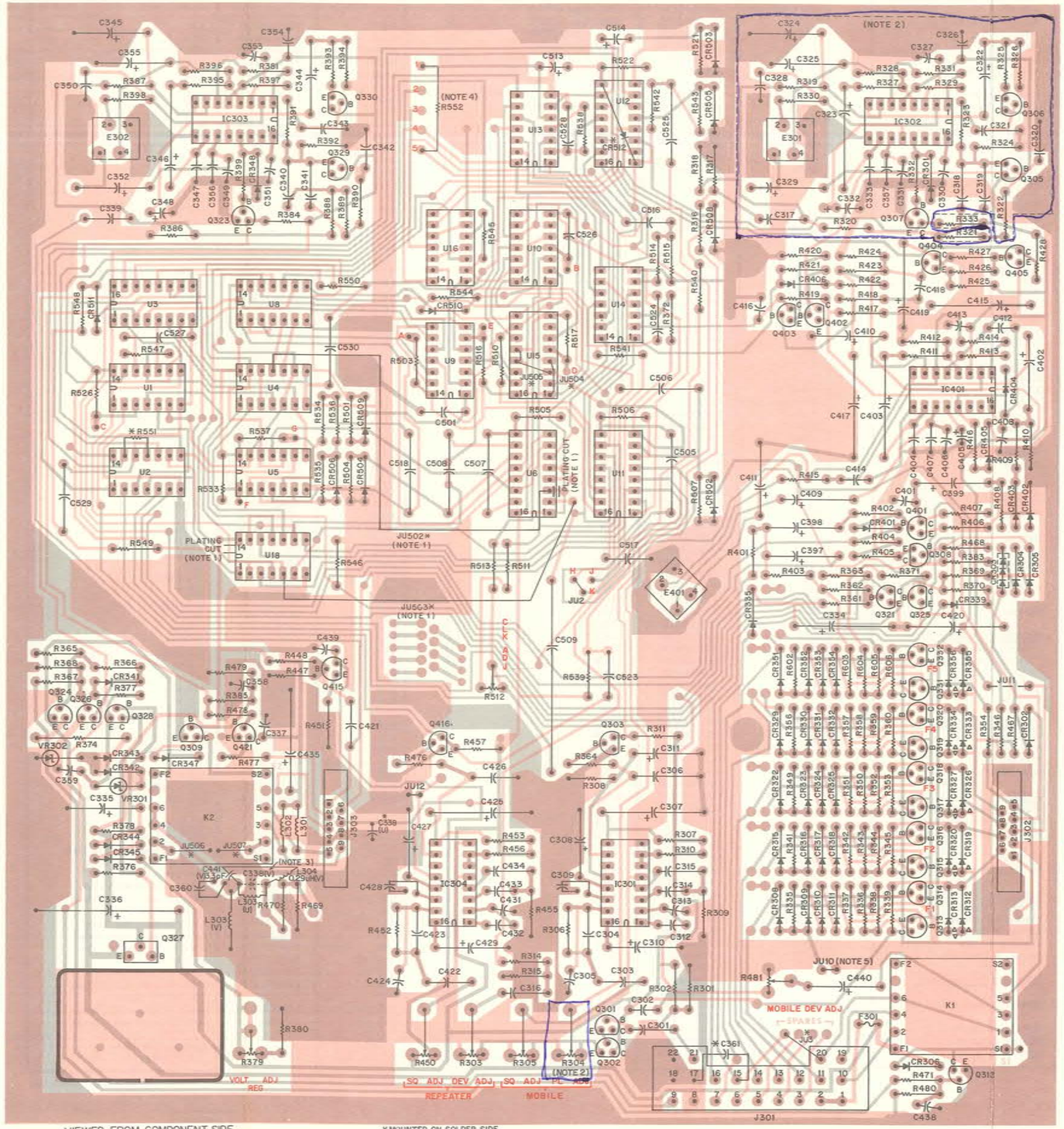




VEHICULAR REPEATER SCHEMATIC DIAGRAM



-B (SHEET 2 OF 2)



VIEWED FROM COMPONENT SIDE

*MOUNTED ON SOLDER SIDE
(V)COMPONENT FOR 150.8-174 MHz RANGE
(U)COMPONENT FOR 450-470 MHz RANGE

Required for PL operation. Components in blue squares. Plus SNLN-9607-MMU PL FILTER BOARD.

VEHICULAR REPEATER CIRCUIT BOARD DETAIL

MOBILE "PL" DETECT

B+ / GND — U3, U6, U11, U12, U15. DETAIL (TOP VIEW)

B+ / GND — U1, U2, U4, U5, U8, U9, U10, U13, U14, U16, U18. DETAIL (TOP VIEW)

SINGLE-TONE ENCODER ENABLE

SINGLE-TONE ENCODE

TX AUDIO

"PAC-RT" TX ENABLE

MOBILE SQUELCH — U9A 22F44 — U1B 22F08 — U4B 22F03 — R547 150k — C527 0.22 — U1C 22F15 — U3B 22F02

U3F 22F02 — R501 10M — C501 0.1 — CR509 — U2A 22F43 — R526 18k — C

JU502 (NOTE 5)

SINGLE-TONE DETECT

U18C 22F44 — U4A 22F03 — U4C 22F03 — U4D 22F03 — U8B 22F43 — U8A 22F43 — R503 18k — U9D 22F44 — A

U2D 22F43 — R551 820k — U13C 22F43 — R510 220k — U11F 22F02 — U14B 22F08 — U14C 22F08 — U13D 22F43 — R516 18k — E — U9B 22F44

U11A 22F02 — U18D 22F44 — R546 470k — U2C 22F43

SINGLE-TONE ENCODER ENABLE

SINGLE-TONE ENCODE

TX AUDIO

U5D 22F08 — U6F 22F02 — U6D 22F02 — C508 0.47 — U6E 22F02 — C507 0.47 — CR504 — R505 470k — R504 10M — 5 SECONDS 1 SHOT

U10A 22F25 — U11E 22F02 — 400 mSEC CLOCK — R511 100k — C509 0.255 — R512 1M CW — R513 10M — CLOCK ADJ — C516 0.1 — U12F 22F02 — R515 22k

C517 0.1 — R514 1M — U16D 22F44 — U16B 22F44 — U16C 22F44 — R545 1M

U2B 22F43 — (NOTE 5) — U18A 22F44 — U1A 22F15 — U3C 22F02 — U5C 22F08 — U6C 22F02

"PAC-RT" "PL" DETECT

"PAC-RT" SQUELCH

C523 0.1 — R540 1.8M — U12A 22F02 — CR508 — R539 150k — R542 1M — U12B 22F02 — CR505 — C525 0.47 — R543 10M

MOBILE SQUELCH

U13B 22F43 — R538 330k — U13A 22F43 — C528 0.1 — U14D 22F08 — CR512 — U12D 22F02 — C513 22 — C514 22 — U12C 22F02 — CR503 — R521 3.3M — R522 3.3M — TIME-OUT-TIMER (TOT) 2 MIN.

D — R517 18k — JU504 — U10B 22F25 — CLOCK — UP/DOWN — CARRY IN — PRESET ENABLE — CARRY OUT — RESET — Q4 Q3 Q2 Q1 — PI — P3 P2 P4 — JU505 — U15 22F31

SINGLE-TONE DECODE ENABLE

"PAC-RT" TX ENABLE

"PAC-RT" SQUELCH

MOBILE SQUELCH

INSIDE /OUTSIDE

MOBILE TX ENABLE

MOBILE PTT

MOBILE ON/OFF

MONITOR SQUELCH

"PL" CHANNEL INDICATOR

NON-SIMPLEX INDICATOR

U3D 22F02 — CR511 — R548 100k — R549 10M — C529 0.22 — R550 470k — C530 0.22 — U3E 22F02 — U16A 22F44

U8C 22F43 — U12E 22F02 — R544 3.9M — CR510 — B — C526 0.15

U11B 22F02 — SWITCHED B+ — SWITCHED GND — J — H — K — JU2 (NOTE 3)

MOBILE XMTR & "PAC-RT" XMTR TOT OPERATION — NO TOT OPERATION — "PAC-RT" XMTR TOT OPERATION — R552 (NOTE 4) — MOBILE XMTR TOT OPERATION

F — U5A 22F08 — R533 18k — R534 22M — R535 2.7M — R536 1.8k — CR506 — C518 0.47 — G — R537 18k — U5B 22F08 — U9C 22F44 — INTERRUPT CLOCK

R541 330k — C524 0.1

U6A 22F02 — (NOTE 5) — JU503 (NOTE 5) — U6B 22F02 — SPARES

SINGLE-TONE ENABLE ONE SHOT 700 mSEC — C505 0.47 — U11D 22F02 — C506 0.47 — U11C 22F02 — R506 1M — R507 1M — CR502

U18B 22F44

63E81010C01-B (SHEE

Vehicular Repeater Main Circuit Board
(V) = 150.8-174 MHz
(U) = 450-470 MHz

PLF-1076-E

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: uF ±10% 50 V unless stated
C301	0882096J04	.047; 250 V
C302	2182428B36	.002; 200 V
C303	0882905G05	0.15
C304	0882096J06	1500 pF; 250 V
C305	2184511B24	100 pF
C306	0882096J20	0.22; 250 V
C307	2382256J08	22 -10 +50%; 40 V
C308	0882905G12	0.22
C309	2184511B86	30 pF
C310	2382256J07	4.7 -10 +50%; 63 V
C311	2384762H08	3.9 ±20%; 15 V
C312	2182187B29	1000 pF; 100 V
C313	2184511B24	100 pF
C314	2182187B39	470 pF; 500 V
C315	0882096J03	.01; 250 V
C316, 317	0882096J18	0.1; 250 V
C318, 319	0882096J03	.01; 250 V
C320	2100874352	1200 pF ±5%; 300 V
C321	0882096J03	.01; 250 V
C322	2382256J03	10; 25 V
C323	2382256J04	1; +50 -10%; 100 V
C324, 325	2382256J03	10; 25 V
C326	2182428B36	.002; 200 V
C327	2184511B24	100 pF
C328	2182428B27	.0047; 100 V
C329	2382256J03	10; 25 V
C330, 331	2184511B24	100 pF
C332	2383441B22	10 ±20%; 4 V
C333	2182428B27	.0047; 100 V
C334	2382256J04	1; +50 - 10%; 100 V
C335	2382256J03	10; 25 V
C336	2382601A25	100 +150 -10%; 20 V
C337	2184511B24	100 pF (V)
	2184511B02	30 pF; N150 (U)
C338	2184494B40	21 pF ±5%; 500 V (V)
	2184511B02	30 pF; N150 (U)
C339	0882096J18	0.1; 250 V
C340, 341	0882096J03	.01; 250 V
C342	2100874352	1200 pF; ±5%; 300 V
C343	0882096J03	.01; 250 V
C344, 345	2382256J03	10; 25 V
C346	2382256J04	1; +50 -10%; 100 V
C347	2182428B27	.0047; 100 V
C348	2383441B22	10 ±20%; 4 V
C349	2184511B24	100 pF
C350	2182428B27	.0047; 100 V
C351	2184511B24	100 pF
C352	2382256J03	10; 25 V
C353	2184511B24	100 pF
C354	2182428B36	.002; 200 V
C355	2382256J03	10; 25 V
C356, 357,361	2182428B36	.002; 200 V
C358, 359	2184511B24	100 pF
C360	2184511B01	100 pF (V)
	2184511B02	30 pF; N150 (U)
C397	2383441B19	10 ±20%; 20 V
C398	2382256J03	10; 25 V
C399	0882905G12	0.22
C401	2184511B24	100 pF
C402	2382256J03	10; 25 V
C403	2382256J04	1; +50 -10%; 100 V
C404	2182428B27	.0047
C405	2383441B22	10 ±20%; 4 V
C406	2184511B24	100 pF
C407	2182428B36	.002; 200 V
C408	2184511B24	100 pF
C409 thru 411	2382256J03	10; 25 V
C412	2182428B36	.002; 200 V
C413	2184511B24	100 pF
C414	2182428B27	.0047; 100 V
C415	2382256J04	1; +50 - 10%; 100 V
C416	2184511B24	100 pF
C417	2382256J04	1; +50 -10%; 100 V
C418	2184511B24	100 pF
C419	2383214C21	6.8 ±20%; 20 V
C420	2382256J04	1; +50 -10%; 100 V
C421	0882096J18	0.1; 250 V
C422	0882096J02	.0047; 100 V
C423	0882096J06	1500 pF; 250 V
C424	2184511B24	100 pF
C425	2382256J03	22; +50 -10%; 40 V
C426	0882905G23	.02; 100 V
C427	0882905C12	0.22
C428	2184511B86	30 pF
C429	2382256J07	4.7; -10 +50%; 63 V
C431	2184511B24	100 pF
C432	2182187B29	1000 pF; 100 V
C433	2182187B39	470 pF; 500 V
C434	0882096J03	.01; 250 V
C435	2382256J04	1; +50 -10%; 100 V
C438, 439	2184511B24	100 pF
C440	2382256J03	10; 25 V
C441		3.3 pF
C501	0882096J18	0.1; 250 V
C505 thru 508	0882905G49	0.47
C509	0883445B69	0.255 ±1%
C513, 514	2383441B31	22 ±20%; 20 V
C516, 517	0882096J18	0.1; 250 V
C518	0882905G49	0.47
C523, 524	0882096J18	0.1; 250 V
C525	0882905G49	0.47
C526	0882905G05	0.15
C527	0882096J20	0.22; 250 V
C528	0882096J18	0.1; 250 V
C529, 530	0882096J20	0.22; 250 V
C801, 802	2184008H13	0.05 ±20%; 25 V
		DIODE: See Note
CR301	4882392B03	Silicon
CR302	4883654H01	Silicon
CR303	4823329G04	Silicon
CR304 thru 335	4883654H01	Silicon
CR339	4883654H01	Silicon
CR341	4883654H01	Silicon
CR342	4805562A01	Silicon
CR343, 344, 345	4883654H01	Silicon
CR347	4883654H01	Silicon
CR348	4882392B03	Silicon
CR350 thru 356	4883654H01	Silicon
CR401 thru 406	4883654H01	Silicon
CR502 thru 506	4883654H01	Silicon
CR508 thru 512	4883654H01	Silicon
		RESONANT REED:
E301, 302	KLN6209A	"Vibrasponder"
E401	KLN6209A	"Vibrasponder," Reed Code 23; 847.5 Hz
		FUSE:
F301	6582896B04	2-Amp.
		INTEGRATED CIRCUIT:
IC301	5182467A09	type M6709
IC302, 303	5182467A94	type SC6794
IC304	5184267A09	type M6709
IC401	5184267A94	type SC6794
		JACK:
J301	2884085B01	PLUG, Connector; 37-line
J302, 303	0982647E03	CONN, Female;9-contact
J304	0982442E01	RECEPTACLE, Antenna
		RELAY:
K1, 2	8005510B01	PTT Control
		COIL, RF:
L301, 302	2482723H01	choke, 1.2 uH (V)
	2482723H11	choke, 0.2 uH (U)
L303	2482723H04	choke, 0.29 uH (V)
	2484238H02	1-1/2 turns (U)
L304	2482723H04	choke, 0.29 uH (V)
		TRANSISTOR: See Note
Q301, 302, 303	4800869570	NPN; type M9570
Q305 thru 308	4800869570	NPN; type M9570
Q309	4800869787	NPN; type M9787
Q312	4800869787	NPN; type M9787
Q313 More 321	4800869570	NPN; type M9570
Q322	4800869570	NPN; type M9570
Q324	4800869762	PNP; type M9762
Q325	4800869570	NPN; type M9570
Q326	4800869787	NPN; type M9787
Q327	4800869677	PNP; type M9677
Q328	4800869787	NPN; type M9787
Q329 thru 333	4800869570	NPN; type M9570
Q401 thru 405	4800869570	NPN; type M9570
Q415, 416	4800869570	NPN; type M9570
Q421	4800869570	NPN; type M9570
Q801	4800869871	PNP; type M9871
		RESISTOR, Fixed: ± ±10%; 1/4 W unless stated
R301	0660124D36	3.9 Meg.
R302	0660124D32	2.7 Meg.
R303, 304, 305	1884944C03	Pot., 10 k
R306	0660124C81	22 k
R307	0660124C05	15
R308	0660124D04	120 k
R309	0660124C83	27 k
R310	0660124C97	100 k
R311	0660124C79	18 k
R314	0660124C79	18 k
R315	0660124D08	270 k
R316	0660124C79	18 k
R317	0660124C95	82 k
R318, 319	0660124D02	150 k
R320 thru 323	0660124C99	120 k
R324	0660124D02	150 k
R325	0660124C69	6.8 k
R326	0660124C63	3.9 k
R327	0660124C57	2.2 k
R328	0660124C73	10 k
R329	0660124C61	3.3 k
R330	0660124C45	680
R331	0660124C87	39 k
R332	0660124C89	47 k
R333 thru 346	0660124C79	18 k
R348 thru 363	0660124C79	18 k
R364	0660124C89	47 k
R365	0660124C79	18 k
R366	0660124C57	2.2 k
R367	0660124C65	4.7 k
R368 thru 371	0660124C79	18 k
R372	0660124C97	100 k
R374	0660126C35	270; 1 W
R376	0660124C63	3.9 k
R377	0660126C35	270
R378	0660124C55	1.8 k
R379	1884944C01	Pot., 2 k
R380	0660124C49	1 k
R381	0660124C87	39 k
R383, 384	0660124C79	18 k
R385	0660124C69	6.8 k
R386, 387	0660124D02	150 k
R388 thru 391	0660124C99	120 k
R392	0660124D02	150 k
R393	0660124C69	6.8 k
R394	0660124C63	3.9 k
R395	0660124C57	2.2 k
R396	0660124C73	10 k
R397	0660124C61	3.3 k
R398	0660124C45	680
R399	0660124C89	47 k
R401	0660124C25	100
R402	0660124C93	68 k
R403	0660124C25	100
R404	0660124C95	82 k
R405	0660124C75	12 k
R406	0660124C49	1 k
R407, 408	0660124C73	10 k
R409	0660124C97	100 k
R410	0660124C49	1 k
R411	0660124C57	2.2 k
R412	0660124C49	1 k
R413	0660124C61	3.3 k
R414	0660124C87	39 k
R415	0660124C45	680
R416	0660124C89	47 k
R417	0660124D02	150 k
R418, 419	0660124C79	18 k
R420	0660124C49	1 k
R421, 422	0660124C79	18 k
R423	0660124C97	100 k
R424	0660124D10	330 k
R425	0660124C79	18 k
R426	0660124D02	150 k
R427	0660124C79	18 k
R428	0660124D22	1 Meg.
R447	0660124C79	18 k
R448	0660124C97	100 k
R450	1884944C03	Pot., 10 k; 0.1 W
R451	0660124C45	680
R452	0660124C81	22 k
R453	0660124C05	15
R455	0660124C33	27 k
R456	0660124C97	100 k
R457	0660124C79	18 k
R467, 469	0660124C79	18 k
R469	0660124C19	56
R470	0660124C43	560
R471	0660124C69	6.8 k
R476	0660124C89	47 k
R477	0660124C93	1.5 k
R478, 479, 480	0660124C89	47 k
R481	1805923C01	Pot., 200 ±; 1/2 W
R501	0660124D46	10 Meg.
R503	0660124C79	18 k
R504	0660124D46	10 Meg.
R505	0660124B14	470 k ±5%
R506, 507	0660124D22	1 Meg.
R510	0660124D06	220 k
R511	0682526F13	100 k
R512	1805923C05	Pot., 1 Meg.
R513	0660124D46	10 Meg.
R514	0660124D22	1 Meg.
R515	0660124C81	22 k
R516, 517	0660124C79	18 k
R521	0660124B34	3.3 Meg. ±5%
R522	0660124B34	3.3 Meg. ±5%
R526	0660124C79	18 k
R533	0660124C79	18 k
R534	0660124D54	22 Meg.
R535	0660124D32	2.7 Meg.
R536	0660124C35	1.8 k
R537	0660124C79	18 k
R538	0660124B10	330 k ±5%
R539	0660124D62	150 k
R540	0660124D28	1.8 Meg.
R541	0660124B10	330 k ±5%
R542	0660124D22	1 Meg.
R543	0660124D46	10 Meg.
R544	0660124D36	3.9 Meg.
R545	0660124D22	1 Meg.
R546	0660124D14	470 k
R547	0660124D02	150 k
R548	0660124C97	100 k
R549	0660124D46	10 Meg.
R550	0660124D14	470 k
R551	0660185C15	820 k; 1/8 W
R552	0660124C87	2.2 k ±10%
R601 thru 606	0660124C79	18 k
R801	0660124A97	100 k ±5%
R802	0660124B04	180 k ±5%
R803	0660124A49	1 k ±5%
		MODULE, Encapsulated:
U1	5182822F15	Triple 3-Input NAND Gate
U2	5182822F43	Quad 2-Input OR Gate
U3	5182822F02	Hex Inverter
U4	5182822F03	Quad 2-Input NOR Gate
U5	5182822F08	Quad 2-Input NAND Gate
U6	5182822F02	Hex Inverter
U8	5182822F43	Quad 2-Input OR Gate
U9	5182822F44	Quad 2-Input AND Gate
U10	5182822F23	Dual 4-Input NOR Gate
U11, 12	5182822F02	Hex Inverter
U13	5182822F43	Quad 2-Input OR Gate
U14	5182822F08	Quad 2-Input NAND Gate
U15	5182822F31	UP/DOWN Counter
U16	5182822F44	Quad 2-Input AND Gate
U15	5182822F44	Quad 2-Input AND Gate
		DIODE: See Note
VR301, 302	4882256C15	5.1 V Zener

NOTE: For optimum performance, order replacement diodes and transistors by Motorola part number only.

CAUTION

This equipment contains MOS devices which are susceptible to damage in handling due to static discharge. Handle with grounded tools and transport in conductive foam or a metallic tray.

PARTS LIST

NOTES