

15160

**MOTOROLA**

**"SABER" SERIES
"SECURENET"
"Handie-Talkie" Portable Radios**

136-174 MHz**SPECIFICATIONS**

GENERAL	TRANSMITTER	RECEIVER
FREQUENCY RANGE: 136-174 MHz BANDSPLITS: 136-150.8 MHz 146-162 MHz 157-174 MHz 146-174 MHz (LP Models) POWER SUPPLY: Rechargeable Nickel-Cadmium Battery or Primary Battery BATTERY VOLTAGE Nominal: 7.5Vdc Range: .6 to 9 Vdc TEMPERATURE RANGE Operating: -30°C to +60°C Storage: -40°C to +85°C DIMENSIONS (H X W X D) Less Battery: 4.42" X 2.94" X 1.18" (112.27 X 74.67 X 29.97 mm) With Light-Capacity Battery: 6.68" X 2.94" X 1.18" (169.67 X 74.67 X 29.97 mm) With Medium-Capacity Battery: 7.56" X 2.94" X 1.18" (192.02 X 74.67 X 29.97 mm) With Ultra-High-Capacity Battery: (or Primary Battery) 8.32" X 2.94" X 1.18" (211.33 X 74.67 X 29.97 mm) WEIGHT Non-Keypad Less Battery: 12.22 oz. (347 g) With Light-Capacity Battery: 18.63 oz. (529 g) With Medium-Capacity Battery: 23.87 oz. (678 g) With Ultra-High-Capacity Battery: 25.49 oz. (724 g) Keypad Less Battery: 12.57 oz. (357 g) With Light-Capacity Battery: 18.98 oz. (539 g) With Medium-Capacity Battery: 24.23 oz. (688 g) With Ultra-High-Capacity Battery: 25.85 oz. (734 g)	RF POWER OUTPUT Low-Power Models: 1 - 2.5 Watts High-Power Models: 2.5 - 6 Watts FREQUENCY STABILITY (-30°C TO +60°C; +25°C REF.): ±.0002% MODULATION: Types 20K0F3E (±.5kHz for 20K0F1D 100% modulation 20K0F2D @ 1000Hz) FM HUM AND NOISE (COMPANION RECEIVER): -45dB SPURIOUS EMISSION (CONDUCTED AND RADIATED) 1.0W: -67dBC 2.5W: -71dBC 6.0W: -75dBC* *-61dBC for H32 models set to the 2.5-watt power level AUDIO DISTORTION: 3% Maximum AUDIO FREQUENCY RESPONSE: +1, -3dB (6dB/OCTAVE PRE-EMPHASIS; 300 - 3000 Hz) MAXIMUM FREQUENCY SEPARATION: Full Bandsplit (NO DEGRADATION)	SENSITIVITY 20dBQ: 0.45 uV 12dBS: 0.35 uV Squelch (Programmable): 0.30 uV* * Factory set above threshold not to exceed 0.35uV USABLE BANDWIDTH: ±5kHz Minimum SELECTIVITY Adjacent channel: -80dB Fourth channel: -90dB INTERMODULATION: -78dB FM HUM AND NOISE: -45dB FREQUENCY STABILITY (-30°C TO +60°C; +25°C REF.): ±.0002% AUDIO SPL (AT 30 cm WITH RATED AUDIO): Weighted, 300 - 3000Hz 90dB Nominal (Non-Submersible) 89dB Nominal (-QXK models) RATED AUDIO OUTPUT: 500 mW (At less than 5% distortion) CHANNEL SPACING: 30 kHz MAXIMUM FREQUENCY SEPARATION: Full Bandsplit (NO DEGRADATION)
SECURENET		
SCRAMBLE TYPE: Digital ENCRYPTION METHOD: Multi-Register, Non-Linear Combiner ENCRYPTION KEY INITIALIZATION: Random ENCRYPTION KEY GENERATION: External, Hand-Held, Microprocessor-Controlled Key loader KEY STORAGE: Volatile Electronic Memory NUMBER OF KEYS PER RADIO: One ANALOG-TO-DIGITAL CONVERSION: Continuously-Variable Slope Delta Modulation (CVSD) VOICE SAMPLE RATE: 12 Kilobits/Second		

SPECIFICATIONS REPRESENT TYPICAL PERFORMANCE AND ARE SUBJECT TO CHANGE WITHOUT NOTICE

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MODEL CONFIGURATION

FACTORY I.D.	POWER LEVEL	FREQ.	SUBMERSIBLE	KEYPAD	DISPLAY
H33QXN7139AN	1W-2.5W	146-174MHz	No	None	None
H43QXN7139AN	2.5W-6W	136-174MHz	No	None	None
H33YXN7139AN	1W-2.5W	146-174MHz	Yes	None	None
H43YXN7139AN	2.5W-6W	136-174MHz	Yes	None	None
H33QXJ7139AN	1W-2.5W	146-174MHz	No	3x1	LCD
H43QXJ7139AN	2.5W-6W	136-174MHz	No	3x1	LCD
H33QXK7139AN	1W-2.5W	146-174MHz	No	3x5	LCD
H43QXK7139AN	2.5W-6W	136-174MHz	No	3x5	LCD

FCC DESIGNATIONS

2.5-Watt Models.....AZ489FT3714

6-Watt Models.....AZ489FT3715

SPECIALIZED TOOLS AND TEST EQUIPMENT

SERVICE AIDS

NTN4720A	Securenet Bypass Module
RPX-4665A	Field Modification Kit/RTX-4005A
RSX-4043A	Rotatorq Tool
RTK-4203A	Program/Test Cable
RTL-4224A	Battery Eliminator
RTL-4225A	Housing Eliminator
RTX-4005B	Portable Products Test Set
TKN8506A	Keyload Cable
0180370B85 thru B86	Ungar Table Fixtures
0180386A81	Micro-Tip Soldering Iron
0180386A82	Static Protection Kit
6680321B79	Phillips-Head Rotatorq Bit
6680334B48 thru B52	Ungar Service Heads
6680370B88	Frequency and On/Off Switch Spanner Nut Rotatorq Bit
6680370B89	Baseplate Spanner Nut Rotatorq Bit
6680370B90	Antenna Bushing Spanner Nut Rotatorq Bit
6680385A11	Module Extractor
6680387A59	Leadless Component Extractor
6680387A64	Heat Controller With Safety Stand
8407668M01	Display Extender Cable

TEST EQUIPMENT

R-1053A	Dual-Trace Oscilloscope
R-2045D	Communications Systems Analyzer with Secure Voice Option
S-1339A	RF Millivoltmeter
S-1347D	Power Supply
RTL-4223A	Charger Tester

FIELD PROGRAMMING EQUIPMENT

RVN-4002A	Field Programmer Software on 5 1/4-inch Disk
RVN-4003A	Field Programmer Software on 3 1/2-inch Disk
0180353A74	Radio Interface Box (RIB)
0180357A57	RIB Wall-Mounted Power Supply
3080369B71	Computer Interface Cable
68P81044C65	SABER Field Programmer User's Guide

CURRENT DRAINS (SEE NOTE)

	SABER I	SABER I AND III
STANDBY	85	88
RECEIVE	215	218
H43 MODELS: 6-WATT	3100	3100
2.5-WATT	1900	1900
H33 MODELS: 2.5-WATT	1500	1500
1-WATT	1300	1300

NOTE: Drain specifications are in milliamperes at 7.5Vdc. These current drains apply to test mode, with the radio operating through the external antenna port. Current drains decrease in normal operation due to antenna switch drains and antenna loading.

SERVICE MANUAL REPRODUCTION

The attached manual is for non-current Motorola Equipment. In order to continue to supply this service literature certain steps may have been taken. These may have included the the following:

- 1) removal of cover
- 2) alternate binding or packaging method
- 3) size reduction of some foldouts, e.g. schematics
- 4) the division of extremely long schematics (over 17") into two or more sheets.
- 5) photographs and screens reproduced from printed material (as opposed to original screened negatives)
- 6) the elimination of colors other than black

We feel that these steps have only minor effect on the readability and utility of basic service information and will allow us to continue to supply this literature at a reasonable cost.

Motorola Communications and Electronics Inc.
Communications and Electronics Parts

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MOTOROLA

MANUAL REVISION

for

Manual No. 68P81045C70-0

SABER™ SECURENET™

**Handie-Talkie® Portable Radios
136-174MHz**

This information outlines changes that have occurred since the printing of your manual. Use this information to supplement your manual.

REVISION DETAILS

<u>NO.</u>	<u>CHANGE AFFECTS</u>
1	Specifications
2	Specialized Tools and Test Equipment
3	Electrical Parts List
4	Exploded View Parts List
5	SABER 2K & SABER III Display Electrical Parts List
6	Exploded View Parts List
7	SECURENET Radio Function Tests (@7.5Vdc)

CHANGES NO.

- 1 On the front cover, **SPECIFICATIONS**, change the following as indicated:

TRANSMITTER FREQUENCY STABILITY

(-30°C to +60°C; +25°C REF.): $\pm 0.0005\%$ ($\pm 0.0003\%$ optional)

SPURIOUS EMISSION (CONDUCTED AND RADIATED)

change to:

*-61 dBC for H43 models set to the 2.5-watt power level

RECEIVER SENSITIVITY

20dBQ: 0.45uV

12dBS: 0.35uV

Squelch Programmable

RECEIVER SPURIOUS AND IMAGE REJECTION: -70dB*

*-55dB for 136-150.8 MHz bandsplit I-F spur (53.55 MHz)

FREQUENCY STABILITY

(-30°C to +60°C; +25°C REF.): $\pm 0.0005\%$ ($\pm 0.0003\%$ optional)

AUDIO SPL (AT 30 cm WITH RATED AUDIO):

87dB Nominal (-QXK- models)

Change the note at the bottom of the page as indicated:

SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

technical publications

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Radio Products Group
8000 W. Sunrise Blvd., Ft Lauderdale, FL 33322

- 1 of 5 -



FMR1313-8

12-13-91

- NO.**
2 On page 2, **SPECIALIZED TOOLS AND TEST EQUIPMENT** change the following as indicated:

SERVICE AIDS

RTL-4225A changed to REN-4001A

Housing Eliminator

NOTE: If Housing Eliminator RTK-4225A is used, it will not be possible to key-load a SABER SECURENET radio through the cable.

RTL-4208A	added	RF Coaxial Probe
RTL-4238A	added	SABER RF Cable
5880348B33	added	SMA to BNC Adapter (for probe)

TEST EQUIPMENT

RTL-4237A	added	Battery Tester
3080369B71	changed to	Computer Interface Cable (PC-XT)
3080369B72	added	Computer Interface Cable (PC-AT)

CURRENT DRAINS

SABER I SABER II AND III

H43 MODEL: 2.5-WATT	2100	2100
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- NO.**
3 On page 11, **Saber VHF SECURENET Electrical Parts List** change the following.

<u>REF. SYM.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
P5	changed to	REX-4166A	Plug: Contact Antenna
R3	changed to	0660076E76	RESISTOR, Fixed: 13K 1% 1/8W
R208	changed to	_____	not used
U300	changed to or	NLD8201A NLD8210A	CIRCUIT MODULE: Synthesizer/VCO (136-150.8MHz) Synthesizer/VCO (146-174MHz)
JU101, 102	added	not used	JUMPER
VR802	deleted	4880140L11	DIODE: Zener, 7.5V; SOT
VR813	deleted	4880140L11	Zener, 7.5V; SOT

For radios with the H852 option, these units can only be addressed with field programmer software release R 04.00.00 or later. Do not attempt to reprogram radios with this option with any previous release of field programmer software. The hardware modifications are listed below for option H852:

<u>REF. SYM.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
U400	changed to	0105954S78	Microcomputer, MC68HC11
U700	changed to	0105954S90	Signal Filter, CMOS

NO.

4

SABER I, II AND III

<u>REF. SYM.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
8	changed to	0305714J09	SCREW, Phillips Pan Hd; 2-56/38"
11	changed to	3205082E80	GASKET, O-Ring (part of item 13)
33	change desc.	NTN4538A	BATTERY, FM/Submersible, 900mAH
		NTN4596A	BATTERY, FM/Submersible, 1500mAH
—	added	7505316J04	PAD, Microphone
—	added	7505934Q02	PAD, DVP
46	changed to	1405807U01	BOOT, Microphone

NO

4 cont'd.

SABER II AND III ONLY

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
50	changed to	8405937R01	FLEX CIRCUIT, LCD Interconnect
51	changed to	4205872S01	RETAINER, Speaker
53	changed to	0705319R02	BRACKET, Switch
54	changed to	4005221R02	SWITCH, Dual Function
—	added	7505316J03	PAD, Speaker Bracket
—	added	1405888Q02	INSULATOR, Front Shield

For radios with Factory ID numbers ending with a "CN" suffix (for example H33SAN7139CN), the following changes apply:

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
49	changed to	8460999A65	ASSEMBLY, 8K Display PCB, SABER II (includes item 48)
	or	8460999A67	ASSEMBLY, 2k Display PCB, SABER II (includes item 48)

SABER I ONLY

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
50	changed to	4205872S01	RETAINER, Speaker
52	changed to	0705319R02	BRACKET, Switch
53	changed to	4005221R02	SWITCH, Dual Function

For radios with the H852 option, these units can only be programmed with field programmer software release R 04.00.00 or later. Do not attempt to reprogram radios with this option with any previous release of field programmer software. The hardware modifications are listed below for option H852:

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
25	changed to	NLD8610A	ASSEMBLY, VHF Main PC Board
43	changed to	NHN6410A	ASSEMBLY, Housing, SABER I (includes items
	34 thru 42)		
	or	NHN6440A	ASSEMBLY, Housing, SABER II (includes items 34 -42)
	or	NHN6412A	ASSEMBLY, Housing, SABER III (includes items 34-42)

NO.

5 U502 changed to 0105954P48 Microcomputer, HCMOS (Option H852)

6 On page 12, **EXPLODED VIEW DIAGRAMS AND PARTS LISTS
FOR SABER II AND III ONLY**

<u>ITEM NO.</u>	<u>ACTION</u>	<u>PART NO.</u>	<u>DESCRIPTION</u>
50	changed to	8405712U01	FLEX CIRCUIT, LCD Interconnect

SECURENET RADIO FUNCTIONAL TESTS (@ 7.5Vdc)

TRANSMITTER PERFORMANCE				
TEST	SERVICE MONITOR	RADIO	TEST BOX	COMMENTS
REFERENCE FREQUENCY	Set to POWER MONITOR, FREQ.ERROR ; frequency to radio transmit frequency; input to RF IN/OUT .	Set to channel corresponding to frequency of test.	PTT Continuous (during performance check).	Frequency error = ≤ 450 Hz
RF POWER OUT	Same as above, except set monitor to measure POWER .	Set to channel corresponding to frequency and power level under test.	PTT Continuous (during performance check).	RF power output $\geq$ published specs for channel under test.*
VOICE MODULATION	Same as above, except set monitor to measure DEVIATION .	Set to channel corresponding to frequency and power level under test.	Input a 1kHz tone @ ≈ 50 mVrms to radio's microphone (through test box). PTT continuous (during performance check).	Listen for 1kHz tone from monitor. Deviation should be ≥ 4.0 kHz and ≤ 5.0 kHz.
CODED VOICE MODULATION	Load monitor with same key used in radio. Select proper algorithm and DEVIATION test with SECURE COM TEST MENU on screen.	Set to channel corresponding to freq. and power level under test. With key loaded, set radio to coded mode.	Same as above.	Listen for decoded 1kHz tone from monitor. Deviation should be ≥ 3.5 kHz and ≤ 4.5 kHz.
RECEIVER PERFORMANCE				
RATED AUDIO	Set to GENERATOR ; frequency to radio receive frequency; 1 mV rf output; 1 kHz modulation; 3 kHz deviation.	Set to open squelch.	Speaker selector on position "A"; switch to load.	Verify that audio is present; adjust radio volume control to read 3.7 to 3.9 Vac on DVM.
12dB SINAD	Same as above, except set monitor to measure SINAD .	Set to open squelch.	Set to speaker load.	Reduce rf level to achieve 12 dB SINAD; rf level $\leq$ published specs.
RECEIVE CODED VOICE	Load monitor with same key used in radio; make sure 1kHz level and all other modulation are turned off when switching to GENERATE . Select TEST under SECURE COM MENU .	Set to channel corresponding to freq. and power level under test. Make sure key is loaded into radio.	Speaker selector on position "A."	Increase 1kHz level on monitor and listen for 1kHz tone from test box.

NOTES

Tests should be performed with Test Box RTX-4005B, and associated Test Cable RTK-4203A.

*RF power levels can be different for each individual channel; refer to Radio Information Sheet.



MOTOROLA INC.

MANUAL REVISION

for
Manuals No. 68P81043C90-O, 68P81043C95-O, 68P81044C45-O,
68P81045C70-O, 68P81045C75-O, and 68P81055C25-O
SABER™, SABER SELECT 5™, and SABER SECURENET™
Portable Radios Service Manuals

This revision outlines changes that have occurred since the printing of your manual. Use this information to supplement your manual. Installation of these changes in earlier equipment is not necessary except as recommended in Motorola Service and Repair Notes (SRN's).

REVISION DETAILS

<u>NO.</u>	<u>CHANGE AFFECTS</u>
1	8405912T01, 8K DISPLAY CIRCUIT BOARD COMPONENT LOCATION DIAGRAMS
2	8405912T01, 8K DISPLAY BOARD SCHEMATIC DIAGRAM
3	8405912T01, 8K DISPLAY BOARD ELECTRICAL PARTS LIST

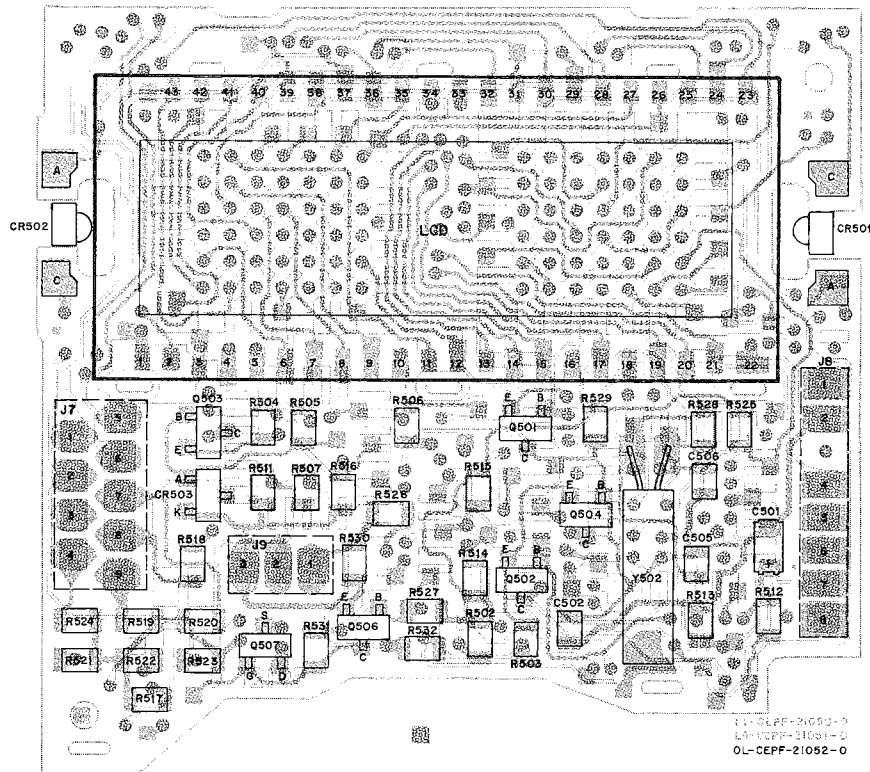
CHANGES

NO.

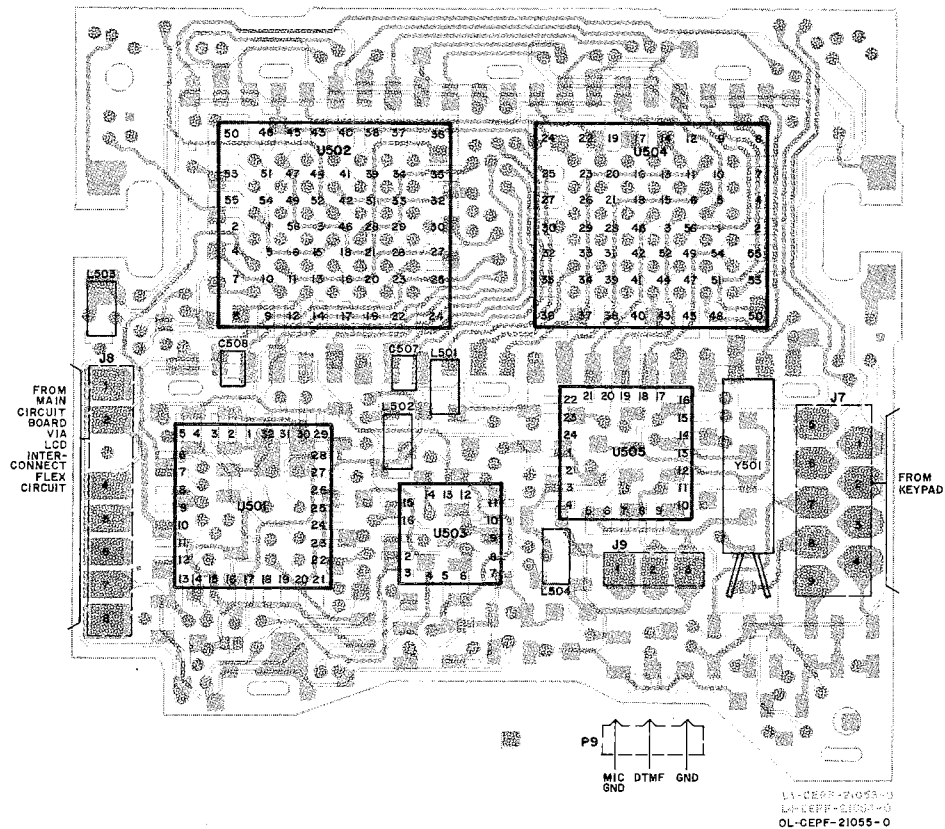
- 1 Add the following Component Location Diagrams for the 8405912T01, 8k Display Circuit Board:

8405912T01 8k DISPLAY CIRCUIT BOARD

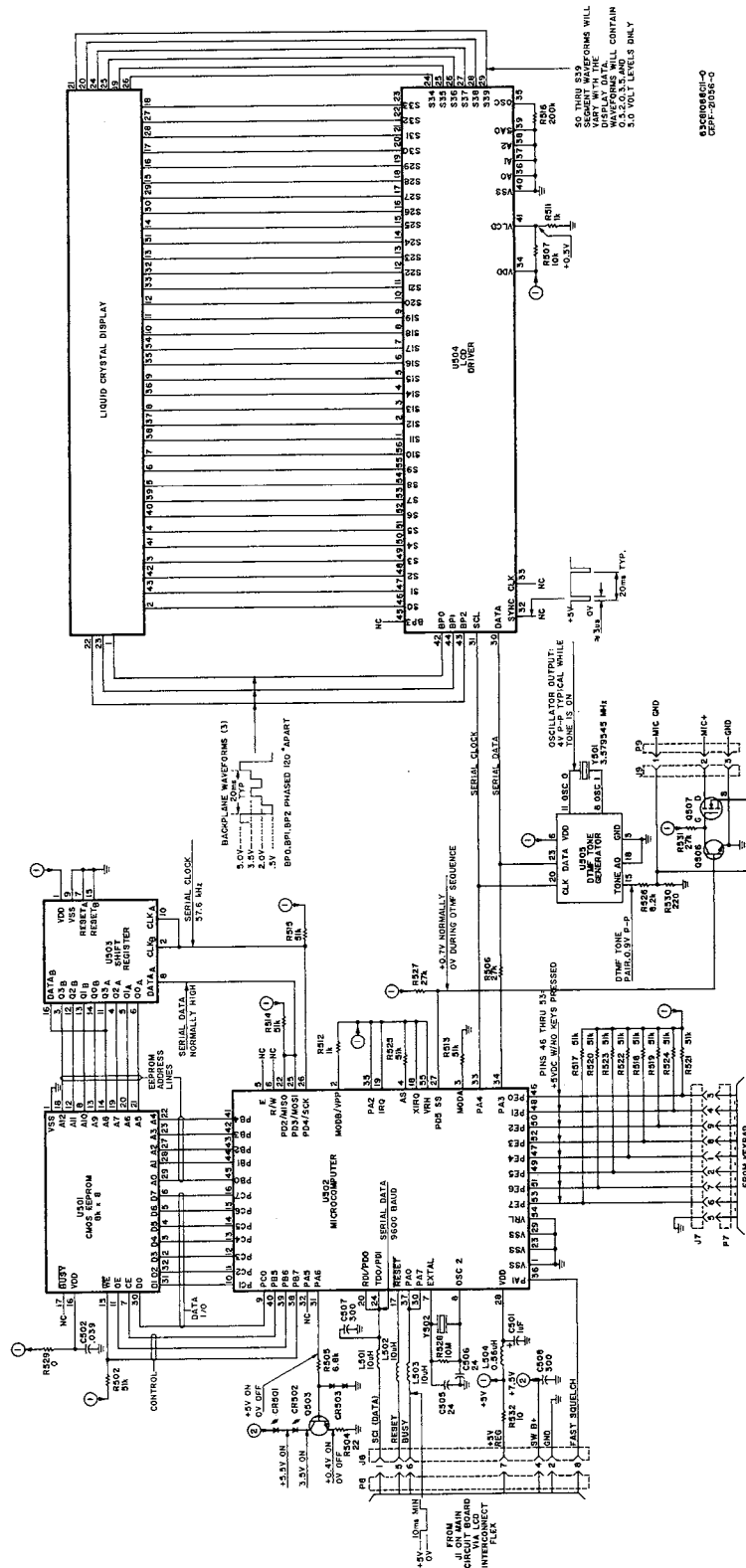
SIDE 1 VIEWED FROM SIDE 1



SIDE 2 VIEWED FROM SIDE 2



2 Add the following Schematic Diagram for the 8405912T01, 8k Display Circuit Board:



3 Add the following Electrical Parts List for the 8405912T01, 8k Display Circuit Board:

8405912T01

SABER 8k Display Circuit Board

Electrical Parts List

TPLF-3935-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C501	2362998B59	CAPACITOR, Fixed: $pF \pm 5\%$; 50V unless stated 1 $\mu F \pm 10\%$; 20V .039 $\mu F \pm 10\%$; 25V Not Used 24 300
C502	2160521C32	
C503,504	-----	
C505,506	2160520B10	
C507,508	2160520C12	
CR501,502	4805729G27	DIODE: See Note I LED, Yellow SOT-23
CR503	4805129M06	
J7	0905287C05	JACK: Socket, Printed Circuit (Keypad Switch)(9 req'd) Socket, Printed Circuit (LCD Interconnect)(8 req'd) Socket, Printed Circuit (Speaker/Mic)(3 req'd)
J8	0905287C05	
J9	0905287C05	
L501 thru 503	2462575A07	
L504	2462575A09	COIL, RF: unless stated Choke, 10 μH Choke, 0.56 μH
Q501,502	-----	
Q503	4805128M12	TRANSISTOR: See Note I Not Used NPN; BCW60B (RH) Not Used NPN; BCW60B (RH) TMOS; BST82
Q504,505	-----	
Q506	4805128M12	
Q507	4805218N11	
R501	-----	
R502	0660076A90	RESISTOR, Fixed: $\Omega \pm 5\%$; 1/8W unless stated Not Used 51k Not Used 22 6.8k 27k 10k Not Used 1k 51k 200k $\pm 1\%$ 51k 8.2k 27k 10M $\pm 10\%$ 0 220 27k 10
R503	-----	
R504	0660076A09	
R505	0660076A69	
R506	0660076A83	
R507	0660076A73	
R508 thru 510	-----	
R511,512	0660076A49	
R513 thru 515	0660076A90	
R516	0660076F08	
R517 thru 525	0660076A90	
R526	0660076A71	
R527	0660076A83	
R528	0660076H49	
R529	0605021K01	
R530	0660076A33	
R531	0660076A83	
R532	0660076A01	
U501	0105954S37	CIRCUIT MODULE: See Note I EEPROM, CMOS; 8k x 8 Microcomputer, HCMOS Shift Register; CMOS LCD Driver, CMOS DTMF Tone Generator, CMOS
U502	0105953N07	
U503	0105953N09	
U504	0105953N10	
U505	0105953N18	
Y501	4805664G40	CRYSTAL: 3.579545MHz 3.6864MHz
Y502	4805664G39	

NOTES:

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



MOTOROLA INC.

MANUAL REVISION

for
Manual No. 68P81045C70-O
SABER™ SECURENET™ VHF
Portable Radio Service Manual

This revision outlines changes that have occurred since the printing of your manual. Use this information to supplement your manual. Installation of these changes in earlier equipment is not necessary except as recommended in Motorola Service and Repair Notes (SRN's).

REVISION DETAILS

<u>NO.</u>	<u>CHANGE AFFECTS</u>
1	EXISTING MAIN CIRCUIT BOARD COMPONENT LAYOUT DIAGRAMS
2	NEW 8405773T01 AND 8405172U01 MAIN CIRCUIT BOARD COMPONENT LAYOUT DIAGRAMS

CHANGES

NO.

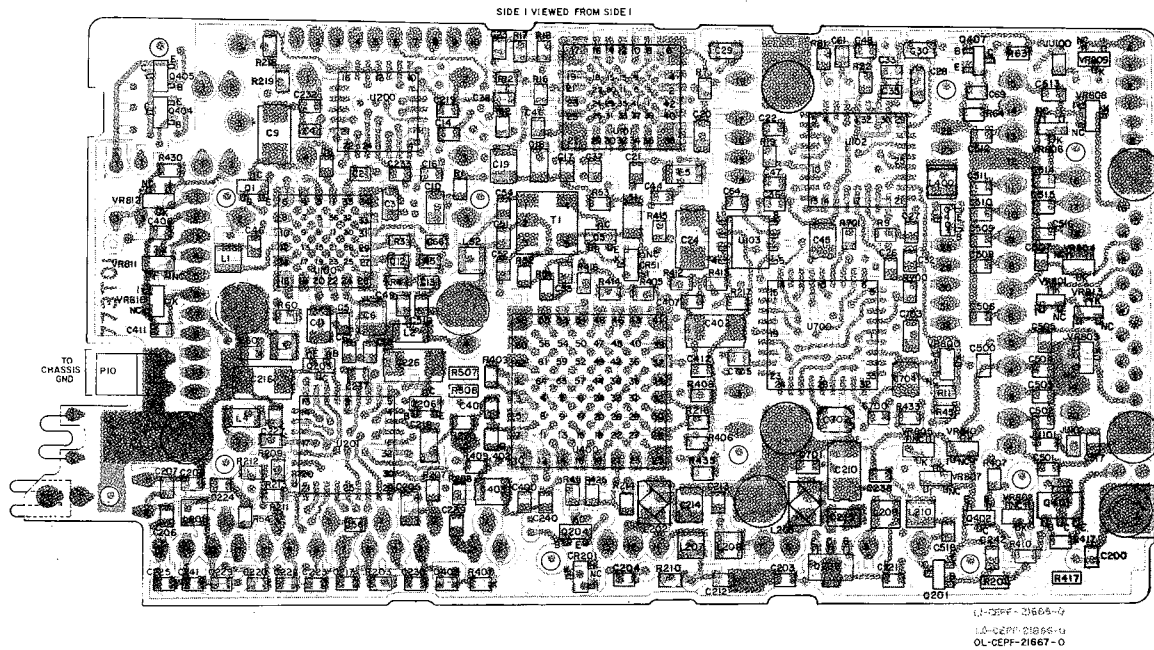
- 1 Add the following above the existing Main Circuit Board Component Layout Diagrams on pages 9 and 10:

8405796Q01 MAIN CIRCUIT BOARD

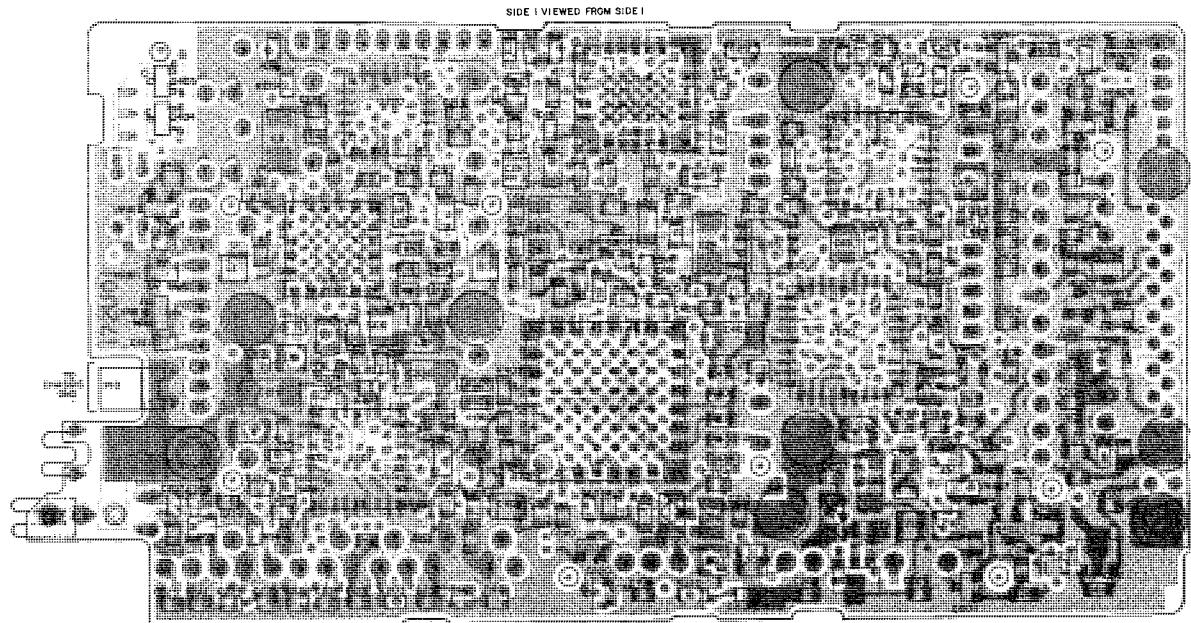
- 2 Add the following new Component Layout Diagrams for the 8405773T01 and 8405172U01, Main Circuit Boards:



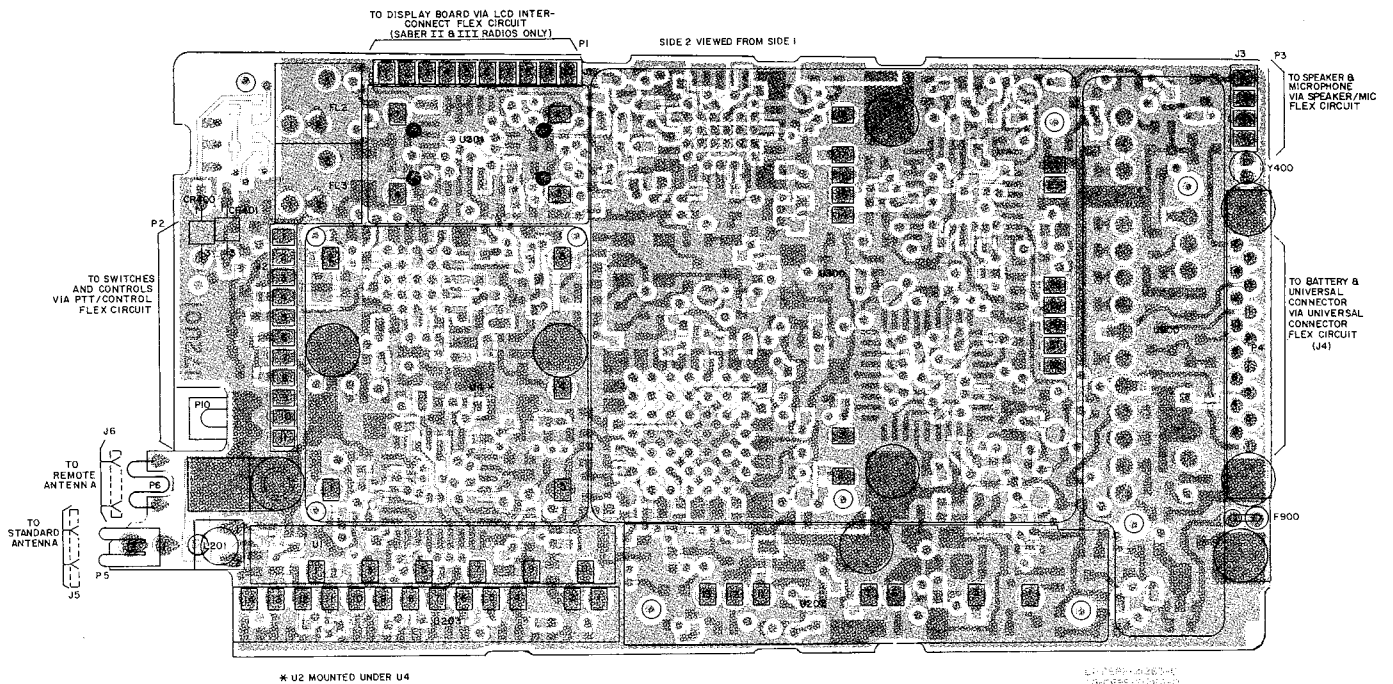
8405773T01 MAIN CIRCUIT BOARD



8405172U01 MAIN CIRCUIT BOARD



LI 05PF-01265-0
 LR 01265-0
 OL 05PF-01265-0





MANUAL REVISION

for "SABER" SERIES " SECURENET"
Handie-Talkie Portable Radios 136-174MHz
68P81045C70-O
Service Manual

This revision outlines changes that have occurred since the printing of your manual. Use this information to supplement your manual. Installation of these changes in earlier equipment is not necessary except as recommended in Motorola Service and Repair Notes (SRNs).

1. On page 11, **SABER VHF SECURENET** Electrical Parts List, TPLF-3492-O, change the following.

Item No.	Motorola Part	Action	Motorola Part	Description
U202	NLD8122A	change to	NLD8773A	Power amplifier (146-162MHz)



FMR-1688-1

5/10/93

R.M.C.

CLEANING

- Clean all external radio surfaces with a 0.5% solution of a mild dishwashing detergent in water (one teaspoon of detergent per gallon of water).
- Stronger cleaning agents may only be used to remove soldering flux from circuit boards after making repairs.

CAUTION

Never allow any alcohol- or solvent-based product to contact any plastic or rubber radio part.

- Clean internal surfaces with water-activated optical wipes.

RELATED PUBLICATIONS AVAILABLE SEPARATELY

SABER I SECURENET OPERATING INSTRUCTIONS.....	68P81045C60
SABER II SECURENET OPERATING INSTRUCTIONS.....	68P81045C65
SABER III SECURENET OPERATING INSTRUCTIONS.....	68P81048C40
SECURENET SERVICE MANUAL (UHF)	68P81045C75
SECURENET THEORY/ MAINTENANCE MANUAL.....	68P81045C85
FIELD PROGRAMMER USER'S GUIDE.....	68P81044C65

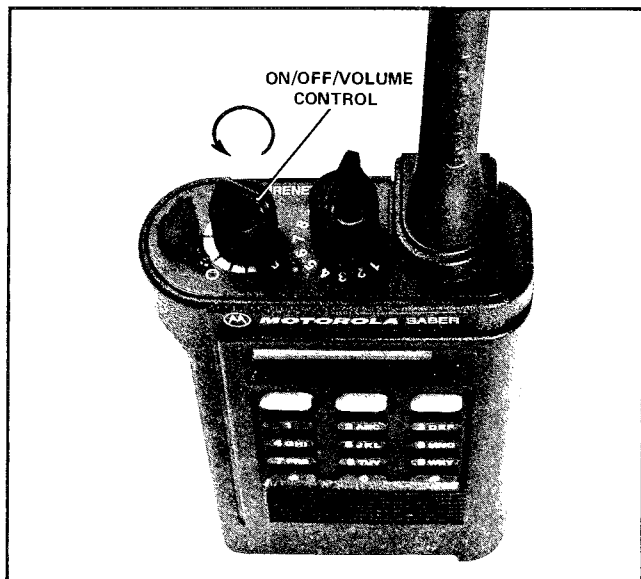
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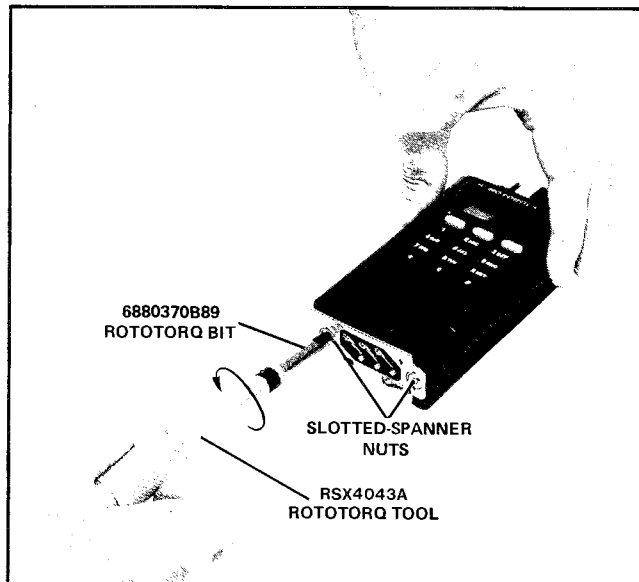
DISASSEMBLY/REASSEMBLY PROCEDURES

1. DISASSEMBLY

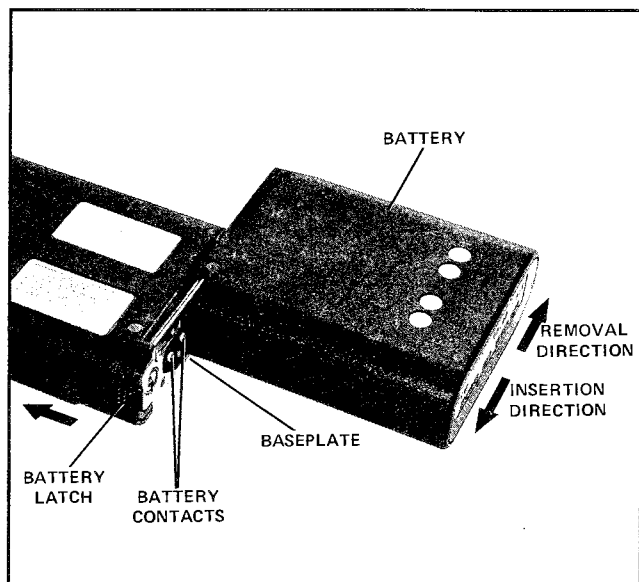
a. **Turn off the radio** by rotating the on/off/volume control knob fully counterclockwise until you hear a click. Remove the universal connector cover or any accessory connected to the radio before beginning disassembly.



c. **Loosen the two slotted-spanner nuts** on the bottom of the radio using Rotatorq tool bit No. 6680370B89. When loosened, the slotted-spanner nuts are captive and will spin freely without separating from the baseplate.



b. **Remove the battery** from the baseplate on the bottom of the radio housing by pushing the spring-loaded battery latch toward the top of the radio, and sliding the battery away from the latch until it clears the baseplate.



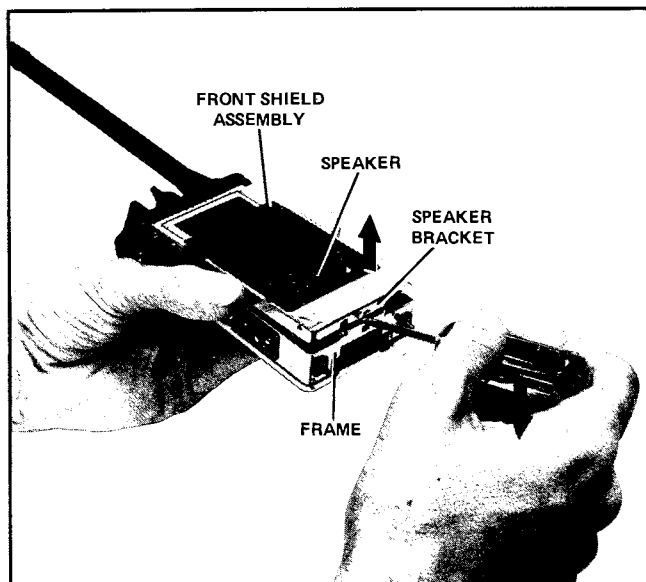
d. **Remove the frame assembly** from the radio housing by grasping the antenna at its base and pulling it gently upward. *Do not depress the PTT switch during removal and do not push on the slotted-spanner nuts to lift the frame assembly.*



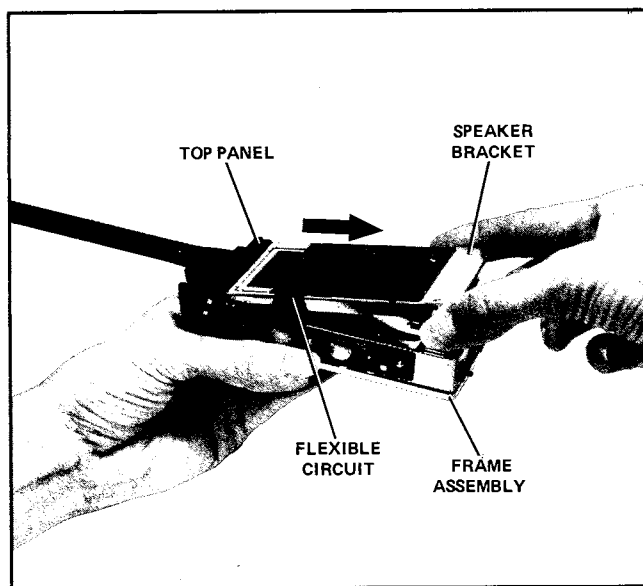
CAUTION

Ensure that all static electricity safeguards are in place.

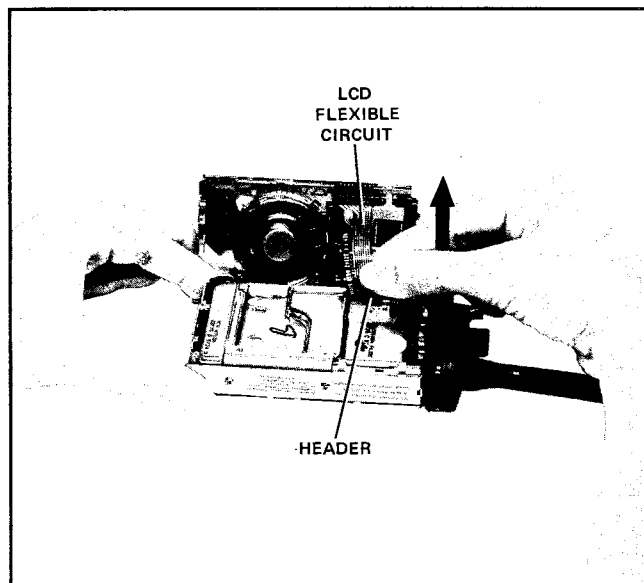
- e. With the speaker facing upward, **remove the speaker bracket assembly** by inserting a thin screwdriver blade between the frame and the bottom of the speaker bracket, and prying gently upward on the speaker bracket until it is disengaged from the frame.



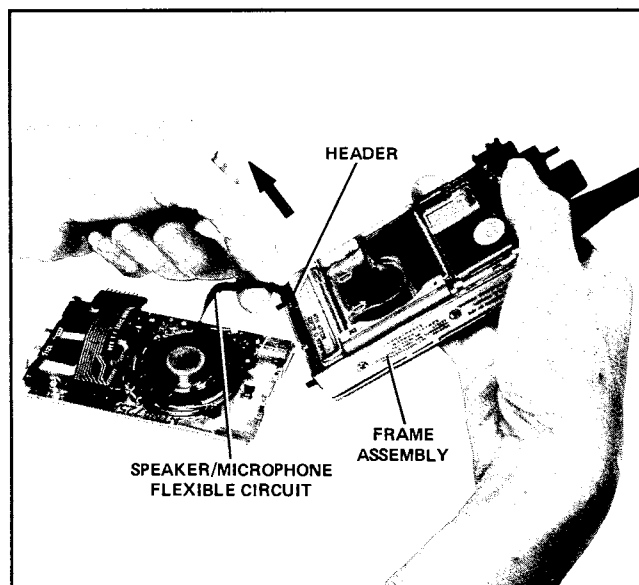
- f. **Lift the speaker bracket assembly** away from the bottom of the frame assembly, then pull it out from under the plastic top panel. Be careful not to pull against the flexible circuits connecting the speaker bracket to the frame assembly.



- g. **ON SABER II AND SABER III RADIOS ONLY:** **Disconnect the LCD interconnect flexible circuit** from the frame assembly by pulling the header straight out and away from the main printed circuit board.



- h. **Disconnect the speaker/microphone flexible circuit** from the frame assembly by pulling the connector straight out and away from the main printed circuit board.



CAUTION

Refer to "SERVICING MAJOR SUBASSEMBLIES" (Section 2) and the appropriate exploded view diagrams at the back of this manual before attempting further disassembly or repair.

2. SERVICING MAJOR SUBASSEMBLIES

a. Baseplate

- All repairs to the baseplate assembly can, and should, be made with the radio chassis inside the radio.
- After the slotted-spanner nuts are loosened, the baseplate is held in place by the power contact screws.
- The retainers holding the slotted-spanner nuts in place are not reusable. Replacement of the retainers requires special insertion procedures; refer to the instruction sheet provided with the slotted-spanner nut kit.
- The "o-ring" portions of the elastomer seal must be fully seated on the threaded bushings before the baseplate is reassembled (the bushings are part of the housing assembly).

b. Housing Assembly

- The housing assembly includes many parts that are not replaceable or repairable.
- The insulator on the universal connector can, and should, be replaced if the old insulator has been torn. When replacing the insulator take care to keep it out of the main seal o-ring's seating area.
- The PTT lever can be replaced by prying out the old part with a soft plastic tool. The plastic housing around the lever may be damaged if a harder tool is used.

c. Control Top Panel

- The control top panel is fastened to the frame by the on/off/volume and frequency switches, and two self-tapping screws; it should be removed from the frame only if absolutely necessary. If repair is required, always start the screws into the control top panel by hand before tightening them with a torque wrench; this will help avoid cross-threading and stripping of the plastic panel.
- The on/off/volume and frequency knobs are 2-part kits; each kit consists of a knob and an insert. Once an insert is removed, it cannot be used again; therefore, remove an insert only if the on/off/volume control or frequency switch must be replaced, or if the control top must be removed from the frame.

- The number of frequency switch positions can be changed by removing the frequency knob and insert, and aligning the top tab on the detent washer with the number on the escutcheon that is equal to the desired number of frequency positions minus three. For example, a 12-position frequency switch would have the top tab aligned with the "9" on the escutcheon. A new frequency knob and insert must be used each time this change is made.

NOTE

There are different detent washers for even or odd numbers of switch positions; see the appropriate exploded view parts list.

d. LCD/Speaker Bracket Assembly

- The LCD assembly can be replaced on SABER II and III radio PC board assemblies, but the instructions on the replacement kit's instruction sheet must be strictly followed.
- The microphone boot must be properly oriented and seated in the speaker bracket **before** the microphone is pressed into place.

e. Backshield Assembly

- Before removing the backshield, ensure that all static electricity safeguards are in place.
- For best results, loosen/tighten all four screws lightly before loosening/tightening any single screw completely.
- The backshield screws are held captive in the shield after being loosened.

f. Circuit Boards and Modules

- All modules plug into sockets on the main circuit board.
- Some modules are fastened to the main board and frame with screws; remove these screws before attempting to unplug a module. **Never** substitute any screw.
- Several of the modules are designed to be removed with a standard DIP extractor tool (OK-1 or equivalent). Always use the extractor tool when removing these modules to avoid damaging their leads.

- Some modules have guide pins to assist in insertion or removal. Pressure may be applied to these guide pins to aid removal of a module if, and only if, it is distributed evenly over all guide pins on the module. *Applying all the force to a single guide pin will cause severe damage to the module.*

- The U900 module is not serviceable.

- Before reinserting any module, always check its leads for damage. Gently straighten any leads that may be bent; replace any modules with severely damaged leads.

- Before reinserting reference oscillator module U301 into the main circuit board, be certain that its squared (pin 1) corner is correctly oriented per the main circuit board component layout diagram.

- When electrically testing and/or probing the main circuit board with the back shield removed, always use the three finger screws on the SABER housing eliminator service aid to provide grounding to VCO synthesizer module U300 (two places), and the rf ground clip (one place).

- When removing the main circuit board from the frame assembly, do the following:

1. Remove the back shield assembly.
2. Unplug the PTT/controls flexible circuit.
3. Remove power amplifier module U202.
4. Remove the two main compression connector screws.
5. Lift the board at the bottom and pull out from under the control top panel.

- The rf and ground contacts at the top of the main circuit board are exposed when the board is removed from the frame. Special care must be taken to avoid accidental damage to these contacts.

g. Frame Assembly

- The tapped tabs on the frame can be stripped if excessive screw tightening torques are used (see Torque Specifications table). The frame is not repairable.

- If you must lift or remove the PTT/controls flex circuit for any reason, do not readhere it to the frame; the flex must be replaced.

h. Dual-Function Switch (S801, 804) and Actuator Assembly

- Before removing the switch, remove the knob by gently separating the two arms of the switch bracket (located between the switch and the main O-ring seal) and pulling upward on the knob.

- Before reinserting the knob, ensure that the slot in the switch is properly aligned with the blade on the knob's shaft.

- When the knob is properly inserted, the arms of the switch bracket will snap into position (approximately 0.2 inches apart), the knob will not be loose in the switch bracket, and the bracket will hold the switch firmly against the inside of the top control panel. If this is not the case, replace the switch bracket.

3. REASSEMBLY

Reassemble the radio in the reverse order of disassembly, referring to "SERVICING MAJOR SUB-ASSEMBLIES" (Section 2) and making certain:

- that the speaker/microphone connector (and the LCD interconnect header on SABER II and III radios) is correctly aligned so that no twisting or pinching of the flexible circuit occurs when the speaker bracket is reattached to the frame assembly.

- that the two extended tabs at the top of the speaker bracket are properly inserted into the slots between the frame and the control top panel.

- to tighten all hardware loosened or removed during disassembly per the torque specifications listed in the Torque Specifications table. Use recommended torque driver (Motorola RSX4043A Rotatorq Tool or equivalent).

- that there is no foreign material on the main O-ring or stud seals.

CAUTION

Inspect the frame stud seals and the top panel O- ring and replace if any damage exists.

- to properly orient the completed frame assembly before inserting it into the radio housing.

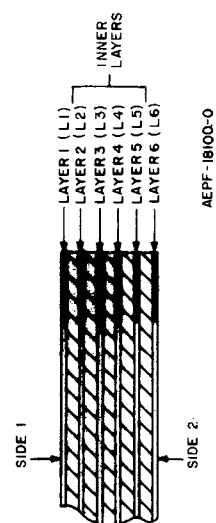
- that the PTT switch and monitor button are not depressed while the frame is being inserted into the housing.

TORQUE SPECIFICATIONS

APPLICATION	TORQUE (IN. LBS.)	TORQUE (N•m)	TORQUE BIT NO.
Antenna Bushing Spanner Nut	20	2.27	6680370B90
Back Shield to Frame Screws	2.5	0.28	6680321B79
Bottom Connector to Frame Screws	2.5	0.28	6680321B79
Frequency Switch Spanner Nut	8	0.91	6680370B88
All Module Screws	2.5	0.28	6680321B79
Power Contact Screws	2.5	0.28	6680321B79
Slotted-Spanner Nut (Baseplate)	4	0.45	6680370B89
Top Panel to Frame Screws	2	0.23	6680321B79
Volume Pot Spanner Nut	8	0.91	6680370B88



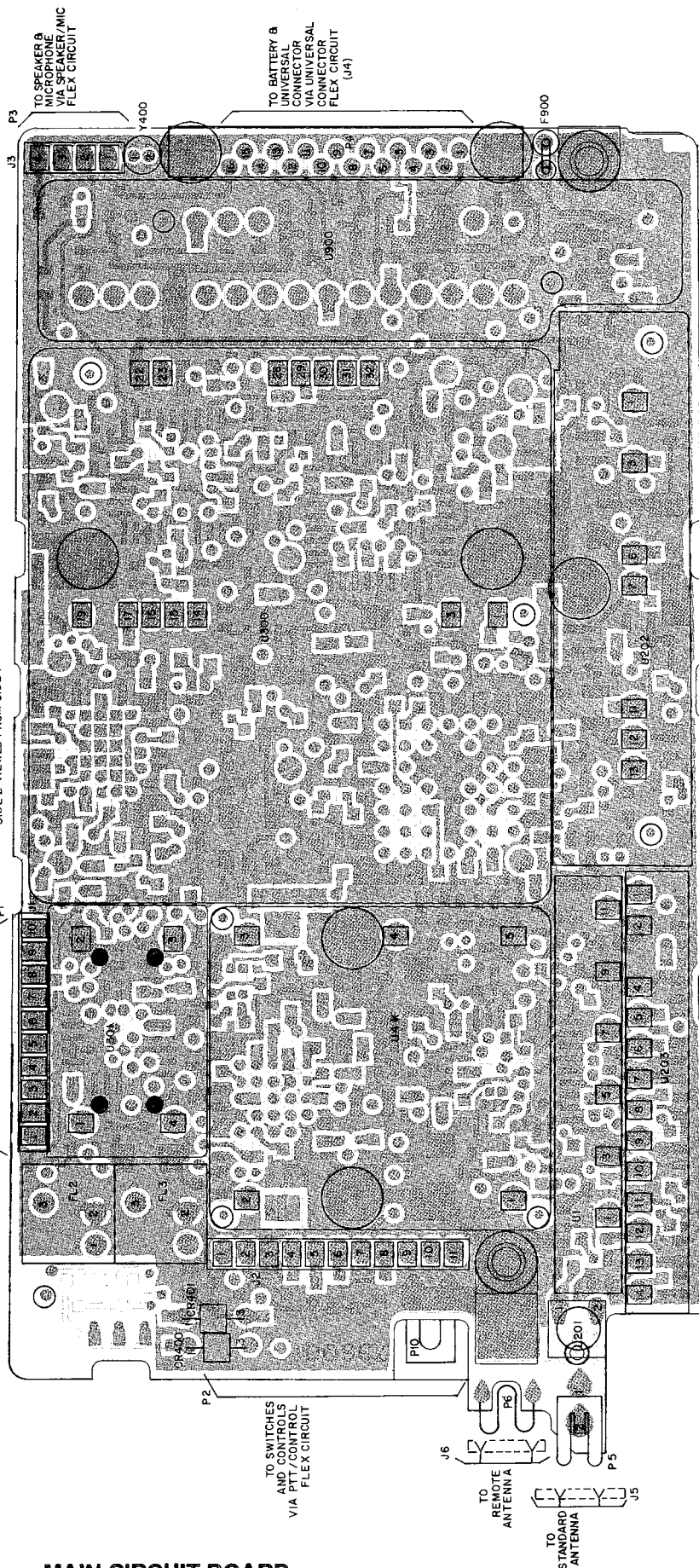
6-LAYER CIRCUIT BOARD COPPER DETAIL VIEWING
COPPER STEPS AT EDGE OF BOARD IN PROPER
LAYER SEQUENCE.



**MAIN CIRCUIT BOARD
COMPONENT LAYOUT DIAGRAM
SIDE 1 VIEWED FROM SIDE 1**

TO DISPLAY BOARD VIA LCD INTER-
CONNECT FLEX CIRCUIT
(SABER III & IIII RADIOS ONLY)

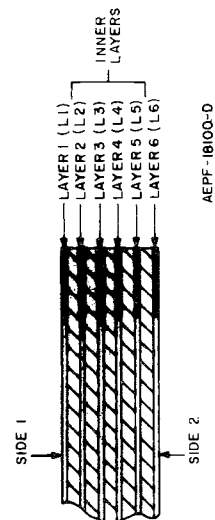
SIDE 2 VIEWED FROM SIDE 1



OLCEPF-17555-0

* U2 MOUNTED UNDER U4

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



MAIN CIRCUIT BOARD
COMPONENT LAYOUT DIAGRAM
SIDE 2 VIEWED FROM SIDE 1

SABER VHF SECURENET Electrical Parts List		
REFERENCE SYMBOL		DESCRIPTION
MOTOROLA PART NO.		
C1		2160521A15
C2		2362998B09
C3		2160521G37
C4.5		2160521G37
C5		2362998B68
C6		2160521G37
C7		2160521G37
C8		2160521G37
C9		2362998B73
C10		2160521H39
C11		2362998B64
C12		2160521A13
C13		2160521E25
C14		2160521G37
C15		2160521G37
C16		2160520B20
C17		2160521G37
C18		2160521H41
C19		2362998B16
C20		2362998B59
C21		2160521A13
C22		2160521G37
C23		2160521A19
C24		2362998B69
C25		2160521G37
C26		2160521A21
C27		2160521A32
C28 thru 30		2362998B59
C31		2160521G37
C32		2160521A32
C33		2160521G37
C34		2160521G37
C35 thru 37		2160521G37
C38		2160520C01
C39,40		2160520C01
C41		2160520C01
C42,43		2160521G37
C44		2362998B16
C45		2160521E28
C46		2160521E25
C47		2160521A29
C48		2160520A20
C49		2160520A20
C50		2160521E28
C51 thru 53		2160520C01
C54		2160520C01
C55		2160521E28
C56		2160521E28
C57 thru 60		2160521A29
C61		2160521A29
C62,63		2160521A29

C64	2160521E28	.018
C65,66	2160521G37	Not Used
C67	2160520C09	0.1-80-20%
C68	2160521E28	.018
C201,202	2160521H41	Not Used
C203	2160520C03	50pF±5%; NPO
C204	2160520C03	120pF±5%; NPO
C205	2160521H41	0.22-80-20%
C206	2160520B05	15pF±5%; 50V; NPO
C207	2160520A03	2.2pF±0.25pF; NPO
C208	2160520B05	15pF±5%; 50V; NPO
C209	2160521E28	Not Used
C210	2362998B69	4.7-10V
C211	2160521E28	Not Used
C212,213	2160521E28	.018
C214	2362998B16	3.3-10%; 16V
C215	2160520P01	1000pF±5%; NPO
C216	2362998B73	10-16V
C217	2160521E28	.018
C218	2160521F33	.047
C219	2160521C09	470pF±10%
C220	2160520C01	100pF±5%; NPO
C221 thru 223	2160521E28	.018
C224	2160521G37	0.1-80-20%
C225	2160521E28	.018
C226	2362998B73	10-16V
C227	2160521E28	.018
C228	2160521E28	Not Used
C229,230	2160521E28	.018
C231	2160521C09	470pF±10%
C232	2160521E28	.018
C233	2160521E28	Not Used
C234 thru 236	2160521E28	.018
C237	2160521E28	Not Used
C238 thru 240	2160521C09	470pF±10%
C241	2160520A15	3.9pF±25pF
C400,401	2160520B05	15pF±5%; 50V; NPO
C402	2362998B73	10-16V
C403	2362998B68	4.7-10V
C404	2160521A25	0.1-80-20%
C405	2160521G37	0.1-80-20%
C406,407	2160521G37	0.1-80-20%
C408 thru 410	2160521G37	0.1-80-20%
C411,412	2160521C09	470pF±10%
C518	2160521G37	0.1-80-20%
C500 thru 517	2160521G37	0.1-80-20%
C518	2160521G37	0.1-80-20%
C702	2362998B16	3.3-10%; 16V
C703	2362998B05	4.7-10V
C704	2362998B68	4.7-10V
C705	2160521G37	0.1-80-20%
CR1 thru 50	2160521G37	Not Used
CR51	4805119G18	Not Used
CR52	4805119G18	Not Used
CR200	4805129M05	LED, Red
CR201	4805129M05	LED, Red
CR400	4805129G22	LED, Red

F900	FUSE:	0105955P27
FL1	FL1	0105955Q11
FL2	FL2	0105955Q12
FL3	FL3	0105955Q12
J1	JACK:	0905287C07
J2	JACK:	0905287C07
J3	JACK:	0905287C07
L1	2405452C66	1800nH±5%
L2	2462575A03	820nH±5%
L3	2405452C09	50nH±5%
L4.5	2462575A08	5.0uH±8%
L6 thru 50	Not Used	
L51	2462575A08	5.0uH±8%
L52	2405452C38	55nH±5%
L200	Not Used	
L201	2405855Q01	Air Wound, Leaded; 6T; 0.080ID
L202 thru 204	Not Used	
L205	2405452C62	1200nH±5%
L206	2405452C62	1200nH±5%
L207 thru 210	2462585A40	33uH
L400	2462585A40	33uH
LS1	LS1	0105955P27
MK1	MK1	0105955P27
P1 thru 3	P1	2805520Q01
P4	P4	3905446Q03
P5	P5	3905446Q03
P6	P6	3905446Q03
P7 thru 9	P7	3905889R01
P10	P10	3905889R01
Q1	4805128M16	PNP; SOT-23; MMBT3906
Q2	4805128M03	PNP; SOT-23; MMBT3906
Q3	4805128M03	PNP; SOT-23; MMBT3906
Q200	4805128M23	PNP; SOT-23; MMBT3906
Q201	4805128M27	PNP; SOT-23; MMBT3906
Q202	4805128M16	PNP; SOT-23; MMBT3906
Q203,204	4805128M16	PNP; SOT-23; MMBT3906
Q205	4805128M16	PNP; SOT-23; MMBT3906

Q206	4805128M16	PNP; SOT-23; MMBT3906
Q400 thru 402	4805128M44	PNP; SOT-23
Q403	4805128M44	PNP; SOT-23
Q404	4805128M44	PNP; SOT-23
Q405	4805128M44	PNP; SOT-23
R1	0660078J80	75k±1%
R2	0660078J80	15k±1%
R3	0660078J80	15k±1%
R4	0660078J80	10k
R5	0660078J80	10k
R6	0660078J80	10k
R7	0660078J80	10k
R8	0660078J80	10k
R9	0660078J80	10k
R10	0660078J80	10k
R11	0660078J80	10k
R12	0660078J80	10k
R13 thru 15	0660078J80	10k
R16	0660078J80	10k
R17	0660078J80	10k
R18	0660078J80	10k
R19	0660078J80	10k
R20,21	0660078J80	10k
R22	0660078J80	10k
R23 thru 44	0660078J80	10k
R45	0660078J80	10k
R51,52	0660078J80	10k
R53	0660078J80	10k
R54	0660078J80	10k
R55 thru 59	0660078J80	10k
R60	0660078J80	10k
R61	0660078J80	10k
R62	0660078J80	10k
R63	0660078J80	10k
R64	0660078J80	10k
R65	0660078J80	10k
R66	0660078J80	10k
R67	0660078J80	10k
R68	0660078J80	10k
R69	0660078J80	10k
R70	0660078J80	10k
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R72	0660078J80	10k
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R79	0660078J80	10k
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R81	0660078J80	10k
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R86	0660078J80	10k
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R95	0660078J80	10k
R96	0660078J80	10k
R97	0660078J80	10k
R98	0660078J80	10k
R99	0660078J80	10k
R100	0660078J80	10k

R405	0660078B01	100k
R406	0660078B01	10k
R407	0660078B01	10k
R408	0660078B01	10k
R409	0660078B01	10k
R410	0660078B01	10k
R411	0660078B01	10k
R412,413	0660078B01	10k
R414 thru 416	0660078B01	10k
R417 thru 424	0660078B01	10k
R425	0660078B01	10k
R426 thru 429	0660078B01	10k
R430	0660078B01	10k
R431,432	0660078B01	10k
R433	0660078B01	10k
R434	0660078B01	10k
R435	0660078B01	10k
R436	0660078B01	10k
R437	0660078B01	10k
R438	0660078B01	10k
R439	0660078B01	10k
R440	0660078B01	10k
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R472	0660078B01	10k
R473	0660078B01	10k
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R476	0660078B01	10k
R477	0660078B01	10k
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R479	0660078B01	10k
R480	0660078B01	10k
R481	0660078B01	10k
R482	0660078B01	10k
R483	0660078B01	10k
R484	0660078B01	10k
R485	0660078B01	10k
R486	0660078B01	10k
R487	0660078B01	10k
R488	0660078B01	10k
R489	0660078B01	10k
R490	0660078B01	10k
R491	0660078B01	10k
R492	0660078B01	10k
R493	0660078B01	10k
R494	0660078B01	10k
R495	0660078B01	10k
R496	0660078B01	10k
R497	0660078B01	10k
R498	0660078B01	10k
R499	0660078B01	10k
R500	0660078B01	10k

or	NLD8123A	Power Amplifier, High 174MHz)
U203	NFD6131A	Filter/Detector/Switch 150.50MHz)
or	NFD6132A	Filter/Detector/Switch
U204	-----	Not Used
U205	NLD8133A	Power Amplifier, Low 174MHz)
U300	NLD8201A	Synthesizer/VCO (13)
or	NLD8202A	Synthesizer/VCO (14)
or	NLD8210A	Synthesizer/VCO (15)
U301	NXN6269A	Oscillator, Reference:
U400	0103553N16	Microcomputer, MC68
U700	0103553N16	Signal Filter, Phase 1
U900	NTN4720A	SECURENET Bypass
or	-----	Optional Encryption M
VR800	4805129M35	DIODE: See Note I Zener, 5.6V
VR801	4805129M49	Zener
VR802	4880140L11	Zener, 7.5V; SOT
VR803 thru812	4805129M35	Zener, 5.6V
VR813	4880140L11	Zener, 7.5V; SOT
VR814,815	-----	Not Used
VR816	4805129M35	Zener, 5.6V
Y400	4805564G32	CRYSTAL: 7.3728MHz

NONREFERENCED ITEMS		
	0905287C07	SOCKET (Printed Circ modules) (9 req'd)
	1405881R01	BD01, Crystal (for U3
	7505934Q01	PAD, Oscillator (for U3

NOTES:

1. For optimum performance, order replacement devices, transistors and circuit modules by Motorola part number only.

SCHEMATIC AND CIRCUIT BOARD NOTES

1. Unless otherwise stated, resistances are in ohms; capacitances less than 1 are in picofarads, and capacitances greater are in picofarads.

ER I SECURENET VHF
oded View Parts List

TPLF-3493-O

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	RPX4720A	ASSEMBLY, Frame Stud (includes item 5)
2	RPX4689A	KIT, Frequency Switch (S823) (includes item 4)
3	RPX4690A	KIT, On/Off Switch (S800)/Volume Control (R800) (includes item 4)
4	3205082E62	GASKET, O-Ring (2 req'd) (part of items 2 and 3)
5	3205422Q01	SEAL, Stud (2 req'd) (part of item 1)
6	6105436Q01	LIGHTPIPE, LED
7	3205082E58	GASKET, O-Ring (part of item 10)
8	RPX4692A	KIT, Control Top Panel (includes item 11)
9	0400139731	LOCKWASHER, Internal Tooth
10	020591R01	NUT, Antenna Bushing
11	0405781Q01	WASHER, Detent (even number of switch positions)
12	0405781Q03	WASHER, Detent (odd number of switch positions)
13	NAD6471A	ANTENNA, VHF Helical (136 - 150.8 MHz)
14	NAD6472A	ANTENNA, VHF Helical (146 - 162 MHz)
15	NAD6473A	ANTENNA, VHF Helical (157 - 174 MHz)
16	RPX4699A	KIT, Frequency Knob
17	RPX4698A	KIT, On/Off/Volume Knob
18	1305622Q09	ESCUTCHEON, SECURENET, No Knob
19	1305622Q07	ESCUTCHEON, SECURENET, Push-Only
20	1305622Q03	ESCUTCHEON, SECURENET, Rotate-Only or Push-and-Rotate
21	1305622Q16	ESCUTCHEON, SECURENET, Submersible, No Knob
22	1305622Q17	ESCUTCHEON, SECURENET, Submersible, Push-Only
23	1305622Q15	ESCUTCHEON, SECURENET, Submersible, Rotate-Only or Push-and-Rotate
24	0205916P01	NUT, Spanner (2 req'd)
25	3205082E61	GASKET, O-Ring (part of item 23)
26	RPX4691A	KIT, RF Connector (includes items 22,24)
27	4205852N01	CONTACT, Ground, RF (part of item 23)
28	NLD8290A	ASSEMBLY, VHF Main PC Board
29	NTN4726A	ASSEMBLY, Back Shield (includes item 27)
30	0305706Q01	SCREW, Captive; 2-56 (4 req'd) (part of item 26)
31	4205577Q01	CLIP, Ground
32	1405387R01	BOOT, Oscillator, SABER I
33	RPX4700A	KIT, PTT/Controls Flex (includes item 31)
34	RPX4723A	KIT, PTT/Controls Flex Assembly (includes items 2,3,31)
35	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
36	4505022P02	LEVER, PTT (part of item 43)
37	NTN4592A	BATTERY, 500 mAh
38	NTN4593A	BATTERY, 900 mAh
39	NTN4595A	BATTERY, 1500 mAh
40	NTN4540A	BATTERY, 3600 mAh Primary
41	NTN4537A	BATTERY, FM, 500 mAh
42	NTN4538A	BATTERY, FM, 900 mAh
43	NTN4596A	BATTERY, FM, 1500 mAh
44	0305706Q02	SCREW, Baseplate Ph Pan Hd; 2-56x3/32" (4 req'd) (part of item 43)
45	3905453Q01	CONTACT, Power (4 req'd) (part of item 43)
46	4205437Q01	RETAINER, Baseplate (part of item 43)
47	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
48	6405847N03	BASEPLATE (part of item 43)
49	3205701Q01	SEAL, Elastomer (part of item 43)
50	3205472M01	SEAL, Vacuum Port (part of item 43)
51	5505333Q01	LATCH, Battery (part of item 43)
52	4105775Q01	SPRING, Latch (part of item 43)
53	NHN6402A	ASSEMBLY, Housing, SABER I (includes items 32,34 thru 42)
54	3305183R02	LABEL, Nameplate, SABER I
55	0105958M24	ASSEMBLY, Speaker/Microphone Flex, SABER I (8k Display)
56	1405490Q01	ASSEMBLY, Speaker/Microphone Flex, SABER I (2k Display)
57	RPX4722A	BOOT, Microphone
58	RPX4703A	ASSEMBLY, LCD/Speaker Bracket
59	8460999A34	KIT, LCD Assembly (part of item 48)
60	8460999A41	ASSEMBLY, 8k Display PC Board, SABER I (includes item 48)
61	8460999A41	ASSEMBLY, 2k Display PC Board, SABER I (includes item 48)

or	NHN6398A	ASSEMBLY, Housing, SABER I Submersible (includes items 32, 34 thru 42)
44	3305183R03	LABEL, Bottom Nameplate, SABER I
45	3305183R01	LABEL, Top Nameplate, SABER I
46	1405490Q01	BOOT, Microphone
47	RPX4721A	KIT, Speaker Bracket, SABER I (includes item 48)
48	7505641N03	PAD, Speaker Bracket (part of item 47)
49	0105958M34	ASSEMBLY, Speaker/Microphone Flex, SABER I
50	4205604Q01	RETAINER, Speaker
51	1405182M03	INSULATOR, Universal Connector
52	0705319R01	BRACKET, Switch
53	4005221R01	SWITCH, Dual-Function (S801, 804)
54	3205082E68	GASKET, O-Ring, Emergency
55	NTN5068A	KIT, Rotate-Only Knob (includes item 54)
or	NTN5076A	KIT, Push-and-Rotate Knob (optional) (includes item 54)
or	4305607S01	PLUG, Seal (optional)
56	NTN4788A	ASSEMBLY, Belt Clip
57	NTN5025A	Cover, Universal Connector

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

SABER II SECURENET VHF
Exploded View Parts List

TPLF-3493-O

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	RPX4720A	ASSEMBLY, Frame Stud (includes item 5)
2	RPX4689A	KIT, Frequency Switch (S823) (includes item 4)
3	RPX4690A	KIT, On/Off Switch (S800)/Volume Control (R800) (includes item 4)
4	3205082E62	GASKET, O-Ring (2 req'd) (part of items 2 and 3)
5	3205422Q01	SEAL, Stud (2 req'd) (part of item 1)
6	6105436Q01	LIGHTPIPE, LED
7	3205082E59	GASKET, O-Ring
8	0300138542	SCREW, Module, Ph Pan Hd; 2-56x3/8" (7 req'd)
9	0305381L02	SCREW, Top Panel; 2-32 (2 req'd)
10	RPX4683A	KIT, Antenna Bushing (includes item 12)
11	3205082E71	GASKET, O-Ring (part of item 13)
12	3205082E58	GASKET, O-Ring (part of item 10)
13	RPX4692A	KIT, Control Top Panel (includes item 11)
14	0400139731	LOCKWASHER, Internal Tooth
15	020591R01	NUT, Antenna Bushing
16	0405781Q01	WASHER, Detent (even number of switch positions)
or	0405781Q03	WASHER, Detent (odd number of switch positions)
17	NAD6471A	ANTENNA, VHF Helical (136 - 150.8 MHz)
18	NAD6472A	ANTENNA, VHF Helical (146 - 162 MHz)
19	NAD6473A	ANTENNA, VHF Helical (157 - 174 MHz)
20	RPX4698A	KIT, Frequency Knob
21	1305622Q09	ESCUTCHEON, SECURENET, No Knob
22	1305622Q07	ESCUTCHEON, SECURENET, Push-Only
23	1305622Q03	ESCUTCHEON, SECURENET, Rotate-Only or Push-and-Rotate
24	0205916P01	NUT, Spanner (2 req'd)
25	3205082E61	GASKET, O-Ring (part of item 23)
26	RPX4691A	KIT, RF Connector (includes items 22,24)
27	4205852N01	CONTACT, Ground, RF (part of item 23)
28	NLD8290A	ASSEMBLY, VHF Main PC Board
29	NTN4726A	ASSEMBLY, Back Shield (includes item 27)
30	0305706Q01	SCREW, Captive; 2-56 (4 req'd) (part of item 26)
31	4205577Q01	CLIP, Ground
32	1405387R01	BOOT, Oscillator, SABER II/III
33	RPX4700A	KIT, PTT/Controls Flex (includes item 31)
34	RPX4723A	KIT, PTT/Controls Flex Assembly (includes items 2,3,31)
35	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
36	4505022P02	LEVER, PTT (part of item 43)
37	NTN4592A	BATTERY, 500 mAh
38	NTN4593A	BATTERY, 900 mAh
39	NTN4595A	BATTERY, 1500 mAh
40	NTN4540A	BATTERY, 3600 mAh Primary
41	NTN4537A	BATTERY, FM, 500 mAh
42	NTN4538A	BATTERY, FM, 900 mAh
43	NTN4596A	BATTERY, FM, 1500 mAh
44	0305706Q02	SCREW, Baseplate, Ph Pan Hd; 2-56x3/32" (4 req'd) (part of item 43)
45	3905453Q01	CONTACT, Power (4 req'd) (part of item 43)
46	4205437Q01	RETAINER, Baseplate (part of item 43)
47	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
48	6405847N03	BASEPLATE (part of item 43)
49	3205701Q01	SEAL, Elastomer (part of item 43)
50	3205472M01	SEAL, Vacuum Port (part of item 43)
51	5505333Q01	LATCH, Battery (part of item 43)
52	4105775Q01	SPRING, Latch (part of item 43)
53	NHN6404A	ASSEMBLY, Housing, SABER II (includes items 32,34 thru 42)
54	3305183R02	LABEL, Nameplate, SABER II
55	0105958M24	ASSEMBLY, Speaker/Microphone Flex, SABER II (8k Display)
56	1405490Q01	ASSEMBLY, Speaker/Microphone Flex, SABER II (2k Display)
57	RPX4722A	BOOT, Microphone
58	RPX4703A	ASSEMBLY, LCD/Speaker Bracket
59	8460999A34	KIT, LCD Assembly (part of item 48)
60	8460999A41	ASSEMBLY, 8k Display PC Board, SABER II (includes item 48)
61	8460999A41	ASSEMBLY, 2k Display PC Board, SABER II (includes item 48)

50	8405532Q01	FLEX CIRCUIT, LCD Interconnect
51	4205604Q01	RETAINER, Speaker
52	1405182M03	INSULATOR, Universal Connector
53	0705319R01	BRACKET, Switch
54	4005221R01	SWITCH, Dual-Function (S801, 804)
55	3205082E68	GASKET, O-Ring, Emergency
56	NTN5068A	KIT, Rotate-Only Knob (includes item 54)
or	NTN5076A	KIT, Push-and-Rotate Knob (optional) (includes item 54)
or	4305607S01	PLUG, Seal (optional)
57	NTN4788A	ASSEMBLY, Belt Clip
58	NTN5025A	Cover, Universal Connector

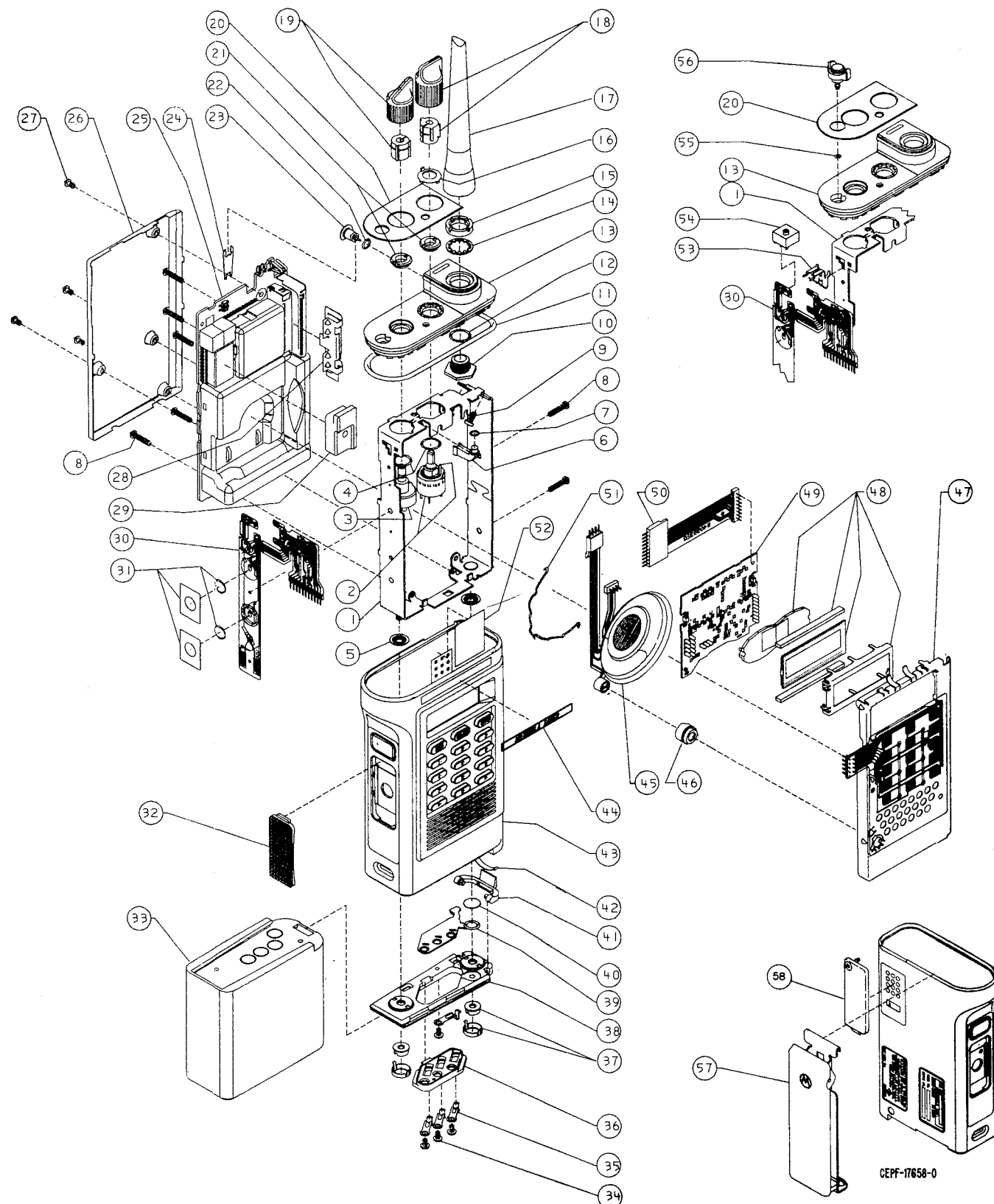
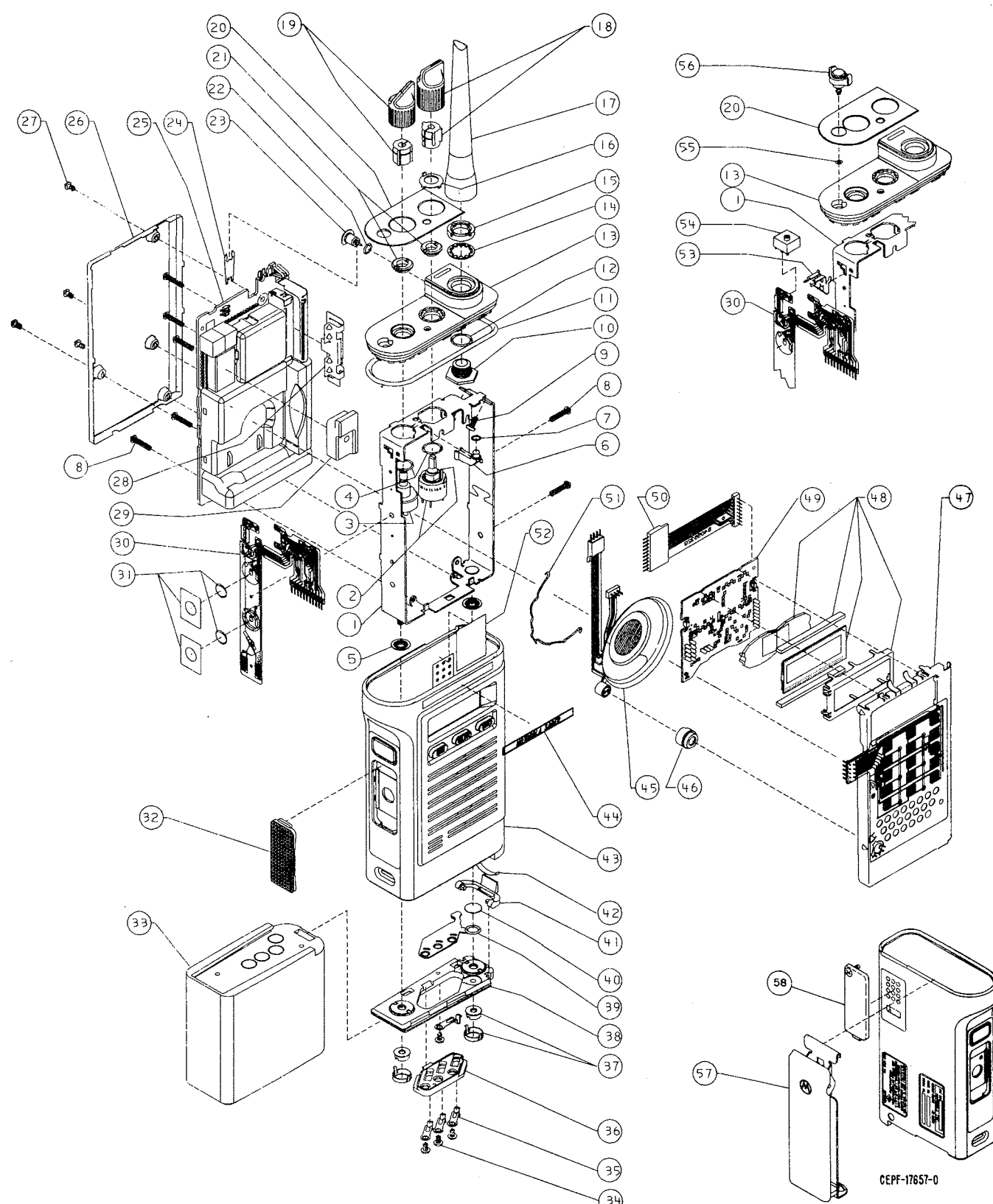
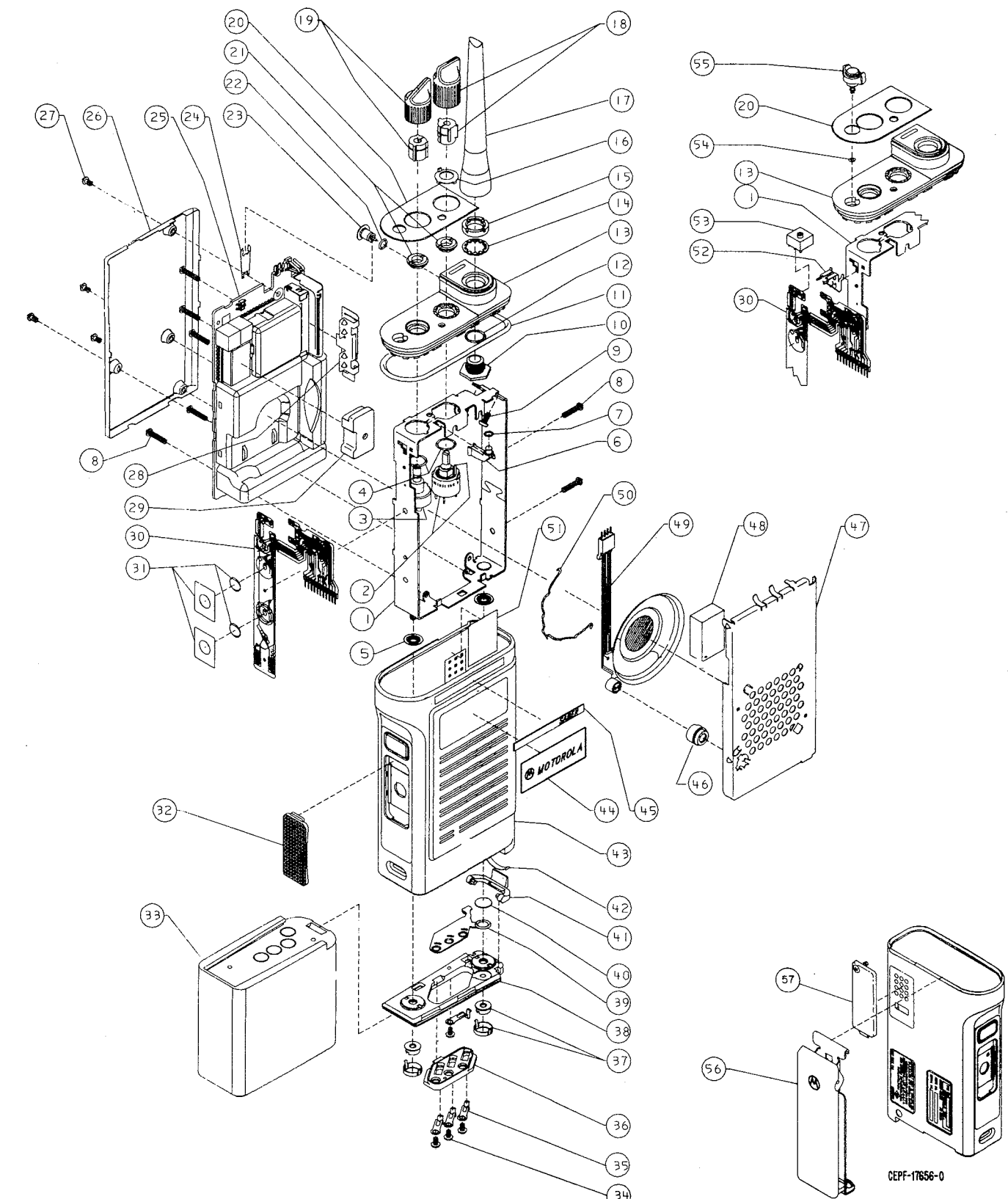
NOTE: Refer to Electrical Parts List for part number and description.

SABER III SECURENET VHF
Exploded View Parts List

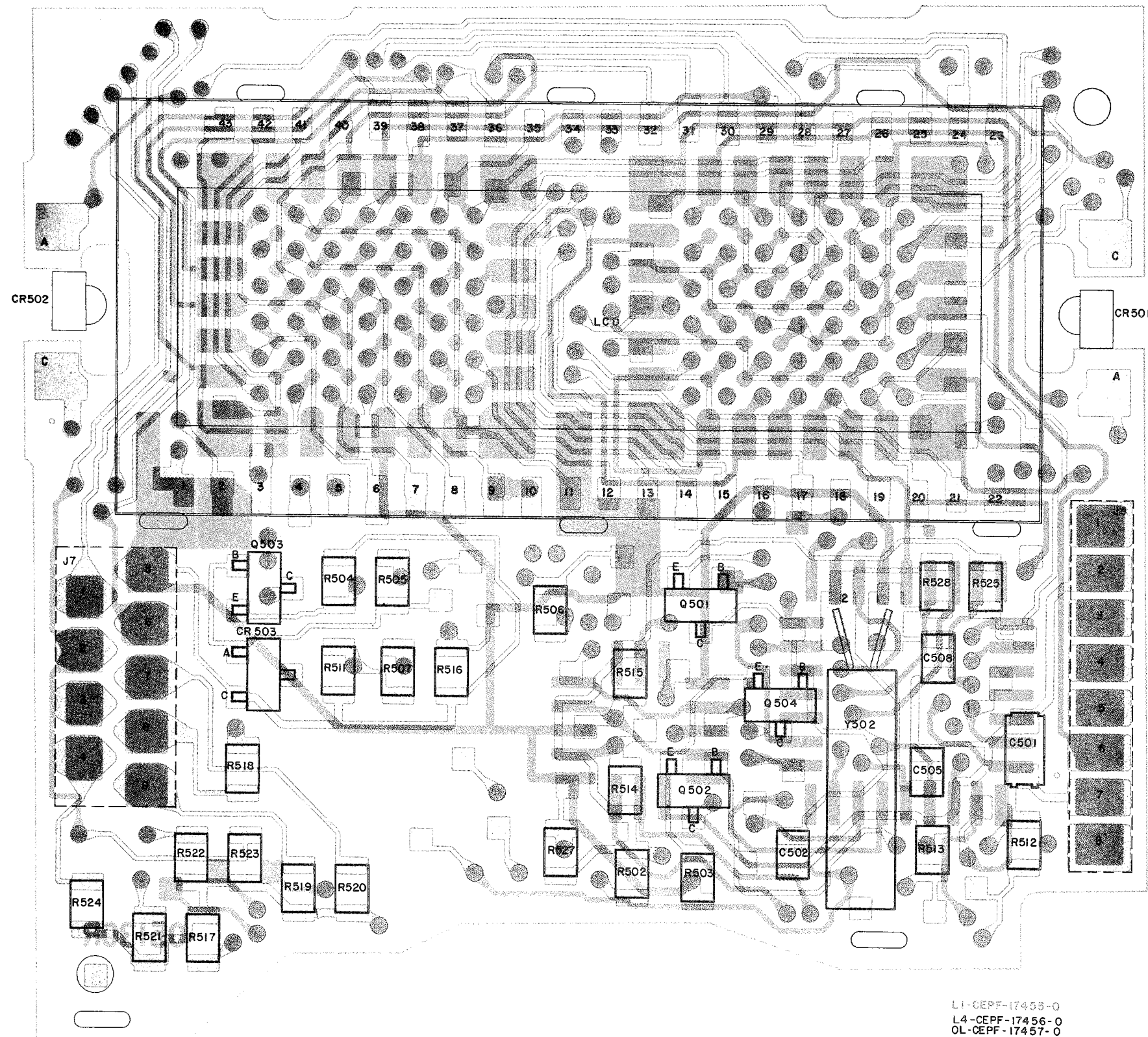
TPLF-3495-O

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	RPX4720A	ASSEMBLY, Frame Stud (includes item 5)
2	RPX4689A	KIT, Frequency Switch (S823) (includes item 4)
3	RPX4690A	KIT, On/Off Switch (S800)/Volume Control (R800) (includes item 4)
4	3205082E62	GASKET, O-Ring (2 req'd) (part of items 2 and 3)
5	3205422Q01	SEAL, Stud (2 req'd) (part of item 1)
6	6105436Q01	LIGHTPIPE, LED
7	3205082E59	GASKET, O-Ring
8	0300138542	SCREW, Module, Ph Pan Hd; 2-56x3/8" (7 req'd)
9	0305381L02	SCREW, Top Panel; 2-32 (2 req'd)
10	RPX4683A	KIT, Antenna Bushing (includes item 12)
11	3205082E71	GASKET, O-Ring (part of item 13)
12	3205082E58	GASKET, O-Ring (part of item 10)
13	RPX4692A	KIT, Control Top Panel (includes item 11)
14	0400139731	LOCKWASHER, Internal Tooth
15	020591R01	NUT, Antenna Bushing
16	0405781Q01	WASHER, Detent (even number of switch positions)
or	0405781Q03	WASHER, Detent (odd number of switch positions)
17	NAD6471A	ANTENNA, VHF Helical (136 - 150.8 MHz)
18	NAD6472A	ANTENNA, VHF Helical (146 - 162 MHz)
19	NAD6473A	ANTENNA, VHF Helical (157 - 174 MHz)
20	RPX4698A	KIT, Frequency Knob
21	1305622Q09	ESCUTCHEON, SECURENET, No Knob
22	1305622Q07	ESCUTCHEON, SECURENET, Push-Only
23	1305622Q03	ESCUTCHEON, SECURENET, Rotate-Only or Push-and-Rotate
24	0205916P01	NUT, Spanner (2 req'd)
25	3205082E61	GASKET, O-Ring (part of item 23)
26	RPX4691A	KIT, RF Connector (includes items 22,24)
27	4205852N01	CONTACT, Ground, RF (part of item 23)
28	NLD8290A	ASSEMBLY, VHF Main PC Board
29	NTN4726A	ASSEMBLY, Back Shield (includes item 27)
30	0305706Q01	SCREW, Captive; 2-56 (4 req'd) (part of item 26)
31	4205577Q01	CLIP, Ground
32	1405387R01	BOOT, Oscillator, SABER III/III
33	RPX4700A	KIT, PTT/Controls Flex (includes item 31)
34	RPX4723A	KIT, PTT/Controls Flex Assembly (includes items 2,3,31)
35	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
36	4505022P02	LEVER, PTT (part of item 43)
37	NTN4592A	BATTERY, 500 mAh
38	NTN4593A	BATTERY, 900 mAh
39	NTN4595A	BATTERY, 1500 mAh
40	NTN4540A	BATTERY, 3600 mAh Primary
41	NTN4537A	BATTERY, FM, 500 mAh
42	NTN4538A	BATTERY, FM, 900 mAh
43	NTN4596A	BATTERY, FM, 1500mAh
44	0305706Q02	SCREW, Baseplate, Ph Pan Hd; 2-56x3/32" (4 req'd) (part of item 43)
45	3905453Q01	CONTACT, Power (4 req'd) (part of item 43)
46	4205437Q01	RETAINER, Baseplate (part of item 43)
47	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
48	6405847N03	BASEPLATE (part of item 43)
49	3205701Q01	SEAL, Elastomer (part of item 43)
50	3205472M01	SEAL, Vacuum Port (part of item 43)
51	5505333Q01	LATCH, Battery (part of item 43)
52	4105775Q01	SPRING, Latch (part of item 43)
53	NHN6402A	ASSEMBLY, Housing, SABER III (includes items 32,34 thru 42)
54	3305183R02	LABEL, Nameplate, SABER III
55	0105958M24	ASSEMBLY, Speaker/Microphone Flex, SABER III
56	1405490Q01	ASSEMBLY, Speaker/Microphone Flex, SABER III
57	RPX4722A	BOOT, Microphone
58	RPX4703A	ASSEMBLY, LCD/Speaker Bracket
59	8460999A34	KIT, LCD Assembly (part of item 48)
60	8405532Q01	FLEX CIRCUIT, LCD Interconnect

51	4205604Q01	RETAINER, Speaker
52	1405182M03	INSULATOR, Universal Connector
53	0705319R01	BRACKET, Switch
54	4005221R01	SWITCH, Dual-Function (S801, 804)
55	3205082E68	GASKET, O-Ring, Emergency
56	NTN5068A	KIT, Rotate-Only Knob (includes item 54)
or	NTN5076A	KIT, Push-and-Rotate Knob (optional) (includes item 54)
or	4305607S01	PLUG, Seal (optional)
57	NTN4788A	ASSEMBLY, Belt Clip
58	NTN5025A	Cover, Universal Connector

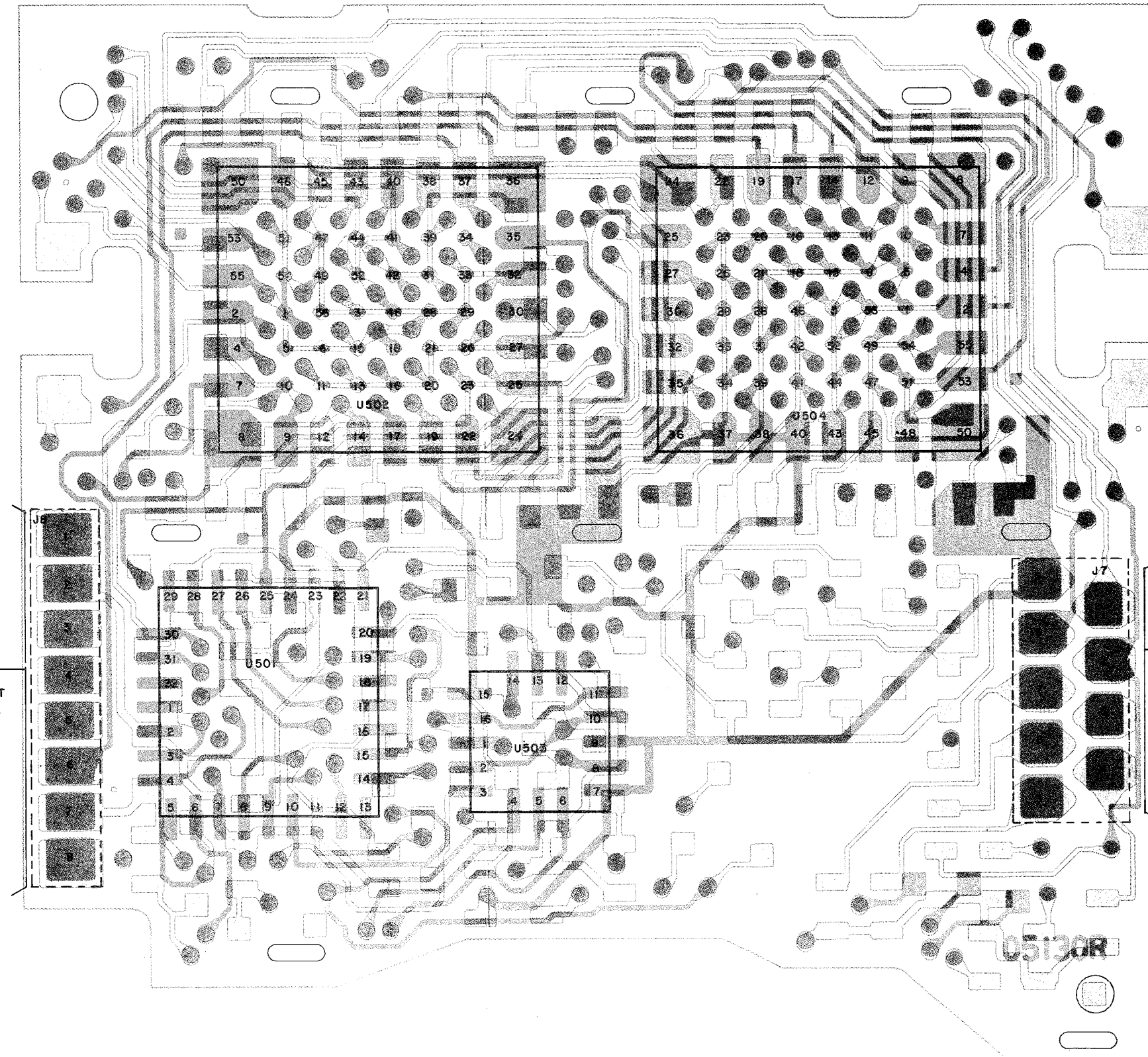


SIDE 1 VIEWED FROM SIDE 1

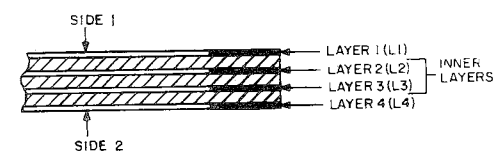


SIDE 2 VIEWED FROM SIDE 2

FROM
MAIN
CIRCUIT
BOARD
VIA
LCD
INTER-
CONNECT
FLEX
CIRCUIT



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



AEPF-18099-0

SABER 2K DISPLAY CIRCUIT BOARD
COMPONENT LAYOUT DIAGRAMS

SABER 2k Display
Electrical Parts List

TPLF-3406-0

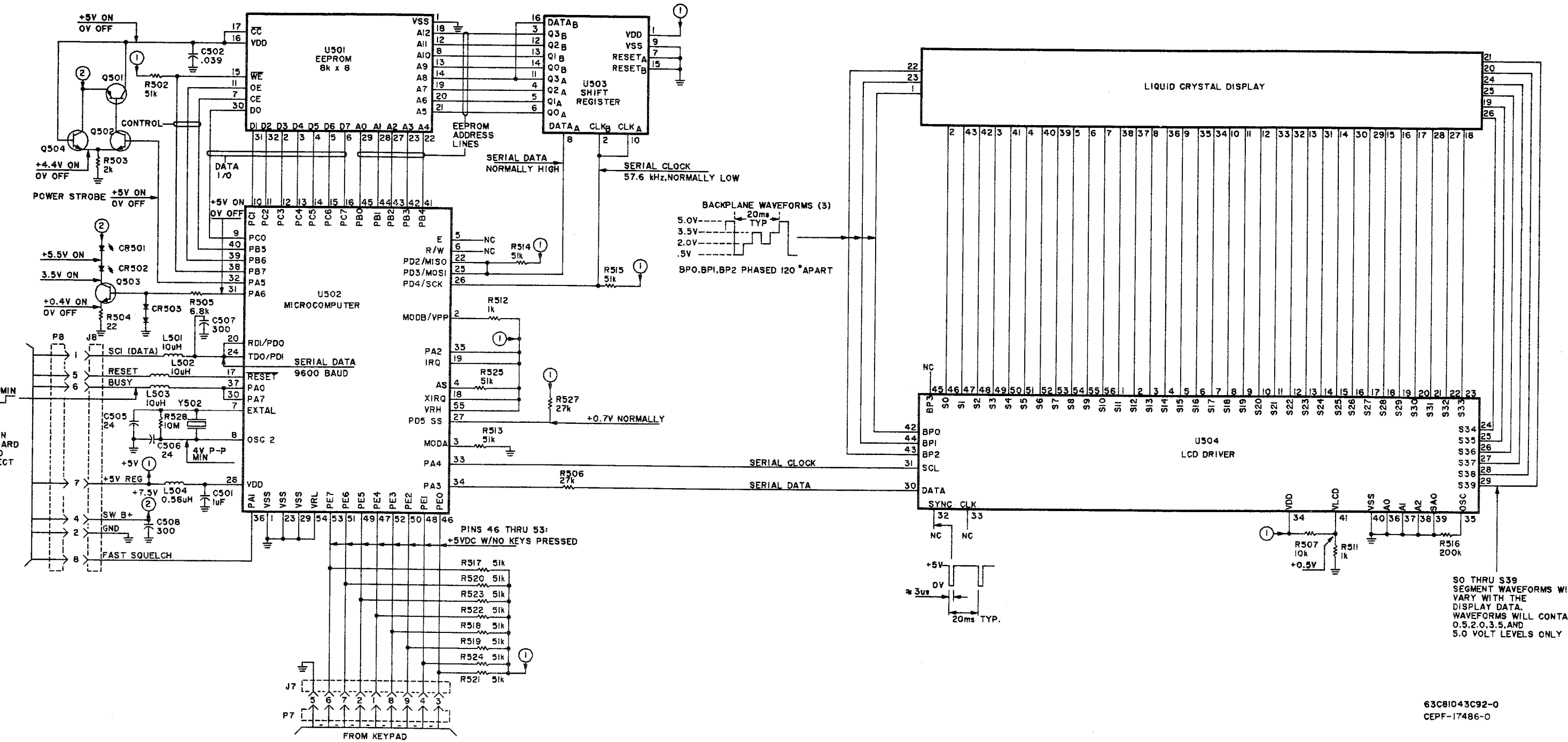
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C501 C502 C503, 504 C505, 506 C507, 508	2362998B59 2160521C32 ----- 2160520B10 2160520C12	CAPACITOR, Fixed: $\text{pF} \pm 5\%$; 50V unless stated 1 $\mu\text{F} \pm 10\%$; 20V .039 $\mu\text{F} \pm 10\%$; 25V Not Used 24 300
CR501, 502 CR503	4805729G27 4805129M06	DIODE: See Note 1 LED, Yellow Dual; SOT-23
J7 J8	0905287C05 0905287C05	JACK: Socket, Printed Circuit (Keypad Switch)(9 req'd) Socket, Printed Circuit (LCD Interconnect)(8 req'd)
L501 thru 503 L504	2462575A07 2462575A09	COIL, RF: unless stated Choke, 10 μH Choke, 0.56 μH
Q501 Q502 thru 504	4805128M29 4805128M12	TRANSISTOR: See Note 1 PNP; BCX18 (LH) NPN; BCW60B (RH)
R501 R502 R503 R504 R505 R506 R507 R508 thru 510 R511, 512 R513 thru 515 R516 R517 thru 525 R526 R527 R528	----- 0660076A90 0660076A56 0660076A09 0660076A69 0660076A83 0660076A73 ----- 0660076A49 0660076A90 0660076F08 0660076A90 ----- 0660076A83 0660076H49	RESISTOR, Fixed: $\Omega \pm 5\%$; 1/8W unless stated Not Used 51k 2k 22 6.8k 27k 10k Not Used 1k 51k 200k $\pm 1\%$ 51k Not Used 27k 10M $\pm 10\%$
U501 U502 U503 U504	0105953N82 0105953N07 0105953N09 0105953N10	CIRCUIT MODULE: See Note 1 EEPROM; 2k x 8 Microcomputer, HCMOS Shift Register, CMOS LCD Driver
Y501 Y502	----- 4805664G39	CRYSTAL: Not Used 3.6864MHz
NONREFERENCED ITEMS		
	7505440S01	PAD, Display Board

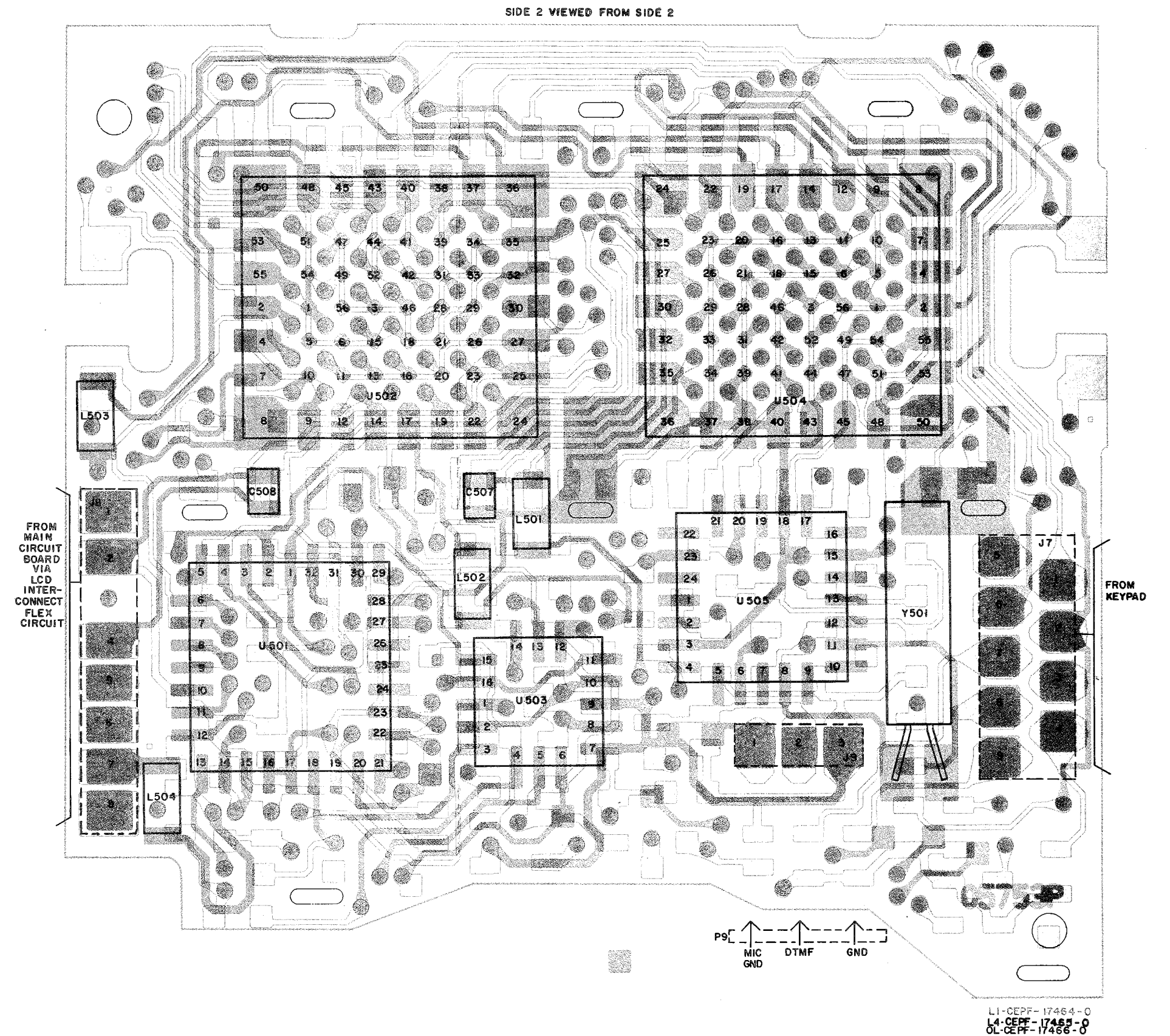
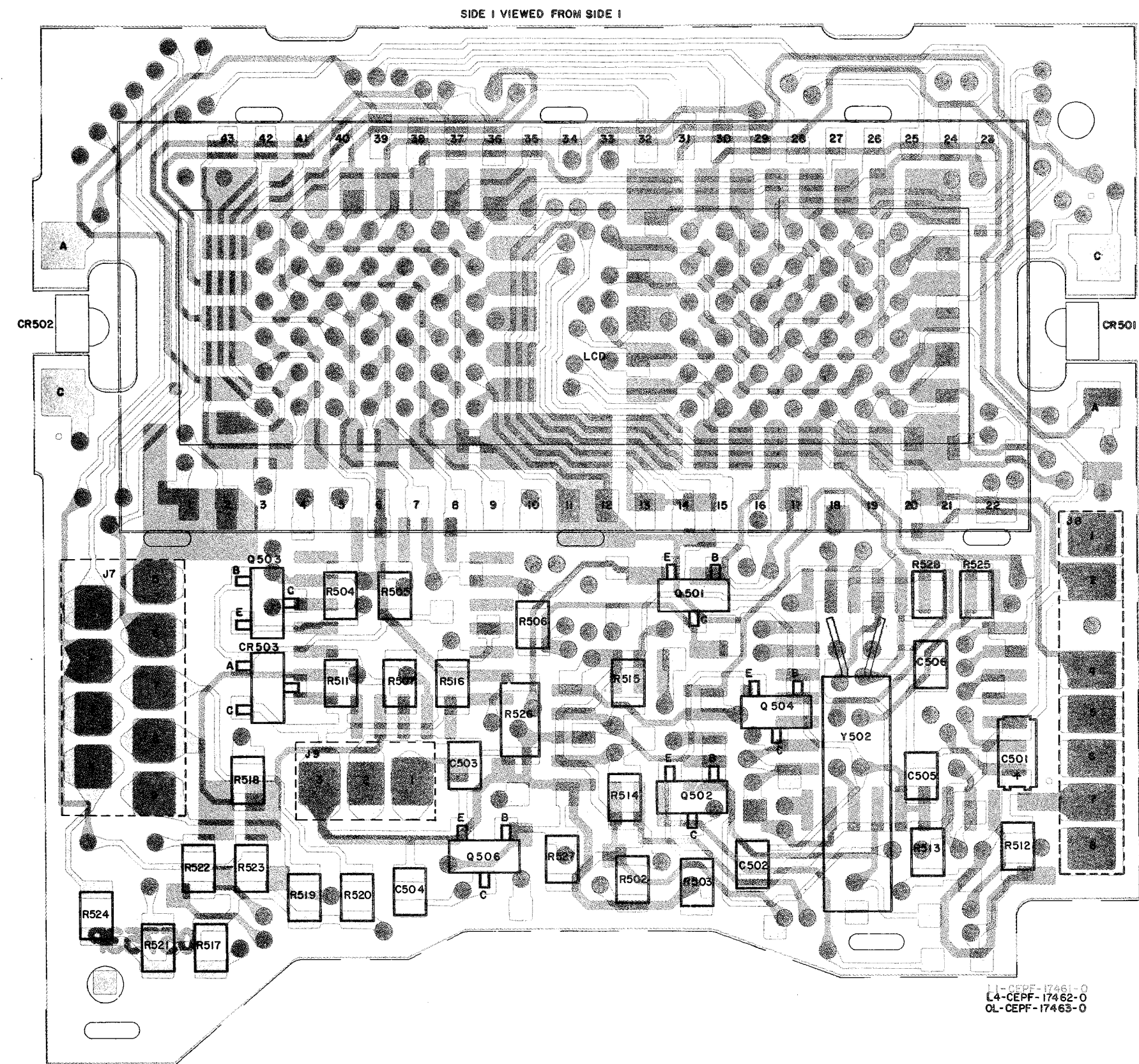
NOTES:
1. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.

SCHEMATIC AND CIRCUIT BOARD NOTES

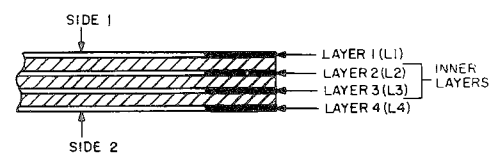
1. Unless otherwise stated, resistances are in ohms ($k = 1000$), capacitances less than 1 are in microfarads, and capacitances 1 or greater are in picofarads.

TEPF-17445-0





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



AEPF-18099-0

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
C501 C502 C503 C504 C505, 506 C507, 508	2362998B59 2160521C32 2160520C12 2160520B12 2160520B10 2160520C12	CAPACITOR, Fixed: pF±5%; 50V unless stated 1uF±10%; 20V .039uF±10%; 25V 300 30 24 300
CR501, 502 CR503	4805729G27 4805129M06	DIODE: See Note 1 LED, Yellow Dual; SOT-23
J7 J8 J9	0905287C05 0905287C05 0905287C05	JACK: Socket, Printed Circuit (Keypad Switch)(9 req'd) Socket, Printed Circuit (LCD Interconnect)(8 req'd) Socket, Printed Circuit (Speaker/Mic)(3 req'd)
L501 thru 503 L504	2462575A07 2462575A09	COIL, RF: unless stated Choke, 10uH Choke, 0.56uH
Q501 Q502 thru 504 Q505 Q506	4805128M29 4805128M12 ----- 4805128M12	TRANSISTOR: See Note 1 PNP; BCX18 (LH) NPN; BCW60B (RH) Not Used NPN; BCW60B (RH)
R501 R502 R503 R504 R505 R506 R507 R508 thru 510 R511, 512 R513 thru 515 R516 R517 thru 525 R526 R527 R528	----- 0660076A90 0660076A56 0660076A09 0660076A69 0660076A83 0660076A73 ----- 0660076A49 0660076A90 0660076F08 0660076A90 0611024B02 0660076A83 0660076H49	RESISTOR, Fixed: Ω±5%; 1/8W unless stated Not Used 51k 2k 22 6.8k 27k 10k Not Used 1k 51k 200k±1% 51k 150k 27k 10M±10%
U501 U502 U503 U504 U505	0105953N12 0105953N07 0105953N09 0105953N10 0105953N18	CIRCUIT MODULE: See Note 1 EEPROM; 8k x 8 Microcomputer, HCMOS Shift Register, CMOS LCD Driver Tone Encoder
Y501 Y502	4805664G40 4805664G39	CRYSTAL: 3.579545MHz 3.6864MHz
NONREFERENCED ITEMS		
	7505440S01	PAD, Display Board

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

SCHEMATIC AND CIRCUIT BOARD NOTES

1. Unless otherwise stated, resistances are in ohms (k = 1000), capacitances less than 1 are in microfarads, and capacitances 1 or greater are in picofarads.

TEPF-17445-0

