



MOTOROLA

“HT600E” SERIES “Handie-Talkie” Portable Radios

438-470 MHz

SPECIFICATIONS

GENERAL		TRANSMITTER		RECEIVER	
FREQUENCY RANGE:	438-470MHz	RF OUTPUT— Nickel-cadmium battery:	2.0W at 9.6Vdc	AUDIO OUTPUT:	500mW at less than 5% distortion
POWER SUPPLY:	Nickel-cadmium battery	MODULATION:	Type 20K0F3E, ±5kHz for 100% modulation at 1000Hz (±4.0kHz min.) including PL modulation for PL models	SEC I-F FREQUENCY:	450kHz ± 1.5kHz measured at M1
BATTERY DRAIN—	at 9.6Vdc	PL MODULATION:	±1kHz max. ± 500Hz min.	SENSITIVITY:	0.35µV max. (12dB SINAD)
Standby:	*44mA	AUDIO DISTORTION:	Less than 5% at 1000Hz, 3kHz deviation	NOISE SQUELCH SENSITIVITY:	Noise compensated type, Programmable; opens from .18µV
Standby with Scan:	*52mA	SWITCHING BANDWIDTH:	17MHz (no degradation)	SWITCHING BANDWIDTH:	3MHz (no degradation)
Standby with Battery Saver:	*36mA	FREQUENCY STABILITY:	±.0005% from -10°C to +50°C (+25°C ref.)	FREQUENCY STABILITY:	±.0005% from -10°C to +50°C (+25°C ref.)
Receive:	*149mA	USEABLE BANDWIDTH:	±5kHz	USEABLE BANDWIDTH:	±5kHz
Transmit:	**825mA	SPURIOUS & HARMONIC FREQUENCIES:	0.25µW	SPURIOUS FREQUENCY REJECTION:	>60dB
*Add 8mA with Remote Antenna		FM NOISE:	At least 45dB below ±3.0kHz deviation at 1000Hz	IMAGE REJECTION:	>60dB
**Add 15mA with Remote Antenna		AUDIO RESPONSE:	+1, -3dB from 6dB/octave pre-emphasis characteristic from 300-3000Hz	SELECTIVITY (CEPT):	>70dB
BATTERY LIFE:	Based on 5% transmit, 20% receive with rated af output, 75% standby with Battery Saver and Nickel-Cadmium battery, 8.7 hours/charge	INTERMODULATION:	>70dB	INTERMODULATION:	>70dB
DIMENSIONS:					
WIDTH:	2.70" (66.8mm)				
DEPTH:	1.55" (39.4mm)				
HEIGHT:					
Radio Only	3.89" (99.0mm)				
Radio with Battery					
High Capacity	6.98" (177.3mm)				
WEIGHT:					
Radio Only	13.5 oz (383 g)				
Radio with Battery (Nickel-Cadmium)					
Low Capacity	19.0 oz (539 g)				
Medium Capacity	21.6 oz (612 g)				
High Capacity	24.1 oz (684 g)				

Specifications Subject To Change Without Notice

NOTE:

- ALL BATTERIES MUST BE CHARGED PRIOR TO USE.
- USE OF CHEMICALS (DETERGENTS, ALCOHOL, AEROSOL SPRAY, PETROLEUM PRODUCTS) MAY BE HARMFUL AND DAMAGE THE RADIO HOUSING. WE RECOMMEND A MILD DISHWASHING SOAP FOR CLEANING THE EXTERIOR OF THE PRODUCT.
- O-RING SEALS MUST BE PROPERLY LUBRICATED AND ASSEMBLED TO INSURE CONFORMANCE TO MIL-810D SPECIFICATIONS FOR WATER INTRUSION.

Service Manual
68P81050C45-0

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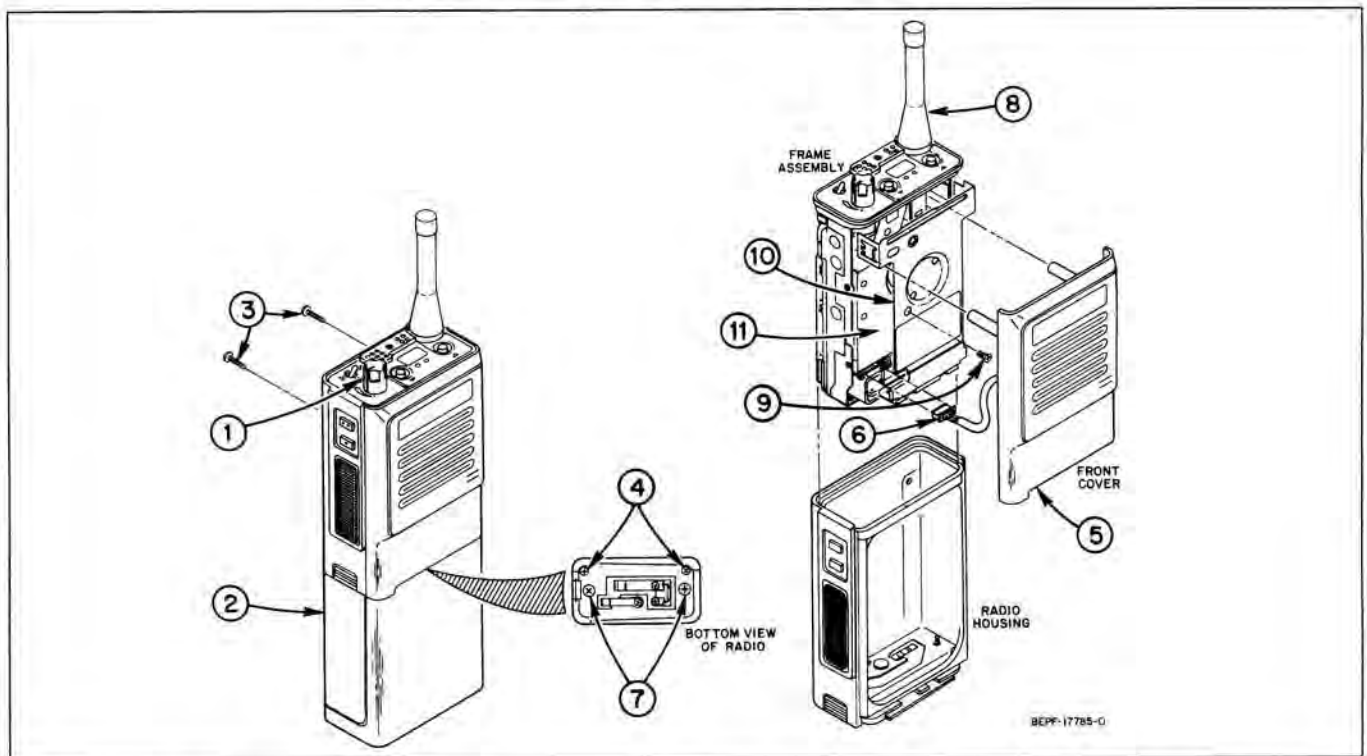
TEPF-11413-B

RELATED PUBLICATIONS AVAILABLE SEPARATELY

Operating Instructions	68P81050C35
Theory/Maintenance Manual	68P81050C50
Programmer/Tuner User's Manual	68P81050C55

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DISASSEMBLY PROCEDURE



1. Turn off the radio.
2. Remove the battery:
While pushing the spring-loaded battery latch towards the top of the radio, slide the battery away from the latch, removing it from the baseplate on the bottom of the radio.
3. Remove the two screws from the back of the radio.
4. Remove the two screws on the bottom of the radio (baseplate corners).
5. Lift the front cover from the radio housing being careful not to pull against the speaker/microphone wires.
6. Disconnect the speaker/microphone connector from the controller flex by grasping the sleeved wires (near the plug) and pulling the plug straight out and away from the circuit board.
7. Loosen the two captive screws on the bottom of the radio (middle of each end of baseplate). Do not completely remove the captive screws from the baseplate.
8. With a thumb and forefinger, grasp the antenna at its base and pull lightly to remove the frame assembly from the radio housing. Do not press the PTT switch during removal.

CAUTION

REFER TO "CMOS" PRECAUTIONS" IN THEORY/ MAINTENANCE MANUAL.

9. Remove the screw that secures the front shield.
10. Remove the front shield by pulling it straight out and away from the radio.
11. Remove the controller carrier:

- (A) Remove the four screws (two on each side) that secure the controller carrier to the frame.

NOTE

Be careful to pull each connector straight out and away from the mating socket so as not to bend or break the connector pins.

- (B) Disconnect the two top flex connectors by carefully sliding them away from the controller carrier.
- (C) Disconnect the two connectors at the bottom of the controller carrier.
- (D) Lift the controller carrier (nearest the top of the radio) away from the radio just enough to gain access to the connector under the controller.
- (E) Disconnect the connector under the controller.
- (F) Lift the controller totally away from the radio.

NOTE

Refer to the Exploded View Diagram if further disassembly is necessary.

12. Assemble the radio in the reverse order of disassembly, making certain:
 - to avoid damage to the flex circuits, connectors, and connector pins when reinserting the controller.
 - not to depress the PTT switch when sliding the circuit board back into the housing.

CAUTION

Inspect the frame O-rings, front cover O-ring and control head O-ring. Replace if obvious damage exists.

GENERAL

THIS RADIO HAS BEEN FACTORY ALIGNED AND DOES NOT REQUIRE ANY ADJUSTMENTS. Realignment may be required if components are replaced or have aged, or if any transmitter/receiver frequencies are changed. If it is necessary to realign the radio, perform the following procedures:

1. When using the RTX-4005B test set, place the MT PL switch in the OFF position.
2. Remove the battery and front cover as described in the "DISASSEMBLY PROCEDURE."
3. Refer to the Test Set-Up Detail and connect the test equipment and Programmer/Tuner to the radio as illustrated.
4. Connect a dc power supply to the battery eliminator (RTL-4226A) and attach the battery eliminator to the radio.
5. Adjust the power supply for 9.6Vdc. Set current limit to 2.0A.
6. Set the PL/CS/SCAN switch to the CS (P) position.
7. Turn the radio off, then on to reinitialise the radio.
8. **Frequency Adjust (Synthesizer)** - Terminate the Programme/Test cable rf BNC connector, through a 30dB pad to a frequency counter or service monitor. Set the radio's channel select buttons to the desired channel. Key the radio using the test set PTT switch. Compare the frequency reading on the counter (or service monitor) to the customer frequency assigned to that channel. Adjust R120 if the frequency difference is more than $\pm 1250\text{kHz}$.
9. Perform either the "RECEIVER ALIGNMENT" procedure or "TRANSMITTER ALIGNMENT" procedure or both procedures as required.

TRANSMITTER ALIGNMENT

Review "GENERAL" information section before performing TRANSMITTER ALIGNMENT

Preliminary Adjustments:

1. Terminate the Programme/Test cable (RTK-4205A) rf BNC connector, to a power meter through a 30dB pad.
2. Make all measurements at the Universal Interface Connector with the radio keyed through the test set PTT switch.
3. Programme new customer frequencies (if necessary).

Power Output Adjustments:

STEP	ADJUST	FOR	USING	NOTE
1	Check power output on all channels. NOTE: You must dekey before changing channels for the synthesizer to change frequencies. Set the channel select buttons to the channel with the lowest output power.			
2	P.A. Trimmer Capacitor (on U102)	2W power output with least current drain	RF Wattmeter and Ampmeter	Reading should be greater than rated rf power output, with current drain less than 840mA (2-Watt Models). Note: Two possible peaks, choose peak with least current drain. Adjust from component side.
3	Check remaining channels	Same power and current limits shown in STEP 2	RF Wattmeter and Ampmeter	
4	Repeat steps 2 and 3 if necessary.			

Deviation Adjustment:

1. Terminate the programme/test cable (RTK-4205A) through a 30dB pad to a service monitor (or deviation meter).
2. Place the **METER SELECTOR** switch on the RTX-4005B test set to the **MIC** position. Insert a 1kHz tone at the **AUDIO IN** port of the test set. Use an ac voltmeter to monitor the voltage at the **AC/DC METER** port of the test set. Using the PTT switch on the RTX-4005B test set to key the radio, adjust the level of the 1kHz tone until 45mV is present at the **AC/DC METER** port. Dekey the radio.
3. Set the radio's PL/SCAN switch to the PL position.
4. Connect the programme/test cable to the Radio Interface Box (RIB). Use the Programmer/Tuner to read the radio.
5. If the radio requires a change in frequency or options, make the appropriate changes to the personality file, and programme the radio.
6. Enter the Tuner menu of the Programmer/Tuner.
7. Set the channel select buttons on the radio's control top for the channel to be adjusted.
8. Press the **ENTER** key on the Programmer/Tuner to move the cursor to the **CHANNEL** position.
9. Press the up/down arrow keys to select the channel to be adjusted; this must be the same as the channel selected in step 7.
10. Proceed to the **TRANSMIT DEV** position in the Tuner menu.
11. Press and hold down the PTT switch on the RTX-4005B to continuously key the radio.
12. Press the up/down arrow keys until 4.6 to 4.8kHz of peak deviation is obtained.
13. Release the PTT switch on the RTX-4005B to dekey the radio.
14. Proceed to the **REFERENCE DEV** position in the Tuner menu.
15. Disconnect the 1kHz tone from the **AUDIO IN** port of the RTX-4005B.
16. Press and hold down the PTT switch on the RTX-4005B to continuously key the radio.
17. Press the up/down arrow keys to adjust the peak deviation of the 30Hz tone for 0.92 to 0.96kHz. **SEE NOTE.**
18. Release the PTT switch on the RTX-4005B to dekey the radio.
19. Reconnect the 1kHz tone to the **AUDIO IN** port of the RTX-4005B.
20. Repeat steps 7-21 for all channels to be adjusted.
21. Press F10 to exit from the Tuner menu. Press 6 in the main menu to programme the radio.
22. With the 1kHz tone applied, check the peak transmit deviation. It should be greater than 4.0kHz but less than 5.0kHz. Repeat the above procedure, if necessary.
23. For channels with transmit PL, remove the 1kHz tone from the **AUDIO IN** port of the RTX-4005B. Check the deviation of the PL signal; it should be greater than 500Hz but less than 1kHz. Repeat the above procedure, if necessary.

NOTE

While in the Tuner menu, changes to Reference Deviation and Transmit Deviation settings (using the up/down arrows) are made in the radio's RAM. If the radio is dekeyed and then rekeyed during the deviation adjustment, the radio's original information will be returned to the RAM. It will be necessary to toggle the up/down arrow keys to replace the programmer settings in the radio's RAM. Refer to the Programmer/Tuner User's Manual for more details.

RECEIVER ALIGNMENT

Review "GENERAL" information section before performing RECEIVER ALIGNMENT

Preliminary Adjustments:

1. Coils L9 through L13 are tuned at the factory for a 30MHz bandwidth and should never need retuning. Coils L1 and L2 adjust a 3MHz window anywhere across the 30MHz bandwidth. Perform the "Receiver Check" to determine if "RECEIVER ALIGNMENT" (tuning any portion of the receiver) is necessary.
2. Connect the programme/test cable (RTK-4205A) to the Radio Interface Box (RIB). Use the Programmer/Tuner to read the radio.
3. Enter into the Per Radio menu in the Programmer/Tuner. If the radio has been programmed for battery saver, disable the battery saver by pressing the space bar. Exit from the Per Radio menu, and then programme the radio.
4. When using the RTX-4005B test set, place the **AUDIO OUT** switch in the **B** position to set for proper speaker loading. Place the meter selector in the **AUDIO PA** position for receiver tests.
5. Connect the rf cable of the test cable to an rf generator or service monitor.

Receiver Check:

1. Use the Programmer/Tuner to program for new customer frequencies, if necessary.
2. Set the rf generator (or service monitor) for the appropriate frequency at a 1mV level with a 1kHz tone modulated at 3kHz deviation.
3. Connect the **AC/DC METER** port of the RTX-4005B to an ac voltmeter. Adjust the volume potentiometer (R140) for an ac voltmeter reading of 4.50Vrms.
4. Connect a SINAD meter to the **AC/DC METER** port of the RTX-4005B.
5. Reduce the rf level until 12dB of SINAD is obtained; record the rf level reading. Depress the monitor button while taking this measurement to ensure that the radio is not squelched. Also temporarily disconnect the test cable from the RIB to ensure that computer noise does not affect the measurement.
6. Perform SINAD measurements on all channels.
7. If the rf level required to produce 12dB SINAD is 0.35uV or less, *DO NOT REALIGN THE RECEIVER*; instead, proceed directly to "Squelch Sensitivity/Check Adjustment." If the rf required to produce 12dB SINAD is greater than 0.35uV, perform the "Receiver Alignment."

Receiver Alignment (Front End):

NOTE

The receiver front end tuning procedure can be accomplished with the radio in its housing. Coils L1 and L2 are tuned through the flex carrier while M1 is monitored on the controller flex.

1. Select the customer frequency that is at the center of the specified customer frequencies. For two-frequency radios, or radios without an obvious center frequency, select the lower frequency. Set the channel select buttons for the appropriate frequency.
2. Tune coils L1 and L2 to the top of the coil form. This will be the position where the coils are nearest to the flex carrier.
3. With an ac voltmeter, monitor M1 on the controller flex. Set the ac voltmeter to the -40dB scale. Set the service monitor to the appropriate frequency and adjust the rf level so that the ac voltage can be read at M1. During the following procedure, adjust the rf level to keep the ac voltage at M1 within the -40dB scale.
4. Peak coil L1 for maximum ac voltage at M1. Select the peak where the coil's slug is closest to the flex carrier assembly.
5. Peak coil L2 for maximum ac voltage at M1. Select the peak where the coil's slug is closest to the flex carrier assembly.
6. Perform steps 2 through 7 of the "Receiver Check" procedure. Repeat the Receiver Alignment (Front End) procedure, if necessary.

Receiver Alignment (Back End/Injection Filter):

NOTE

The receiver back end coils L9, L10, and L11, and the injection filter coils L12 and L13 are factory tuned and should not need retuning. Should the mixer, crystal filter, i-f modules, or accompanying back end parts need replacing, it will be necessary to perform the back end procedure.

Back End

7. Remove the radio from its housing as described in the "DISASSEMBLY PROCEDURE," then remove the backplane shield (exploded view item #74).
8. Attach the battery adapter to the radio frame, then attach the battery eliminator to the battery adapter.
9. Selecting any one of the customer frequencies, adjust the rf generator or monitor for the appropriate frequency. Then, place the radio front side down so that the solder side (side 2) of the PC board is facing up.
10. Tune coils L9, L10, and L11 flush with the solder side of the board.
11. With an ac voltmeter, monitor M1 on the solder side of the PC board. Set the ac voltmeter to the -40dB scale, and adjust the rf level so that the voltage can be monitored at M1. During the following procedure, adjust the rf level to keep the ac voltage at M1 within the -40dB scale.
12. Peak coils L9, L10, and L11 (in that order) for maximum ac voltage at M1. Detune L11 for a dip, then repeak L10 and L9.
13. Perform the "Receiver Check" procedure, then repeat steps 10, 11, and 12 of the "Back End" procedure, if necessary.

Injection Filter

NOTE

Perform the following procedure only if the radio fails the receiver check and both receiver front end and back end alignments have been performed or if the buffer module is replaced. The radio should already be removed from the housing.

14. Tune coils L12 and L13 to be flush with the solder side of the PC board. Temporarily reprogramme channel 1 for the highest receiver band edge frequency.
15. Monitor M2 with a dc voltmeter.
16. Peak L12, then L13 for maximum dc voltage at M2.
17. Reprogramme channel 1 to its initial receive frequency.
18. Perform the "Receiver Check" procedure, then repeat steps 14, 15, and 16 of the "Injection Filter" procedure, if necessary.

Squelch Sensitivity Check/Adjustment:

1. Use the Programmer/Tuner to read the radio, then proceed to the Tuner menu.
2. Set the channel select buttons for the channel determined to have the poorest sensitivity on the "Receiver Check." Place the PL/SCAN switch in the carrier squelch position.
3. Connect an ac voltmeter to the **AC/DC METER** port of the RTX-4005B.
4. Set the rf generator or service monitor for the appropriate frequency and no modulation. Reduce the rf level to a minimum, then turn the rf off.
5. Depress the monitor button on the side of the radio and adjust the noise level for 2.2Vrms. Make a note of the level on the dB scale; this will be the reference level for quieting measurements.
6. Press the **ENTER** key on the Programmer/Tuner to select **TONE SQUELCH**. Turn the rf of the generator or monitor on, at the minimum possible level. Increase the rf level until squelch break occurs. Note the quieting level at squelch break. If squelch break occurs between 6 and 12dB of quieting, proceed directly to the carrier squelch check, step 9. If the quieting level is not within the 6 to 12dB range, continue on with step 7.
7. Press the up/down arrow keys to adjust the tone squelch setting to 0. Adjust the rf level for 6dB of quieting.
8. Holding the rf level constant, press the up arrow key to increment the tone squelch setting one step at a time until the radio squelches. This will be the tone squelch setting.
9. Reduce the rf level to minimum and turn the rf off. The radio should be squelched.
10. Proceed to the **CARRIER SQUELCH** position in the tuner menu.
11. Turn the rf of the generator or monitor on at the minimum possible level. Increase the rf level until squelch break occurs. Note the quieting level at squelch break. If squelch break occurs between 8 and 14dB of quieting, proceed directly to step 14. If the quieting level is not within the 8 to 14dB range, continue on with step 12.
12. Press the up/down arrow keys to adjust the carrier squelch setting to 0. Adjust the rf level for 8dB of quieting.
13. Holding the rf level constant, press the up arrow key to increment the carrier squelch setting one step at a time until the radio squelches. This will be the carrier squelch setting. **SCAN SQUELCH** level should be set to the same level obtained for carrier squelch.
14. Exit from the Tuner menu.
15. If the squelch settings required modification, programme the radio.

NOTE

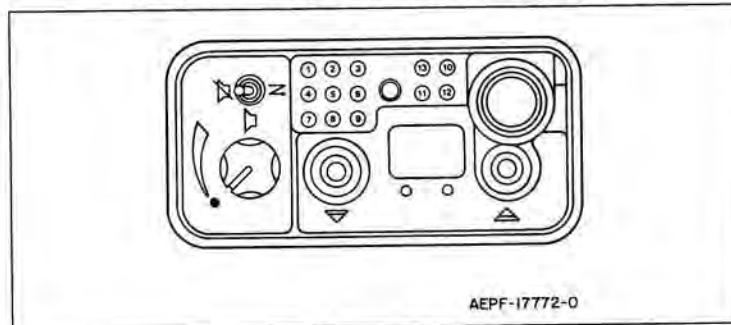
Upon completion of the receiver/squelch adjustments, it will be necessary to enable the battery-saver if this option was initially enabled and programme the radio.

Cloning Procedure:

(The content of radio A is to be duplicated into radio B)

1. Connect the cloning cable (NKN-6376A) to the Universal Connector of both radio A and radio B.
2. Set radio B to the lowest programmed channel on the display.
3. Turn off radio A and turn on radio B.
4. Place the PL switch on radio A to the carrier squelch position (P) for full cloning, or to the PL position (A) for partial cloning. Full cloning will duplicate the entire content of radio A to radio B. Partial cloning will duplicate the content of radio A to radio B, except for the deviation and squelch settings.
5. Simultaneously depress the PTT and monitor button on radio A and hold.
6. Turn on radio A. The green LED on radio B will flash indicating cloning is in progress.
7. Cloning is complete once the green LED turns off and an alert tone is heard from radio B. Release both the PTT and monitor button on radio A.

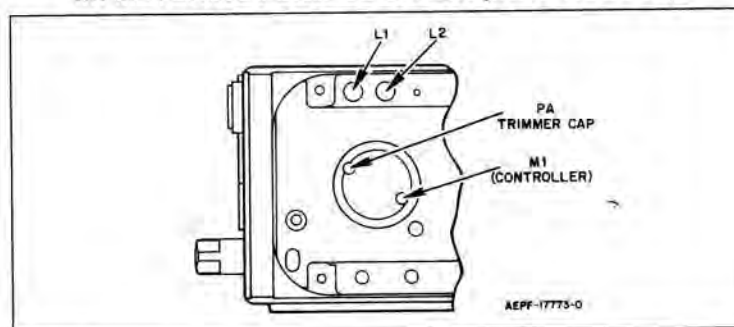
**RADIO (TOP VIEW) UNIVERSAL CONNECTOR
DETAIL AND PIN NUMBER ASSIGNMENT**



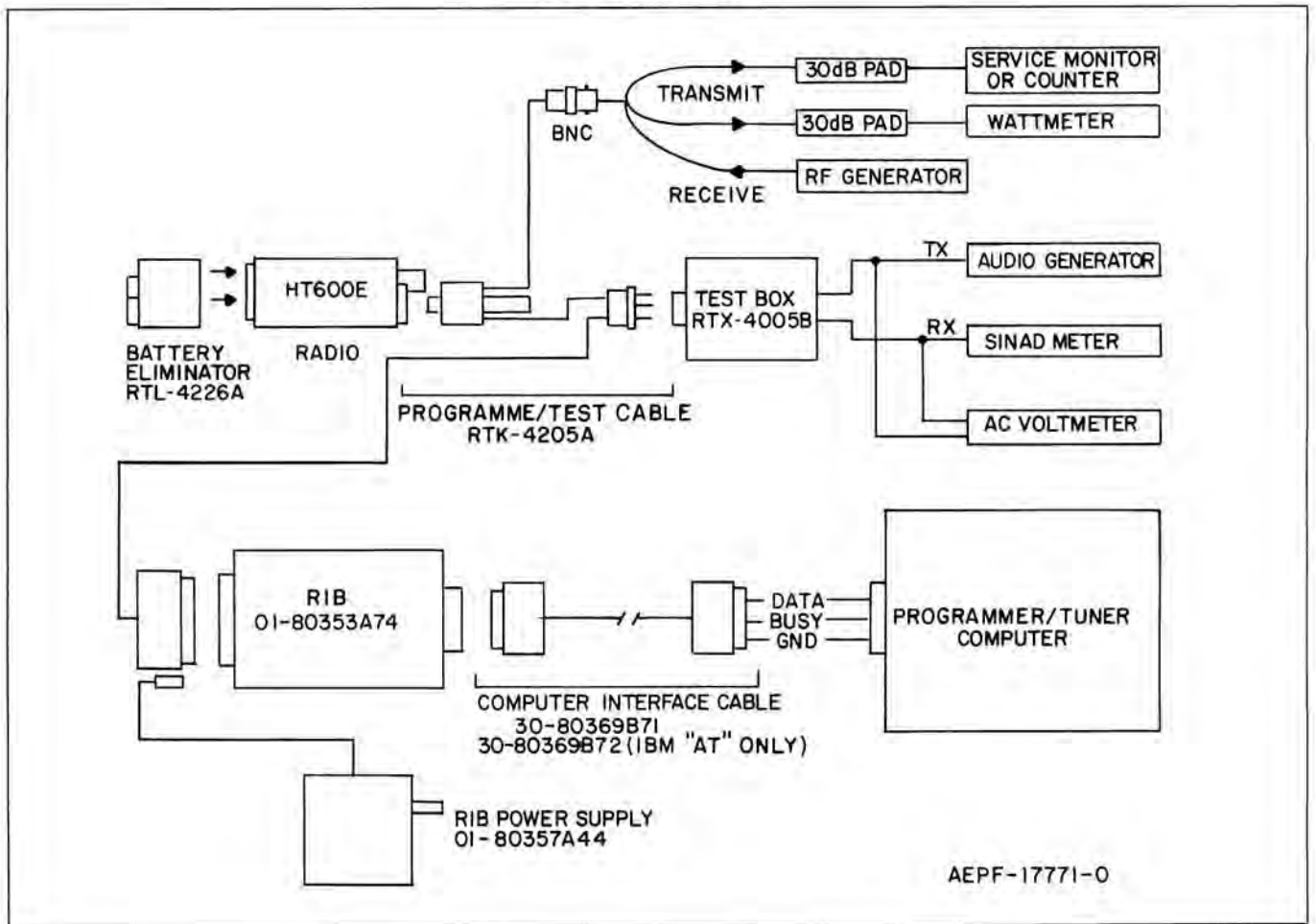
- | | |
|-----------------------------------|---------------------------|
| ① EXTERNAL MICROPHONE | ⑦ EXTERNAL SPEAKER SELECT |
| ② EXTERNAL SPEAKER | ⑧ SPEAKER COMMON |
| ③ OPTION B + | ⑨ BUSY |
| ④ EXTERNAL PTT | ⑩ REMOTE RF |
| ⑤ GROUND
(to Controller Board) | ⑪ CVC SENSE |
| ⑥ DATA | ⑫ RF GROUND |
| | ⑬ REMOTE RF SELECT |

TEPF-17782-0

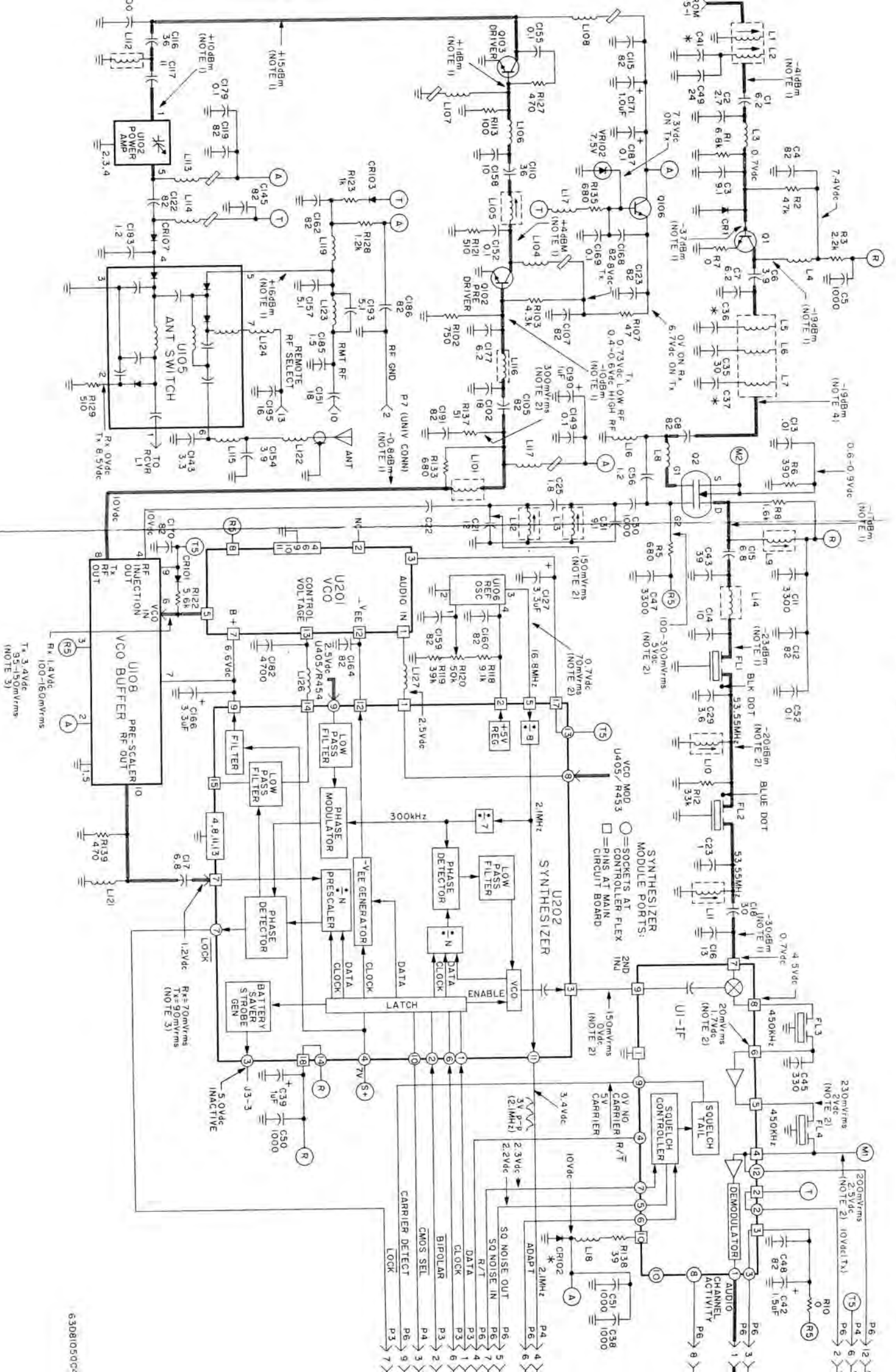
M1 METERING POINT LOCATION (CONTROLLER)



TEST SETUP DETAIL



* REFER TO ELECTRICAL PARTS LIST FOR VALUE AND DESCRIPTION



ELECTRICAL PARTS LIST

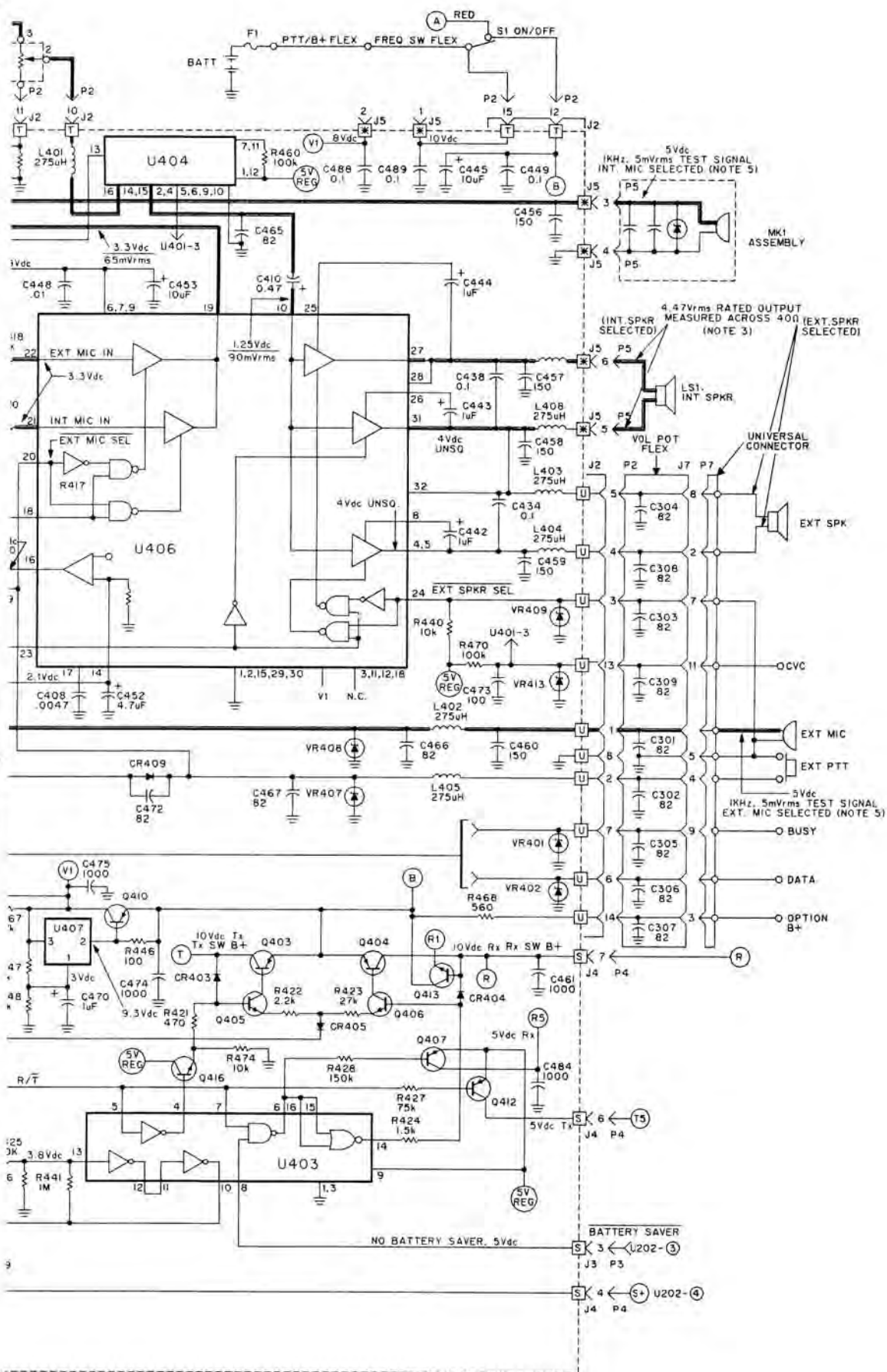
TPLF-3505-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: pF ± 5%; 50V unless stated
C1	2160520A20	6.2 ± 0.25pF NPO
C2	2160520A11	2.7 ± 0.25pF NPO
C3	2160520A24	9.1 ± 0.25pF NPO
C4	2160520B23	82 NPO
C5	2160521A13	1000; 25V
C6	2160520A15	3.9 ± 0.25pF NPO
C7	2160520A20	6.2 ± 0.25pF NPO
C8	2160520B23	82 NPO
C9, 10	-----	Not Used
C11	2160521A19	3300; 25V
C12	2160520B23	82 NPO
C13	2160521A25	0.01uF; 25V
C14	2160520B01	10 NPO
C15	2160520A21	6.8 ± 0.25pF NPO
C16	2160520B04	13 NPO
C17	2160520A21	6.8 ± 0.25pF NPO
C18	2160520B12	30 NPO
C19, 20	-----	Not Used
C21	2160520B03	12 NPO
C22, 23	2160520A01	1 NPO
C24	-----	Not Used
C25	2160520A07	1.8 ± 0.25pF NPO
C26,27,28	-----	Not Used
C29	2160520A14	3.6 ± 0.25pF NPO
C30	2160521A13	1000; 25V
C31	2160520A24	9.1 ± 0.25pF NPO
C32,33,34	-----	Not Used
C35	2160520B12	30 NPO
C36, 37	0660076M01	Chip Resistor; 0Ω
C38	2160521A13	1000; 25V
C39	2360562A13	1uF ± 20%; 16V
C40	-----	Not Used
C41	0660076M01	Chip Resistor; 0Ω
C42	2360562A16	1.5uF ± 20%; 10V
C43	2160520B15	39 NPO
C44	-----	Not Used
C45	2160520C13	330 NPO
C46	-----	Not Used
C47	2160521A19	3300 NPO
C48	2160520B23	82 NPO
C49	2160520B10	24 NPO
C50, 51	2160521A13	1000; 25V
C52	2160521G37	0.1uF + 80 - 20%; 25V
C53,54,55	-----	Not Used
C56	2160520A03	1.2 ± 0.25pF NPO
C100	2160520A01	1.0 ± 0.25pF NPO
C101	-----	Not Used
C102	2160520B07	18 NPO
C103, 104	-----	Not Used
C105	2160520B23	82 NPO
C106	-----	Not Used
C107	2160520B23	82 NPO
C108, 109	-----	Not Used
C110	2160520B14	36 NPO
C111 thru 114	-----	Not Used
C115	2160520B23	82 NPO
C116	2160520B14	36 NPO
C117	2105454G02	11 N150
C118	-----	Not Used
C119	2160520B23	82 NPO
C120, 121	-----	Not Used
C122, 123	2160520B23	82 NPO
C124,125,126	-----	Not Used
C127	2360562A24	3.3uF ± 20%; 16V
C128 thru 142	-----	Not Used
C143	2160520A13	3.3 ± 0.25pF NPO
C144	-----	Not Used
C145	2160520B23	82 NPO
C146,147,148	-----	Not Used
C149	2160521G37	0.1uF + 80 - 20%; 25V
C150	-----	Not Used
C151	2160520B07	18 NPO
C152	2160521G37	0.1uF + 80 - 20%; 25V
C153	-----	Not Used
C154	2160520A15	3.9 ± 0.25pF NPO
C155	2160521G37	0.1uF + 80 - 20%; 25V
C156	-----	Not Used
C157	2160520A18	5.1 ± 0.25pF NPO
C158	2160520B01	10 NPO

C159, 160	2160520B23	82 NPO
C161	-----	Not Used
C162	2160520B23	82 NPO
C163	-----	Not Used
C164	2160520B23	82 NPO
C165	-----	Not Used
C166	2360562A24	3.3uF ± 20%; 16V
C167	-----	Not Used
C168	2160520B23	82 NPO
C169	2160521G37	0.1uF + 80 - 20%; 25V
C170	2160520B23	82 NPO
C171	2305499G13	1uF ± 20%; 25V
C172 thru 176	-----	Not Used
C177	2160520A20	6.2 ± 0.25pF NPO
C178	-----	Not Used
C179	2160521G37	0.1uF + 80 - 20%; 25V
C180, 181	-----	Not Used
C182	2160521C21	4700 ± 10%; 25V
C183	2160520A03	1.2 ± 0.25pF NPO
C184	-----	Not Used
C185	2160520A05	1.5 ± 0.25pF NPO
C186	2160520B23	82 NPO
C187	2105499G19	0.1uF ± 20%; 35V
C188, 189	-----	Not Used
C190	2105499G13	1uF ± 20%; 25V
C191	2160520B23	82 NPO
C192	-----	Not Used
C193	2160520A18	5.1 ± 0.25pF NPO
C194	-----	Not Used
C195	2160520B06	16 NPO
C301 thru 310	2160520B23	82 NPO
C400	2160521C19	3300 ± 10%
C401	2360562A07	0.47uF; 25V
C402	2360562A21	2.2uF; 20V
C403	2160521G37	0.1uF + 80 - 20%
C404	2360562A28	4.7uF; 10V
C405, 406	2360562A07	0.47; 25V
C407	-----	Not Used
C408	2160521C21	4700 ± 10%
C409	-----	Not Used
C410	2360562A07	0.47uF; 25V
C411 thru 414	-----	Not Used
C415	2360562A43	10uF; 16V
C416	2160521G37	0.1uF + 80 - 20%
C417,418,419	-----	Not Used
C420	2360562A13	1uF; 16V
C421, 422	2160620B14	36 NPO
C423	2160520G01	100 NPO
C424	2111032B13	0.1uF + 80 - 20%
C425	-----	Not Used
C426,427,428	2160520G01	100 NPO
C429, 430	-----	Not Used
C431	2160521G37	0.1uF + 80 - 20%
C432, 433	-----	Not Used
C434	2160521G37	0.1uF + 80 - 20%
C435,436,437	-----	Not Used
C438	2160521G37	0.1uF + 80 - 20%
C439,440,441	-----	Not Used
C442,443,444	2360562A13	1uF; 16V
C445	2360562A35	10uF; 25V
C446,447,448	2160521C25	0.01uF ± 10%
C449	2160521G37	0.1uF + 80 - 20%
C450, 451	-----	Not Used
C452	2360562A28	4.7uF; 10V
C453	2360562A43	10uF; 16V
C454, 455	-----	Not Used
C456 thru 460	2160220C05	150 NPO
C461	2160521A13	1000
C462	-----	Not Used
C463 thru 467	2160520F23	82 NPO
C468, 469	2160521C19	3300 ± 10%
C470, 471	2360562A13	1uF; 16V
C472	2160520F23	82 NPO
C473	2160520G01	100 NPO
C474, 475	2160521A13	1000
C476	2160520C13	330 NPO
C477	2360562A43	10uF; 16V
C478	2160520G01	100 NPO
C479, 480	-----	Not Used
C481	2360562A43	10uF; 16V
C482	-----	Not Used
C483, 484	2160521A13	1000
C485	2160520F23	82 NPO
C486	2360562A13	1uF; 16V

C487	2160521A13	1000
C488, 489	2160521G37	0.1uF + 80 - 20%
C490	2160521A13	1000
C491	-----	Not Used
C492, 493	2111031A37	82
C501	2160520B23	82 NPO
C801	2160520G11	270
C802	2160521G37	0.1uF + 80 - 20%
C803, 804	-----	Not Used
C805	2160521A14	1200
CR1	4883654H06	DIODE: See Note I
CR2	4805119G34	Silicon
CR101	4805494Q04	Silicon
CR102	4805490G02	Silicon
CR103	4883654H06	Silicon
CR104, 105, 106	-----	Not Used
CR107	4880010E05	Silicon
CR403, 404, 405	4805494Q04	Silicon
CR406, 407, 408	-----	Not Used
CR409	4805494Q04	Silicon
CR501	4805729G28	LED, Red
CR502	4805729G29	LED, Green
DS501	6505018G01	LAMP: Axial Lead
E103	7683960B04	CORE: Ferrite Bead
F1	6505214E02	FUSE: Axial, 2-Ampere
FL1, FL2	4805245J20	FILTER: Crystal, 53.55MHz (Matched pair) FL1 = Black Dot FL2 = Blue Dot
FL3	9105726Q02	Ceramic, 450kHz
FL4	9105726Q01	Ceramic, 450kHz
J1, 2	0905467R01	Socket, 15-position
J3, 4	0905577P01	Socket, 7-position
J5	0905249Q01	Socket, 6-position
J6	0105959M27	Header Assembly, 12-socket
J501	0905570R01	Female, 10-pin (Part of LCD Assembly 0105958N65)
JU401	0660076M01	JUMPER: Chip Resistor; 0Ω
L1, 2	0105957M23	COIL, RF: unless stated Assembly, Preselector; 2-pole
L3, 4	2484238H02	11 1/2 turns, close wound
L5	2405723J21	10 3/4 turns, Preselector
L6, 7	2405732J01	11 turns, Preselector
L8	2405559P13	5 1/2 turns, air wound
L9	2405063H24	13 turns, space wound
L10	2405063H13	1.2uH Choke, tunable
L11	2405063H09	0.6uH Choke, tunable
L12, 13	2405523P35	1 1/2 turns, space wound; with core
L14	2505129Q02	1.2uH Choke, tunable
L15	-----	Not Used
L16	2405027E19	Coil, RF
L17, 18	2462575A01	0.39uH Choke
L101	2405523P07	2 1/2 turns, space wound
L102, 103	-----	Not Used
L104	0105951N35	Assembly, 0.085uH Choke, with bead and sleeving
L105	2405523P03	3 1/2 turns, space wound, with core
L106	2405027E38	3 1/2 turns, fixed
L107, 108	0105951N35	Assembly, 0.085uH Choke, with bead and sleeving
L109, 110, 111	-----	Not Used
L112	2405027E38	3 1/2 turns, fixed
L113	0105955N19	Assembly, 0.2uH Choke, with bead and sleeving
L114	0105951N34	Assembly, 0.29uH Choke, with bead and sleeving
L115	2405559P19	4 1/2 turns
L116	2484238H02	1 1/2 turns
L117	0105951N34	Assembly, 0.29uH Choke, with bead and sleeving
L118	-----	Not Used
L119	2405452C08	275uH Chip
L120	-----	Not Used
L121	2405452C09	50uH Chip

L122	2405559P18	3 1/2 turns, air wound
L123	2405027E38	3 1/2 turns, fixed
L124	2482732H28	0.29uH
L125	-----	Not Used
L126, 127, 128	2462575A01	0.39uH Choke
L401 thru 408	2405452C08	Electrical Chip
LS1	5005155Q01	SPEAKER: Transducer, 39Ω
MK1	0105956M62	MICROPHONE: Assembly, microphone flex
P1, 2	2805466R01	PLUG: Connector, Male; 15-pin (Part of Freq. Adj. Flex 0105958N55)
P3, 4	-----	Part of U202 - 5105822P75
P5	-----	Part of MK1 - 0105956M62
P6	-----	Part of U1 - 5105822P62
Q1	4880182D39	TRANSISTOR: See Note I
Q2	4805452G13	NPN
Q102	4805128M84	MOSFET, Dual Gate
Q103	4805474G48	NPN - SOT
Q104, 105	-----	NPN
Q106	4805128M09	Not Used
Q400	4805128M94	NPN - SOT
Q401	4805128M12	PNP - SOT
Q402, 403, 404	4805128M94	RH
Q405, 406	4805128M12	PNP - SOT
Q407	4805128M94	RH
Q408, 409	-----	Not Used
Q410	4805128M10	PNP
Q411	-----	Not Used
Q412	4805128M94	PNP - SOT
Q413	4805128M12	RH
Q414	4805128M94	PNP - SOT
Q415, 416	4805128M12	RH
R1	0660076A69	RESISTOR, Fixed: Ω ± 5%; 1/8W unless stated
R2	0660076A89	6.8k
R3	0660076A57	47k
R4	-----	2.2k
R5	0660076A45	Not Used
R6	0660076A39	680
R7	0660076M01	390
R8	0660076A54	Chip Resistor; 0Ω
R9	-----	1.6k
R10	0660076M01	Not Used
R11	-----	Chip Resistor; 0Ω
R12	0660076A85	Not Used
R102	0660076A46	33k
R103	0660076A64	750
R104 thru 106	-----	4.3k
R107	0660076A17	Not Used
R108 thru 112	-----	47
R113	0660076A25	Not Used
R114 thru 117	-----	100
R118	0660076A72	Not Used
R119	0660076A87	9.1k
R120	1805581P01	39k
R121	0660076A42	Pot., 50k
R122	0660076A67	510
R124, 125, 126	-----	5.6k
R127	0660076A41	Not Used
R128	0660076A51	470
R129	0660076A42	1.2k
R130, 131, 132	-----	510
R133	0660076A45	Not Used
R134	-----	680
R135	0660076C45	Not Used
R136	-----	680
R137	0660076A18	Not Used
R138	0660076A15	51
R139	0660076A41	39
R140	1805100Q02	470
R400, 401, 402	0660076B01	Pot., 25k (Volume-includes S1)
R403	0660076A67	100k
R404	0660065B01	5.6k
R405	0660076K49	100k
R406, 407, 408	0660076B01	10M
R409	0660076A47	100k
R410	0660076A59	820
		2.7k

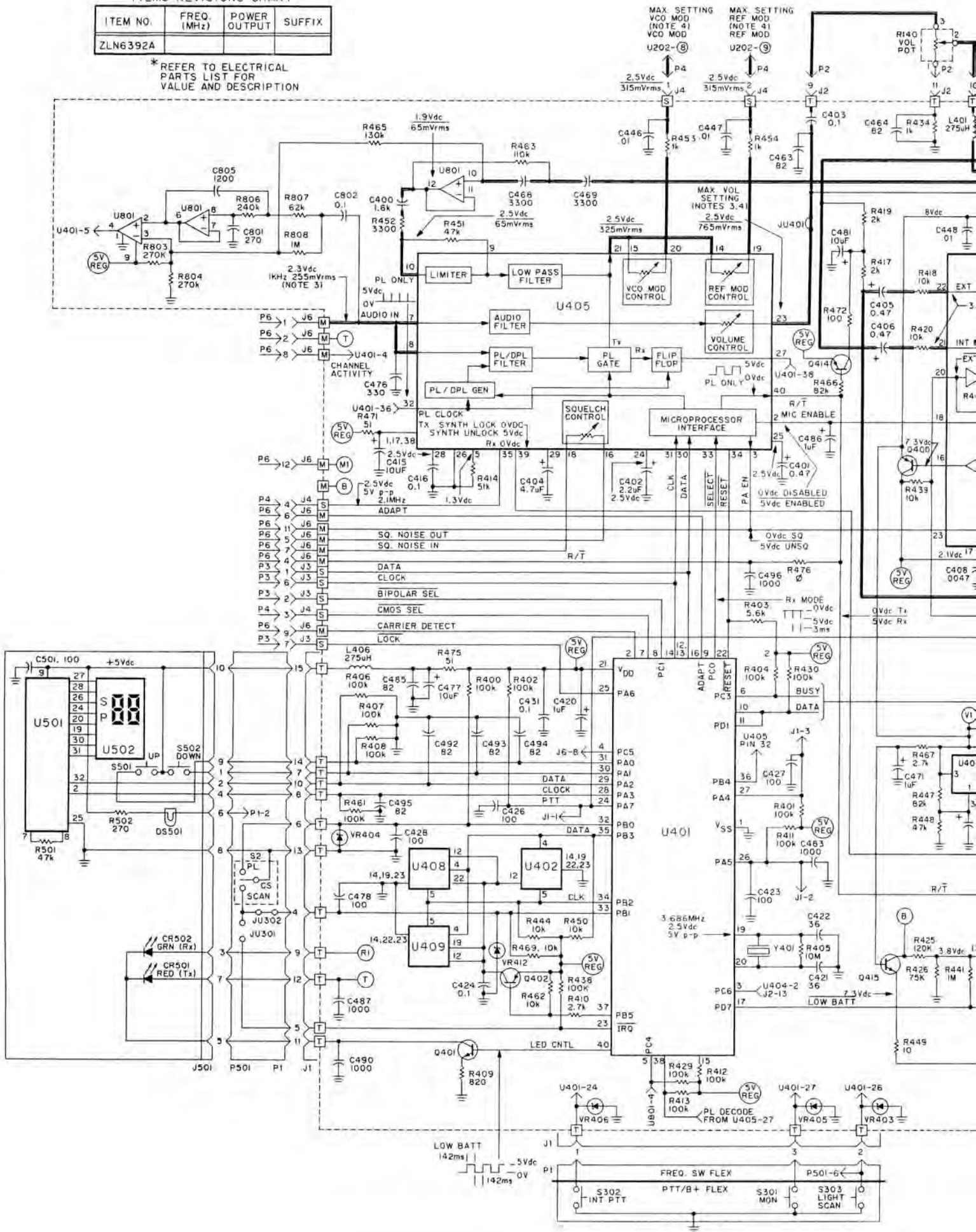


**CONTROLLER FLEX
SCHEMATIC DIAGRAM**

ITEMS REVISIONS CHART

ITEM NO.	FREQ. (MHz)	POWER OUTPUT	SUFFIX
ZLN6392A			

* REFER TO ELECTRICAL PARTS LIST FOR VALUE AND DESCRIPTION



R411,412,413	0660076B01	100k
R414	0660076A90	51k
R415, 416	-----	Not Used
R417	0660076A56	2k
R418	0660076A73	10k
R419	0660076A56	2k
R420	0660076A73	10k
R421	0660076A41	470
R422	0660076A51	1.2k
R423	0660076A83	27k
R424	0660076A53	1.5k
R425	0660076F03	120k
R426	0660076E94	75k
R427	0660076A94	75k
R428	0660076B05	150k
R429, 430	0660076B01	100k
R431,432,433	-----	Not Used
R434	0660076A49	1k
R435,436,437	-----	Not Used
R438	0660076B01	100k
R439, 440	0660076A73	10k
R441	0660076B25	1M
R442, 443	-----	Not Used
R444	0660076A73	10k
R445	-----	Not Used
R446	0660076A25	100
R447	0660076E95	82k
R448	0660076E89	47k
R449	0660076A01	10
R450	0660076A73	10k
R451	0660076A89	47k
R452	0660076A54	1.6k
R453, 454	0660076A49	1k
R455 thru 459	-----	Not Used
R460, 461	0660076B01	100k
R462	0660076A73	10k
R463	0660076A93	120k
R464	-----	Not Used
R465	0660076B08	240k
R466	0660076A95	82k
R467	0660076A59	2.7k
R468	0660076A43	560
R469, 470	0660076B01	100k
R471	0660076A18	51
R472	0660076A25	100
R473	-----	Not Used
R474	0660076A57	2.2k
R475	0660076A18	51
R476	0660076M01	Chip Resistor; 0Ω
R501	0660076A89	47k
R502	0660076A35	270
R803, 804	0660076B11	270k
R805	-----	Not Used
R806	0660076B10	240k
R807	0660076A92	62k
R808	0660076B25	1M

S1	-----	SWITCH:
S2	4005101Q01	ON/OFF, Part of R140
S301	3905834K04	MODE SELECT, 3-Position Toggle
S302	3905834K04	MONITOR, Snap Dome
S303	3905834K04	INT PTT, Snap Dome
S501	3805558R01	LIGHT/SCAN, Snap Dome
S502	3805558R01	UP, Elastomeric
		DOWN, Elastomeric
		CIRCUIT MODULE: See Note I
U1	5105822P62	I-F
U102	5105822P71	2-Watt PA
U103, 104	-----	Not Used
U105	5105822P63	Antenna Switch
U106	5105729E52	Reference Oscillator, 16.8MHz
U107	-----	Not Used
U108	5105822P50	VCO Buffer
U201	5105822P56	VCO, 438-470MHz
U202	5105822P75	Synthesizer
U401	0105954P16	Computer
U402	0105954P14	Code Plug
U403	0105957N87	Hex Gate
U404	0105954P13	Analog Switch
U405	0105957N86	Audio Filter
U406	0105952P27	Audio PA
U407	5160870F01	5-Volt Regulator
U408, 409	0105954P14	Code Plug
U501	0105954P15	LCD Driver
U502	5105185R27	LCD
U801	0105957N83	Op Amp
VR102	4805189E05	DIODE: See Note I
VR401 thru 409	4805129M42	Zener; 7.5V
CR410, 411	-----	Zener; 5.6V
VR412, 413	4805129M42	Not Used
		Zener; 5.6V
		CRYSTAL: See Note II
Y401	4805664G33	3.6864MHz

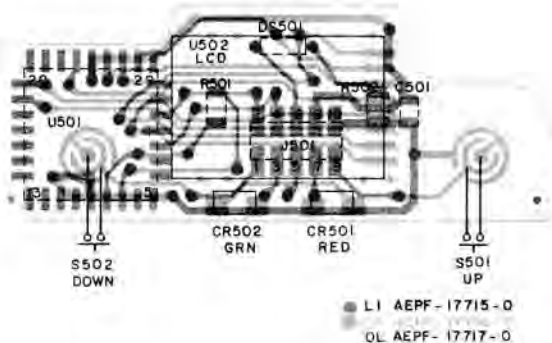
NONREFERENCED ITEMS

0105955G27	ASSEMBLY, Tuning Slug (for L1, L2)
0105957M24	SHIELD CAN (for L5,L6,L7)
0705196A04	BOOT (for FL1, FL2)
0705766R01	SUPPORT, Rubber (for Contact)
0905557R01	CONTACT STRIP, Elastomeric (for LCD Display)
1305559R01	BEZEL, Display (for LCD Display)
2605524P03	SHIELD CAN (for L12,L13,L105)
2605524P01	SHIELD CAN (for L14, L126)
3700132562	TUBING, Heat Shrinkable (for L14)
3905509R02	CONTACT (Solder-side of NUJ6912B to Main Back Shield)
6105566R01	DIFFUSER (for LCD Display)
7505295B07	BASE PAD (for FL1,FL2)
7505560R01	PAD, Diffuser (for LCD Display)
7505695R01	PAD (for U106)
8405748R01	FLEX, Controller

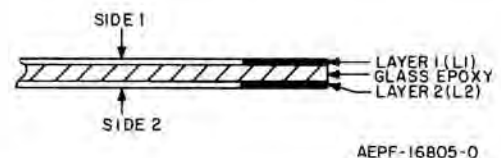
NOTES:

- I. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.
- II. When ordering crystal units, specify carrier frequency, crystal frequency, crystal type number, and Motorola part number.

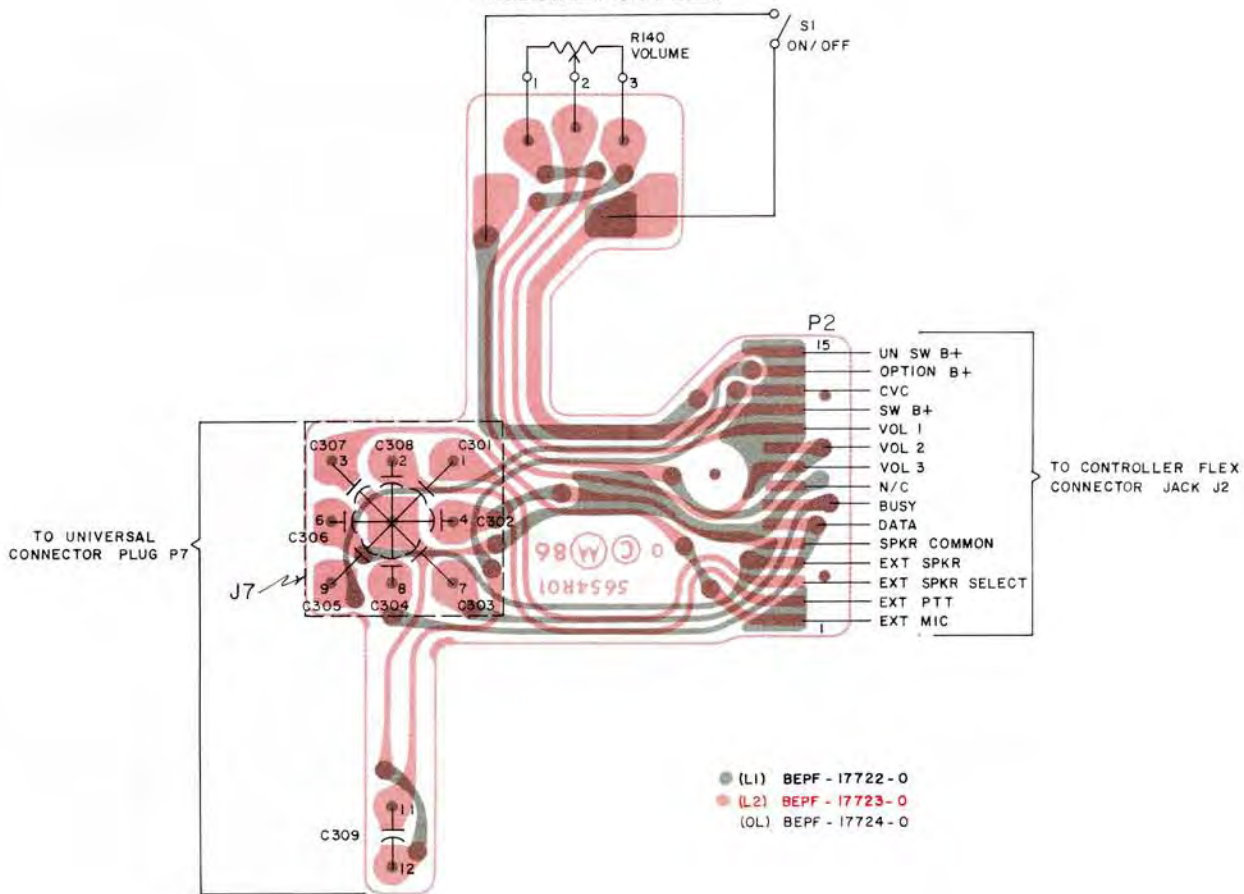
VIEWED FROM SIDE 2
(SOLDER SIDE)



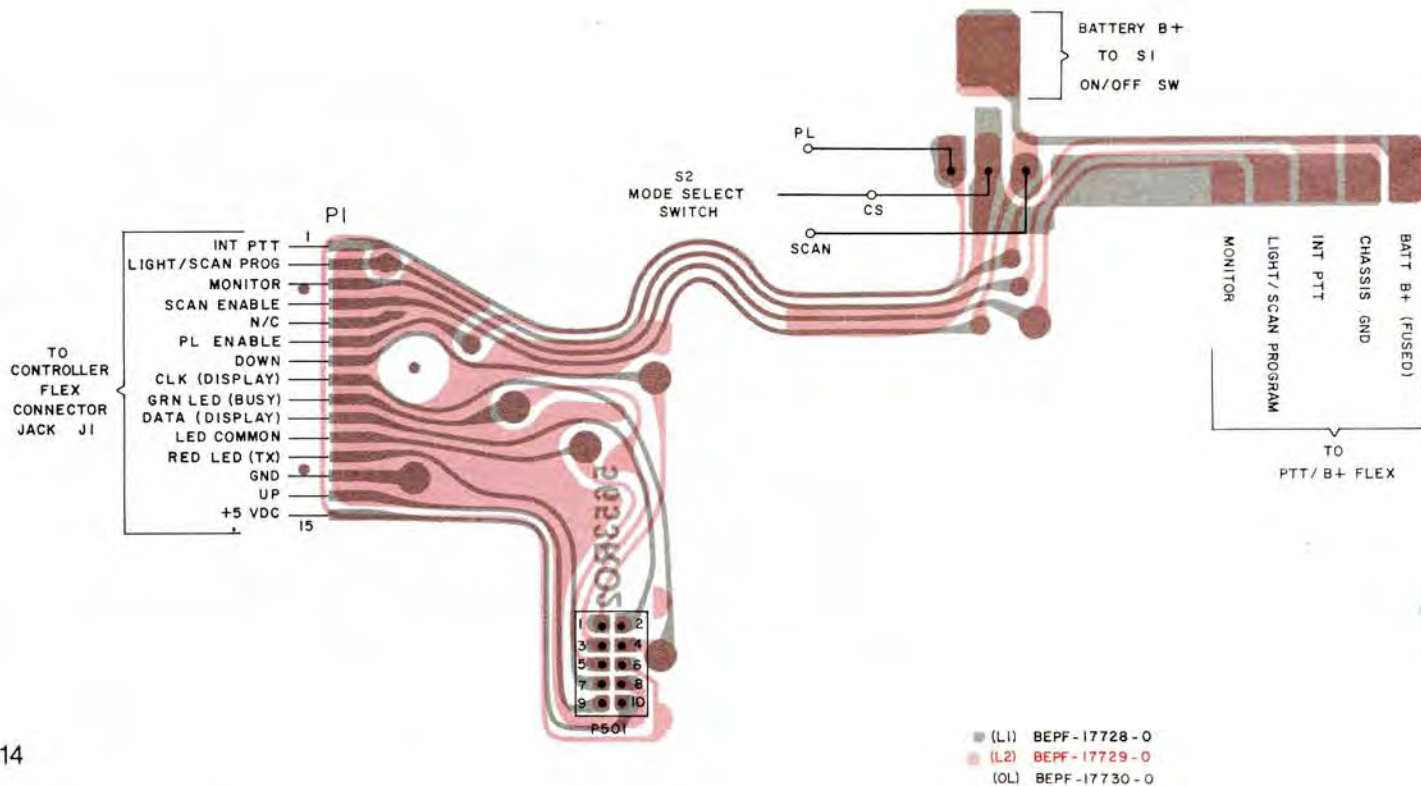
2-LAYER CIRCUIT BOARD COPPER DETAIL VIEWING
COPPER STEPS AT EDGE OF BOARD IN PROPER
LAYER SEQUENCE.



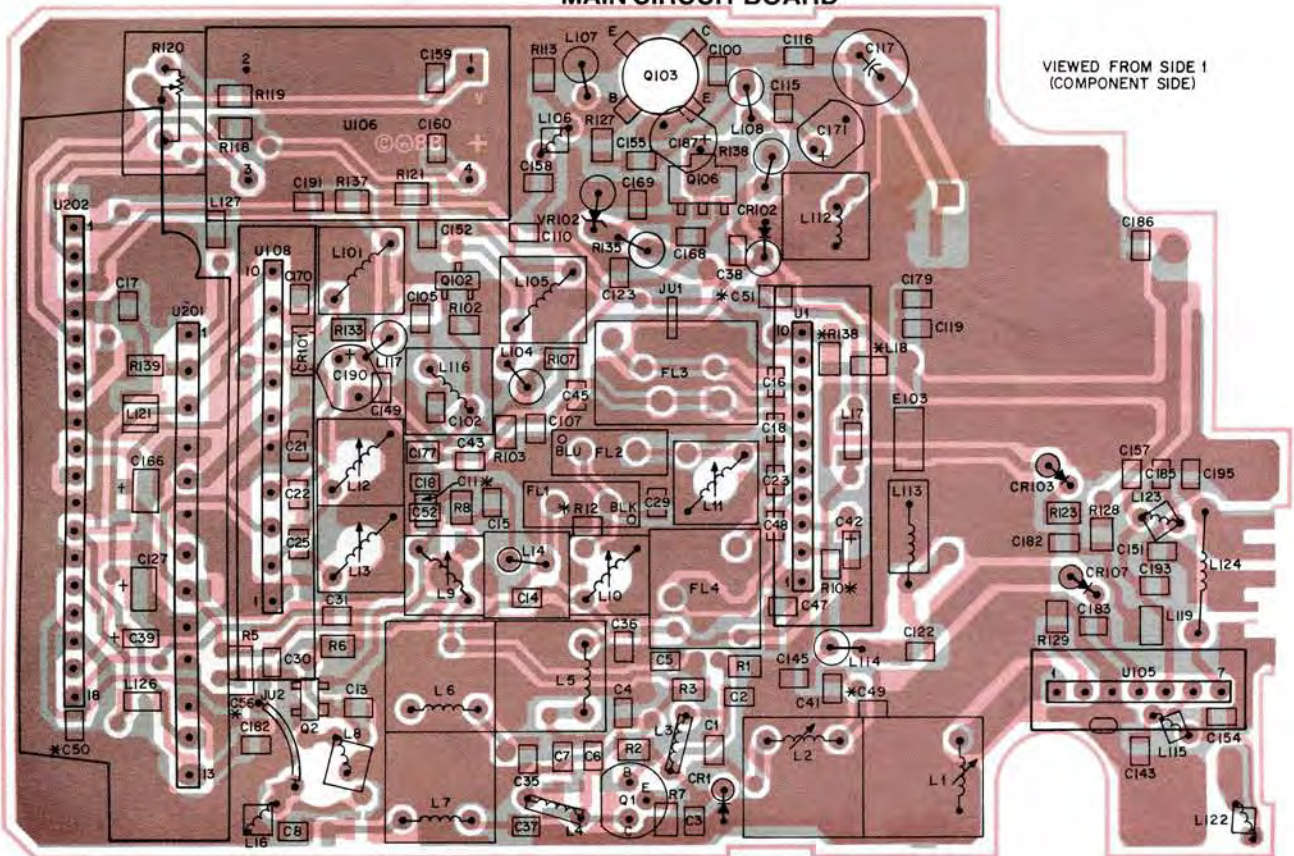
VOLUME POT FLEX



FREQUENCY SWITCH FLEX



MAIN CIRCUIT BOARD

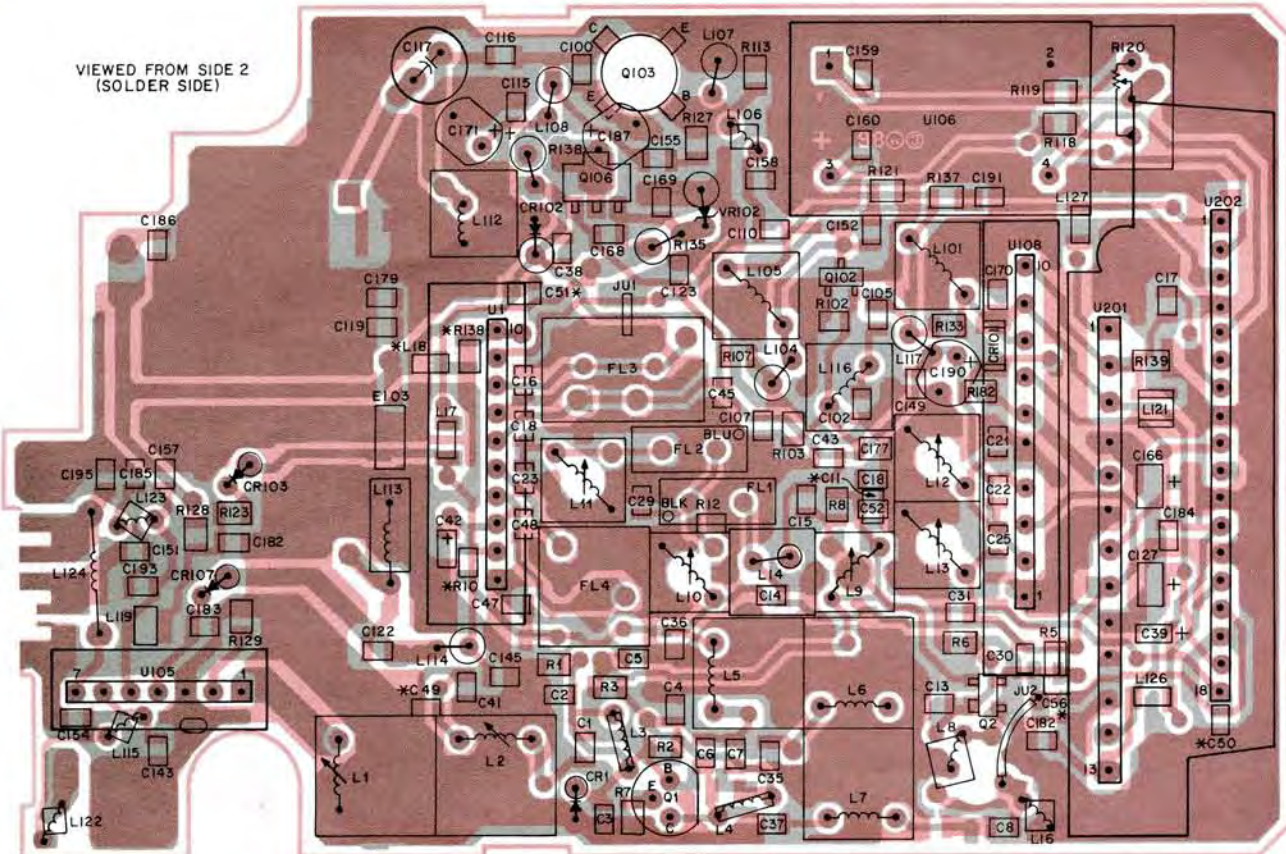


VIEWED FROM SIDE 1
(COMPONENT SIDE)

* = MOUNTED ON SOLDER SIDE

- L1-CEPF-17709-0
- L2-CEPF-17710-0
- OL-CEPF-17711-0

VIEWED FROM SIDE 2
(SOLDER SIDE)



* = MOUNTED ON SOLDER SIDE

- L1-CEPF-17712-0
- L2-CEPF-17713-0
- OL-CEPF-17714-0

PTT/B + FLEX

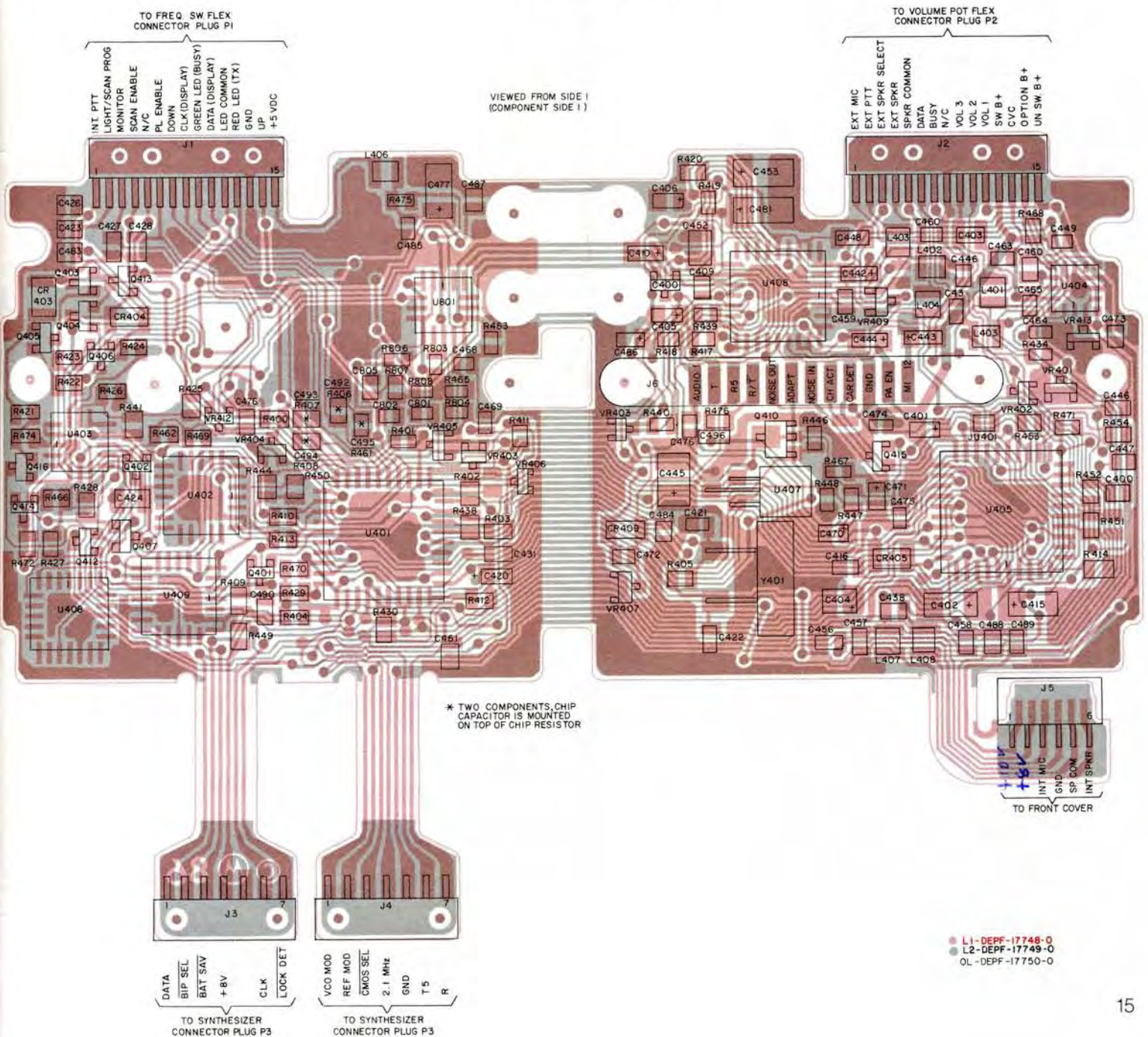
VIEWED FROM SIDE 2



- L1 - BEPF-17058-A
- L2 - BEPF-17059-A
- OL - BEPF-17060-B

CONTROLLER FLEX

VIEWED FROM SIDE 1
(COMPONENT SIDE)



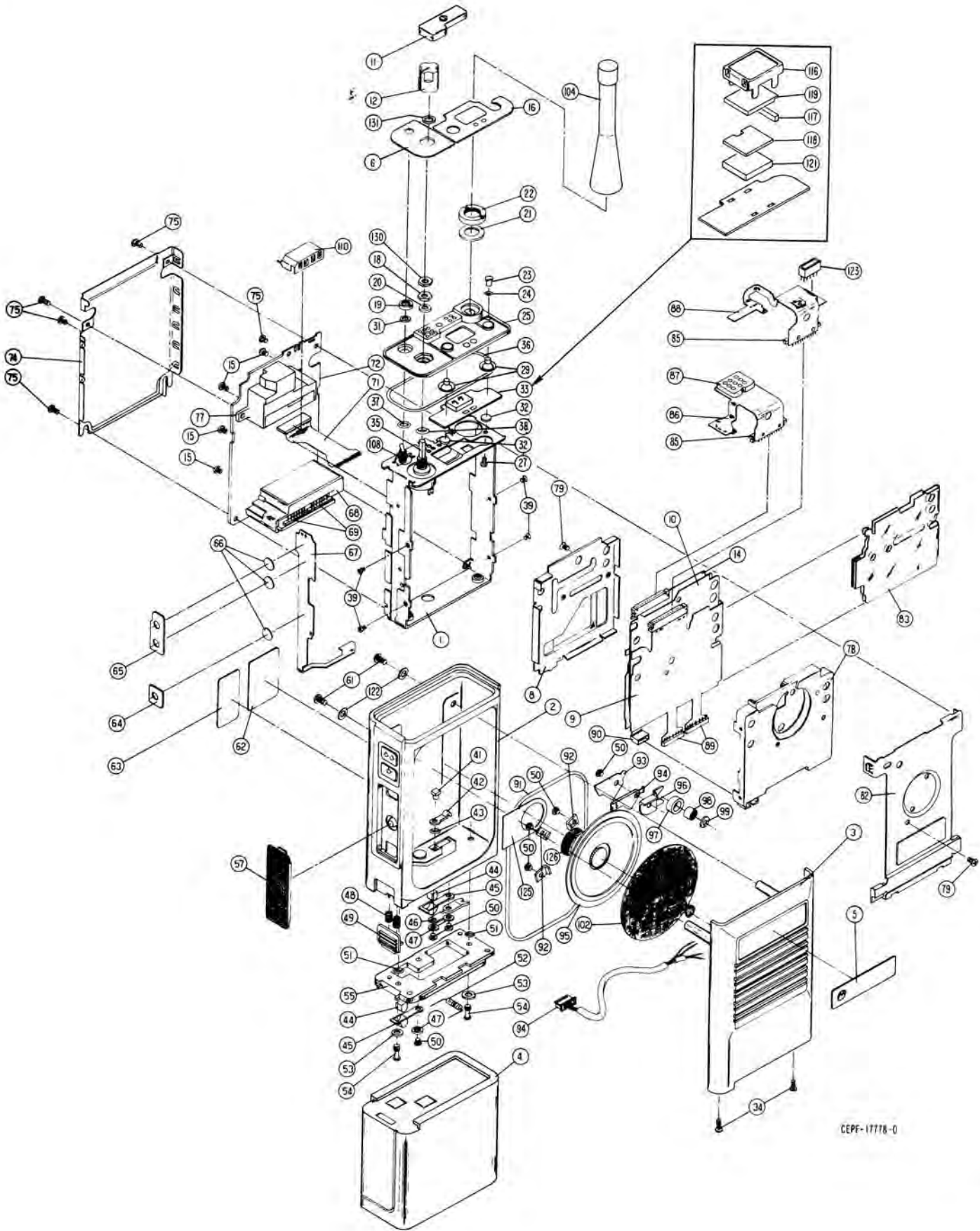
EXPLODED VIEW PARTS LIST

TPLF-3506-O

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	0105958N59	FRAME
2	NHN6419A	HOUSING KIT; includes: items 41 thru 57
3	NTN5017A	FRONT COVER KIT; includes: items 5, 50, 91 thru 99, 102, 125, 126
4	NTN5048A	BATTERY; 900mAh
5	3305260Q03	NAMEPLATE
6	1305564R01	ESCUTCHEON; ON/OFF Volume
7A	ZLN6392A	CONTROLLER FLEX KIT; includes: items 8, 9, 10, 14, 78, 79, 83
7B	1505784R01	CONTROLLER FLEX CARRIER; Top
8	2605184Q01	CONTROLLER FLEX CARRIER; Bottom
9	0105951P19	CONTROLLER FLEX
10	2605499R01	CENTER SHIELD; Top Carrier Side
11	1505221Q01	DUST COVER
12	0105951N79	KNOB, Volume
14	2605499R01	CENTER SHIELD; Bottom Carrier Side
15	0300136772	SCREW, Phillips; 2-56 x 3/16"
16	1305563R01	ESCUTCHEON, Display
18	0205629L01	NUT HEX; (Volume Pot.) 0.75 x 8 x 1.6mm
19	0205163Q01	NUT, Spanner (Toggle Switch)
20	0405162Q02	WASHER, Flat (Volume Pot.)
21	0405216L04	WASHER, Flat (Antenna)
22	0205765L02	NUT, Spanner (Antenna)
23	0205562R01	NUT, Plate
24	3205556R02	SEAL, Nut Plate
25	0105958N64	CONTROL TOP
27	0305573R01	SCREW, Phillips; 2-56
29	3805558R01	SWITCH, Elastomer
31	0405162Q01	WASHER, Flat (Toggle Switch)
32	7505561R01	PAD, LCD
33	0105958N65	LCD DISPLAY ASSEMBLY
34	0300140041	SCREW, Phillips; 2-56 x 1/4"
35	1805100Q02	POTENTIOMETER, Volume, 25k
36	3205141Q02	O-RING, Control Top
37	3205141Q03	O-RING (Toggle Switch)
38	3205082E01	O-RING (Volume Pot.)
39	0300140369	SCREW, Flat Head; 2-56 x 1/8"
41	4605945K05	CONTACT STUD, Battery
42	3905127Q01	CONTACT B+
43	3205082E24	O-RING, Gasket (Stud)
44	0705830C02	SUPPORT, Contact
45	3905421C07	CONTACT, Battery
46	2905124Q01	LUG, Fuse
47	0400002625	LOCKWASHER
48	4105944K01	SPRING, Battery Latch
49	5505536P01	LATCH
50	0300139982	SCREW, 2056 x 5/32"
51	3205082E03	O-RING, Gasket
52	6505214E02	FUSE, 2 Ampere
53	0400009761	LOCKWASHER
54	0305941K01	SCREW, Captive 4-40
55	6405531P01	PLATE, Base
57	4505535P01	LEVER, PTT
61	0305137Q01	SCREW, Phillips; 4-40 x 1/2"
62	3305408R??	LABEL 1
63	3305408R??	LABEL 2
64	3205231Q01	SEAL, Dome (PTT)
65	3205196Q01	SEAL, Dome (MON/LIGHT)
66	3905834K04	CONTACT, Snap Dome
67	0105951N40	B+ FLEX KIT; Includes: items 64, 65, 66 (P/O U201)
68	See Note	
69	2805144Q01	PLUG, 7-position (P/O U202)
71	See Note	
74	0105955N90	MAIN BACK SHIELD
75	0300136772	SCREW, 2-56 x 3/16"
77	See Note	
79	0300138620	SCREW, Phillips; Flat Head, 2-56 x 3/16"
82	0105951P28	FRONT PLANE SHIELD
83	1405264Q01	INSULATOR, Flex
86	0105958N56	VOLUME, Flex (P2)
88	0105958N55	FREQ. ADJUST FLEX (P1)
91	3205141Q01	O-RING, Gasket (Front Cover)
92	4205140Q01	CLAMP, Speaker
93	1405135P01	INSULATOR, Mic
94	0105956M62	MIC FLEX KIT; includes: items 97, 98
95	5005155Q01	SPEAKER, 391L
96	4205140Q01	CLAMP, Mic
97	1405299L01	BOOT, Mic
98	5005227J01	MIC, Element
99	7505582P01	PAD, Mic Boot
102	3505143Q05	FELT, Speaker

104	NAE6232A	ANTENNA, Heliflex (Green)
108	4005101Q02	SWITCH, 3-position Toggle
116	1305559R01	BEZEL, LCD
117	0905557R01	CONTACT STRIP, Elastomeric
118	6105566R01	DIFFUSER
119	5105165R27	LCD
121	7505560R01	PAD, Diffuser
122	0484345A06	WASHER, Seal
125	1405299Q01	INSULATOR, Speaker
126	7505501R02	PAD, Speaker
130	0405534R01	WASHER, Flat Octagonal
131	0405749R01	WASHER, Flat (Kapton)
136	7505501R03	PAD
137	0305103S01	SCREW, Captive 4-40

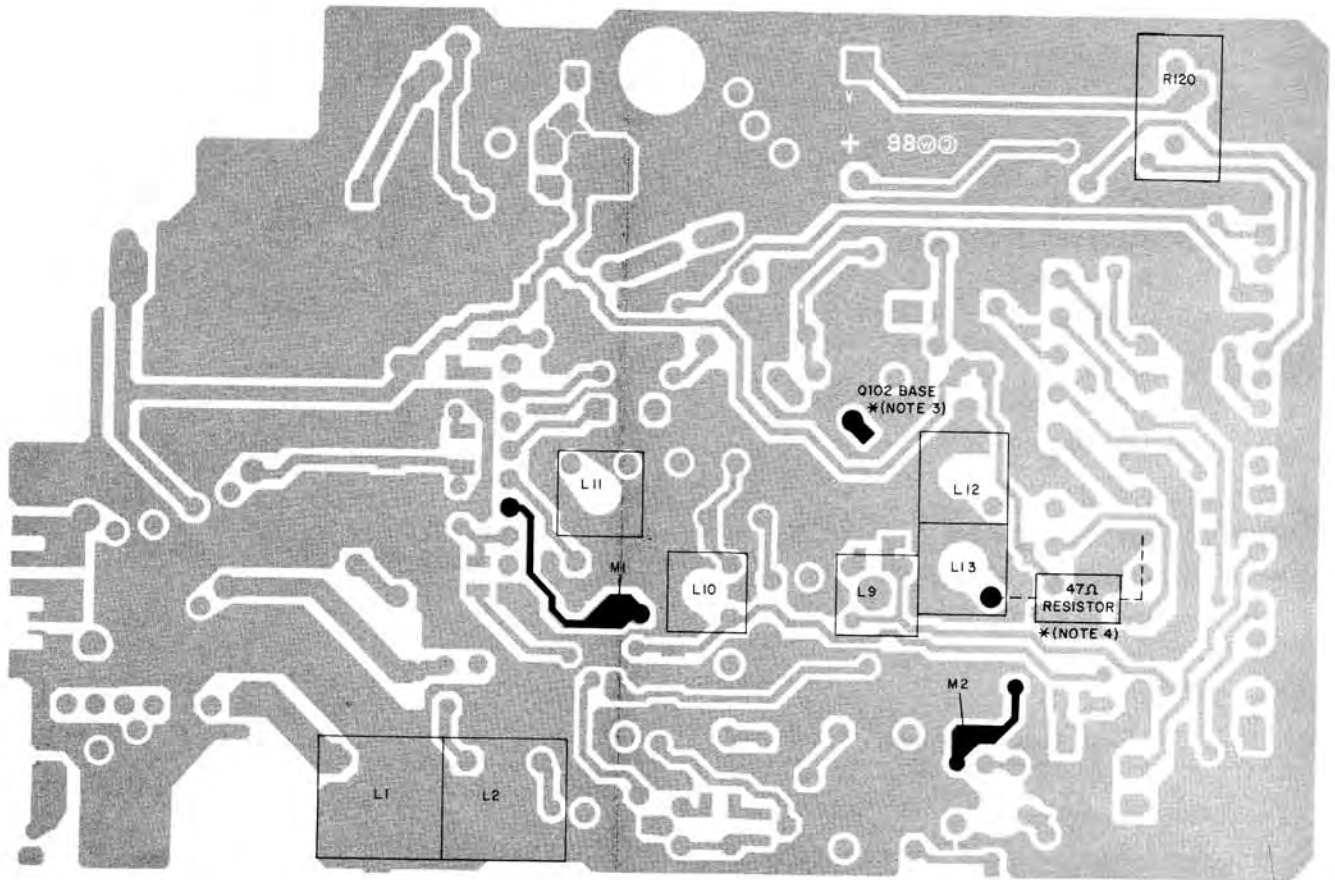
NOTE: Refer to Electrical Parts List for part number and description.



CEPF-17778-0

EXPLODED VIEW PARTS LIST AND DIAGRAM

ALIGNMENT/ADJUSTMENT LOCATIONS



* REFER TO VOLTAGE OVERLAY
AND WAVEFORM NOTE INDICATED.

Ⓢ L2-CEPF-17713-0
OL CEPF-17777-0