

NTN4958A Multicall Front Cover
Electrical Parts List

TPLF-3600-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
C901, 902	2160521G37	CAPACITOR, Fixed: pF±5%; 16V unless stated 100nF; +80-20%	
C903, 904	2160520B08		
C905	2160521A13		
C906	2160520C13		
C908, 909	2160520B23		
C910	2160520C13		
C923	2160521G37		
C924	2160521A13		
C991 *	-----		
C992 *	-----		
L901, 902	2462575A03		COIL: 0.82uH Choke 180 uH Chip Inductor
L903	2460590A03		
L991, 992 *	-----		
LS901	5005155Q03	TRANSDUCER	
MK901 *	-----	MICROPHONE	
P901 *	-----	PLUG: Contacts, flex circuit plating Socket, 10-Pin	
P902 *	-----		
Q901, 902	4805128M12	TRANSISTOR: See Note I SOT	
R901 thru 910	0660076A90	RESISTOR, Fixed: Ω ±5%; 1/8W unless stated 51k 10 Meg ±10% 27k 15k 100k 51k 100k 51k	
R912	0660076H49		
R913	0660076A83		
R914	0660076A77		
R915	0660076B01		
R916, 917	0660076A90		
R921, 922	0660076B01		
R923	0660076A90		
S901	-----		SWITCH: Program, Single-Pole (Not replaceable, order Multicall Front Cover Kit) Keypad (Not replaceable, order Multicall Front Cover Kit)
S902	-----		
U901	0105805P23	CIRCUIT MODULE: See Note I Microcomputer 14-bit Frequency Counter 5-Volt Regulator	
U902	5105461G42		
U903	5160880B01		
VR901 thru 908	4880140L09	DIODE: See Note I Zener, 6.2V Zener, 6.2V	
VR912	4880140L09		
VR991 *	-----		
Y901	4805664G33	CRYSTAL: See Note II 3.6864 MHz Resonator	

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.

* Not field replaceable, order microphone flex assembly 0105956P58.

P210



MOTOROLA

Service Manual

Wartungsanleitung

Manuel de Réparation

HT800

403-433 MHz

438-470 MHz



SPECIFICATIONS

GENERAL	TRANSMITTER	RECEIVER
<p>FREQUENCY RANGE: 403-433 MHz 438-470 MHz</p> <p>POWER SUPPLY: Nickel-Cadmium Battery</p> <p>BATTERY DRAIN- at 10VDC (MD)H24 (MD)H34 (MD)H44 Standby: *47mA *47mA *47mA Receive: *153mA *153mA *153mA Transmit: **825mA **825mA **1560mA *Add 8mA with Remote Antenna **Add 15mA with Remote Antenna</p> <p>DIMENSIONS:</p> <p>WIDTH: 66.8mm (2.63")</p> <p>DEPTH: 35.3mm (1.39")</p> <p>HEIGHT: Radio Only 99.0mm (3.90") Radio with Battery Medium Capacity 161.3mm (6.35") High Capacity 177.3mm (6.98")</p> <p>WEIGHT: Radio Only 383 g (13.5 oz) Radio with Battery (Nickel-Cadmium) Medium Capacity 612 g (21.6 oz) High Capacity 684 g (24.1 oz)</p>	<p>RF OUTPUT- (MD)H24 (MD)H34 (MD)H44 Nickel-cadmium 1.0W at 2.0W at 4.0W at battery: 10Vdc 10Vdc 10Vdc</p> <p>MODULATION: Type 16F3: For 25kHz channel spacing: ±5kHz for 100% modulation at 1000Hz (±4.0kHz min.); For 20kHz channel spacing: ±4kHz for 100% modulation at 1000Hz (±3.2kHz min); For 12.5kHz channel spacing: ±2.5kHz for 100% modulation at 1000Hz (±2.0kHz min.); including PL modulation for PL models.</p> <p>PL MODULATION: 25kHz Channel Spacing ±1kHz max ±500Hz min 20kHz Channel Spacing ±800Hz max ±400Hz min 12.5kHz Channel Spacing ±500Hz max ±250Hz min</p> <p>AUDIO Meets CEPT requirements DISTORTION: at rated audio</p> <p>MAX. PERMISSIBLE CHANNEL 8MHz SEPARATION: (No degradation)</p> <p>FREQUENCY STABILITY: FROM -25°C to +55°C (+25°C ref.) ±.0005% (25/20kHz Channel Spacing) ±.0002% (12.5kHz Channel Spacing)</p> <p>SPURIOUS & HARMONIC FREQUENCIES: Less than: 0.25µW below 1GHz 1.0µW between 1GHz - 4GHz</p> <p>FM NOISE: At least 40dB below ±3.0kHz deviation at 1000Hz</p>	<p>AUDIO OUTPUT- Less than 5% distortion at 1kHz into rated load</p> <p>SECOND I-F FREQUENCY: 450kHz ± 1.5kHz measured at M1</p> <p>SENSITIVITY: 0.42µV max. (12dB SINAD), 0.50µV max. (20dB SINAD psophometrically weighted)</p> <p>NOISE SQUELCH SENSITIVITY: Programmable</p> <p>MAX. PERMISSIBLE CHANNEL 8MHz SEPARATION: (No degradation)</p> <p>FREQUENCY STABILITY: FROM -25°C TO +55°C (+25°C ref.) ±.0005% (25/20kHz Channel Spacing) ±.0002% (12.5kHz Channel Spacing)</p> <p>USEABLE BANDWIDTH: ±5kHz (25kHz Channel Spacing) ±4kHz (20kHz Channel Spacing) ±2.5kHz (12.5kHz Channel Spacing)</p> <p>SPURIOUS FREQUENCY REJECTION: More than 70dB below carrier</p> <p>IMAGE REJECTION: More than 70dB below carrier</p> <p>SELECTIVITY: More than 70dB at ±20/25kHz More than 60dB at ±12.5kHz</p> <p>INTERMODULATION: More than 70dB at adjacent channel</p> <p>CHANNEL SPACING: 25/20/12.5kHz</p>

Specifications Subject to Change Without Notice, and Assume CEPT '84 Test Methods Except as Noted
12.5kHz Specifications Reflect CEPT '84 Methods at -10°C to +55°C.

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.

SAFETY INFORMATION

DO NOT hold the radio with the antenna close to, or touching, exposed parts of the body, especially the face or eyes, while transmitting. The radio will perform best if the microphone is five to eight centimeters away from the lips and the radio is vertical.

DO NOT hold the transmit (PTT) switch on when not actually desiring to transmit.

DO NOT allow children to play with any radio equipment containing a transmitter.

DO NOT operate a transmitter near unshielded electrical blasting caps or in an explosive atmosphere unless it is a type especially qualified for such use.



AEPF-17813

CMOS PRECAUTIONS

THIS RADIO CONTAINS STATIC-SENSITIVE DEVICES. DO NOT OPEN THE RADIO UNLESS PROPERLY EARTHED. TAKE THE FOLLOWING PRECAUTIONS WHEN WORKING ON THIS UNIT.

The red printed circuit boards indicate static sensitive devices are contained on these boards, and should be handled with the following precautions.

- (1) Store and transport all CMOS devices in conductive material so that all exposed leads are shorted together. Do not insert CMOS devices into conventional plastic "snow" or plastic trays used for storage and transportation of other semiconductor devices.
- (2) Ground the working surface of the service bench to protect the CMOS device. We recommend using the Motorola P/N 0180386A82 Static Protection Kit which includes a wrist strap, 2 ground cords, a table mat, and a floor mat.
- (3) Wear a conductive wrist strap in series with a 1M resistor to ground. Replacement Wrist Straps that connect to the bench top covering - Motorola P/N RSX-4015B.
- (4) Do not wear nylon clothing while handling CMOS devices.
- (5) Neither insert nor remove CMOS devices with power applied. Check all power supplies to be used for testing CMOS devices and be certain there are no voltage transients present.
- (6) When straightening CMOS pins, provide ground straps for apparatus used.
- (7) When soldering, use a earthed soldering iron.
- (8) If at all possible, handle CMOS devices by the package and not by the leads. Prior to touching the unit, touch an electrical ground to remove any static charge that you may have accumulated. The package and substrate may be electrically common. If so, the reaction of a discharge to the case would cause the same damage as touching the leads.

CAUTION

DO NOT DEPRESS THE PTT OR SIDE SWITCHES WHILE INSERTING THE FRAME INTO THE HOUSING; DAMAGE TO THE SWITCHES COULD OCCUR. FOR REASSEMBLY, USE ONLY THE TOOLS THAT ARE RECOMMENDED. USING UNAUTHORISED TOOLS, IMPROPERLY USING AUTHORISED TOOLS, OR FAILING TO ADHERE TO TORQUE SPECIFICATIONS MAY CAUSE IRREPARABLE DAMAGE. DO NOT ATTEMPT TO REMOVE THE ANTENNA BUSHING FROM THE CONTROL TOP; IT IS ULTRASONICALLY WELDED IN PLACE. DO NOT DESOLDER OR RESOLDER ANY CONNECTIONS BETWEEN THE VOLUME POTENTIOMETER FLEX AND THE ON/OFF-VOLUME POTENTIOMETER (37) WITH THE SWITCH IN THE OFF POSITION. MAKE SURE THAT THE SWITCH IS IN THE ON POSITION BEFORE APPLYING ANY HEAT; OTHERWISE THE INTERNAL PARTS OF THE SWITCH WILL BE DAMAGED.

SERVICE AIDS

The following table lists tools and service aids recommended for working on the HT800. While all of these items are available from Motorola, most are standard shop equipment items, and any equivalent item capable of the same performance may be substituted for the item listed.

MOTOROLA PART NO.	DESCRIPTION	APPLICATION
RTX-4205A	RIB/Radio/test set cable	Connects radio to RTX-4005B Test Box and RIB.
RTL-4226B	Battery Eliminator	Interconnects radio to power supply.
15-8036B62	Battery Adapter	Connects radio to battery eliminator without main housing.
RTL-4234A	Controller Flex Extender Fixture	Eases in troubleshooting of controller flex and RF board.
01-80370B92	Controller Flex Hold Down Fixture	Provides secure mount for controller flex during servicing.
RTX-4005B or both RTX-4005A and RPX-4665A field modification kit	Portable Test Set	Enables connection to the universal Allows switching for radio testing.
1-80353A74	Radio Interface Box	Enables communications between the radio and the computer's serial communications adapter.
EPN-4041A	Wall-mounted Power Supply (220VAC)	Used to supply power to the RIB.
EPN-4040A	Wall-mounted Power Supply (240VAC)	Used to supply power to the RIB.
30-80369B71 or 30-80369B72	Computer Interface Cable	Use B72 for the IBM PC AT. All other IBM models use B71. Connects the computer's serial communications adapter to the RIB.
NKN6376A	Cloning Cable	Allows an HT800 radio to be duplicated from a master radio by transferring programmed data from one radio to another.
EVN-4101A	Programmer/Tuner Software	Software on 5-1/4" floppy disc.
EVN-4103A	Programmer/Tuner Software	Software on 3-1/2" floppy disc.
F.A.S.T. #9	"Using the RSX-4057A Desoldering Station"	How to use the RSX-4057A to successfully remove and replace surface mount devices.

RECOMMENDED TOOL LISTS

The following table lists the tools recommended for working on the HT800; these also are available from Motorola. Note that the RSX-4057A workstation requires the use of a specific "heat focus head" for each of the components on which this item is used. **Each of these heat focus heads must be ordered separately.** The individual heat focus heads (and the components on which they are used) are listed at the end of the table.

MOTOROLA PART NO.	DESCRIPTION	APPLICATION
RSX 4043A	Torque Screwdriver	Handle for bits listed below
66-80321B86	Phillips bit	Radio screws
55-0517E01	Hex socket bit	Volume and rotary switch nuts
66-80370B95	Spanner bit	Toggle switch spanner nut
66-05106N01	Tuning tool	Tunable coils and potentiometers
66-80387A59	Extractor, 2 contact	Removal of discrete surface mounted devices.
66-80387A64	Heat controller with safety stand, or	
01-80382A31	Portable desoldering unit	
66-80375A74	0.025 replacement tip, 5/pk	For 01-803282A31 portable desoldering unit
01-80386A81	Miniature digital readout soldering station (incl. 1/64" micropoint tip)	
01-80386A81	Illuminated magnifying glass with lens attachment	
01-80386A82	Anti-static grounding kit	Used during all radio assembly and disassembly procedures
66-84253C72	Straight prober	
66-80384A98	Brush	
10-10041A86	Solder (RMA type), 63/37, .20" diameter - 1 lb. spool	
10-80370B43	RMA liquid flux	
RSX-4057A	Surface mounted component - IC removal/rework station (order all heat focus heads separately)	Removal of surface-mounted integrated circuits
HEAT FOCUS HEADS	INSIDE DIMENSIONS OF HEADS	
66-80334B48	0.318"X0.318" for U402 & U403	
66-80334B49	0.410"X0.410" for U406	
66-80334B51	0.492"X0.492" for U401 & U405	

TORQUE AND TOOL SPECIFICATIONS CHART

DESCRIPTION	SIZE	PART NUMBER	QTY.	RETIGHTEN WITH RSX-4043A TORQUE SCREWDRIVER AND	TORQUE (IN.LB.)	TORQUE IN N/METER INT'L.	EXP. VIEW NUMBER
Control Top							
Antenna Bushing Spanner		0205765L02	1	6680370B90	12	1.36	22
Volume Pot Nut	0.75x8x1.6	0205629L01	1	5505717E01	5	0.57	17
Freq. Switch Nut	0.75x8x1.6	0205629L01	1	5505717E01	5	0.57	17
Toggle Switch Spanner		0205163Q01	1	6680370B95	4	0.45	19
Control Top Screw	4-40x3/16"	0300136785	1	6680321B79	5	0.57	6
Housing							
Battery Contact Screws	2-56x5/32"	0300139982	2	6680321B86	3	0.34	45
Bottom Front Cover Screws	2-56x1/4"	0300140041	2	6680321B86	3	0.34	87
Baseplate to Frame Screws	4-40 (captive)	0305941K01	2	6680321B79	5	0.57	49
Front Cover Post Screws	4-40x5/16"	0305137Q01	2	6680321B79	5	0.57	52
Controller							
Front Shield Screw	2-56x7/16"	0300140484	1	6680321B86	2	0.23	35
Bottom Screw	2-56x5/16"	0300138620	1	6680321B86	3	0.34	67
Controller to Frame Screws	2-56x1/8"	0300140369	4	6680321B86	2	0.23	35
RF Board							
Back Shield Screws	2-56x5/16"	0300136772	4	6680321B86	3	0.34	65
RF Board Screw	2-56x5/16"	0300136772	1	6680321B86	3	0.34	not shown
PA Heatsink to PCB	2/56x3/16"	0300136771	2	6680321B86	3	0.34	15
Synthesiser Casting Screw	2-56x3/16"	0300136771	2	6680321B56	4	0.45	15
Front Cover							
Speaker/Mic Tab Screws	2-56x5/32"	0300139982	4	6680321B86	3	0.34	45

DISASSEMBLY PROCEDURE

REFER TO DISASSEMBLY ART ON PAGE 37 (FIG. 1)

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. 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.
6. Lift the front cover from the radio housing being careful not to pull against the speaker/microphone wires.
7. Disconnect the speaker/microphone connector from the controller flex by grasping the microphone flex (near the plug) and pulling the plug straight out and away from the circuit board.
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, PART OF "SAFETY INFORMATION SECTION."

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 circuit as follows:
(A) Remove the 4 screws (2 on each side) that secure the controller 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 2 bottom flex connectors by carefully sliding them away from the bottom of the radio.
- (C) Lift the controller circuit (nearest the bottom of the radio) away from the radio just enough to gain access to the connector under the controller.
- (D) Disconnect the connector under the controller.
- (E) Disconnect the 2 connectors at the top of 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-ring and control head O-ring. Replace if obvious damage exists.

GENERAL

REFER TO ALIGNMENT LOCATIONS DIAGRAM ON PAGE 37 (FIG. 2)

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-4005 test box, place the MP 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 and attach the battery eliminator to the radio.
5. Adjust the power supply for 10.0Vdc. Set current limit to 2.0A.
6. Turn the radio off then on to reinitialise the radio.
7. Frequency Adjust (Synthesiser). Terminate the program/test cable (RTK-4205A), RF lines (pins 10 and 12), through a 30dB pad to a frequency counter or service monitor. Set the radio's frequency switch to any channel. Key the radio using the external PTT switch. Compare the frequency reading on the counter (or service monitor) to the customer frequency assigned to that channel. The frequency difference should be less than $\pm 1250\text{Hz}$. Adjust R120 if the frequency difference is more than $\pm 1250\text{Hz}$.
8. 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 program/test cable (RTK4205A), rf lines (pins 10 and 12), to a power meter through a 30dB pad.
2. Make all measurements at the Program Test Cable (pins 10 and 12), with radio keyed through the external PTT switch.
3. Program new customer frequencies (if necessary).

STEP	ADJUST	FOR	USING	NOTE
1	Check power output on all channels. NOTE: You must dekey before changing channels for the synthesiser to change frequencies. Set the frequency switch to the channel with the lowest output power.			
2	P.A. Trimmer Capacitor (on U102)	Maximum power output with least current drain	RF Wattmeter and Ammeter	Reading should be greater than rated rf power output, with current drain less than 840mA (1-Watt Models), less than 840mA (2-Watt Models), or less than 1575mA (4-Watt Models). Note: Two possible peaks, choose peak with least current drain. Adjust from component side.
3	Check remaining channels	Same power and current readings obtained in STEP 2	RF Wattmeter and Ammeter	
4	Repeat steps 1 through 3 if necessary.			

Deviation Adjustment:

1. Terminate the program/test cable (RTK-4205A) through a 30dB pad to a service monitor (or deviation meter).
2. Place the **METER SELECTOR** switch on the RTX-4005 test box to the **MIC** position. Insert a 1kHz tone at the **AUDIO IN** port of the test box. Use an ac voltmeter to monitor the voltage at the **AC/DC METER** port of the test box. Using the PTT switch on the RTX-4005 box to key the radio, adjust the level of the 1kHz tone until 45mV is present at the **AC/METER** port. Dekey the radio.
3. Connect the program/test cable to the Radio Interface Box (RIB). Use the Programmer/Tuner to read the radio.
4. If the radio requires a change in frequency or options, make the appropriate changes to the personality file and program the radio.
5. Enter the **RADIO ALIGNMENT** and **SERVICE AIDS** menu from the main menu. Select the **TUNE CHANNEL** option.
6. Set the frequency switch on the radio's control top for the channel to be adjusted.
7. Proceed to the **VCO MODULATION LEVEL** position of the **TUNE CHANNEL** screen.
8. Press and hold down the PTT switch on the RTX-4005 to continuously key the radio.
9. Press the \pm keys to tune for a peak deviation as shown in the table below for the radio's appropriate channel spacing.
10. Release the PTT switch on the RTX-4005 to dekey the radio.
11. Proceed to the **REF OSCILLATOR LEVEL** position of the **TUNE CHANNEL** screen.
12. Disconnect the 1kHz tone from the **AUDIO IN** port of the RTX-4005.
13. Press and hold down the PTT switch on the RTX-4005 to continuously key the radio.
14. Press the \pm keys to tune for a peak deviation as shown in the following table for the radio's appropriate channel spacing.
15. Release the PTT switch on the RTX-4005 to dekey the radio.
16. Reconnect the 1kHz tone to the **AUDIO IN** port of the RTX-4005.
17. Repeat steps 6-16 for all channels to be tuned.
18. Exit from the **TUNE CHANNEL** menu and program the radio.
19. With the 1kHz tone applied, check the total transmit deviation to the range shown in the following table. Repeat the above procedure to retune any of the channels if necessary.
20. The programmer disables normal transmit (5-tone or PL encode) while on the **REF OSCILLATOR LEVEL** operation, and forces the radio to encode 30Hz PL regardless of radio settings.
21. If any changes to the deviation levels were necessary, the radio must be reprogrammed.

CH SPACING

25kHz
20kHz
12.5kHz

VCO MODULATION

STEP 9	STEP 19
4.5-4.8kHz	4-5kHz
3.5-3.8kHz	3.2-4kHz
2.25-2.40kHz	2-2.5kHz

REF MODULATION

STEP 14
670-730Hz
590-650Hz
300-350Hz

NOTE

While in the TUNE CHANNEL Screen, changes to the deviation settings are made in the radio's RAM. If the radio is dekeyed during the deviation adjustment, the radio's original information will be returned to RAM. To place the programmer settings back into RAM, press either the ENTER, +, or - key.

Deviation Adjustment DTMF Radios:

1. Follow the deviation procedure detailed above, but in step 14, adjust for the VCO MODULATION LEVEL as shown in the table below for the radio's appropriate channel spacing.
2. Press the number 1 key on the DTMF pad and continuously key the radio using the radio's PTT switch. Adjust R709 for the deviation defined in the table below for the radio's appropriate channel spacing.

CH. SPACING

25kHz
20kHz
12.5kHz

STEP 1

4.7-4.9kHz
3.7-3.9kHz
2.35-2.45kHz

STEP 2

3.0-3.2kHz
2.4-2.6kHz
1.5-1.7kHz

NOTE

DTMF memory is volatile. If the battery is left off for more than 2 minutes the memory will be erased.

Power Output Adjustments:

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 an 8MHz 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 program/test cable (RTK-4205A) to the Radio Interface Box (RIB). Use the Programmer/Tuner to read the radio.
3. Enter the Per Radio menu in the Programmer/Tuner. Disable the battery saver by pressing the space bar. Exit from the Per Radio menu, and then program the radio.
4. When using the RTX-4005 test box, 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-4005 to an ac voltmeter. Adjust the volume potentiometer (R140) for an ac voltmeter reading of 4.47Vrms.
4. Connect a SINAD meter to the **AC/DC METER** port of the RTX-4005.
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 0.42µV or less, **DO NOT REALIGN THE RECEIVER**; instead, proceed directly to "Squelch Sensitivity/Check Adjustment." If the rf level required to produce 12dB SINAD is greater than 0.42µV, 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.

Narrow Bandwidth (less than 5MHz)

1. Select the customer frequency which is closest to the center of the specified customer frequencies. For a two-frequency radio select the channel with the lowest frequency. Set the channel switch for the appropriate frequency.
2. Tune coils L1 and L2 to the top of the coil form. This will be the position where the slugs 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 coils's slug is closest to the flex carrier assembly.
6. Perform steps 2 through 7 of the "Receiver Check" procedure, then repeat the "Narrow Bandwidth" procedure, if necessary.

Wide Bandwidth (5-8MHz)

7. For wide bandwidth tuning, coils L1 and L2 must be peaked at a frequency that is located ± 0.1 MHz from the center of the specified customer frequencies. If no such frequency is specified, it will be necessary to program a temporary tune frequency. (Make sure that the highest and lowest customer frequencies are not changed for a radio with more than 2 channels. If the radio has 2 channels, program the lowest frequency channel for the center frequency.) Program the radio for this frequency if necessary. Set the channel switch for this center frequency.
8. Tune coils L1 and L2 to the top of the coil form. This will be the position where the slugs are nearest to the flex carrier.
9. With an ac voltmeter, monitor M1 on their 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.
10. Peak coil L1 for maximum ac voltage at M1. Select the peak where the coil's slug is closest to the flex carrier assembly.
11. Peak coil L2 for maximum ac voltage at M1. Select the peak where the coil's slug is closest to the flex carrier assembly. For a 2 channel radio, reprogram the lowest frequency channel before going to step 12.
12. Set the channel switch to the lowest customer frequency. Repeak coil L2 for maximum ac voltage at M1. Select the peak where the coil's slug is closest to the flex carrier assembly.
13. Set the channel switch to the highest customer frequency. Repeak coil L1 for maximum ac voltage at M1. Select the peak where the coil's slug is closest to the flex carrier assembly.
14. Perform steps 2 through 7 of the "Receiver Check" procedure, then repeat the "Wide Bandwidth" procedure, if necessary.
15. Program the radio back to the customer frequencies if the radio was reprogrammed in step 7.

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 for 30MHz 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

16. Remove the radio from its housing as described in the "DISASSEMBLY PROCEDURE," then remove the backplane shield (exploded view item #74).
17. Attach the battery adapter to the radio frame, then attach the battery eliminator to the battery adapter.
18. 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.
19. Tune coils L9, L10, and L11 flush with the solder side of the board.
20. 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.
21. Peak coils L9, L10, and L11 (in that order) for maximum ac voltage at M1.
22. Perform the "Receiver Check" procedure, then repeat steps 19-21 of the "Back End" procedure, if necessary.

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. The radio should already be removed from the housing.

Injection Filter

23. Tune coils L12 and L13 to be flush with the solder side of the PC board.
24. Monitor M2 with a dc voltmeter.
25. Peak L12, then L13 for maximum dc voltage at M2.
26. Perform the "Receiver Check" procedure, then repeat steps 23-25 of the "Back End" procedure, if necessary.

Squelch Sensitivity Check/Adjustment:

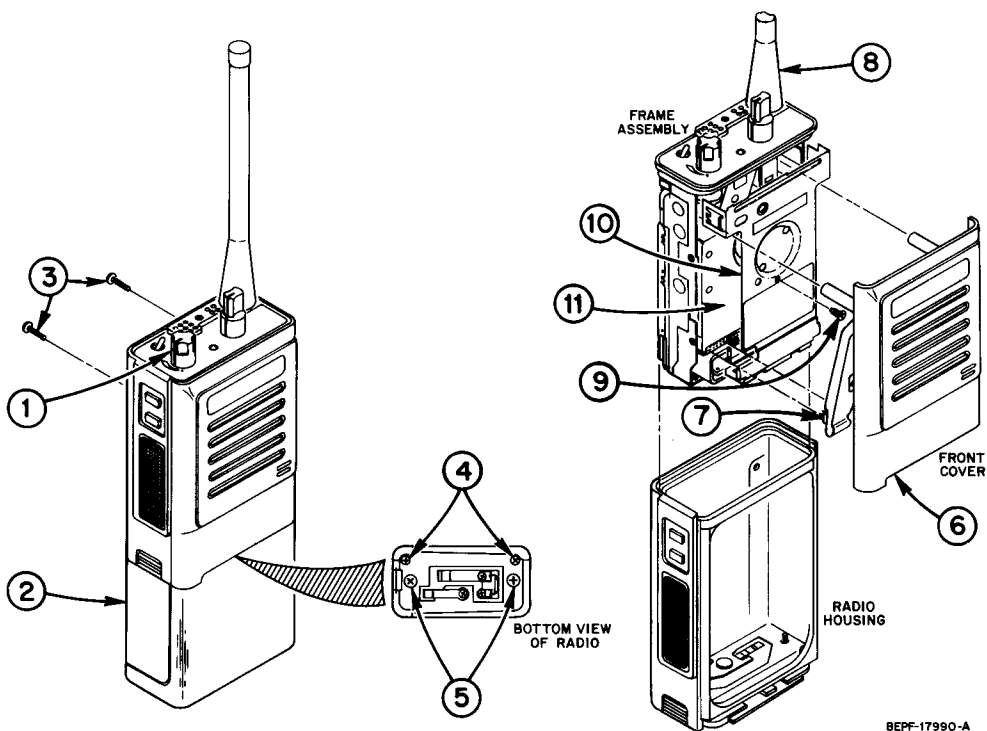
1. Use the Programmer/Tuner to read the radio, then proceed to the **RADIO ALIGNMENT** and **SERVICE AIDS** menu from the main menu. Next, select the **TUNE RADIO** operation.
2. Set the frequency switch for the channel determined to have the poorest sensitivity on the "Receiver Check." Place the decode select switch to the carrier squelch position.
3. Connect an ac voltmeter to the **AC/DC METER** port of the RTX-4005.
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. Proceed to the **TONE SQUELCH** position in the **TUNE RADIO** screen.
7. Turn the rf of the generator or service 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 in step 10. If the quieting level is not within the 6 to 12dB range, continue on with step 8.
8. Press the \pm keys to adjust the tone squelch setting to 0. Adjust the rf level for 6dB of quieting.
9. Holding the rf level constant, press the + key to increment the tone squelch setting one step at a time until the radio squelches. This will be the tone squelch setting.
10. Reduce the rf level to minimum and turn the rf off. The radio should be squelched.
11. Proceed to the **CARRIER SQUELCH** position in the **TUNE RADIO** screen.
12. 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 15. If the quieting level is not within the 8 to 14 dB range, continue with step 13.
13. Press the \pm keys to adjust the carrier squelch setting to 0. Adjust the rf level for 8dB of quieting.
14. Holding the rf level constant, press the + key to increment the carrier squelch setting one step at a time until the radio squelches. This will be the carrier squelch setting.
15. Exit from the **RADIO ALIGNMENT** and **SERVICE AIDS** menu.
16. If the squelch settings required modification, program the radio.

Cloning Procedure:

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

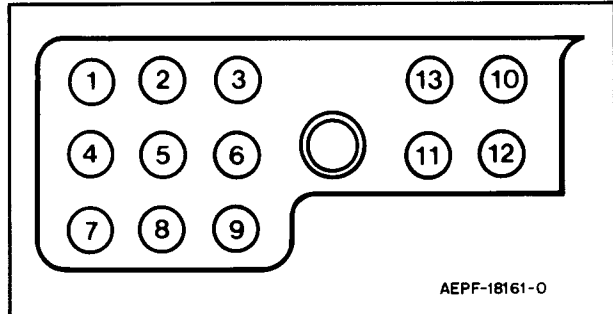
1. Connect the cloning cable (NKN6376A) to the Universal Connector of both radio A and radio B.
2. Turn off radio A and turn on radio B.
3. Place the decode select switch on radio A to the coded squelch position (**ⓧ**) for partial cloning. Cloning will duplicate the content of radio A to radio B, except for the deviation and squelch settings.
4. Simultaneously depress the PTT and monitor button on radio A and hold.
5. Turn on radio A. The green LED on radio B will flash indicating cloning is in progress.
6. 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.

DISASSEMBLY ART (FIGURE 1)



BEPF-17990-A

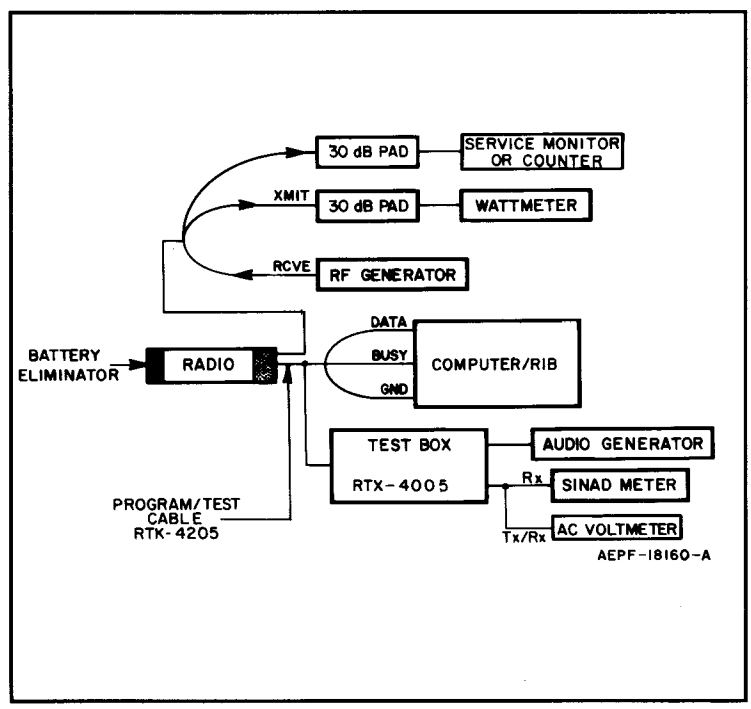
UNIVERSAL CONNECTOR DETAIL AND PIN NUMBER ASSIGNMENT



AEPF-18161-0

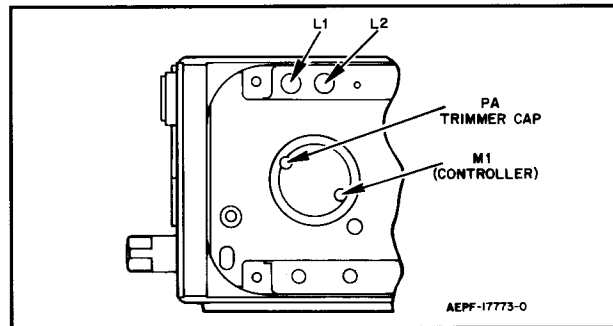
- | | |
|-----------------------|--------------------------------|
| 1 EXTERNAL MICROPHONE | 7 EXTERNAL SPEAKER SELECT |
| 2 EXTERNAL SPEAKER | 8 SPEAKER COMMON |
| 3 OPTION B + | 9 BUSY |
| 4 EXTERNAL PTT | 10 REMOTE ANTENNA |
| 5 GROUND | 11 NOT USED |
| (to Controller Board) | 12 RF GROUND (to Mother Board) |
| 6 DATA | 13 SENSE |

TEST SET-UP DETAIL



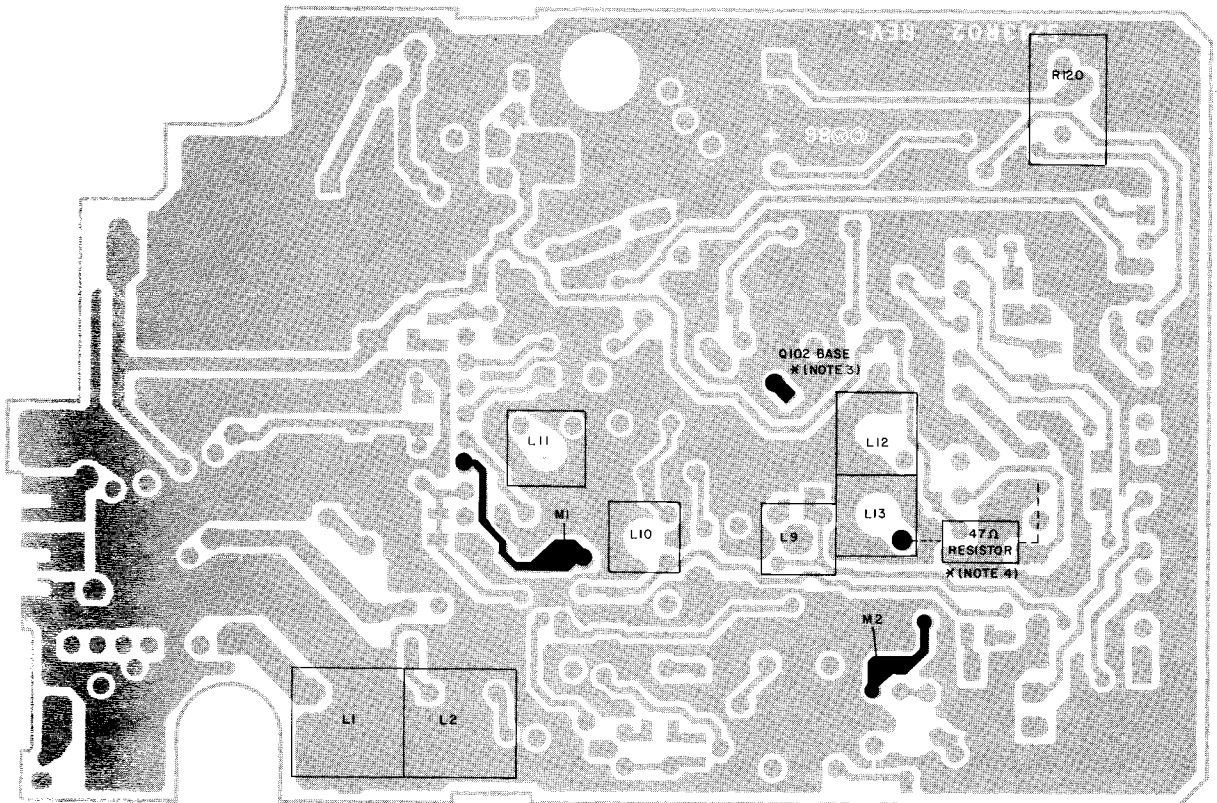
AEPF-18160-A

M1 METERING POINT LOCATION (CONTROLLER)



AEPF-17773-0

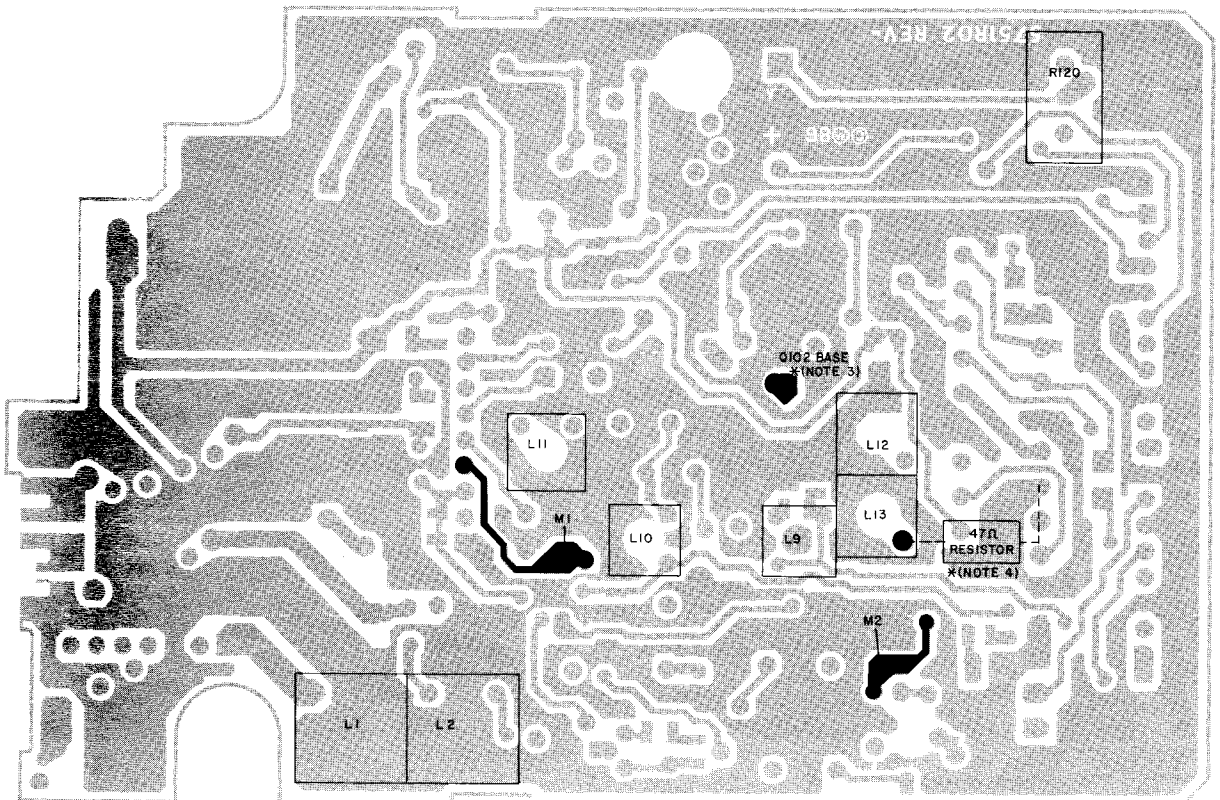
**ALIGNMENT ADJUSTMENT LOCATIONS (FIGURE 2)
1- AND 2-WATT RADIOS**



* REFER TO VOLTAGE OVERLAY
AND WAVEFORM NOTE INDICATED.

OL CEPF-18530-0

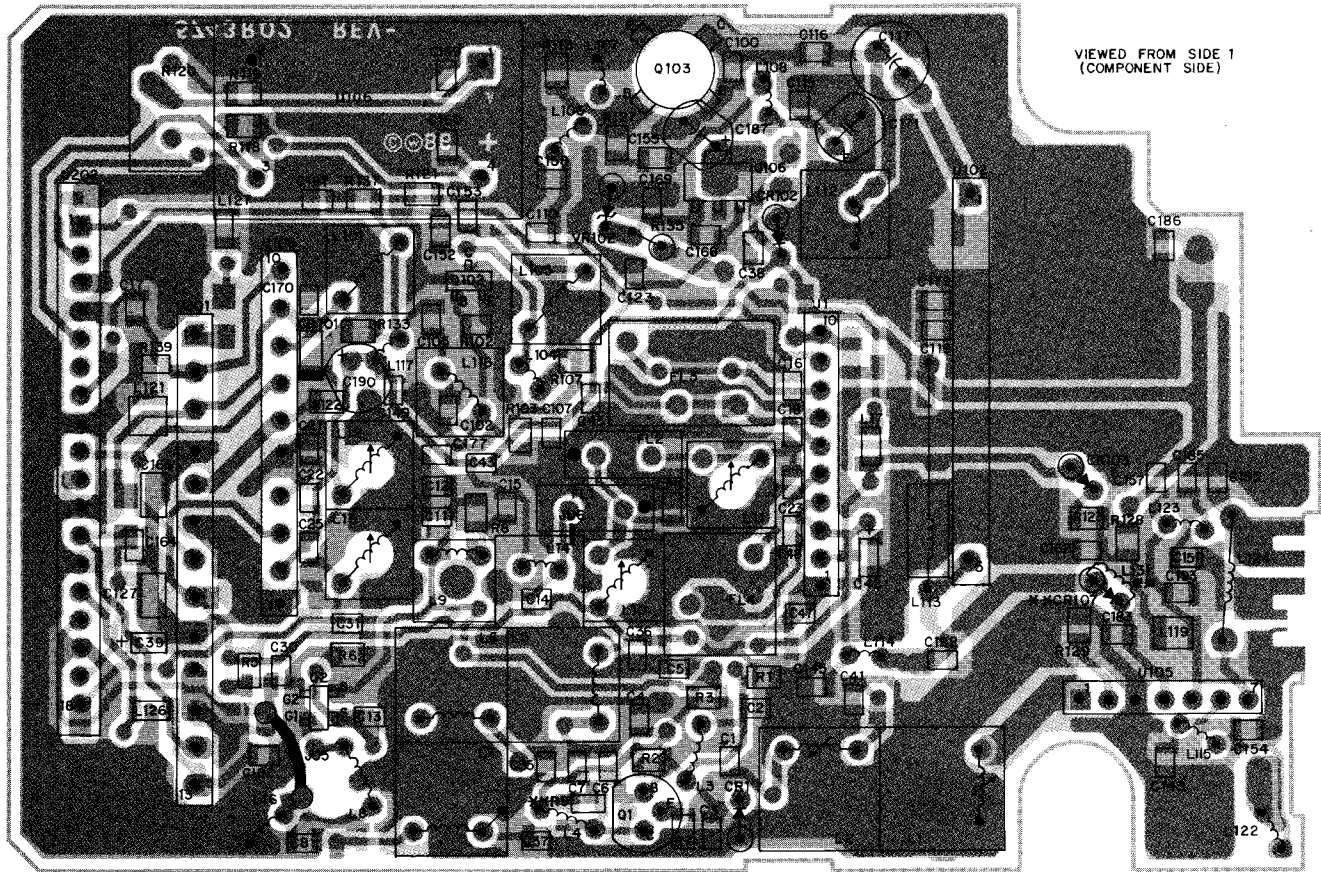
4-WATT RADIOS



* REFER TO VOLTAGE OVERLAY
AND WAVEFORM NOTE INDICATED.

OL CEPF-18531-0

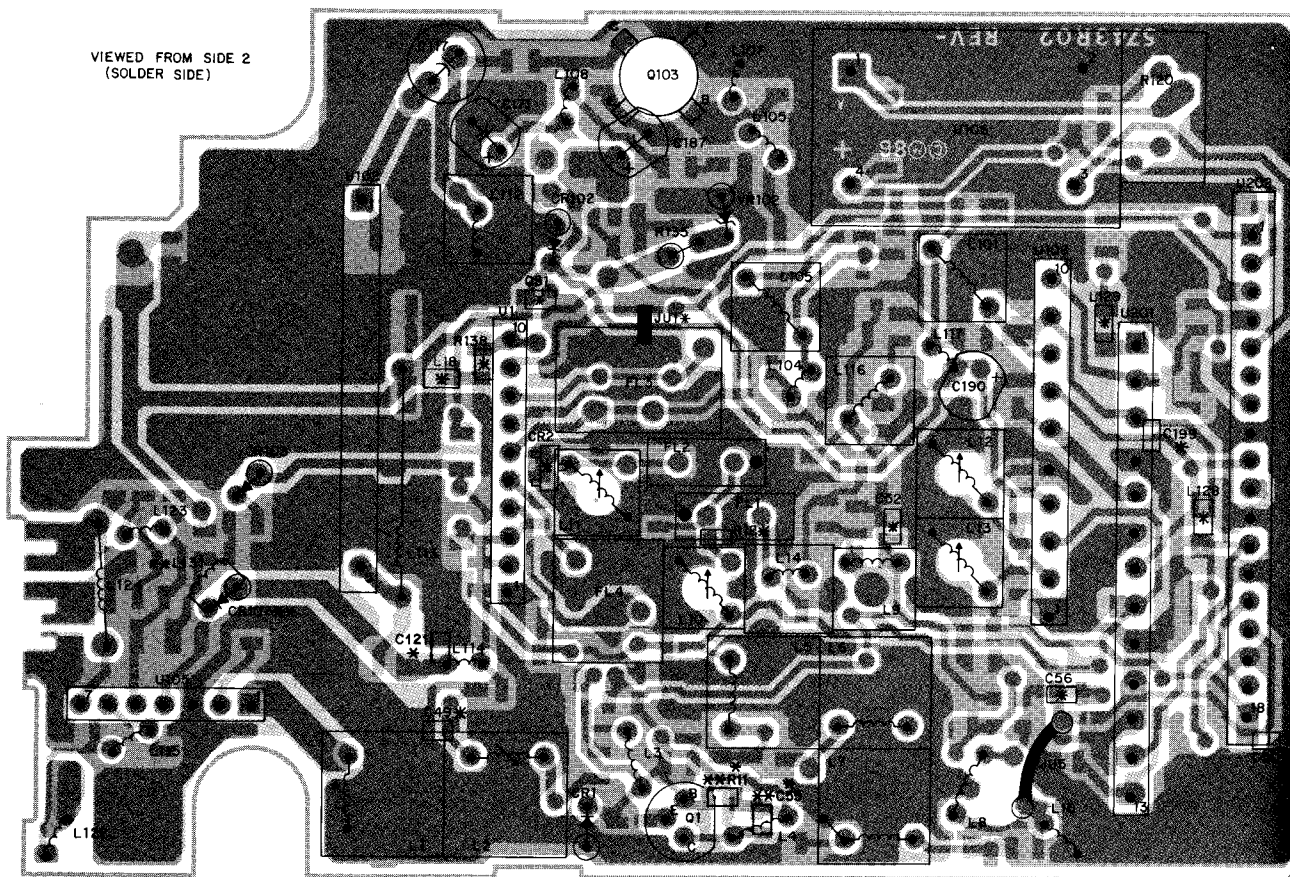
1-WATT AND 2-WATT RADIOS



VIEWS FROM SIDE 1
(COMPONENT SIDE)

**REFER TO ELECTRICAL PARTS LIST FOR USAGE

L1 CEPP-18518-0
L2 CEPP-18519-0
OL CEPP-18757-0



VIEWS FROM SIDE 2
(SOLDER SIDE)

* MOUNTED ON SOLDER SIDE
** REFER TO ELECTRICAL PARTS LIST FOR USAGE

L1 CEPP-18521-0
L2 CEPP-18522-0
OL CEPP-18758-0

SCHEMATIC AND CIRCUIT BOARD NOTES

- UNLESS OTHERWISE STATED, RESISTANCES ARE IN OHMS ($k=1000$), CAPACITANCES LESS THAN 1 ARE IN MICROFARADS, AND CAPACITANCES 1 OR GREATER ARE IN PICOFARADS.
- DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CHASSIS GROUND USING MOTOROLA DC MULTIMETER OR EQUIVALENT. TRANSMITTER MEASUREMENTS SHOULD BE MADE WITH A $1.2\mu\text{H}$ RF CHOKE IN SERIES WITH VOLTAGE PROBE TO PREVENT CIRCUIT LOADING.
- REFERENCE DESIGNATIONS ARE ASSIGNED IN THE FOLLOWING MANNER:
 UNITS SERIES = RECEIVER
 100 SERIES = TRANSMITTER
 200 SERIES = VCO & SYNTHESIZER
 300 SERIES = MISCELLANEOUS
 400 SERIES = CONTROLLER FLEX
 700 SERIES = DTMF
 800 SERIES = SIGNALLING

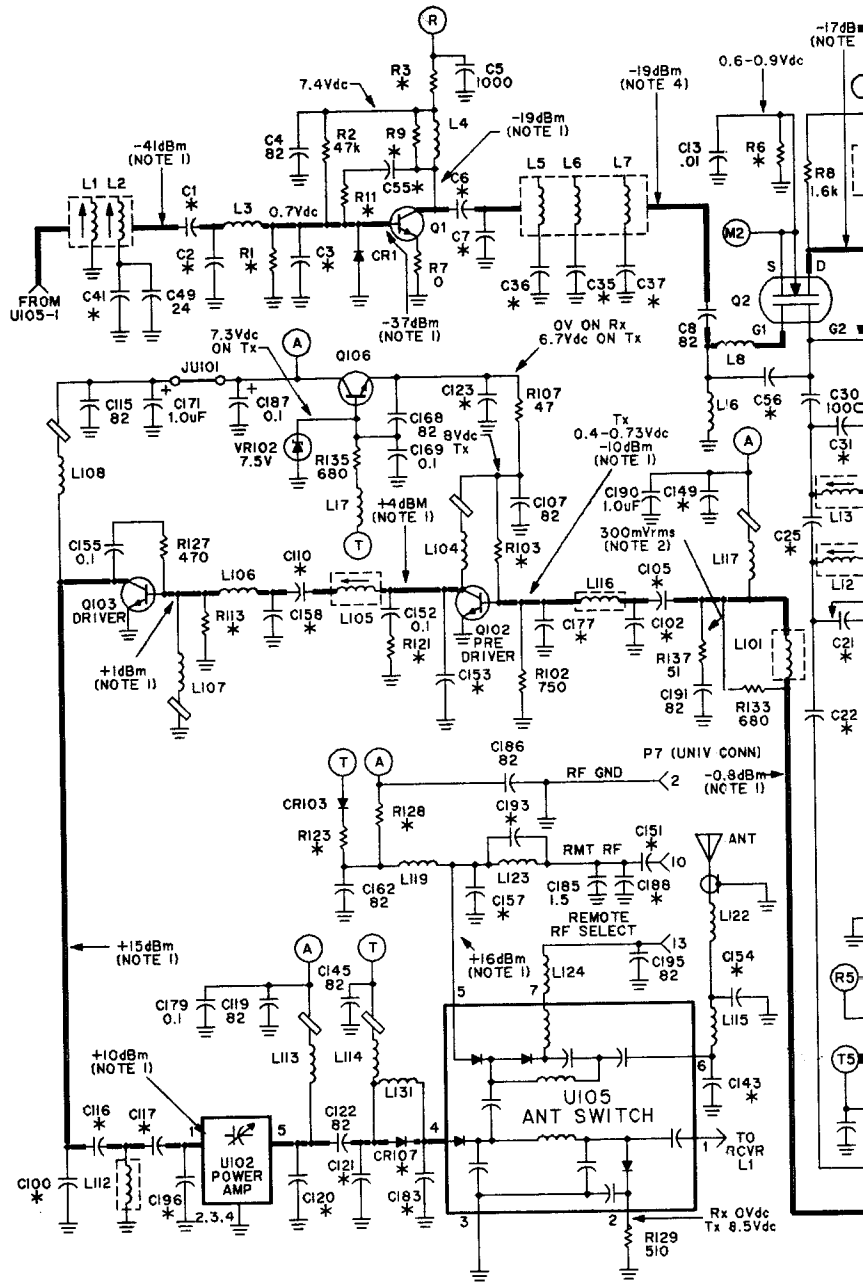
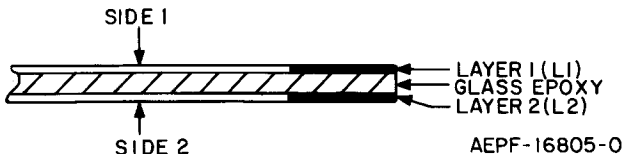
4. INTERCONNECT TIE POINT LEGEND:

- (A) B+ TO MOTHER BOARD
- (B) CONTROLLER FLEX B+
- (5V REG) REGULATED 5V
- (D) TO DTMF CIRCUIT
- (M1) METERING POINTS M1, M2, M3
- (R) RECEIVE 10V
- (R5) RECEIVE 5V
- (S) TO SYNTHESIZER BOARD
- (T) TRANSMIT 10V
- (T5) TRANSMIT 5V
- (T) TO CONTROLLER FLEX
- (U) TO UNIVERSAL CONNECTOR
- (F) TO FRONT COVER
- (V1) REGULATED 8V

VOLTAGE OVERLAY AND WAVEFORM NOTES

- AC VOLTAGE READINGS IN dBm ARE MADE VIA A 1pF CAPACITOR INTO THE 50 OHM ADAPTER OF AN RF mV METER. RX READINGS ARE MADE WITH -20dBm CARRIER SIGNAL INTO REMOTE PORT. TX READINGS MADE WITH REMOTE PORT INTO 50 OHMS .
- AC VOLTAGE READINGS IN mV ARE MADE VIA A HIGH IMPEDANCE RF mV METER.
- THESE READINGS OBTAINED BY S/C BASE OF Q102 TO GROUND.
- THIS READING IS OBTAINED BY PUTTING A 47 OHM RESISTOR ACROSS C31 TO REDUCE LOW INJECTION FEED THROUGH.

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



Electrical Parts List, Transceiver Board

TPLF-3635-O

- NUE6971A 403-433 MHz, 1&2W, 12.5kHz (A)
- NUE6972A 438-470 MHz, 1&2W, 12.5kHz (B)
- NUE6981A 403-433 MHz, 4W, 12.5kHz (C)
- NUE6982A 438-470 MHz, 4W, 12.5kHz (D)
- NUE7101A 403-433 MHz, 1&2W, 20/25kHz (E)
- NUE7102B 438-470 MHz, 1&2W, 20/25kHz (F)
- NUE7111A 403-433 MHz, 4W, 20/25kHz (G)
- NUE7112A 438-470 MHz, 4W, 20/25kHz (H)

REF. SYM.	MOTOROLA PART NO.	DESCRIPTION	APPLICATION
		CAPACITOR, Fixed: pF ±5%; 50V unless stated	
C1	2160520B05	15	A, C, E, G
	or 2160520A20	6.2 ±0.25pF	B, D, F, H
C2	2160520A13	3.3	A, C, E, G
	or 2160520A11	2.7 ±0.25pF	B, D, F, G
C3	2160520A19	5.6 ±0.25pF	A, C, E, G
	or 2160520A24	9.1 ±0.25pF	B, D, F, H
C4	2160520B23	82	
C5	2160521A13	1000; 25V	
C6	2160520A22	7.5	A, C, E, G
	or 2160520A15	3.9 ±0.25pF	B, D
	or 2160520A16	4.3	F, H
C7	2160520B03	12	A, C, E, G
	or 2160520A20	6.2 ±0.25pF	B, D
	or 2160520A10	2.4	F, H
C8	2160520B23	82	
C11	2160521A19	3300; 25V	
C12	2160520B23	82	
C13	2160521A25	.01µF; 25V	
C14	2160520B01	10	
C15	2160520A22	7.5	A, E, G
	or 2160520A24	9.1 ±0.25pF	B, C, D
	or 2160520A21	6.8 ±0.25pF	F, H
C16	2160520B04	13	
C17	2160520B15	39	A, C, E, G
	or 2160520B12	30	B, D, F, H
C18	2160520B12	30	
C21	2160520A24	9.1 ±0.25pF	A, C, E, G
	or 2160520B03	12	B, D, F, H
C22	2160520A08	2.0 ±0.25pF	A, C, E, G
	or 2160520A01	1.0 ±0.25pF	B, D, F, H
C23	2160520A01	1.0 ±0.25pF	
C25	2160520A12	3.0 ±0.25pF	A, C, E, G
	or 2160520A07	1.8 ±0.25pF	B, D, F, H
C29	2160520B04	13	A, B, C, D
	or 2160520A14	3.6 ±0.25pF	E, F, G, H
C30	2160521A13	1000; 25V	
C31	2160520A17	4.7 ±0.25pF	A, C, E, G
	or 2160520A24	9.1 ±0.25pF	B, D, F, H
C35	0660076M01	Chip Resistor; 0Ω	A, C, E, G
	or 2160520B12	30	B, D, F, H
C36,37	0660076M01	Chip Resistor; 0Ω	
C38	2160521A13	1000; 25V	A, B, E, F (only)
C39	2360562A13	1µF ±20%; 16V	
C41	0660076M01	Chip Resistor; 0Ω	
C42	2360562A16	1.5µF ±20%; 10V	
C43	2160520B15	39	
C45	2160520C01	100	E, F, G, H (only)
C47	2160521A19	3300	
C48	2160520B23	82	
C49	2160520B10	24	B, D, F, H (only)
C50	2160521A13	1000; 25V	
C51	2160521A13	1000; 25V	A, B, E, F (only)
C52	2160521G37	0.1µF +80-20%; 25V	
C55	2160520B23	82	E, F, G, H (only)
	or 2160520A11	2.7 ±0.25pF	C, G (only)
C56	2160520A05	1.5 ±0.25pF	A, C, E, G
	or 2160520A03	1.2	B, D, F, H
C100	2160520A01	1.0	B, F (only)
C102	2160520B05	15	A, E
	or 2160520B07	18	B, D, F, H
	or 2160520B09	22	C, G
C105	2160520B23	82	A, B, E, F
	or 2160520B10	24	C, G

C107	or 2160520B13	33	D, H
C108	2160520B23	82	
	2160520A24	9.1 ±0.25pF	C, G (only)
	or 2160520B03	12	D, H (only)
C110	2160520A16	4.3	A, E, H
	or 2160520B14	36	B, D, F
	or 2160520B23	82	C, G
C111	2160520B23	82	C, G (only)
	or 2160520B03	12	D, H (only)
C112	2160520B10	24	C, D, G, H (only)
C113	2160520B23	82	C, D, G, H (only)
C115	2160520B23	82	
C116	2160520B10	24	A, E
	or 2160520B14	36	B, F
	or 2160520B08	20	C, G
	or 2160520B06	16	D, H
C117	2105454G38	33	A, C, E, G
	or 2105454G18	22	D, H
	or 2105454G02	11	B, F
C119	2160520B23	82	
C120	2160520A08	2.0 ±0.25pF	D, H (only)
C121	2160520A23	82	A (only)
	or 2160520A08	2.0 ±0.25pF	C (only)
C122	2160520B23	82	
C123	2160520B23	82	A, B, E, F
	or 2160521G37	0.1µF +80-20%; 25V	C, D, G, H
C127	2360562A24	3.3µF ±20%; 16V	
C130	2160520A01	1.0 ±0.25pF	D, H (only)
C143	2160520A15	3.9 ±0.25pF	A, C, E, G
	or 2160520A13	3.3 ±0.25pF	B, D, F, H
C145	2160520B23	82	
C149	2160521G37	0.1µF +80-20%; 25V	A, B, E, F
	or 2160520B23	82	C, D, G, H
C151	2160520B23	82	A, C, D, E, G, H
	or 2160520B07	18	B, F
C152	2160521G37	0.1µF +80-20%; 25V	
C154	2160520A21	6.8	A, C, E, G
	or 2160520A15	3.9 ±0.25pF; 25V	B, D, F, H
C155	2160521G37	0.1µF +80-20%; 25V	
C157	2160520A18	5.1 ±0.25pF	B, F (only)
	or 2160520A20	6.2 ±0.25pF	C, G (only)
C158	2160520A15	3.9 ±0.25pF	A, E (only)
	or 2160520B01	10	B, F (only)
C159, 160	2160520B23	82	
C162	2160520B23	82	
C164	2160520B23	82	
C166	2360562A24	3.3µF ±20%; 16V	
C167	2160520A15	3.9 ±0.25pF	C, G (only)
	or 2160520A01	1.0 ±0.25pF	D, H (only)
C168	2160520B23	82	A, B, E, F (only)
C169	2160521G37	0.1µF +80-20%; 25V	A, B, E, F (only)
C170	2160520B23	82	
C171	2305499G13	1µF ±20%; 25V	
C177	2160520A08	2.0 ±0.25pF	A, B, E, F (only)
	or 2160520A20	6.2 ±0.25pF	B, F
	or 2160520A23	8.2 ±0.25pF	C, G
	or 2160520A18	5.1 ±0.25pF	D, H
C179	2160521G37	0.1µF +80-20%; 25V	
C182	2160521C21	4700 ±10%; 25V	
C183	2160520A03	1.2 ±0.25pF	B, F (only)
	or 2160520A11	2.7 ±0.25pF	C, G (only)
	or 2160520A09	2.2 ±0.25pF	D, H (only)
C185	2160520A22	7.5 ±0.25pF	A, E (only)
	or 2160520A17	4.7 ±0.25pF	C, D, G, H (only)
C186	2160520B23	82	
C187	2305499G19	0.1µF ±20%; 35V	A, B, E, F (only)
C188	2160520A13	3.3	B, F (only)
C190	2305499G13	1µF ±20%; 25V	
C191	2160520B23	82	
C193	2160520A18	5.1 ±0.25pF	B, C, F, G (only)
C195	2160520B23	82	
C197	2160520A13	1000	C, D, G, H (only)
C198	2160520B12	30	H (only)
C199	2160520B16	43	A (only)
	or 2160520B23	82	B, D, F, H (only)
CR1	4883654H08	Silicon	
CR2	4805129M76	Silicon	
CR101	4805494Q04	Silicon	
CR102	4805490G02	Silicon	
CR103	4883654H01	Silicon	A, E
	or 4883654H08	Silicon	B, C, D, F, G, H
CR105	4805119G14	Silicon	C, D, G, H (only)
CR107	4880010E05	Silicon	B, C, F, H (only)

F1	6505214E02	FUSE: Axial, 5-Amp.	
FL1, 2	4805245J19 or 4805245J20	FILTER: Crystal, 53.55 MHz	A, B, C, D E, F, G, H
FL3	9105725Q03	Ceramic, 450 KHz	A, B, C, D E, F, G, H
FL4	9105726Q03 or 9105726Q01	Ceramic, 450 KHz	A, B, C, D E, F, G, H
L1, 2	0105951P30 or 0105957M23	COIL, RF: unless stated ASSY, Preselector; 2-pole	A, C, E, G B, D, F, H
L3, 4	2405559P09 or 2484238H02	1 1/2 turns	A, C, E, G B, D, F, H
L5	2405732J22	11 3/4 turns	A, C, E, G B, D, F, H
L6	2405732J21	10 3/4 turns	A, C, E, G B, D, F, H
L7	2405732J22	11 3/4 turns	A, C, E, G B, D, F, H
L8	2405732J01 or 2405559P13	11 turns	A, C, E, G B, D, F, H
L9	2405835C16	5 1/2 turns	A, B, C, D, E, G F, H
L10	2405063H24	13 turns	
L11	2405063H05 or 2405063H13	0.4 μ H Choke, tunable	A, B, C, D E, F, G, H
L12, 13	2405063H05 or 2405063H09	0.4 μ H Choke, tunable	A, B, C, D E, F, G, H
L14	2405523P36	2 1/2 turns, with core	A, C, E, G B, D, F, H
L16	2405523P35 or 2505129Q02	1 1/2 turns, with core	
L17, 18	2405523P07 or 2405523P08	1.2 μ H Choke, tunable	A, C, E, F, G, H B, D
L104	2405559P14 or 2405027E19	3.5 turns RF Choke	A, B, D, E, F, H C, G
L105	2462575A01	0.39 μ H Choke	
L106	2405523P07 or 2405523P08	2 1/2 turns	A, B, D, E, F, H C, G
L107	0105951N35	3 1/2 turns Assy, .085 μ H Choke, with bead and sleeving	A, E B, C, D, F, G, H A, C, D, E, G, H
L108	0105951N35	4 1/2 turns Assy, .085 μ H Choke, with bead and sleeving	B, F
L109	0105951N35	3 1/2 turns Assy, .085 μ H Choke, with bead and sleeving	C, D, G, H (only)
L110	0105951N34	3 1/2 turns Assy, .029 μ H Choke, with bead and sleeving	C, D, G, H (only)
L111	0105951N35	3 1/2 turns Assy, .085 μ H Choke, with bead and sleeving	C, D, G, H (only)
L112	2405523P08 or 2405027E38	3 1/2 turns	A, E B, C, D, F, G, H A, B, E, F
L113	0105951N19	3 1/2 turns Assy, 0.2 μ H Choke, with bead and sleeving	C, D, G, H (only)
L114	0105951N34	Assy, 0.15 μ H Choke, with bead and sleeving	
L115	2405559P19	Assy, 0.29 μ H Choke, with bead and sleeving	
L116	2484238H02	4 1/2 turns	
L117	0105951N34	1 1/2 turns Assy, 0.29 μ H Choke, with bead and sleeving	
L118	2405027E28	3 1/2 turns	C, D, G, H (only)
L119	2405452C08	275 μ H chip	
L120	2405452C08	275 μ H chip	C, G (only)
L121	2405452C06	21 nH chip	
L122	2405559P18	3 1/2 turns air wound	
L123	2405027E38	3 1/2 turns	
L124	2482723H28	0.29 μ H Choke	
L126, 127, 128	2462575A01	0.39 μ H Choke	
L129	0105957P25	Assy, 0.29 μ H Choke, with bead and sleeving	A, B, C, D, F, H (only)
L131	2405559P18	3 1/2 turns	A, E (only)
LS1	5005155Q03	TRANSDUCER	
MK1	0105956M62	MICROPHONE FLEX ASSEMBLY	

P1	-----	PLUG: Not field repairable, order Freq. Switch Flex Assembly 0105956M68	
P2	-----	Not field repairable, order Volume Pot Flex Assembly 0105956M66	
P3, 4	-----	Not field repairable, order Synthesizer U202	
P5	-----	Not field repairable, order Microphone Assembly 0105956M62	
P6	-----	Not field repairable, order IF Module U1	
P7	-----	Not field repairable, order Top Control Panel Assembly 0105951N41	
Q1	4880182D39	TRANSISTOR: See Note I NPN	
Q2	4805452G13	MOSFET; Type M52G13	
Q102	4805218M84	NPN, SOT	
Q103	4805474G48	NPN; Type MRF581	A, B, E, F
	or 4805474G38	NPN; Type MRF559	C, D, G, H
Q104	4800869887	NPN; Type M9887	C, D, G, H (only)
Q106	4805128M09	NPN; Type BCX54-16, SOT	A, B, E, F (only)
R1	0660076A71	RESISTOR, Fixed: $\Omega \pm 5\%$; 1/10W unless stated	
R2	0660076A69	4.7k	A, C, E, G
R3	0660076A89	6.8k	B, D, F, H
R5	0660076A59	47k	
R6	0660076A57	2.7k	A, C, E, G
R7	0660076A45	2.2k	B, D, F, H
R8	0660076A35	680	
R9	0660076A35	270	A, C, E, G
R10	0660076A39	390	B, D, F, H
R11	0660076M01	Chip Resistor, 0 Ω	
R12	0660076A54	1.6k	
R13	0660076A56	2k	A, C, E, G (only)
R14	0660076A57	2.2k	B, D (only)
R15	0660076A41	470	E, F, G, H (only)
R16	0660076A85	33k	
R17	0660076A46	750	A, B, E, F (only)
R18	0660076A65	4.7k	A, E
R19	0660076A64	4.3k	B, F
R20	0660076A77	15k	C, D, G, H
R21	0660076A17	47	A, B, E, F
R22	0660076A29	150	C, D, G, H
R23	0660076A32	200	A, E
R24	0660076A25	100	B, F
R25	0660076M01	Chip Resistor, 0 Ω	
R26	0660076A22	75	C, D, G, H
R27	0660076A18	51	D (only)
R28	0660076A25	100	C, G (only)
R29	0660076A72	9.1k	H (only)
R30	0660076A87	39k	
R31	1805581P01	Pot., 50k	
R32	0660076A49	1k	A, E
R33	0660076A42	510	B, F
R34	0660076A41	470	C, D, G, H
R35	0660076A79	18k	A, E
R36	0660076A67	5.6k	B, F
R37	0660076A63	3.9k	C, D, G, H
R38	0660076A48	910	A, C, E, G
R39	0660076A49	1k	B, D, F, H
R40	0660076A41	470	
R41	0660076A52	1.3k	A, C, E, G
R42	0660076A51	1.2k	B, D, F, H
R43	0660076A42	510	
R44	0660076A45	680	
R45	0660075C45	680	A, B, E, F
R46	0660076A18	51	
R47	0660076A15	39	

R13
R14
R14
S1
S2
S3
S30
S30
S30
U1
U10
U10
U10
U20
U20
VR1-
NOTES
I. Fe
ci
II. We
cr

R139	0660076A51	1.2k	A, C, E, G
R140	or 0660076A49	1k	B, D, F, H
R141	1805100Q02	Pot., 25k (includes S1)	
	0660076A39	3.9k	D, H (only)
S1	-----	SWITCH:	
S2	4005265Q01	On/Off, Part of R140	
	or 4005265Q02	2- & 8-channel radios	
S3	4005101Q01	16-channel radios	
S301	3905834k04	Toggle, SPDT	
S302	3905834k04	Snap Dome, Monitor	
S303	3905834k04	Snap Dome, PTT	
		Snap Dome, Monitor	
		CIRCUIT MODULE:	
		See Note I	
U1	5102001J04	I-F	A, B, C, D
	or 5102001J01	I-F	E, F, G, H
U102	5105729E79	Power Amplifier	A, E
	or 5105822P71	Power Amplifier	B, F
	or 5105729E81	Power Amplifier	C, G
	or 5105729E82	Power Amplifier	D, H
U105	5105822P85	Antenna Switch	A, E
	or 5105822P63	Antenna Switch	B, F
	or 5105729E75	Antenna Switch	C, G
	or 5105729E76	Antenna Switch	D, H
U106	5105729E72	Reference Oscillator	A, B, C, D
	or 5105729E52	Reference Oscillator	E, F, G, H
U108	5102001J05	Buffer	A, C, E, G
	or 5102001J02	Buffer	B, D, F, H
U201	5105549J04	VCO	A, C, E, G
	or 5105549J02	VCO	B, D, F, H
U202	5105822P84	Synthesizer	A, C, E, G
	or 5105822P75	Synthesizer	B, D, F, H
VR102	4805189E05	DIODE: See Note I Zener, 7.5V	A, B, E, F (only)

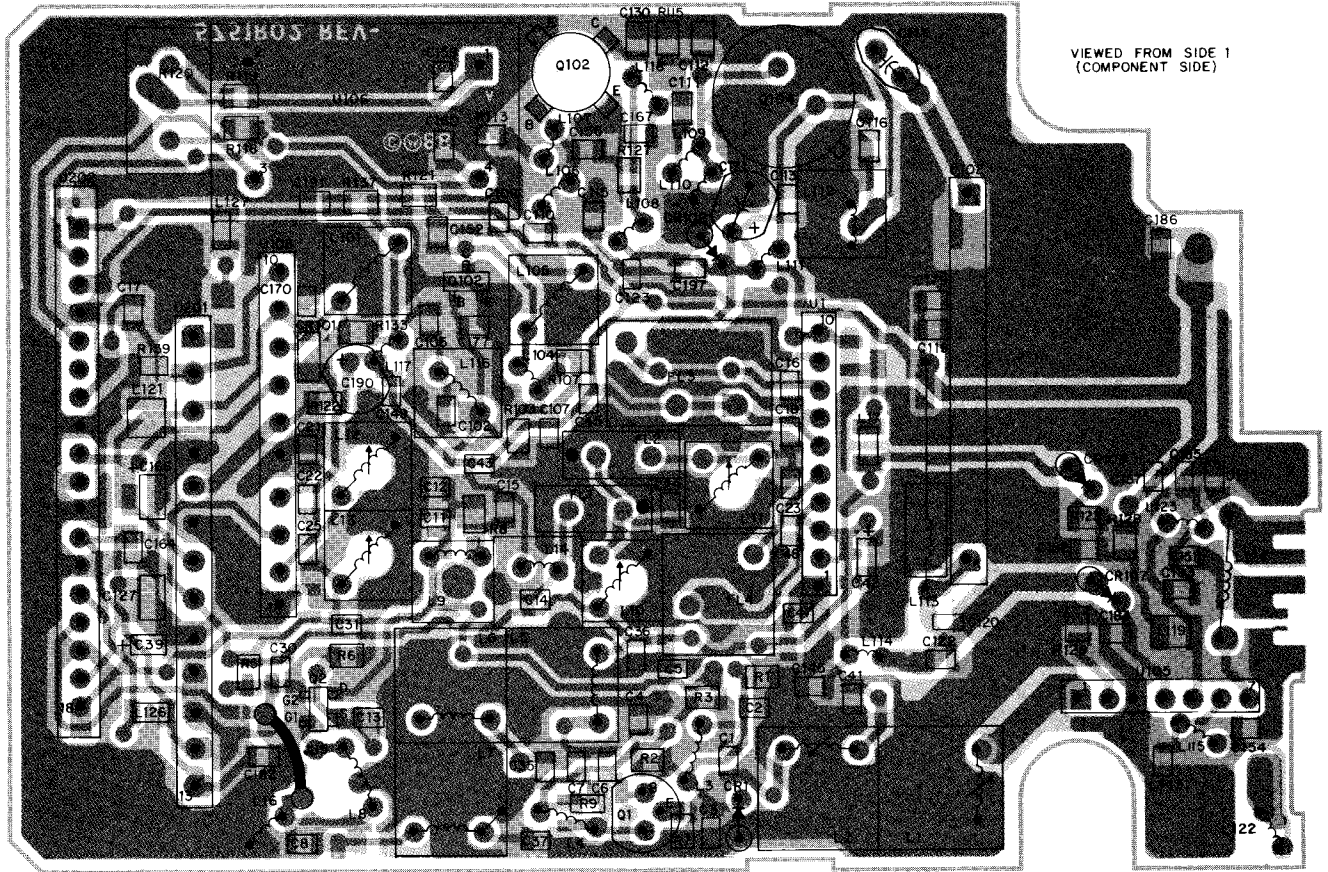
NONREFERENCED ITEMS

0200007007	NUT, Hex; 8-32 x 1/4" x 3/32" (for Q104, 4W Models)
0300136771	SCREW, Phillips; 2-56 x 3/16" (for Q104 heatsink, 2W Models)
0300136771	SCREW, Phillips; 2-56 x 3/16" (for Q104 heatsink, 4W Models)
0705196A04	BOOT, for FL1, FL2
1400861196	INSULATOR, for Q103
7505695R01	PAD, for U106
1405496R01	INSULATOR
2605494R01	SHIELD, I-F Module
0105955G27	ASSEMBLY, Preselector Tuning Slug
0300139982	SCREW, Phillips; 2-56 x 5/32"
2605524P01	CAN, for L14, L112
2605524P03	CAN, for L105, L111 thru L115, L119, L120
3905509R02	CONTACT
7505295 B07	PAD, for FL1, FL2
0705766R01	SUPPORT, Rubber

NOTES:

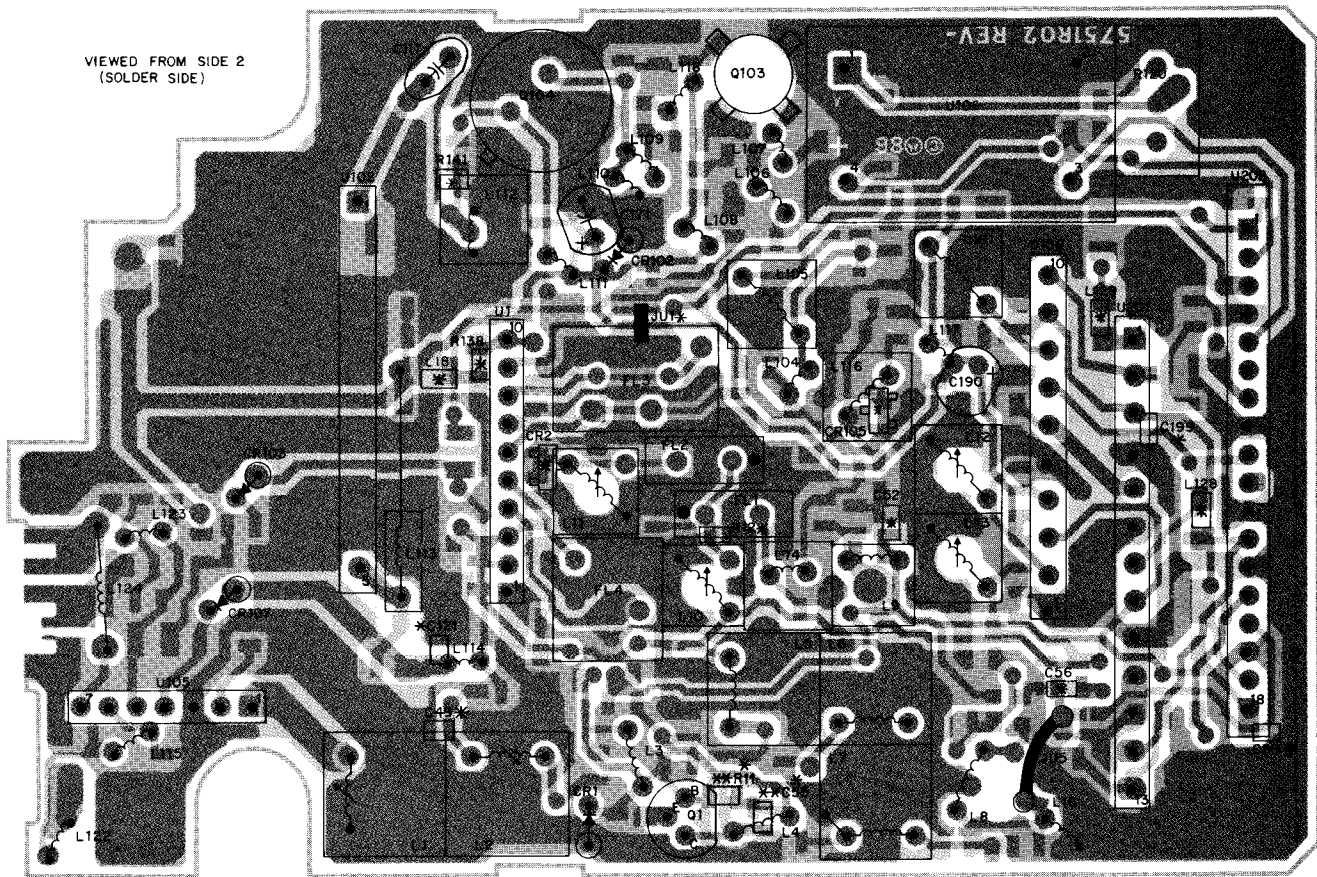
- I. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.
- II. When ordering crystal units, specify carrier frequency, crystal frequency, crystal type number, and Motorola part number.

4-WATT RADIOS



VIEWED FROM SIDE 1
(COMPONENT SIDE)

OL CEPF-18759-0



VIEWED FROM SIDE 2
(SOLDER SIDE)

* MOUNTED ON SOLDER SIDE
** REFER TO ELECTRICAL PARTS LIST FOR USAGE

OL CEPF-18760-0

SCHEMATIC AND CIRCUIT BOARD NOTES

- UNLESS OTHERWISE STATED, RESISTANCES ARE IN OHMS (k=1000), CAPACITANCES LESS THAN 1 ARE IN MICROFARADS, AND CAPACITANCES 1 OR GREATER ARE IN PICOFARADS.
- DC VOLTAGES ARE MEASURED FROM POINT INDICATED TO CHASSIS GROUND USING MOTOROLA DC MULTIMETER OR EQUIVALENT. TRANSMITTER MEASUREMENTS SHOULD BE MADE WITH A 1.2 μ H RF CHOKE IN SERIES WITH VOLTAGE PROBE TO PREVENT CIRCUIT LOADING.
- REFERENCE DESIGNATIONS ARE ASSIGNED IN THE FOLLOWING MANNER:
 UNITS SERIES = RECEIVER
 100 SERIES = TRANSMITTER
 200 SERIES = VCO & SYNTHESIZER
 300 SERIES = MISCELLANEOUS
 400 SERIES = CONTROLLER FLEX
 700 SERIES = DTMF
 800 SERIES = SIGNALLING

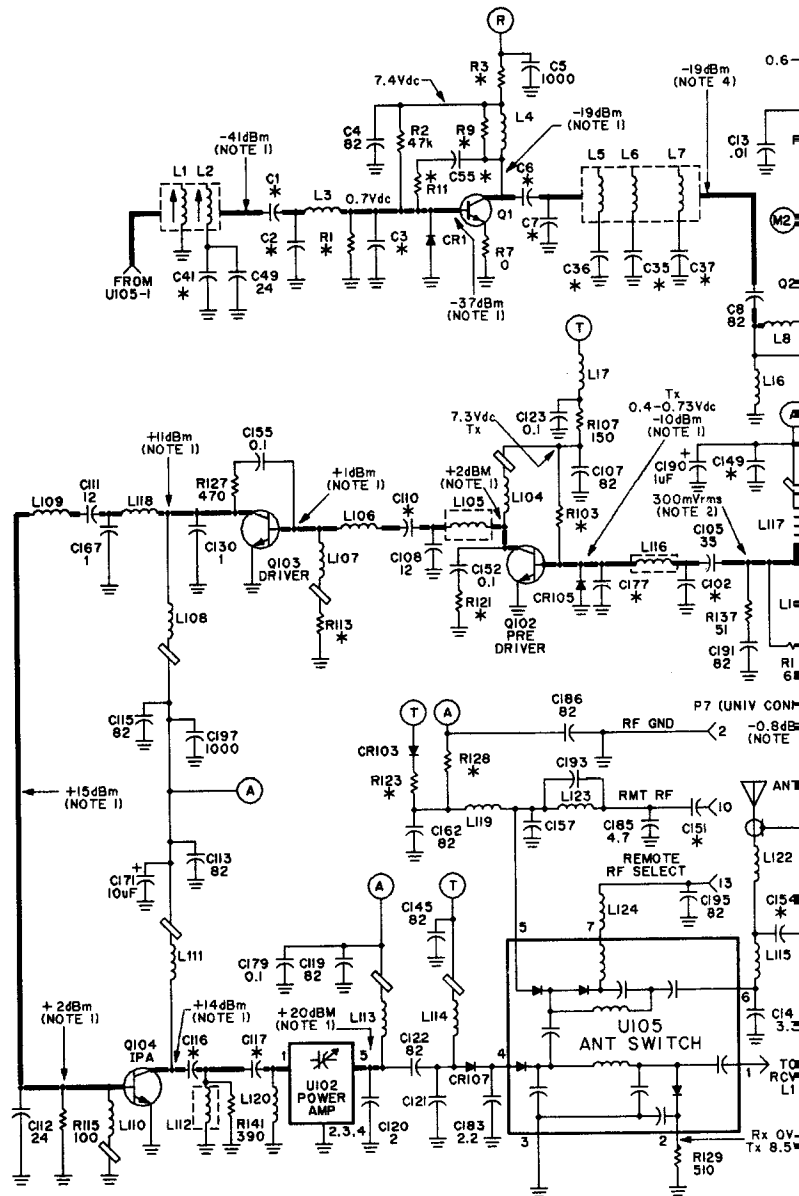
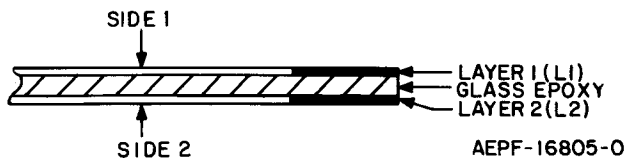
4. INTERCONNECT TIE POINT LEGEND:

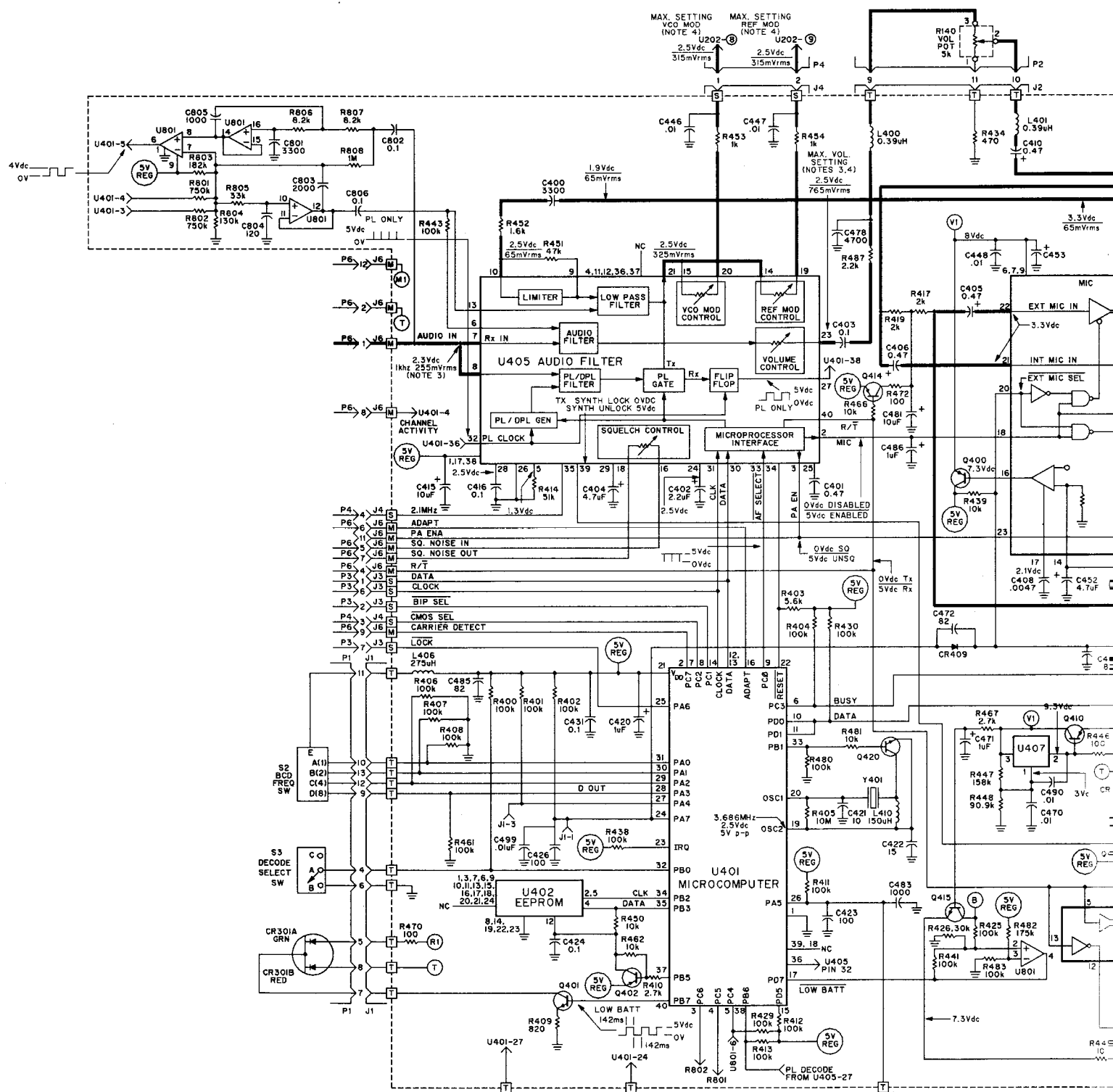
- (A) B+ TO MOTHER BOARD
- (B) CONTROLLER FLEX B+
- (5V REG) REGULATED 5V
- (D) TO DTMF CIRCUIT
- (M1) METERING POINTS M1, M2, M3
- (R) RECEIVE 10V
- (R5) RECEIVE 5V
- (S) TO SYNTHESIZER BOARD
- (T) TRANSMIT 10V
- (T5) TRANSMIT 5V
- (T) TO CONTROLLER FLEX
- (U) TO UNIVERSAL CONNECTOR
- (F) TO FRONT COVER
- (V) REGULATED 8V

VOLTAGE OVERLAY AND WAVEFORM NOTES

- AC VOLTAGE READINGS IN dBm ARE MADE VIA A 1pF CAPACITOR INTO THE 50 OHM ADAPTER OF AN RF mV METER. RX READINGS ARE MADE WITH -20dBm CARRIER SIGNAL INTO REMOTE PORT. TX READINGS MADE WITH REMOTE PORT INTO 50 OHMS.
- AC VOLTAGE READINGS IN mV ARE MADE VIA A HIGH IMPEDANCE RF mV METER.
- THESE READINGS OBTAINED BY S/C BASE OF Q102 TO GROUND.
- THIS READING IS OBTAINED BY PUTTING A 47 OHM RESISTOR ACROSS C31 TO REDUCE LOW INJECTION FEED THROUGH.

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

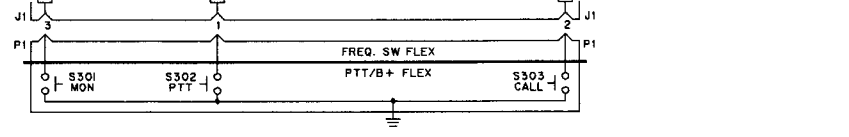




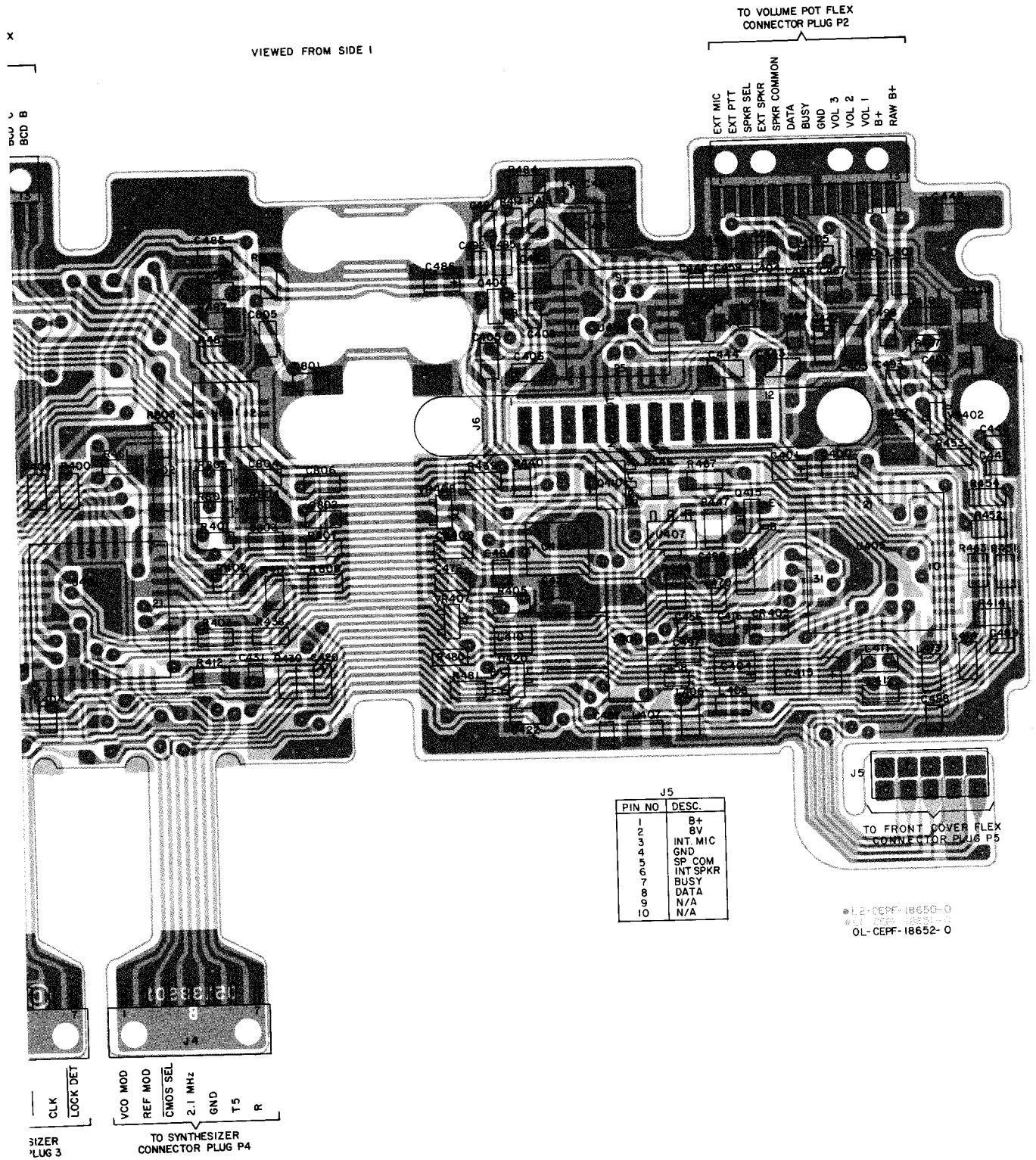
ITEMS REVISIONS CHART

ITEM NO.	SUFFIX
NTN5374A	

* REFER TO ELECTRICAL PARTS LIST FOR VALUE AND DESCRIPTION



CONTROLLER FLEX



**CONTROLLER FLEX
SCHEMATIC DIAGRAM AND
COMPONENT LOCATION DIAGRAM**

NTN5374A Controller Flex

TPLF-3555-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: pF ±5% 50V unless stated
C400	2111032A15	3300 ± 10%
C401	2360562A07	0.47; 25V
C402	2360562A21	2.2µF ±20%; 20V
C403	2160521G37	0.1 +80 - 20%
C404	2360562A28	4.7µF; 10V
C405, 406	2360562A07	0.47; 25V
C408	2160521C21	.0047 ± 10%
C410	2360562A07	0.47; 25V
C415	2360562A43	10µF; 16V
C416	2160521G37	0.1
C420	2360562A13	1µF; 16V
C421	2111031B01	10
C423	2160520C01	100
C424	2160521G37	0.1 +80 - 20%
C426	2160520C01	100
C431	2160521G37	0.1 +80 - 20%
C442-444	2360562A13	1µF; 16V
C445	2369562A35	10µF; 25V
C446-448	2160521C25	.01µF
C449	2111032B13	0.1µF +80 - 20%
C452	2360562A28	4.7µF; 10V
C453	2360562A43	10µF; 16V
C456-460	2160520C05	150
C466, 467	2160520C05	82
C470	2111032A21	.01µF
C471	2360562A13	1.0µF; 16V
C472	2111031A37	82
C481	2360562A43	10µF; 16V
C483, 484	2160521A13	1000
C485	2111031A37	82
C488, 489	2160521G37	0.1µF + 80 - 20%; 25
C490	2160521C25	.01µF
C491, 492	2160521C29	.022µF
C493, 494	2160521G37	.1µF
C497	2160521C29	.022µF
C498	2160521C21	.0047µF
C499	2160521C25	.01µF
C801	2111031A15	3300
C802	2111032B13	0.1µF +80 - 20%
C803	2160520P08	2000
C804	2111031A51	330
C805	2111031A21	.01µF
C806	2111032B13	0.1 +80 - 20%
CR403-405	4805494Q04	DIODE: See Note
CR409-411	4805494Q04	Silicon
J1-J5	---	JACK: Not field replaceable, order Controller Flex NTN5374A Header Assembly, 13-pin
J6	0105959M27	Not field replaceable, order Volume Pot. Flex 0105956M66
J7	---	COIL, RF: unless stated
L400-409	2462575A01	0.39µH Choke
L410	2460590A02	150µH Choke
L411-415	2462575A01	0.39µH Choke
Q400	4805128M94	TRANSISTOR: See Note II
Q401	4805128M12	PNP
Q402-404	4805128M94	NPN
Q405, 406	4805128M12	PNP
Q407	4805128M94	NPN
Q410	4805128M10	PNP
Q412	4805128M94	PNP
Q413	4805128M12	NPN
Q414	4805128M94	PNP
Q415, 416, 420	4805128M12	NPN
R400-402	0611024A97	RESISTOR, Fixed: Ω ± 5%; 1/8W unless stated
R403	0611024A67	100k
R404	0611024A97	5.6k
R405	0660076K49	100k
R406-408	0611024A97	10 Meg ± 10%
R409	0611024A47	100k
R410	0611024A59	820
R411-413	0611024A97	2.7k
R414	0611024A90	100k
R417	0611024A56	51k
		2k

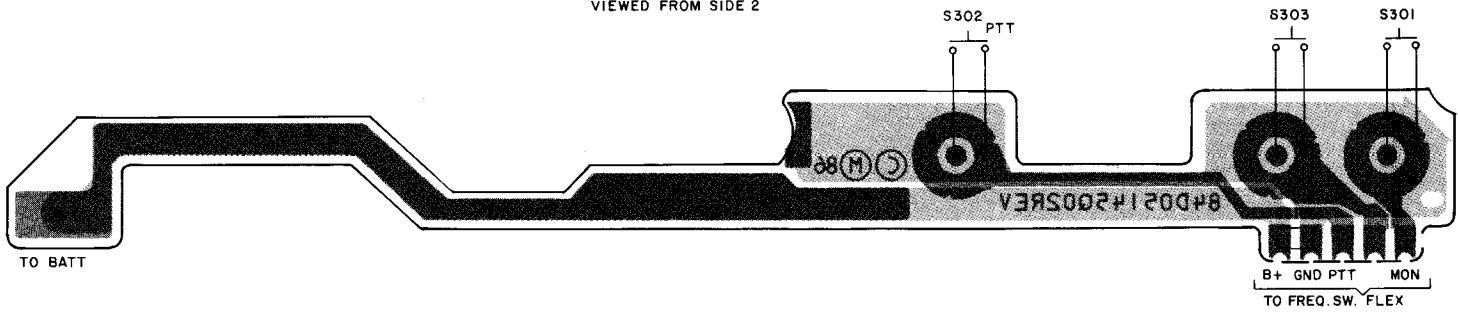
R419	0660076A56	2k
R421	0611024A41	470
R422	0611024A57	2.2k
R423	0611024A83	27k
R424	0611024A53	1.5k
R425	0660076F01	100k ± 1%
R426	0660076E84	30k ± 1%
R427	0660076A94	75k; 1/10W
R428	0660076B05	150k
R429	0660076B01	100k
R430	0611024A97	100k
R434	0611024A41	470
R438	0611024A97	100k
R439	0611024A73	10k
R440	0660076A73	10k
R441	0660076B25	1 Meg
R443	0611024A97	100k
R446	0611024A25	100
R447	0611024J08	158k ± 1%
R448	0611024H84	90.9k ± 1%
R449	0611024A01	10
R450	0611024A73	10k
R451	0611024A89	47k
R452	0611024A54	1.6k
R453, 454	0611024A49	1k
R461	0611024A97	100k
R462	0660076A73	10k
R466	0660076A73	10k
R467	0611024A59	2.7k
R470	0611024A25	100
R472	0611024A25	100
R480	0611024A97	100k
R481	0611024A73	10k
R482	0611024J09	175k±1%
R483	0611024H88	100k
R484	0611024H09	15k
R485	0660076E90	51k±1%
R486, 487	0611024A57	2.2k
R801, 802	0611024J73	750k
R803	0611024J14	182k
R804	0611024B01	130k
R805	0611024A85	33k
R806, 807	0611024A74	82k
R808	0611024B22	1 Meg
U401	0105951P05	CIRCUIT MODULE: See Note I
U402	0105956M99	Microcomputer
U403	0105956M87	EEPROM
U405	0105950P22	Hex Gate
U406	0105954P37	Audio Filter
U407	5160870B01	Audio PA
U801	0105950N67	5V Regulator, CMOS
VR401, 402	4805129M42	Quad Op-Amp
VR407-409	4805129M42	DIODE: See Note I
		Zener, 5.6V
		Zener, 5.6V
		CRYSTAL: See Note II
Y401	4805664G33	3.6864MHz

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.

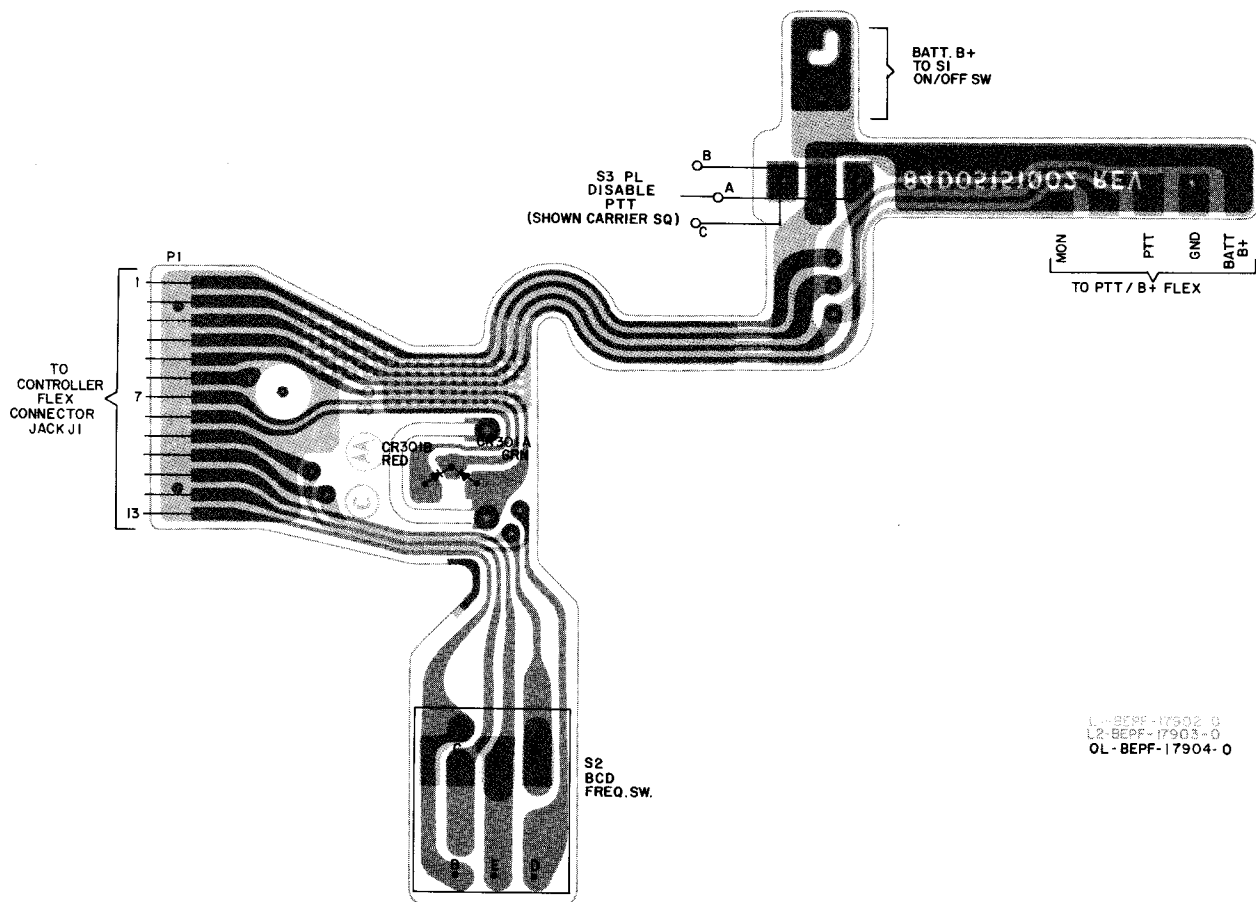
PTT/B+ FLEX

VIEWED FROM SIDE 2



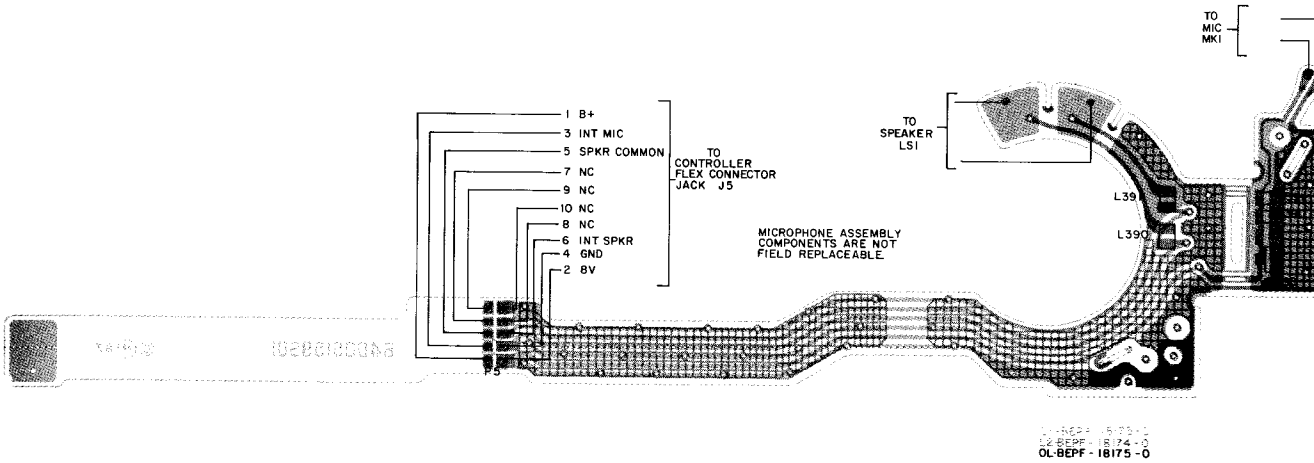
L1-SPVF-17899-1
L2-BEPF-17900-0
OL-BEPF-17901-0

FREQUENCY SWITCH FLEX

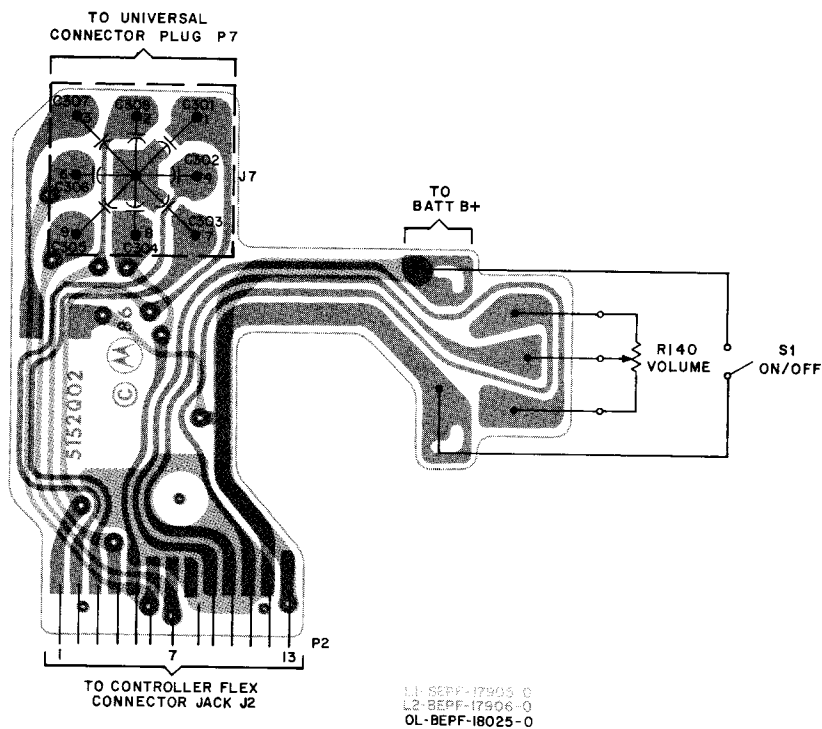


L1-BEPF-17902-0
L2-BEPF-17903-0
OL-BEPF-17904-0

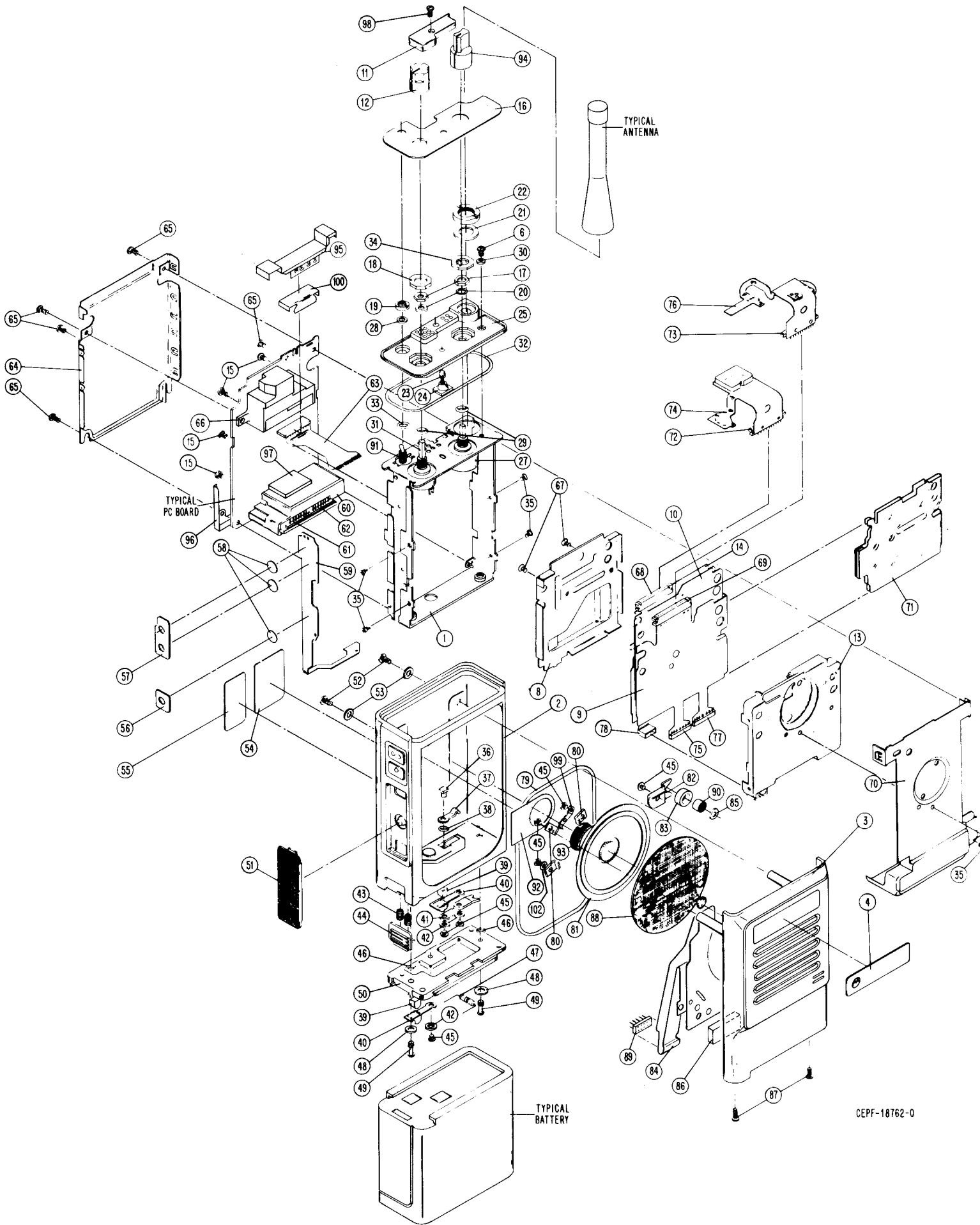
MICROPHONE FLEX ASSEMBLY MK1



VOLUME POT FLEX



PTT/B+ FLEX, MICROPHONE FLEX,
VOLUME POT FLEX, & FREQUENCY SWITCH
FLEX COMPONENT LOCATION DIAGRAMS AND
CONTROLLER FLEX PARTS LIST



Exploded View Parts List

TPLF-3636-0

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	0105956M63	ASSEMBLY, Frame
2	NHN6419A	KIT, Housing; includes items 36 thru 51
3	NTN4956A	KIT, Front Cover; includes items 4, 45, 79 thru 86
4	3305260Q06	NAMEPLATE, Front
5	-----	Not Used
6	0300136785	SCREW, Phillips; 4-40 x 3/16"
7	NTN5374A	KIT, Controller Flex; includes items 8, 9, 10, 13, 14, 67, 68, 69, 75, 77, 78
8	0105952P34	SHIELD, Bottom
9	-----	ASSEMBLY, Controller Flex; part of item 7
10	-----	SHIELD, Center; Top Carrier Side; part of item 7
11	1505102S01	COVER, Dust
12	0105951N79	ASSEMBLY, Knob; VOLUME
13	1505182S01	CARRIER, Top; Controller Flex
14	-----	SHIELD, Center; Bottom Carrier Side; part of item 7
15	0300136771	SCREW, Phillips; 2-56 x 3/16" (4 req'd.)
16	1305676R01 or 1305676R03 or 1305676R06	ESCUTCHEON, 2-channel ESCUTCHEON, 8-channel ESCUTCHEON, 16-channel
17	0205629L01	NUT, Hex (2 req'd)
18	0405534R01	WASHER, Flat; Octagonal
19	0205163Q01	NUT, Spanner
20	0405162Q02	WASHER, Flat; Volume Pot and Freq. Switch
21	0405216L04	WASHER, Flat
22	0205765L02	NUT, Spanner
23	See Note	LED, Bicolor (CR301A, 301B)
24	3205157Q01	SEAL, LED
25	0105951N41	ASSEMBLY, Control Top
26	Not Used	
27	See Note	SWITCH, Frequency (S2)
28	0405162Q01	WASHER, Flat
29	3205082E01	GASKET, O-Ring; (2 req'd.)
30	0484345A06	WASHER, Seal
31	See Note	SWITCH / POT, On-Off / Volume (S1 / R140)
32	3205141Q02	GASKET, O-Ring
33	3205141Q03	GASKET, O-Ring; Mode Select Switch
34	0405218Q01 or 0405534R01	WASHER, Flat; Octagonal (2- & 8-channel) WASHER, Flat; Octagonal (16-channel)
35	0300140369	SCREW, Flat Hd.; 2-56 x 1/8" (4 req'd)
36	4605945K05	CONTACT STUD, Battery
37	3905127Q01	CONTACT, B+
38	3205082E24	GASKET, O-Ring
39	0705830C02	SUPPORT, Contact (2 req'd)
40	3905421C07	CONTACT, Battery (2 req'd)
41	2905124Q01	LUG (2 req'd)
42	0400002625	LOCKWASHER, Split #2 (3 req'd)
43	4105944K01	SPRING, Battery Latch (2 req'd)
44	5505536P01	LATCH
45	0300139982	SCREW, Phillips Hd.; 2-56 x 5/32" (7 req'd)
46	3205082E03	GASKET, O-Ring (2 req'd)
47	See Note	FUSE (F1)
48	0400009761	LOCKWASHER, Split #4 (2 req'd)
49	0305941K01	SCREW, Captive; 4-40 (2 req'd)
50	6405531P02	PLATE, Base
51	4505535P01	LEVER, PTT
52	0305137Q01	SCREW, Phillips Hd.; 4-40 x 1/2" (2 req'd)
53	0484345A06	WASHER, Seal (2 req'd)
54	-----	LABEL, FCC
55	-----	LABEL, FM
56	3205231Q01	SEAL, Dome (PTT); part of item 59
57	3205196Q01	SEAL, Dome (Mon); part of item 59
58	3905834K04	CONTACT, Snap Dome; part of item 59
59	0105951N40	ASSEMBLY, B+ / PTT Flex; includes items 56, 57, 58
60	See Note	(P/O U201)
61	See Note	PLUG (P3)
62	See Note	PLUG (P4)
63	See Note	FLEX, Connector (P/O of U1)
64	0105953N75	ASSEMBLY, Main Back Shield
65	0300136772	SCREW, Phillips Hd.; 2-56 x 5/16" (5 req'd)
66	See Note	RF PA (U102)
67	0300138620	SCREW, Phillips; 2-56 x 5/16" (2 req'd)
68	See Note	JACK (J2)

69	See Note	JACK (J1)
70	0102700J17	ASSEMBLY, Front Shield
71	1405264Q01	INSULATOR, Flex
72	See Note	PLUG (P2)
73	See Note	PLUG (P1)
74	0105956M66	ASSEMBLY, Volume Pot Flex
75	See Note	JACK (J3)
76	0105956M68	ASSEMBLY, Frequency Flex
77	See Note	JACK (J4)
78	See Note	JACK (J5)
79	3205141Q01	GASKET, O-Ring
80	4205140Q01	CLAMP, Speaker (3 req'd)
81	See Note	SPEAKER (LS1)
82	4205136S01	RETAINER, Microphone
83	1405299L01	BOOT, Microphone; part of item 98
84	See Note	ASSEMBLY, Microphone Flex (MK1); includes item 90
85	7505564S01	PAD, Microphone Boot
86	7505501R03	PAD, Front Cover
87	0300140041	SCREW, Phillips; 2-56 x 1/4" (2 req'd)
88	0105958N94	ASSEMBLY, Speaker Felt
89	See Note	PLUG (P5)
90	-----	CARTRIDGE, Microphone; part of item 84
91	See Note	SWITCH (S3)
92	1405299Q01	INSULATOR, Speaker
93	7505501R02	PAD, Speaker
94	0105950N92	ASSEMBLY, Knob
95	2605120S01	SHIELD, I-F
96	2605123S01	SHIELD, PC BOARD; Bottom
97	0200007007	NUT, Hex (for Q104 5W radios only)
98	0305103S01	SCREW, Captive
99	3905178S01	CONTACT
100	1405140S01	INSULATOR
101	-----	Not Used
102	0484345A06	WASHER, Seal

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

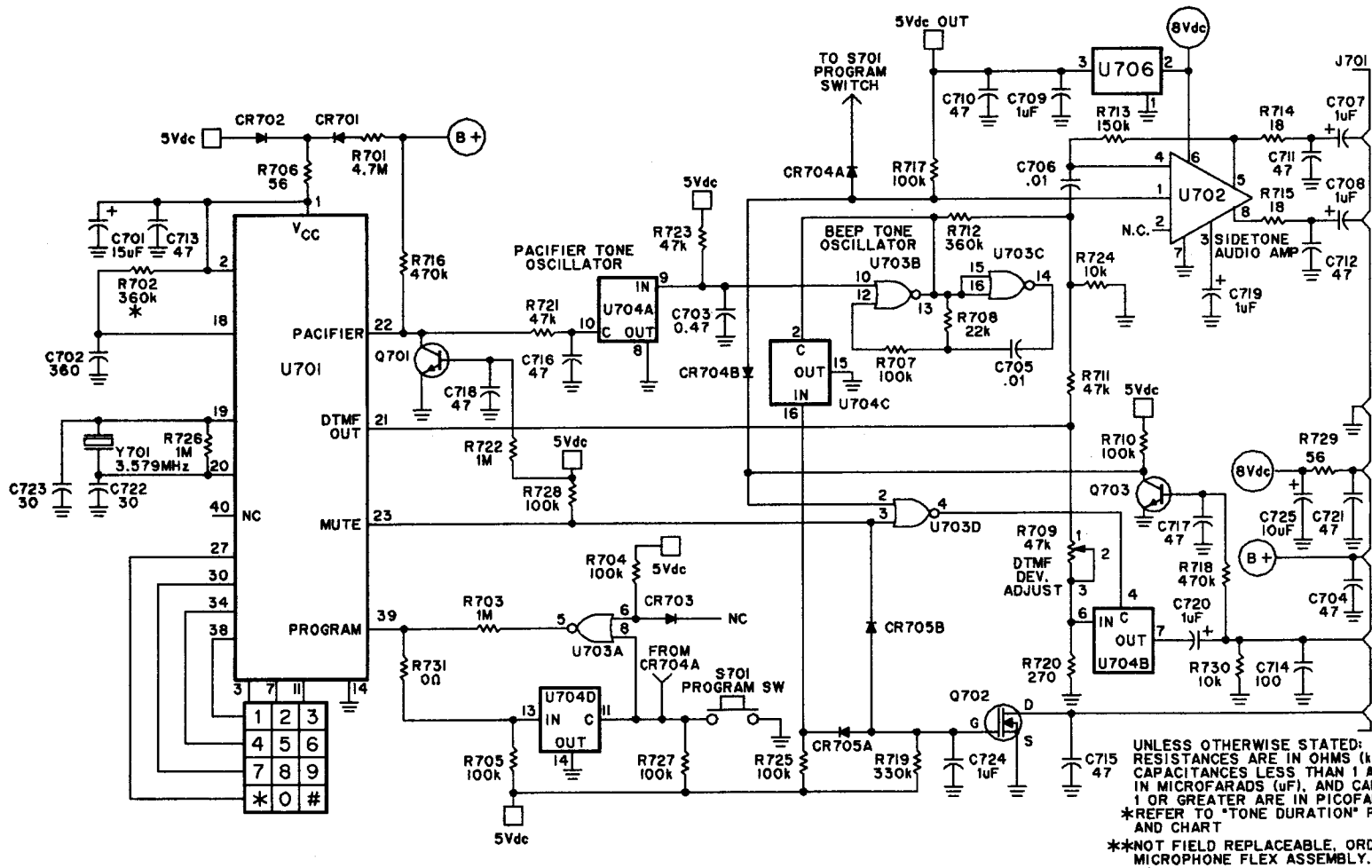
Exploded View Parts List

TPLF-3636-0

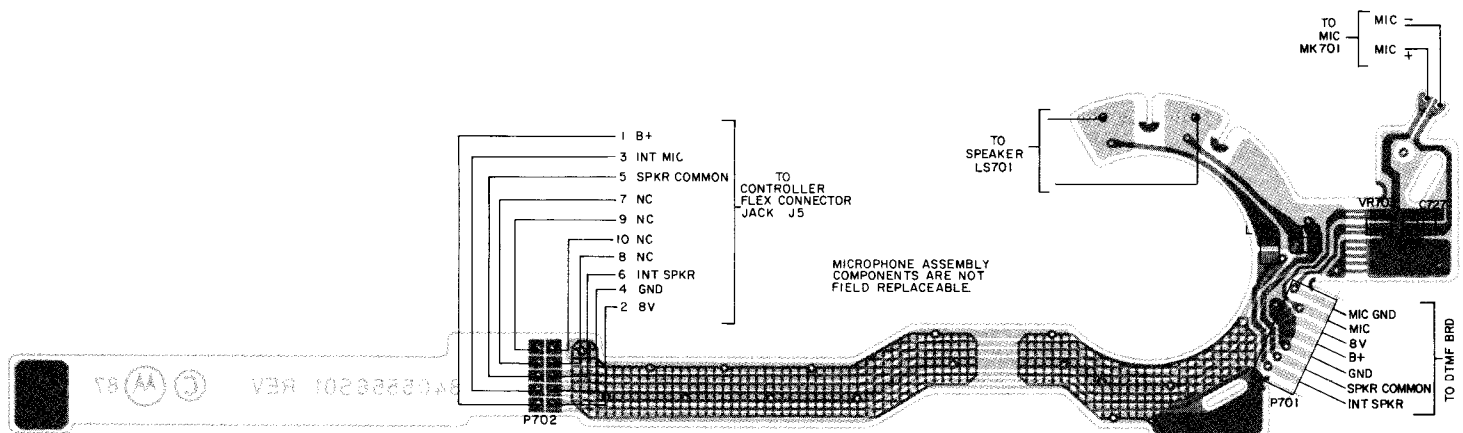
ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	0105956M63	ASSEMBLY, Frame
2	NHN6419A	KIT, Housing; includes items 36 thru 51
3	NTN4956A	KIT, Front Cover; includes items 4, 45, 79 thru 86
4	3305260Q06	NAMEPLATE, Front
5	-----	Not Used
6	0300136785	SCREW, Phillips; 4-40 x 3/16"
7	NTN5374A	KIT, Controller Flex; includes items 8, 9, 10, 13, 14, 67, 68, 69, 75, 77, 78
8	0105952P34	SHIELD, Bottom
9	-----	ASSEMBLY, Controller Flex; part of item 7
10	-----	SHIELD, Center; Top Carrier Side; part of item 7
11	1505102S01	COVER, Dust
12	0105951N79	ASSEMBLY, Knob; VOLUME
13	1505182S01	CARRIER, Top; Controller Flex
14	-----	SHIELD, Center; Bottom Carrier Side; part of item 7
15	0300136771	SCREW, Phillips; 2-56 x 3/16" (4 req'd.)
16	1305676R01 or 1305676R03 or 1305676R06	ESCUTCHEON, 2-channel ESCUTCHEON, 8-channel ESCUTCHEON, 16-channel
17	0205629L01	NUT, Hex (2 req'd)
18	0405534R01	WASHER, Flat; Octagonal
19	0205163Q01	NUT, Spanner
20	0405162Q02	WASHER, Flat; Volume Pot and Freq. Switch
21	0405216L04	WASHER, Flat
22	0205765L02	NUT, Spanner
23	See Note	LED, Bicolor (CR301A, 301B)
24	3205157Q01	SEAL, LED
25	0105951N41	ASSEMBLY, Control Top
26	Not Used	
27	See Note	SWITCH, Frequency (S2)
28	0405162Q01	WASHER, Flat
29	3205082E01	GASKET, O-Ring; (2 req'd.)
30	0484345A06	WASHER, Seal
31	See Note	SWITCH / POT, On-Off / Volume (S1 / R140)
32	3205141Q02	GASKET, O-Ring
33	3205141Q03	GASKET, O-Ring; Mode Select Switch
34	0405218Q01 or 0405534R01	WASHER, Flat; Octagonal (2- & 8-channel) WASHER, Flat; Octagonal (16-channel)
35	0300140369	SCREW, Flat Hd.; 2-56 x 1/8" (4 req'd)
36	4605945K05	CONTACT STUD, Battery
37	3905127Q01	CONTACT, B+
38	3205082E24	GASKET, O-Ring
39	0705830C02	SUPPORT, Contact (2 req'd)
40	3905421C07	CONTACT, Battery (2 req'd)
41	2905124Q01	LUG (2 req'd)
42	0400002625	LOCKWASHER, Split #2 (3 req'd)
43	4105944K01	SPRING, Battery Latch (2 req'd)
44	5505536P01	LATCH
45	0300139982	SCREW, Phillips Hd.; 2-56 x 5/32" (7 req'd)
46	3205082E03	GASKET, O-Ring (2 req'd)
47	See Note	FUSE (F1)
48	0400009761	LOCKWASHER, Split #4 (2 req'd)
49	0305941K01	SCREW, Captive; 4-40 (2 req'd)
50	6405531P02	PLATE, Base
51	4505535P01	LEVER, PTT
52	0305137Q01	SCREW, Phillips Hd.; 4-40 x 1/2" (2 req'd)
53	0484345A06	WASHER, Seal (2 req'd)
54	-----	LABEL, FCC
55	-----	LABEL, FM
56	3205231Q01	SEAL, Dome (PTT); part of item 59
57	3205196Q01	SEAL, Dome (Mon); part of item 59
58	3905834K04	CONTACT, Snap Dome; part of item 59
59	0105951N40	ASSEMBLY, B+ / PTT Flex; includes items 56, 57, 58
60	See Note	(P/O U201)
61	See Note	PLUG (P3)
62	See Note	PLUG (P4)
63	See Note	FLEX, Connector (P/O of U1)
64	0105953N75	ASSEMBLY, Main Back Shield
65	0300136772	SCREW, Phillips Hd.; 2-56 x 5/16" (5 req'd)
66	See Note	RF PA (U102)
67	0300138620	SCREW, Phillips; 2-56 x 5/16" (2 req'd)
68	See Note	JACK (J2)

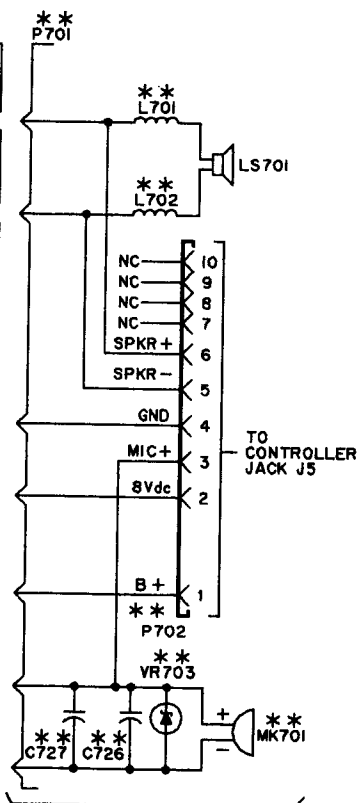
69	See Note	JACK (J1)
70	0102700J17	ASSEMBLY, Front Shield
71	1405264Q01	INSULATOR, Flex
72	See Note	PLUG (P2)
73	See Note	PLUG (P1)
74	0105956M66	ASSEMBLY, Volume Pot Flex
75	See Note	JACK (J3)
76	0105956M68	ASSEMBLY, Frequency Flex
77	See Note	JACK (J4)
78	See Note	JACK (J5)
79	3205141Q01	GASKET, O-Ring
80	4205140Q01	CLAMP, Speaker (3 req'd)
81	See Note	SPEAKER (LS1)
82	4205136S01	RETAINER, Microphone
83	1405299L01	BOOT, Microphone; part of item 98
84	See Note	ASSEMBLY, Microphone Flex (MK1); includes item 90
85	7505564S01	PAD, Microphone Boot
86	7505501R03	PAD, Front Cover
87	0300140041	SCREW, Phillips; 2-56 x 1/4" (2 req'd)
88	0105958N94	ASSEMBLY, Speaker Felt
89	See Note	PLUG (P5)
90	-----	CARTRIDGE, Microphone; part of item 84
91	See Note	SWITCH (S3)
92	1405299Q01	INSULATOR, Speaker
93	7505501R02	PAD, Speaker
94	0105950N92	ASSEMBLY, Knob
95	2605120S01	SHIELD, I-F
96	2605123S01	SHIELD, PC BOARD; Bottom
97	0200007007	NUT, Hex (for Q104 5W radios only)
98	0305103S01	SCREW, Captive
99	3905178S01	CONTACT
100	1405140S01	INSULATOR
101	-----	Not Used
102	0484345A06	WASHER, Seal

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



MICROPHONE FLEX ASSEMBLY MK701

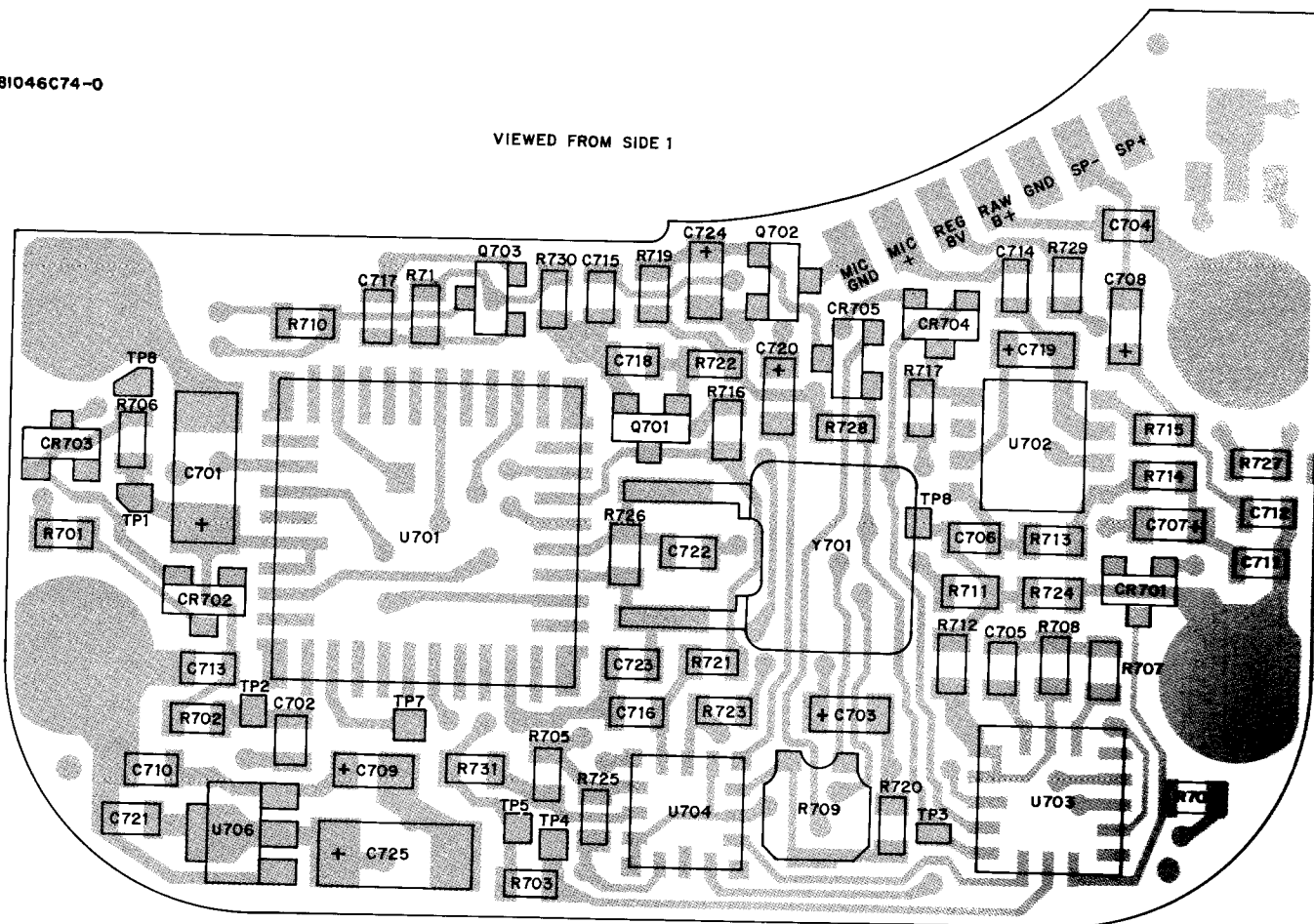




10001.
E
ACITANCES
ADS (pF).
ARAGRAPH

63B81046C74-0

VIEWED FROM SIDE 1



OL CEPF-18791-0

NTN4884B DTMF Front Cover
Electrical Parts List

TPLF-3646-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
C701	2362998C24	CAPACITOR, Fixed: uF±10%; 16V unless stated 15;10V; Tant. 360pF±2%;25V 0.47;35V 47pF±5%;50V .01;25V 1 47pF±5%;50V 100pF±5% 47pF±5%;50V 1 47pF±5%;50V 30pF±5%;50V 1 10±20%	
C702	2160520C14		
C703	2362998C05		
C704	2160520B17		
C705, 706	2160521C25		
C707 thru 709	2362998C09		
C710 thru 713	2160520B17		
C714	2160520C01		
C715 thru 718	2160520B17		
C719, 720	2362998C09		
C721	2160520B17		
C722, 723	2160520B12		
C724	2362998C09		
C725	2362998B73		
C726 **	-----		
C727 **	-----		
CR701 thru 705	4805129M24		DIODE: See Note I Switching
L701, 702 **	-----		COIL: 0.39uH Choke
LS701	5005155Q03		TRANSDUCER
MK701 **	-----		MICROPHONE
P701 **	-----		PLUG: Contacts, flex circuit plating
P702 **	-----		Socket, 10-Pin
Q701	4805128M11	TRANSISTOR: See Note I SOT	
Q702	4805218N11	D-MOS	
Q703	4805128M11	SOT	
R701	0660076H41	RESISTOR, Fixed:Ω ±5%;1/10W unless stated 4.7Meg	
R702	0660076B14	360k	
R703	0660076B25	1Meg	
R704, 705	0660076B01	100k	
R706	0660076A19	56;1/8W	
R707	0660076B01	100k	
R708	0660076A81	22k	
R709	1860502A17	Pot., 47k	
R710	0660076B01	100k	
R711	0660076A89	47k	
R712	0660076B14	360k	
R713	0660076B05	150k	
R714, 715	0660076A07	18	
R716	0660076B17	470k	
R717	0660076B01	100k	
R718	0660076B17	470k	
R719	0660076B13	330k	
R720	0660076A35	270	
R721	0660076A89	47k	
R722	0660076B25	1Meg	
R723	0660076A89	47k	
R724	0660076A73	10k	
R725	0660076B01	100k	
R726	0660076B25	1Meg	
R727, 728	0660076B01	100k	
R729 **	-----		
R730	0660076A73	10k	
R731	0660076M01	0	
S701	-----	SWITCH: Program, Single-Pole (Not replaceable, order DTMF Front Cover Kit)	
S702	-----	Keypad (Not replaceable, order DTMF Front Cover Kit)	
U701	0105953P31	CIRCUIT MODULE: See Note I Tone Generator	
U702	5105469E51	Audio Amplifier	

U703	0105953P32	Quad NOR Gate
U704	0105953P33	Analog Switch
U706	5160880B01	5-Volt Regulator
VR703 **	-----	DIODE: See Note I Zener, 5.6V
Y701	4805719G04	CRYSTAL: See Note II 3.579 MHz Resonator

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.

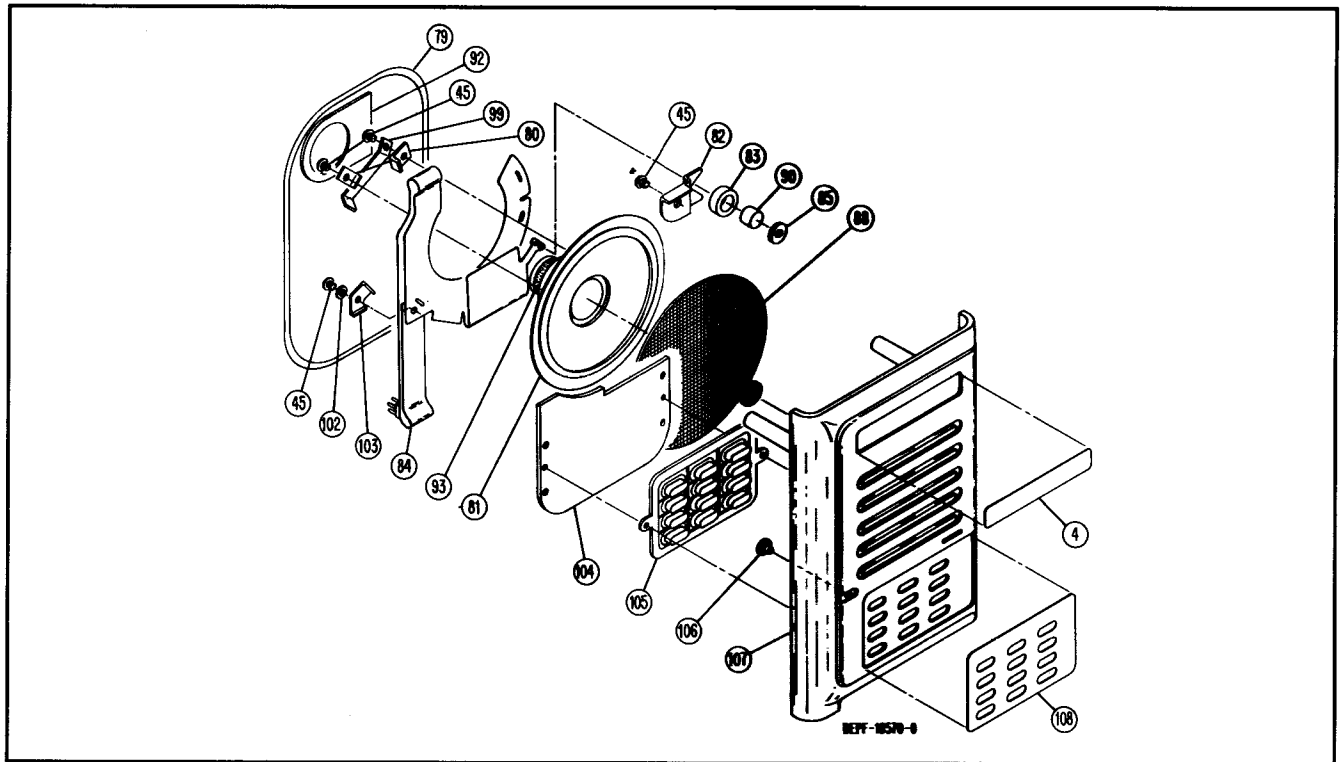
** Not field replaceable, order microphone flex assembly 0105956P38.

TONE DURATION

DTMF radios transmit timed DTMF tones. These tones are preset at the factory for 150ms. duration. To accommodate equipment with timing requirements other than 150ms., the tone duration can be changed by changing resistor R702, which is located between pins 2 and 18 of U701(lower left corner of circuit board). Refer to the following table for details.

R702

MOTOROLA PART NUMBER	VALUE OHMS ±5%	TONE DURATION RANGE (ms)	TONE DURATION NOMINAL Tn (ms)
0660076B10	240k	94 - 108	101
0660076B12	300k	117 - 135	126
0660076B14	360k	141 - 162	150
0660076B16	430k	168 - 193	180
0660076B17	470k	184 - 211	197
0660076B18	510k	199 - 229	214
0660076B19	560k	219 - 252	235
0660076B20	620k	242 - 279	260
0660076B21	680k	266 - 306	285
0660076B22	750k	293 - 337	315
0660076B23	820k	320 - 368	344
0660076B24	910k	355 - 409	382
0660076B25	1M	391 - 449	420

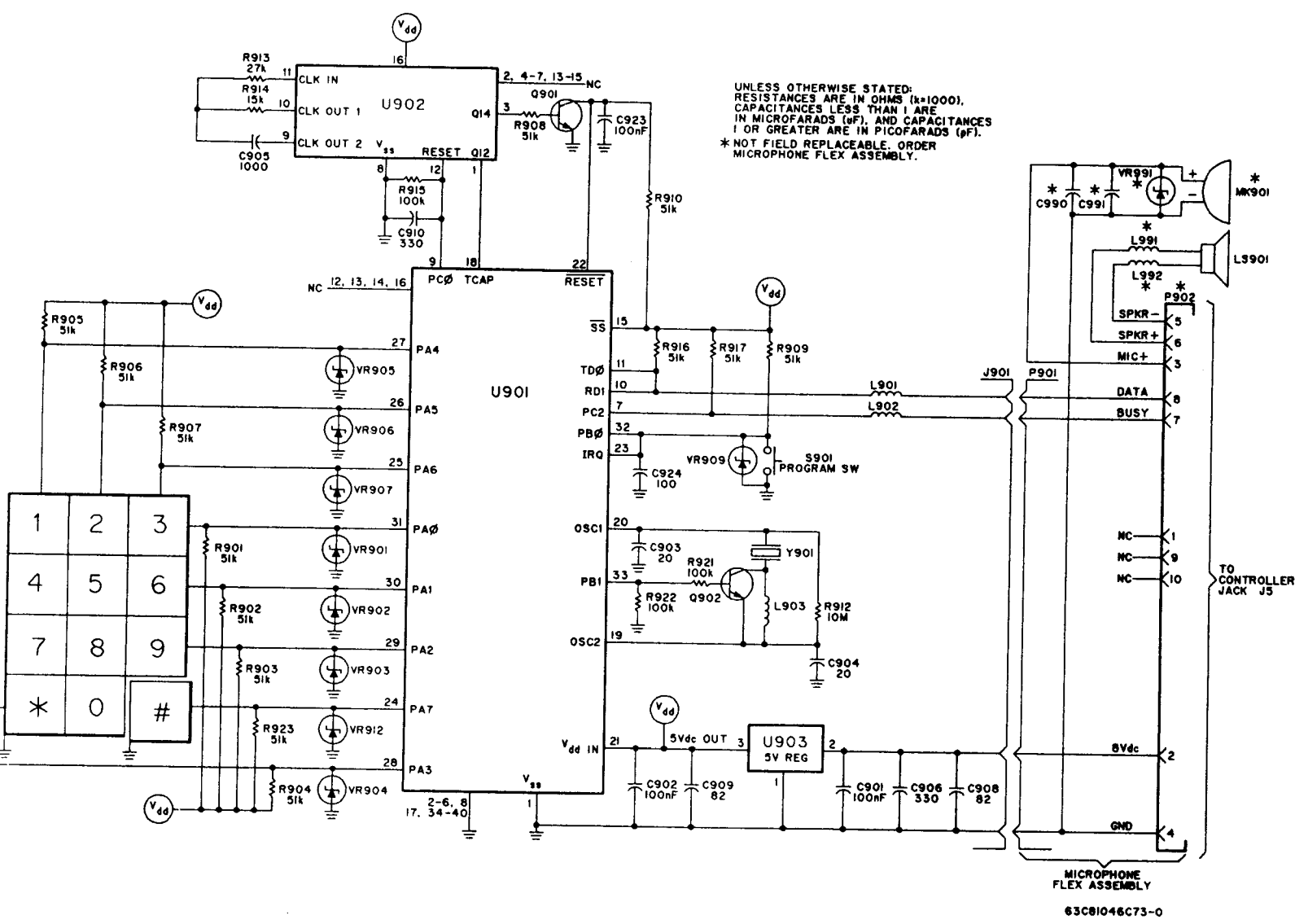


**NTN4884A DTMF Front Cover
Exploded View Parts List**

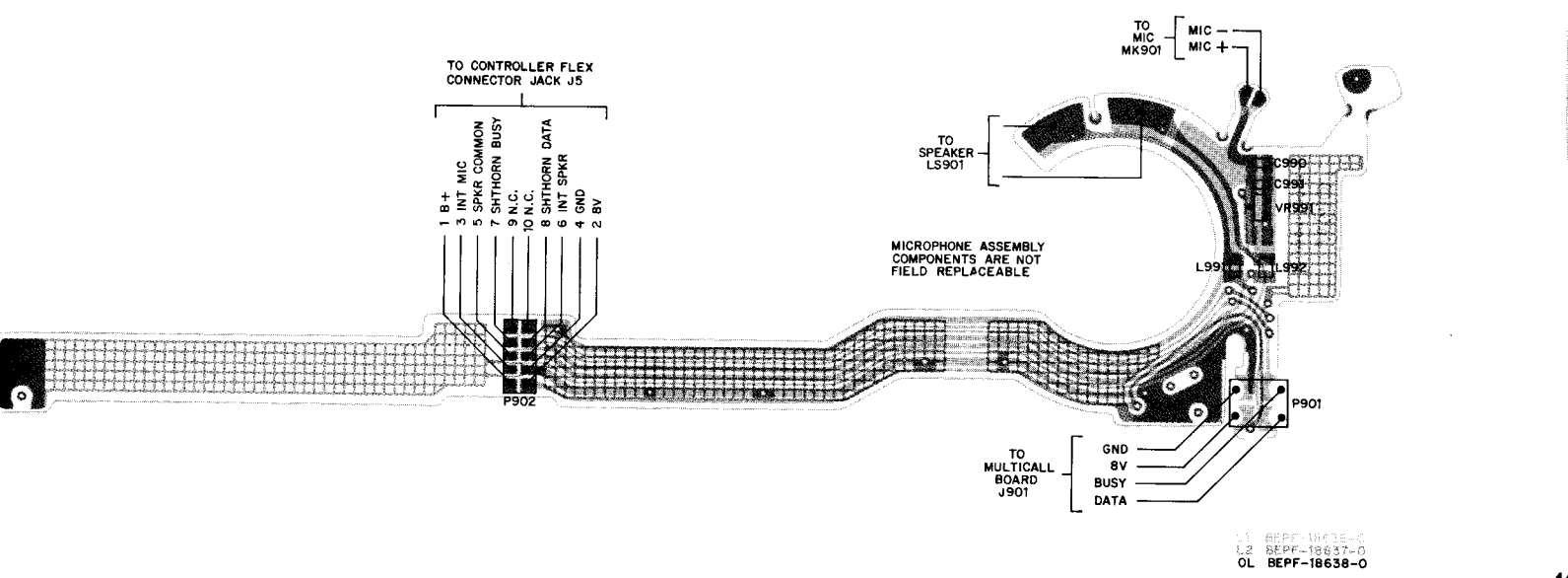
TPLF-3589-O

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
<p>Note: Motorola part number and description of DTMF Exploded View items (ITEM NO.s 4 to 83, 85, 88, 90, 93, and 99) correspond to those of the standard radio Exploded View and Exploded View Parts List. The following items are unique to DTMF Front Cover.</p>		
84	0105956P38	ASSEMBLY, DTMF Microphone Flex
102	0484345A06	WASHER, Seal
103	0705456R01	BRACKET, Speaker
104	-----	* CIRCUIT BOARD, DTMF
105	-----	* SWITCH, Keypad
106	-----	* SWITCH, Actuator
107	-----	* COVER, Front
108	1305455R01	ESCUTCHEON, DTMF

* Not field replaceable, order DTMF Front Cover Kit NTN4884A.



MICROPHONE FLEX ASSEMBLY MK901

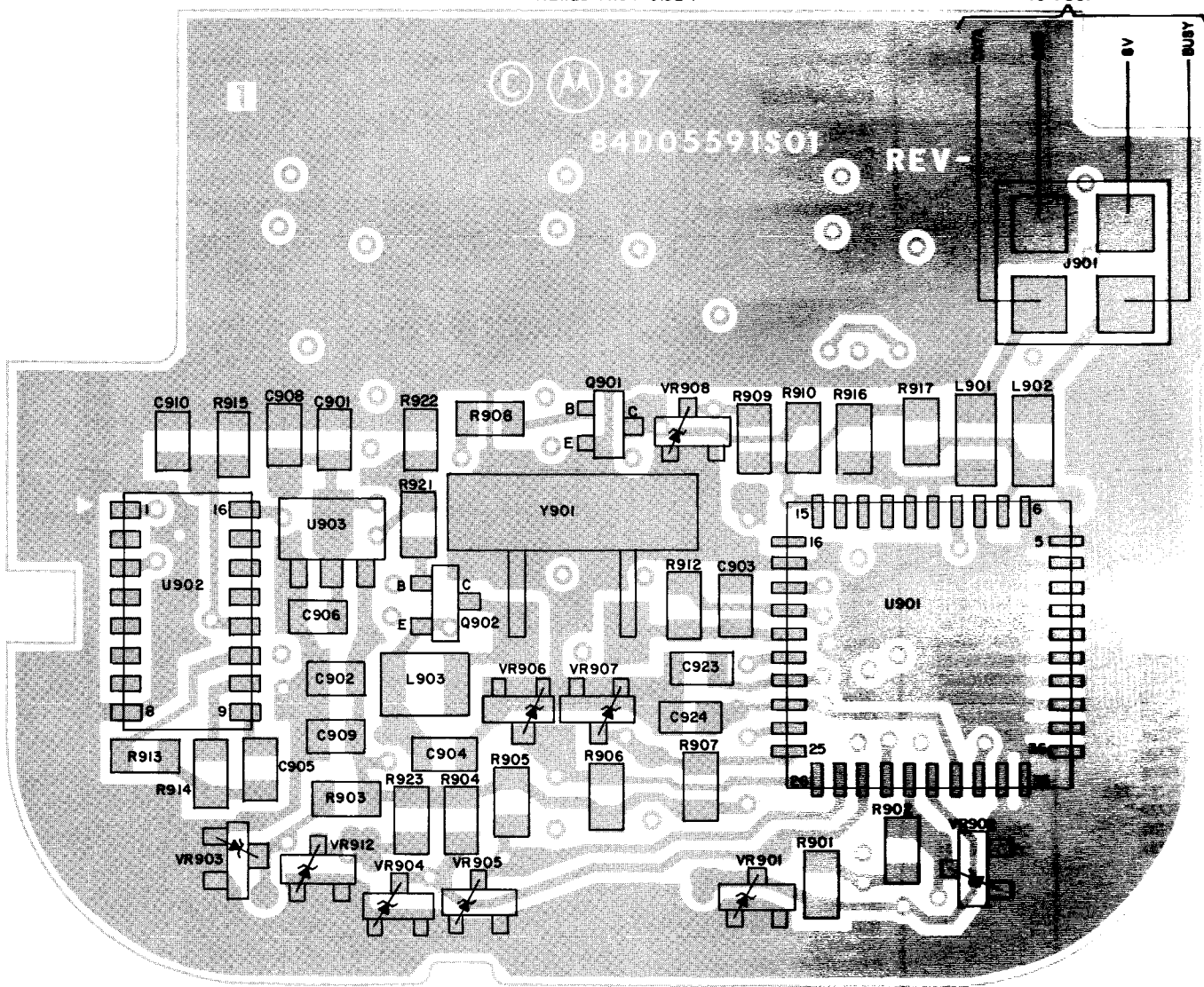


* MK901
L3901

TO CONTROLLER JACK J5

VIEWED FROM SIDE 1

TO P901



OL: CEPP-18635-0

NTN4958A Multicall Front Cover
Electrical Parts List

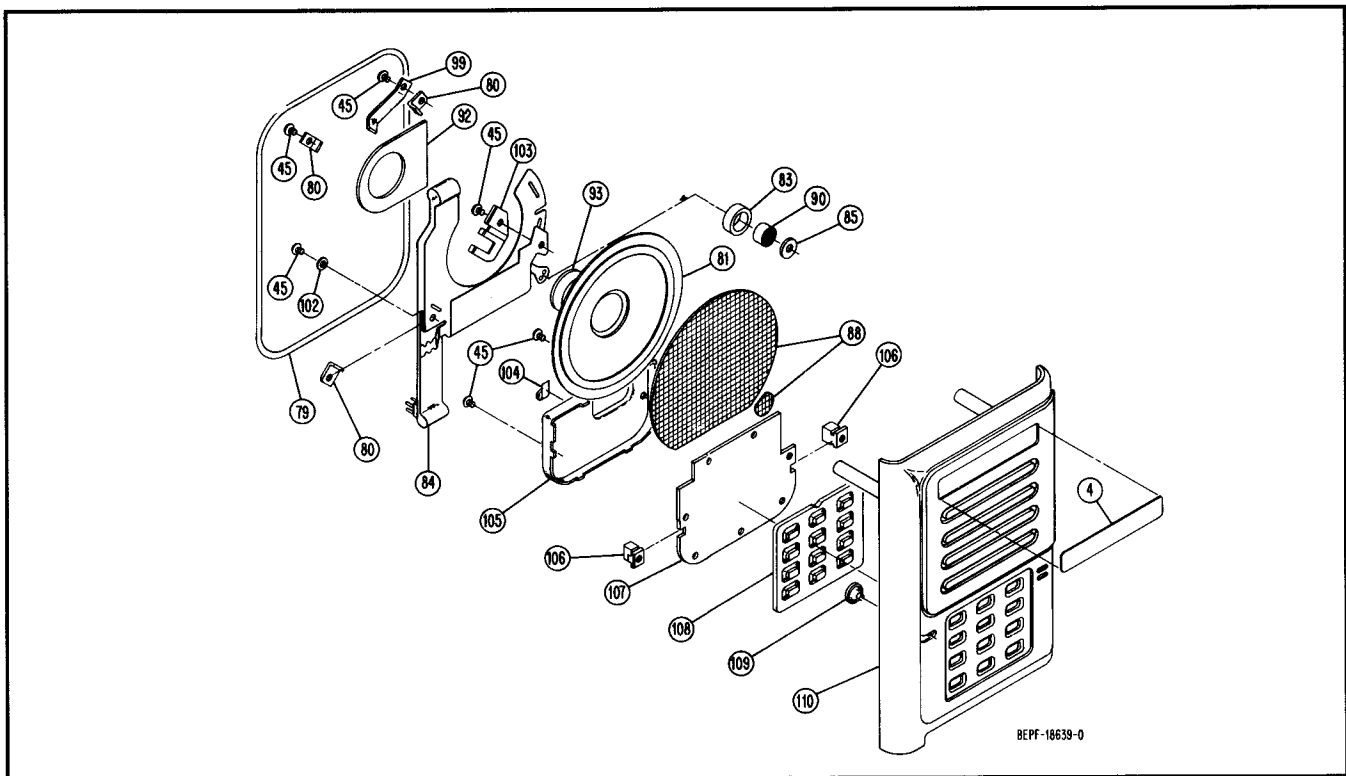
TPLF-3600-A

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
C901, 902	2160521G37	CAPACITOR, Fixed: pF±5%; 16V unless stated 100nF; +80-20%	
C903, 904	2160520B08		
C905	2160521A13		
C906	2160520C13		
C908, 909	2160520B23		
C910	2160520C13		
C923	2160521G37		
C924	2160521A13		
C991 *	-----		
C992 *	-----		
L901, 902	2462575A03	COIL: 0.82uH Choke	
L903	2460590A03		
L991, 992 *	-----		
LS901	5005155Q03	TRANSDUCER	
MK901 *	-----	MICROPHONE	
P901 *	-----	PLUG: Contacts, flex circuit plating Socket, 10-Pin	
P902 *	-----		
Q901, 902	4805128M12	TRANSISTOR: See Note I SOT	
R901 thru 910	0660076A90	RESISTOR, Fixed: Ω ±5%; 1/8W unless stated	
R912	0660076H49		
R913	0660076A83		
R914	0660076A77		
R915	0660076B01		
R916, 917	0660076A90		
R921, 922	0660076B01		
R923	0660076A90		
S901	-----		SWITCH: Program, Single-Pole (Not replaceable, order Multicall Front Cover Kit)
S902	-----		
U901	0105805P23	CIRCUIT MODULE: See Note I Microcomputer	
U902	5105461G42		
U903	5160880B01		
VR901 thru 908	4880140L09	DIODE: See Note I Zener, 6.2V	
VR912	4880140L09		
VR991 *	-----		
Y901	4805664G33	CRYSTAL: See Note II 3.6864 MHz Resonator	

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.

* Not field replaceable, order microphone flex assembly 0105956P58.



**NTN4958A Multicall Front Cover
Exploded View Parts List**

TPLF-3601-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
<p>Note: Motorola part number and description of Multicall Exploded View items (ITEM NO.s 4 to 83, 85, 90, 92, 93, 99, and 102) correspond to those of the standard radio Exploded View and Exploded View Parts List. The following items are unique to Multicall Front Cover.</p>		
84	0105956P58	ASSEMBLY, Multicall Microphone Flex
88	3505152J01	FELT, Speaker
103	4205167S01	RETAINER, Microphone
104	3905509R02	CONTACT
105	2605164S01	SHIELD, Circuit Board
106	-----	* INSERT, Shield (2 req'd)
107	-----	* CIRCUIT BOARD, Multicall
108	-----	* SWITCH, Keypad
109	-----	* SWITCH, Actuator
110	-----	* COVER, Front

* Not field replaceable, order Multicall Front Cover Kit NTN4958A.

**MULTICALL FRONT COVER
EXPLODED VIEW
AND PARTS LIST**