MOTOROLA

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

136-174 MHz

SPECIFICATIONS

GENERAL

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-CadmiumBattery 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" X1.18"
(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)

TRANSMITTER

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
(±ɔkHz 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 the2.5-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)

RECEIVER

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

Service Manual
68P81045C70-O

Manual Scan

I hope this service manual is of use to you. Motorola does not make this available as a PDF and all other available copies are of poor quality.

Each page is captured at 600 DPI, and as 24-bit color, 8-bit grayscale or black and white and at the proper page size, up to 11x34 inches in many cases. OCR has been preformed on the document, even on the large pages. The document is condensed into one single PDF with text overlay. You should be able to print the larger sheets on 11x17 or tile them onto 8.5x11 if needed.

Please do not charge for access to this, or put it on a pay-wall site. Please don't pay for access to any such sites, they are against the ethos of hacking, and it only encourages them to profit off the hard work of others which has been shared openly. Please don't change this/recompress it; this defeats the point of capturing this at high resolution.

If something is incorrect here, or unreadable please reach out; I likely have the original lossless compressed images. In the final PDF that's color or grayscale will be JPEG 2000 format with highest quality selected. B&W images will be compressed using CCITT Group 4. This is quite close to the source material, but there may be some artifacts due to lossy compression. If there's a choice between file size and image quality, image quality will win. It's 2021 and storage and bandwidth is cheap.

This was captured on a Canon DR-G2140 scanner which is ~ 7500 USD unit circa 2021. You may note some artifacts and lines in on the scans, these are due to scratches on the sensor glass, and are minor. The replacement glass is about 250 USD if you're feeling generous :-)

If you have a hard to find/out of print manual and would like to make it available please reach out, I may be able to scan and return it to you.

Thank you,

Bryan Fields, W9CR
bryan@bryanfields.net

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	Rototorq 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 Rototorq Bit
6680334B48 thru B52	Ungar Service Heads
6680370B88	Frequency and On/Off Switch Spanner Nut Rototorq Bit
6680370B89	Baseplate Spanner Nut Rototorq Bit
6680370B90	Antenna Bushing Spanner Nut Rototorq 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 IAND 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.

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

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

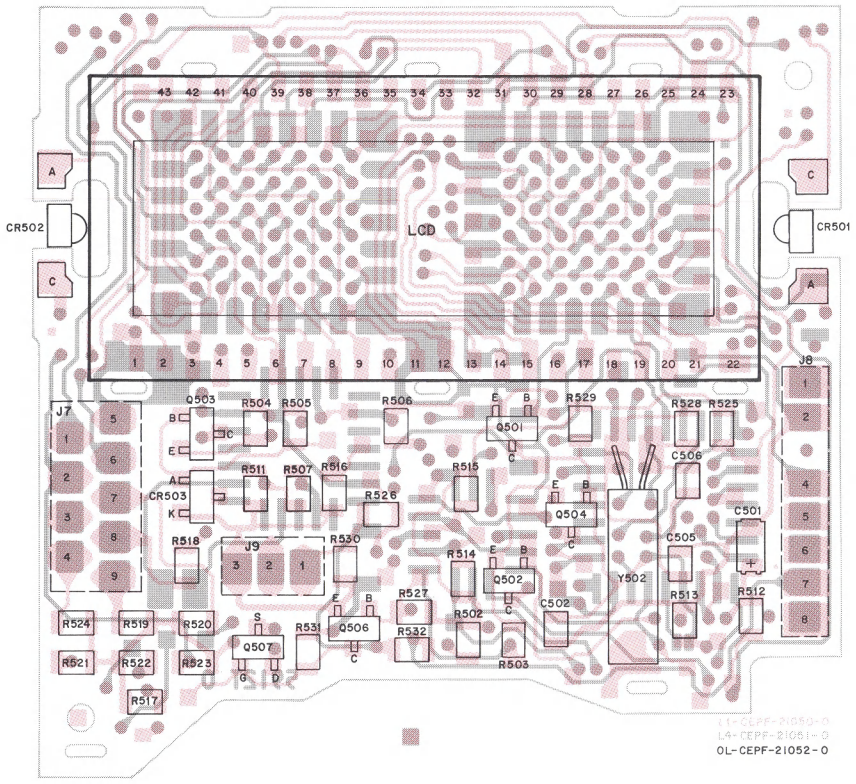
CHANGES

NO.

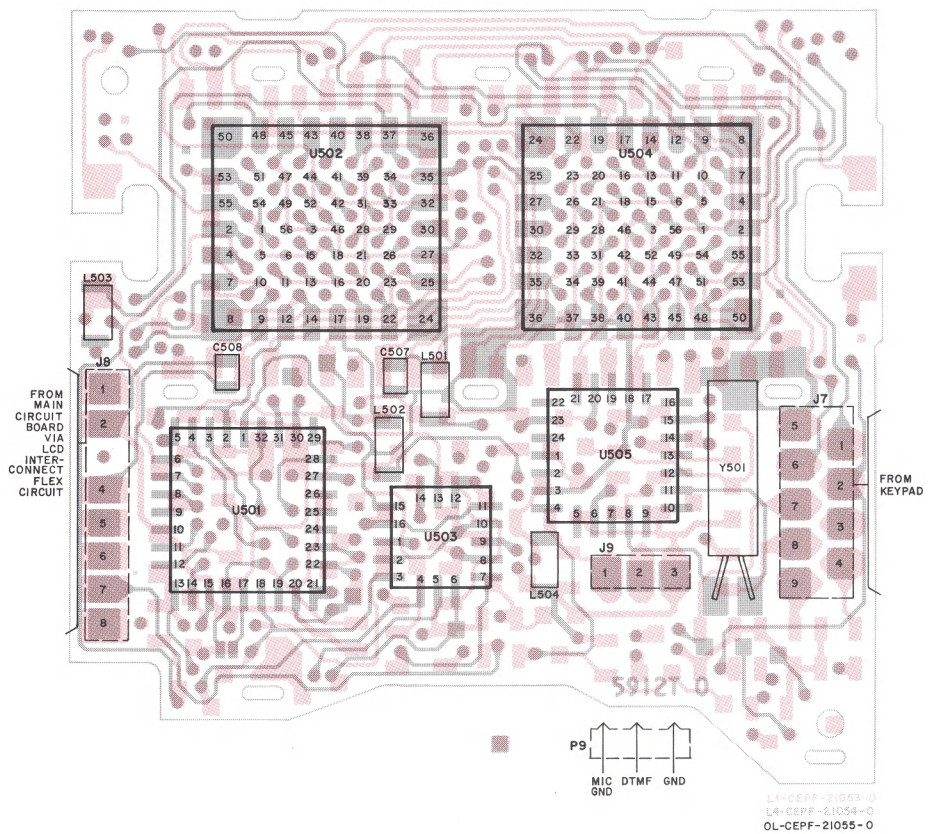
1 Add the following Component Location Diagrams for the 8405912T01, 8k Display Circuit Board:

8405912T01 8k DISPLAY CIRCUIT BOARD

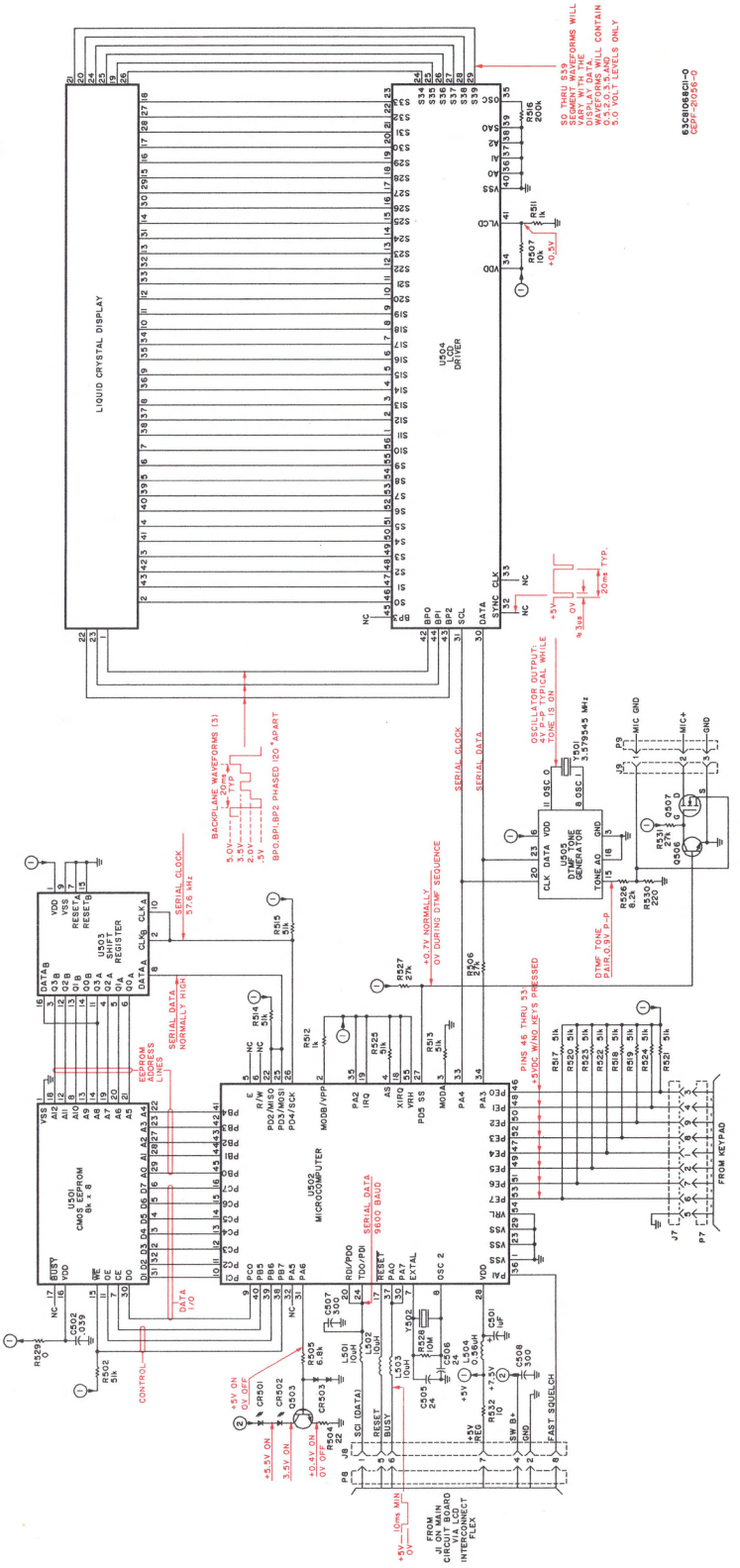
SIDE 1 VIEWED FROM SIDE 1



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
		CAPACITOR, Fixed: pF±5%; 50V unless stated
C501	2362998B59	1µF±10%; 20V
C502	2160521C32	.039µF±10%; 25V
C503,504	- - - - -	Not Used
C505,506	2160520B10	24
C507,508	2160520C12	300
		DIODE: See Note I
CR501,502	4805729G27	LED, Yellow
CR503	4805129M06	SOT-23
		JACK:
J7	0905287C05	Socket, Printed Circuit (Keypad Switch)(9 req'd)
J8	0905287C05	Socket, Printed Circuit (LCD Interconnect)(8 req'd)
J9	0905287C05	Socket, Printed Circuit (Speaker/Mic)(3 req'd)
		COIL, RF: unless stated
L501 thru 503	2462575A07	Choke, 10µH
L504	2462575A09	Choke, 0.56µH
		TRANSISTOR: See Note I
Q501,502	- - - - -	Not Used
Q503	4805128M12	NPN; BCW60B (RH)
Q504,505	- - - - -	Not Used
Q506	4805128M12	NPN; BCW60B (RH)
Q507	4805218N11	TMOS; BST82
		RESISTOR, Fixed: Ω±5%;1/8W unless stated
R501	- - - - -	Not Used
R502	0660076A90	51k
R503	- - - - -	Not Used
R504	0660076A09	22
R505	0660076A69	6.8k
R506	0660076A83	27k
R507	0660076A73	10k
R508 thru 510	- - - - -	Not Used
R511,512	0660076A49	1k
R513 thru 515	0660076A90	51k
R516	0660076F08	200k±1%
R517 thru 525	0660076A90	51k
R526	0660076A71	8.2k
R527	0660076A83	27k
R528	0660076H49	10M±10%
R529	0605021K01	0
R530	0660076A33	220
R531	0660076A83	27k
R532	0660076A01	10
		CIRCUIT MODULE: See Note I
U501	0105954S37	EEPROM, CMOS; 8k x 8
U502	0105953N07	Microcomputer, HCMOS
U503	0105953N09	Shift Register; CMOS
U504	0105953N10	LCD Driver, CMOS
U505	0105953N18	DTMF Tone Generator, CMOS
		CRYSTAL:
Y501	4805664G40	3.579545MHz
Y502	4805664G39	3.6864MHz

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

MOTOROLA INC.

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

NO.	CHANGE AFFECTS
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.): ±.0005% (±.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.): ±.0005% (±.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

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

FMR1313-8
12-13-91
RMG

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

NO.

3 On page 11, **Saber VHF SECURENET Electrical Parts List** change the following.

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

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

NO.
4

SABER I, II AND III

REF. SYM.	ACTION	PART NO.	DESCRIPTION
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

ITEM NO.	ACTION	PART NO.	DESCRIPTION
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:

ITEM NO.	ACTION	PART NO.	DESCRIPTION
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

ITEM NO.	ACTION	PART NO.	DESCRIPTION
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:

ITEM NO.	ACTION	PART NO.	DESCRIPTION
25	changed to	NLD8610A	ASSEMBLY, VHF Main PC Board
43	changed to 34 thru 42)	NHN6410A	ASSEMBLY, Housing, SABER I (includes items
	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**

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

NO

7 Add the **SECURENET RADIO FUNCTIONAL TESTS (@7.5Vdc)**

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 ≥ 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 achieve12 dB SINAD; rf level≤ 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
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

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

CHANGES

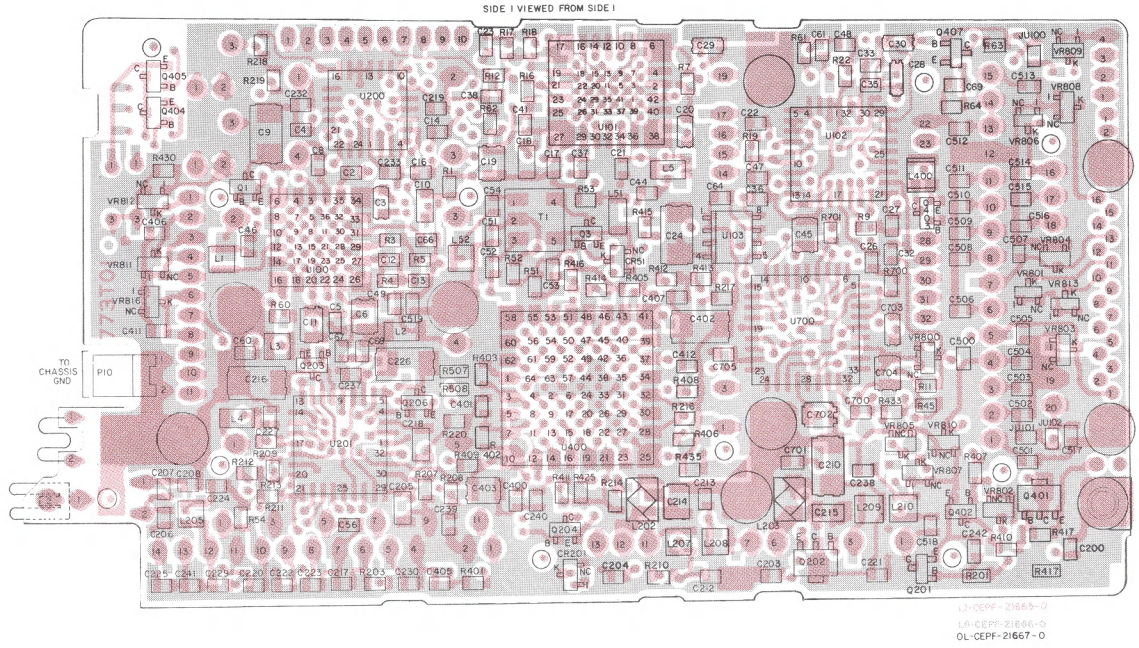
NO.

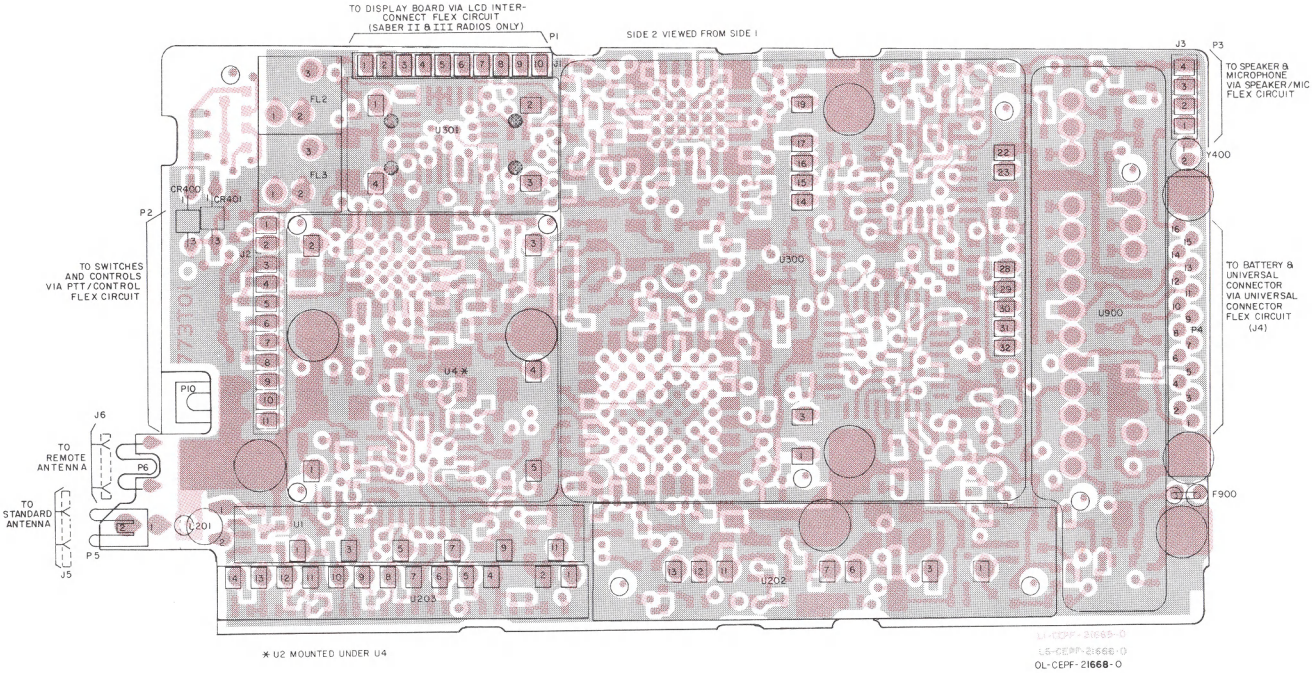
1 Add the following above the existing Main Circuit Board Component Layout Diagrams on pages 9 and 10:

8405796Q01 MAIN CIRCUIT BOARD

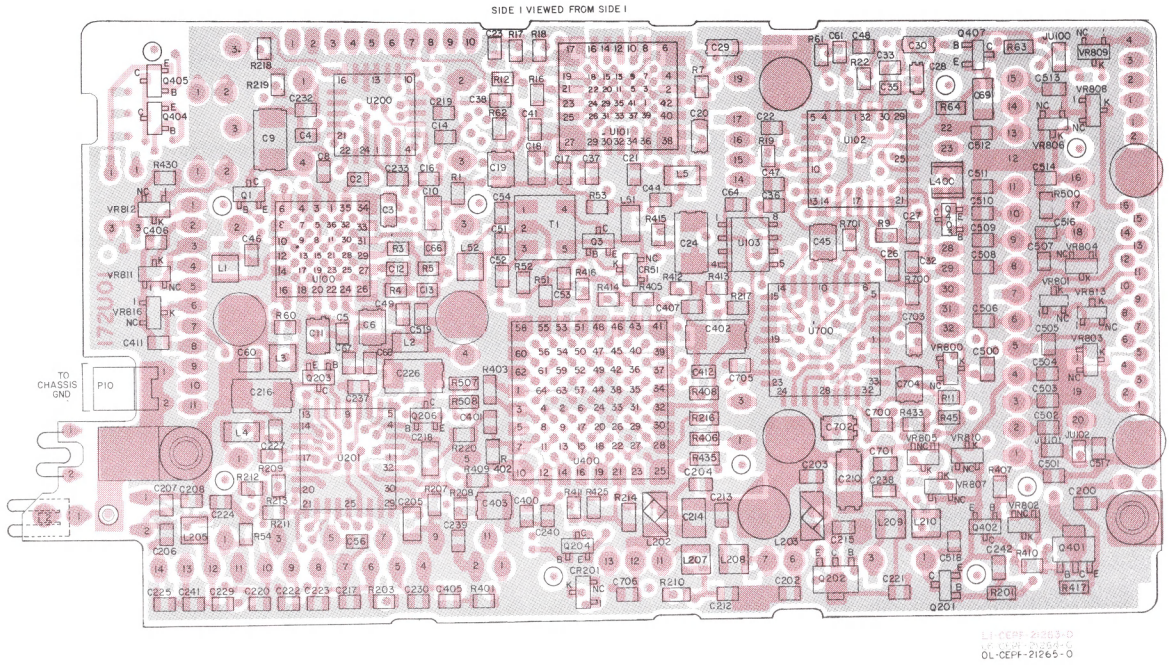
2 Add the following new Component Layout Diagrams for the 8405773T01 and 8405172U01, Main Circuit Boards:

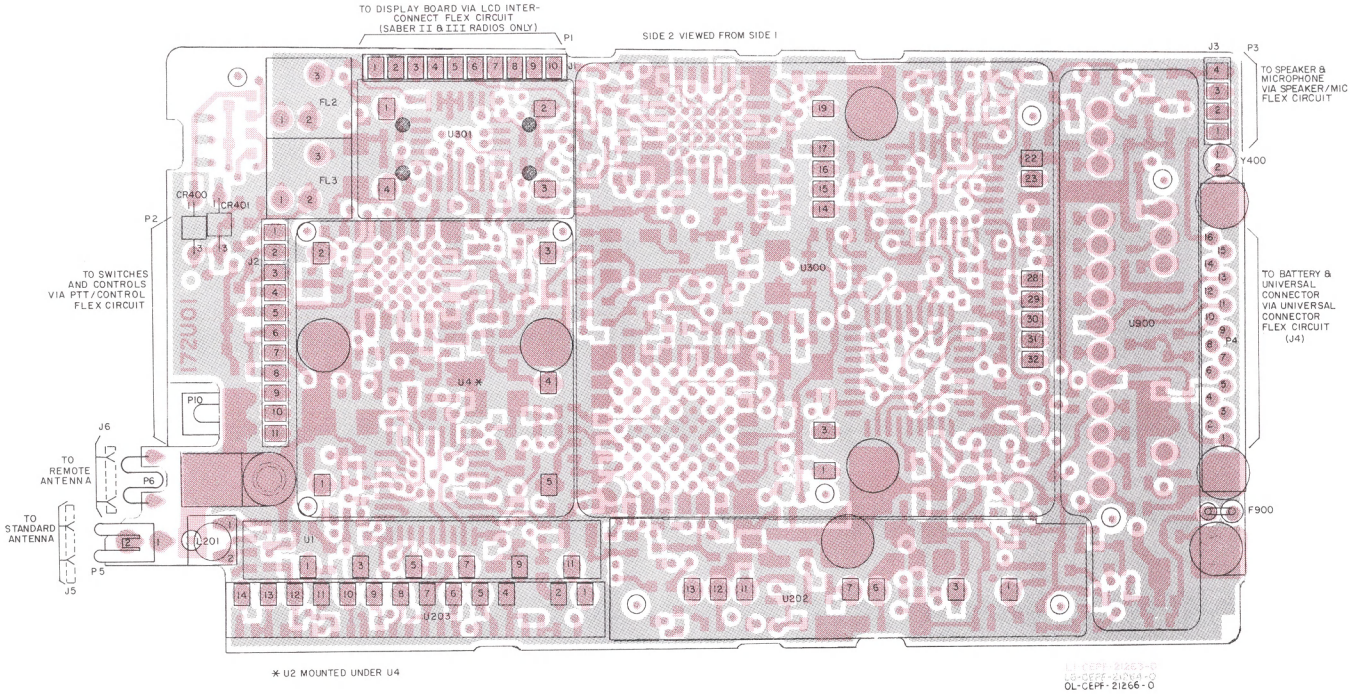
8405773T01 MAIN CIRCUIT BOARD





8405172U01 MAIN CIRCUIT BOARD





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

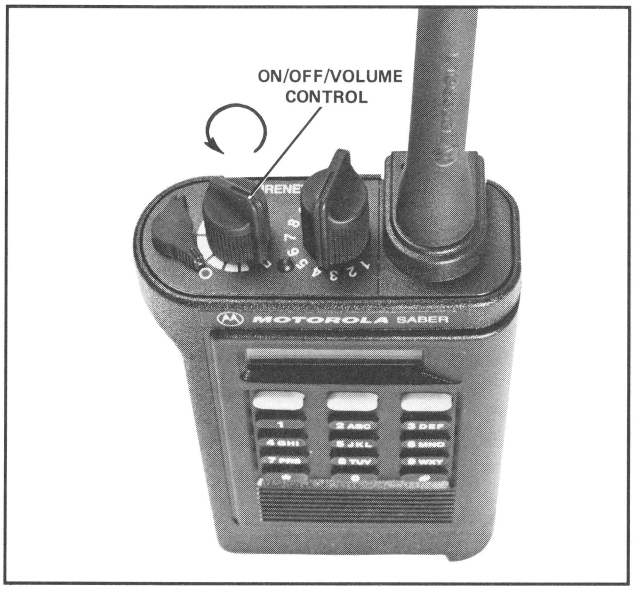
SABER I SECURENET OPERATING INSTRUCTIONS.....68P81045C60
SABER II SECURENET OPERATING INSTRUCTIONS.....68P81045C65
SABER III SECURENET OPERATING INSTRUCTIONS.....68P81048C40
SECURENET SERVICE MANUAL (UHF).....68P81045C75
SECURENET THEORY/ MAINTENANCE MANUAL.....68P81045C85
FIELD PROGRAMMER USER'S GUIDE.....68P81044C65

COMPUTER SOFTWARE COPYRIGHTS

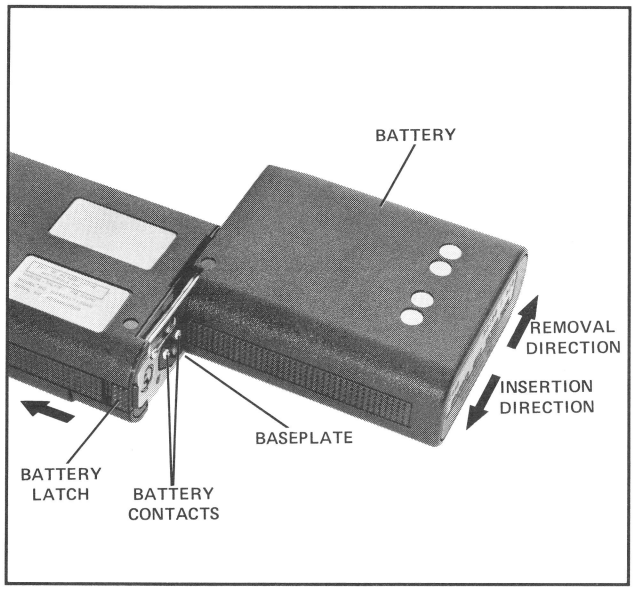
DISASSEMBLY/REASSEMBLY PROCEDURES

1. DISASSEMBLY

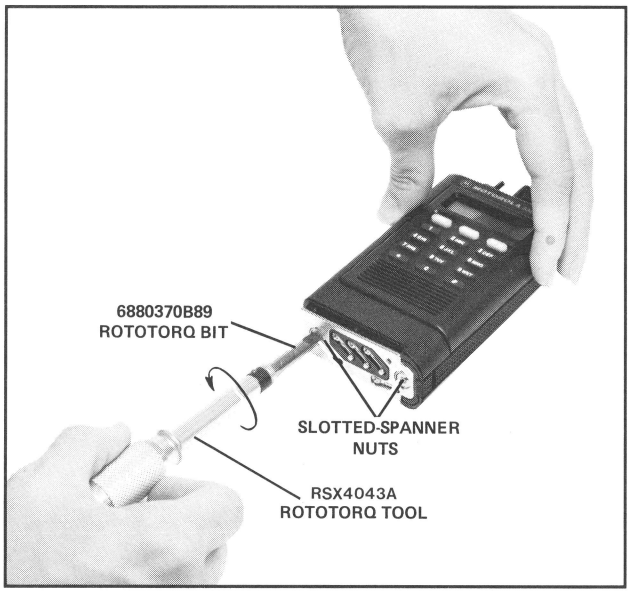
a. **Turn off the radio** by rotating the on/off/volume control knob fully counterclockwise until you hear a click. Remove the universal connector cover or any accessory connected to the radio before beginning disassembly.



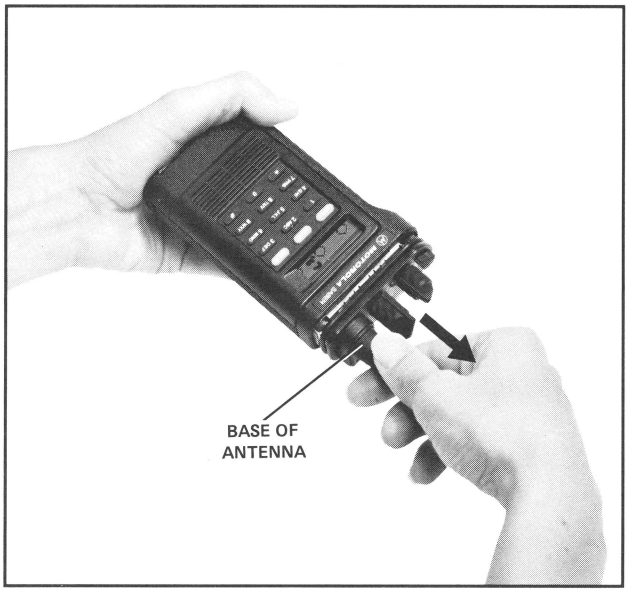
b. **Remove the battery** from the baseplate on the bottom of the radio housing by pushing the spring-loaded battery latch toward the top of the radio, and sliding the battery away from the latch until it clears the baseplate.



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



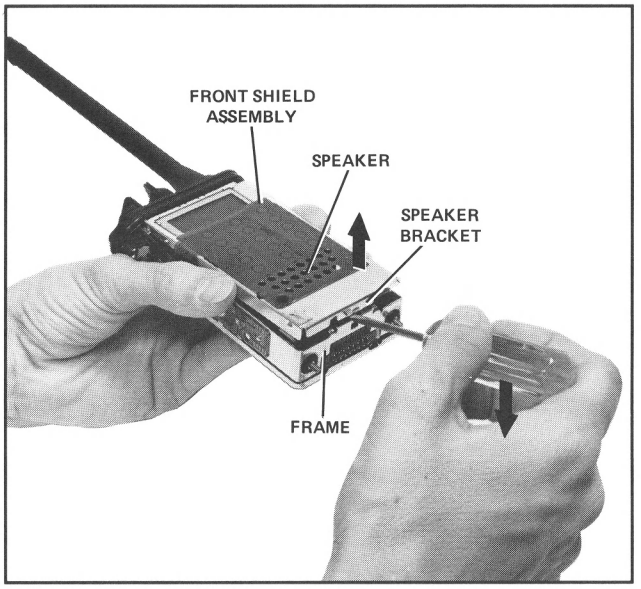
d. **Remove the frame assembly** from the radio housing by grasping the antenna at its base and pulling it gently upward. *Do not depress the PTT switch during removal and do not push on the slotted-spanner nuts to lift the frame assembly.*



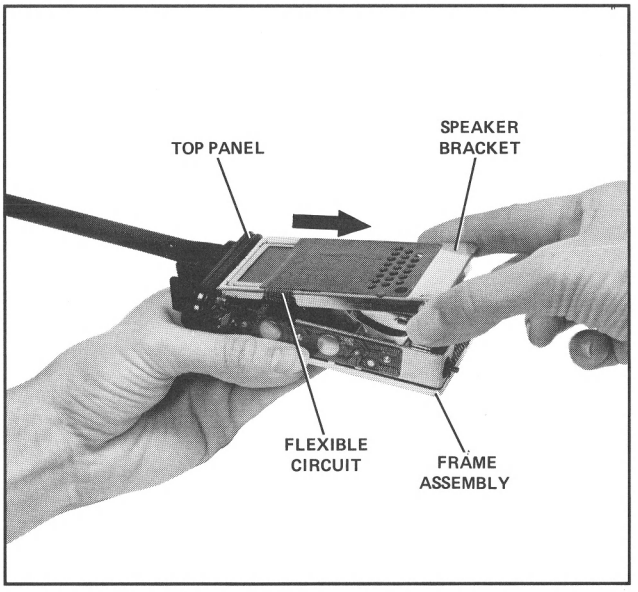
CAUTION

Ensure that all static electricity safeguards are in place.

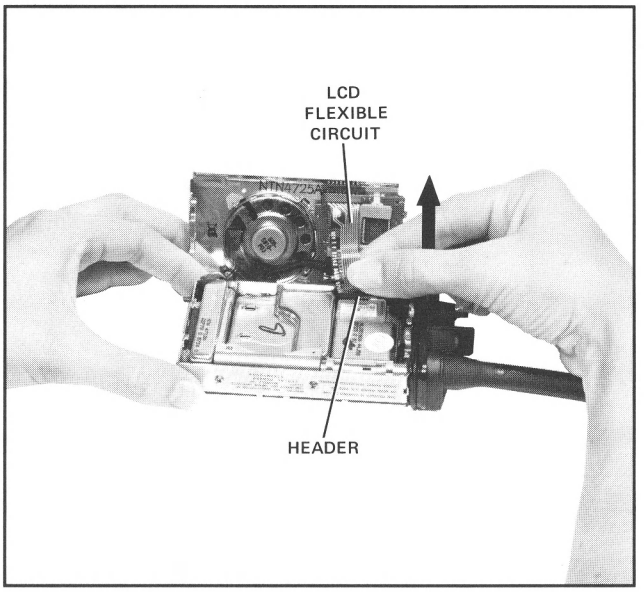
e. With the speaker facing upward, **remove the speaker bracket assembly** by inserting a thin screwdriver blade between the frame and the bottom of the speaker bracket, and prying gently upward on the speaker bracket until it is disengaged from the frame.



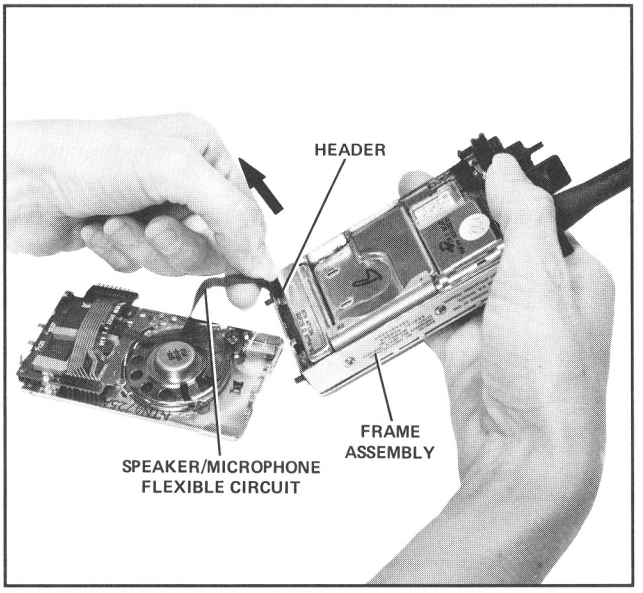
f. **Lift the speaker bracket assembly** away from the bottom of the frame assembly, then pull it out from under the plastic top panel. Be careful not to pull against the flexible circuits connecting the speaker bracket to the frame assembly.



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 t o r n . 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 Rototorq 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.

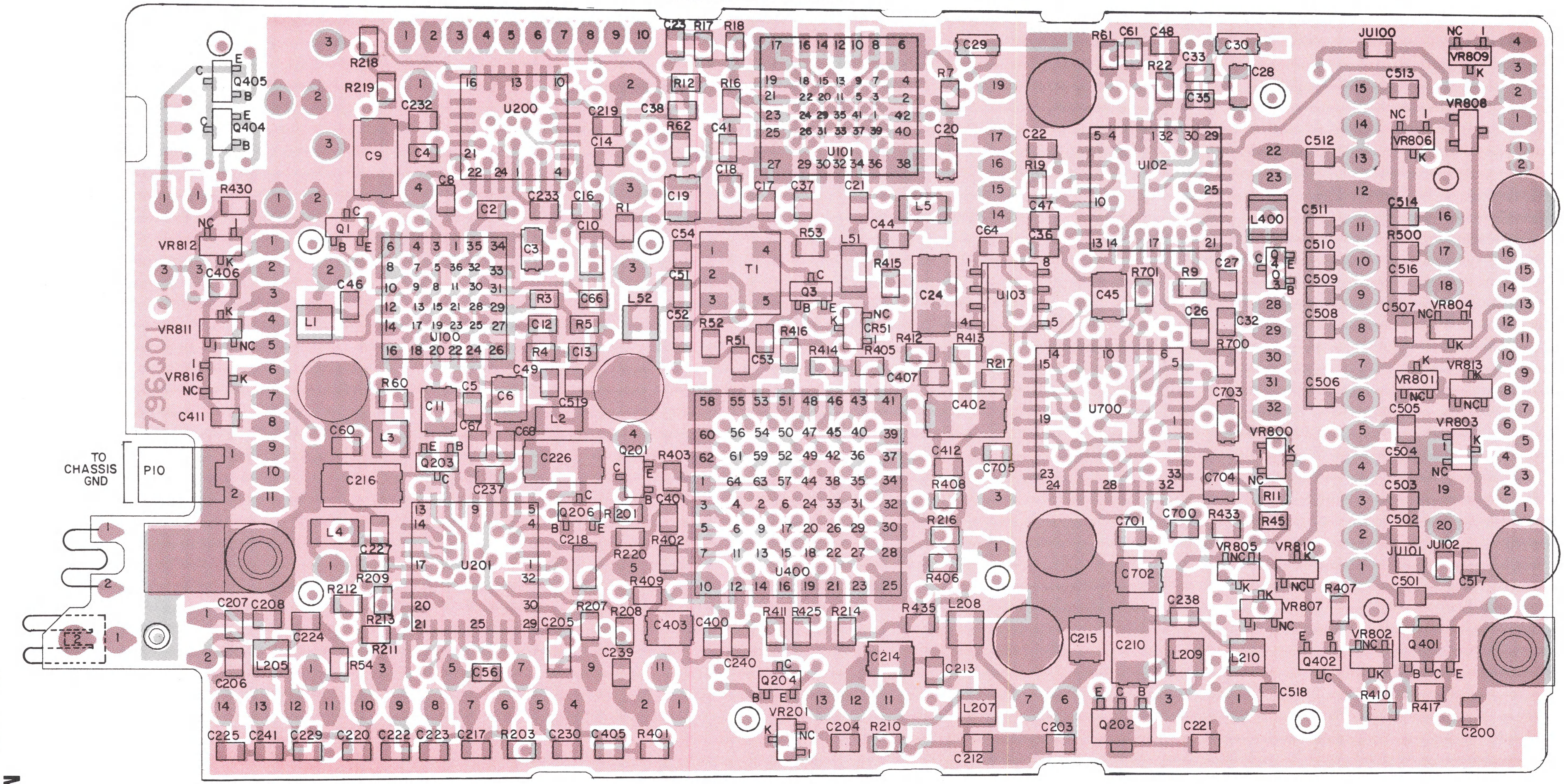
• to properly orient the completed frame assembly before inserting it into the radio housing.

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

TORQUE SPECIFICATIONS

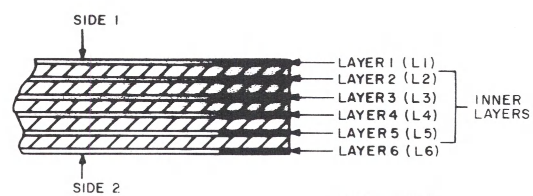
APPLICATION	TORQUE (IN. LBS.)	TORQUE (N•m)	TORQUE BIT NO.
Antenna Bushing Spanner Nut	20	2.27	6680370B90
Back Shield to Frame Screws	2.5	0.28	6680321B79
Bottom Connector to Frame Screws	2.5	0.28	6680321B79
Frequency Switch Spanner Nut	8	0.91	6680370B88
All Module Screws	2.5	0.28	6680321B79
Power Contact 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

SIDE 1 VIEWED FROM SIDE 1



L1-CEPF-17652-O
L6-CEPF-17653-O
OL-CEPF-17654-O

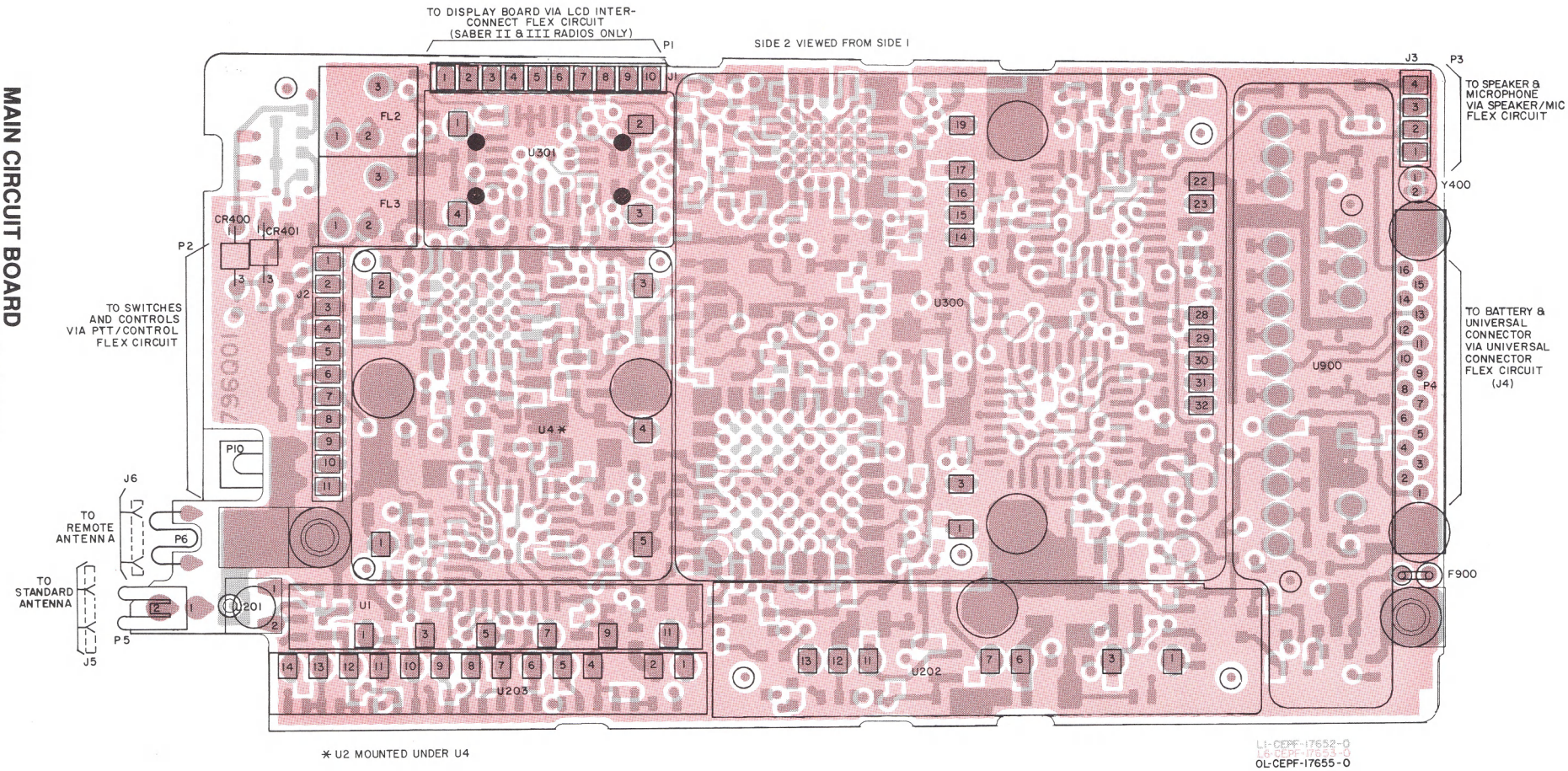
6-LAYER CIRCUIT BOARD COPPER DETAIL VIEWING COPPER STEPS AT EDGE OF BOARD IN PROPER LAYER SEQUENCE.



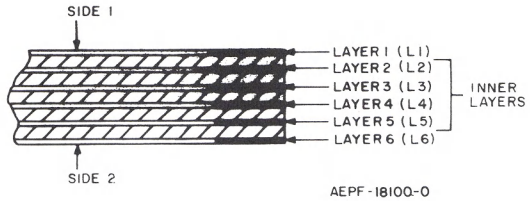
AEPF-18100-O

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

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



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



AEPF-18100-O

SABER VHF SECURENET
Electrical Parts List

TPLF-3492-0

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: uF±20%; 25V unless stated
C1	- - - - -	Not Used
C2	2160521A15	1500pF±5%
C3	2362998B09	1±10%; 16V
C4,5	2160521G37	0.1+80-20%
C6	2362998B68	4.7; 10V
C7	- - - - -	Not Used
C8	2160521G37	0.1+80-20%
C9	2362998B73	10; 16V
C10	2160521H39	0.15+80-20%
C11	2362998B64	2.2; 20V
C12	2160521A13	1000pF±5%
C13	2160521E25	.01
C14	2160521G37	0.1+80-20%
C15	- - - - -	Not Used
C16	2160520B20	62pF±5%
C17	2160521G37	0.1+80-20%
C18	2160521H41	.22+80-20%
C19	2362998B16	3.3±10%; 16V
C20	2362998B59	1; 16V
C21	2160521A13	1000pF±5%
C22	2160521G37	0.1+80-20%
C23	2160521A19	3300pF±5%
C24	2362998B69	4.7; 20V
C25	- - - - -	Not Used
C26	2160521A21	4700pF±5%
C27	2160521A32	.039±5%
C28 thru 30	2362998B59	1; 16V
C31	- - - - -	Not Used
C32	2160521A32	.039±5%
C33	2160521G37	0.1+80-20%
C34	- - - - -	Not Used
C35 thru 37	2160521G37	0.1+80-20%
C38	2160520C01	100pF±5% NPO
C39,40	- - - - -	Not Used
C41	2160520C01	100pF±5% NPO
C42,43	- - - - -	Not Used
C44	2160521G37	0.1+80-20%
C45	2362998B16	3.3±10%; 16V
C46	2160521E28	.018
C47	2160521E25	.01
C48	2160521A29	.022±5%
C49	2160520A20	6.2pF±.25pF; NPO
C50	- - - - -	Not Used
C51 thru 53	2160521E28	.018
C54	2160520C01	100pF±5%; NPO
C55	- - - - -	Not Used
C56	2160521E28	.018
C57 thru 60	- - - - -	Not Used
C61	2160521A29	.022±5%
C62,63	- - - - -	Not Used
C64	2160521E28	.018
C65,66	- - - - -	Not Used
C67	2160521G37	0.1+80-20%
C68	2160520C09	220pF
C200	2160521E28	.018
C201,202	- - - - -	Not Used
C203	2160520B19	56pF±0.25pF; NPO
C204	2160520C03	120pF±5%; NPO
C205	2160521H41	0.22+80-20%
C206	2160520B05	15pF±5%; 50V; NPO
C207	2160520A09	2.2pF±0.25pF; NPO
C208	2160520B05	15pF±5%; 50V; NPO
C209	- - - - -	Not Used
C210	2362998B69	4.7; 20V
C211	- - - - -	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	- - - - -	Not Used
C229,230	2160521E28	.018
C231	- - - - -	Not Used
C232	2160521C09	470pF±10%
C233	2160521E28	.018
C234 thru 236	- - - - -	Not Used
C237	2160521E28	.018
C238 thru 240	2160521C09	470pF±10%
C241	2160520A15	3.9pF±.25pF
C400,401	2160520B05	15pF±5%; 50V; NP0
C402	2362998B73	10; 16V
C403	2362998B68	4.7; 10V
C404	- - - - -	Not Used
C405	2160521A25	.01±5%
C406,407	2160521G37	0.1+80-20%
C408 thru 410	- - - - -	Not Used
C411,412	2160521G37	0.1+80-20%
C500 thru 517	- - - - -	Not Used
C518	2160521C09	470pF±10%
C700,701	2160521G37	0.1+80-20%
C702	2362998B16	3.3±10%; 16V
C703	2362998B05	.47±10%
C704	2362998B68	4.7; 10V
C705	2160521G37	0.1+80-20%
CR1 thru 50	- - - - -	**DIODE:** See Note I Not Used
CR51	4805119G18	SOT-23
CR200	- - - - -	Not Used
CR201	4805129M05	SOT-23
CR400	4805729G22	LED, Red
F900	0105955P27	**FUSE:** Assembly, 5 Amp
FL1	- - - - -	**FILTER:** Not Used
FL2	9105685Q11	Ceramic; 450kHz; 20kHz BW
FL3	9105685Q12	Ceramic; 450kHz; 15kHz BW
J1	0905287C07	**JACK:** Socket, Printed Circuit (LCD Interconnect) (10 req'd)
J2	0905287C07	Socket, Printed Circuit (PTT/Controls Flex) (11 req'd)
J3	0905287C07	Socket, Printed Circuit (Speaker/Mic Connector) (4 req'd)
L1	2405452C66	**COIL, RF:** unless stated 1800nH±5%
L2	2462575A03	820nH±5%
L3	2405452C09	50nH±5%
L4,5	2462575A08	5.6uH±6%
L6 thru 50	- - - - -	Not Used
L51	2462575A08	5.6uH±6%
L52	2405452C38	65nH±5%
L200	- - - - -	Not Used
L201	2405855Q01	Air Wound, Leaded; 6T; 0.086ID
L202 thru 204	- - - - -	Not Used
L205	2405452C62	1200nH±5%
L206	- - - - -	Not Used
L207 thru 210	2405452C62	1200nH±5%
L400	2462585A40	33uH
LS1	- - - - -	**SPEAKER:** 28Ω±1% (part of Speaker/ Microphone Flex Assembly)
MK1	- - - - -	**MICROPHONE:** (part of Speaker/Microphone Flex Assembly)
P1 thru 3	- - - - -	**PLUG:** Not Used
P4	2805520Q01	Connector, Bottom
P5	3905446Q03	Connector, Antenna
P6	3905445Q03	Contact, RF Wireform
P7 thru 9	- - - - -	Not Used
P10	3905889R01	Contact, PCB Ground
Q1	4805128M16	**TRANSISTOR:** See Note I PNP; SOT-23; MMBT3906
Q2	- - - - -	Not Used
Q3	4805128N03	Bipolar; SOT-23; MMBR901
Q200	- - - - -	Not Used
Q201	4805128M23	NPN; SOT-23
Q202	4805128M27	PNP; SOT-89
Q203,204	4805128M16	PNP; SOT-23; MMBT3906
Q205	- - - - -	Not Used
Q206	4805128M16	PNP; SOT-23; MMBT3906
Q400 thru 402	- - - - -	Not Used
Q403	4805128M44	NPN; SOT-23
Q404	- - - - -	Not Used
Q405	4805128M44	NPN; SOT-23
R1	0660079K02	**RESISTOR, Fixed: Ω±5%;1/8W** unless stated 75k±1%
R2	- - - - -	Not Used
R3	0660076E77	15k±1%
R4	0660078T24	91k
R5	0660078T01	10k
R6	- - - - -	Not Used
R7	0660078J80	49.9k±1%
R8	- - - - -	Not Used
R9	0660078G33	2k±1%
R10	- - - - -	Not Used
R11	0660078G33	2k±1%
R12	0660076A49	1k
R13 thru 15	- - - - -	Not Used
R16	0660078L01	100k±1%
R17	0660076E73	10k±1%
R18	0660076E89	47k±1%
R19	0660076A49	1k
R20, 21	- - - - -	Not Used
R22	0660076A92	62k±5%
R23 thru 44	- - - - -	Not Used
R45	0660076A29	150
R46 thru 50	- - - - -	Not Used
R51,52	0660076A85	33k
R53	0660076A41	470
R54	0660076A79	10k
R55 thru 59	- - - - -	Not Used
R60	0660076A29	150
R61	0660076A77	15k±5%
R62	0660076B01	100k
R200	- - - - -	Not Used
R201	0660076A89	47k
R202	- - - - -	Not Used
R203	0660078G33	2k±1%
R204 thru 206	- - - - -	Not Used
R207	0660078J18	14.7k±1%
R208	0660078G58	3.32k±1%
R209	0660076A48	910
R210	0660078J80	49.9k±1%
R211,212	0660078G33	2k±1%
R213	0660078J23	16.2k±1%
R214	0660076B01	100k
R215	- - - - -	Not Used
R216,217	0660076A73	10k
R218	0660076B01	100k
R219	0660076B05	150k
R220	0660076A49	1k
R400	- - - - -	Not Used
R401	0660076A65	4.7k
R402	0660076B25	1M
R403	0660076B01	100k
R404	- - - - -	Not Used
R405	0660076B01	100k
R406	0660076A73	10k
R407	- - - - -	Not Used
R408	0660076B01	100k
R409	0660076A29	150
R410	- - - - -	Not Used
R411	0660076A80	20k
R412,413	0660078L01	100k±1%
R414 thru 416	0660076B01	100k
R417 thru 424	- - - - -	Not Used
R425	0660076A73	10k
R426 thru 429	- - - - -	Not Used
R430	0660076A29	150
R431,432	- - - - -	Not Used
R433	0660076A21	68
R434	- - - - -	Not Used
R435	0660076A49	1k
R500	0660076A73	10k
R700	0660078J80	49.9k±1%
R701	0660076A49	1k
R800	RPX4690A (includes S800)	Kit, Potentiometer, On/Off/Volume
R801	0660076B08	200k
R802	0660076A93	68k
R803	- - - - -	Not Used
R804	0660076A85	33k
R805	0660076A49	1k
S800	RPX4690A	**SWITCH:** Kit, On/Off/Volume (includes R800)
S801/S804	4005221R01	Dual-Function, Clear/Coded (S804)(Standard) and Emergency (S801)(Optional)
S802	- - - - -	Not Used
S803	RPX4694A	Kit, Contact Snapdome, PTT
S805	RPX4694A	Kit, Contact Snapdome, Monitor
S806 thru 822	- - - - -	Not Used
S823	RPX4689A	Kit, Frequency
T1	2405548Q03	**TRANSFORMER:** Ferrite
U1	NFD6111A	**CIRCUIT MODULE:** See Note I Filter, 2-Pole (136-150.8MHz)
or	NFD6112A	Filter, 2-Pole (146-174MHz)
U2	NFD6091A	Filter, 5-Pole (136-150.8MHz)
or	NFD6092A	Filter, 5-Pole (146-174MHz)
U4	NLD8180A	Receiver Front End (136-174MHz)
U100	0105958P77	IC, I-F
U101	0105958P80	IC, Audio Filter, CMOS
U102	0105958P74	IC, Audio, Bipolar
U103	5105469E65	IC, Regulator
U200	0105953N05	IC, Digital/Analog Converter, CMOS
U201	0105953N06	IC, Transmit Automatic Level Control
U202	NLD8121A	Power Amplifier, High-Power (136-150.8MHz)
or	NLD8122A	Power Amplifier, High-Power (146-162MHz)
or	NLD8123A	Power Amplifier, High-Power (157-174MHz)
U203	NFD6131A	Filter/Detector/Switch (136-150.8MHz)
or	NFD6132A	Filter/Detector/Switch (146-174MHz)
U204	- - - - -	Not Used
U205	NLD8133A	Power Amplifier, Low-Power (146-174MHz)
U300	NLD8201A	Synthesizer/VCO (136-150.8MHz)
or	NLD8202A	Synthesizer/VCO (146-162MHz)
or	NLD8210A	Synthesizer/VCO (157-174MHz)
U301	NXN6269A	Oscillator, Reference; 16.8MHz
U400	0105953N16	Microcomputer, MC68HC11; Binary
U700	0105953N11	Signal Filter, Phase 1, CMOS
U900	NTN4720A	SECURENET Bypass Module
or	- - - - -	Optional Encryption Module
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	4805664G32	**CRYSTAL:** 7.3728MHz

NONREFERENCED ITEMS

	0905287C07	SOCKET, Printed Circuit (for all modules) (69 req'd)
	1405881R01	BOOT, Crystal (for Y400)
	7505934Q01	PAD, Oscillator (for U301)

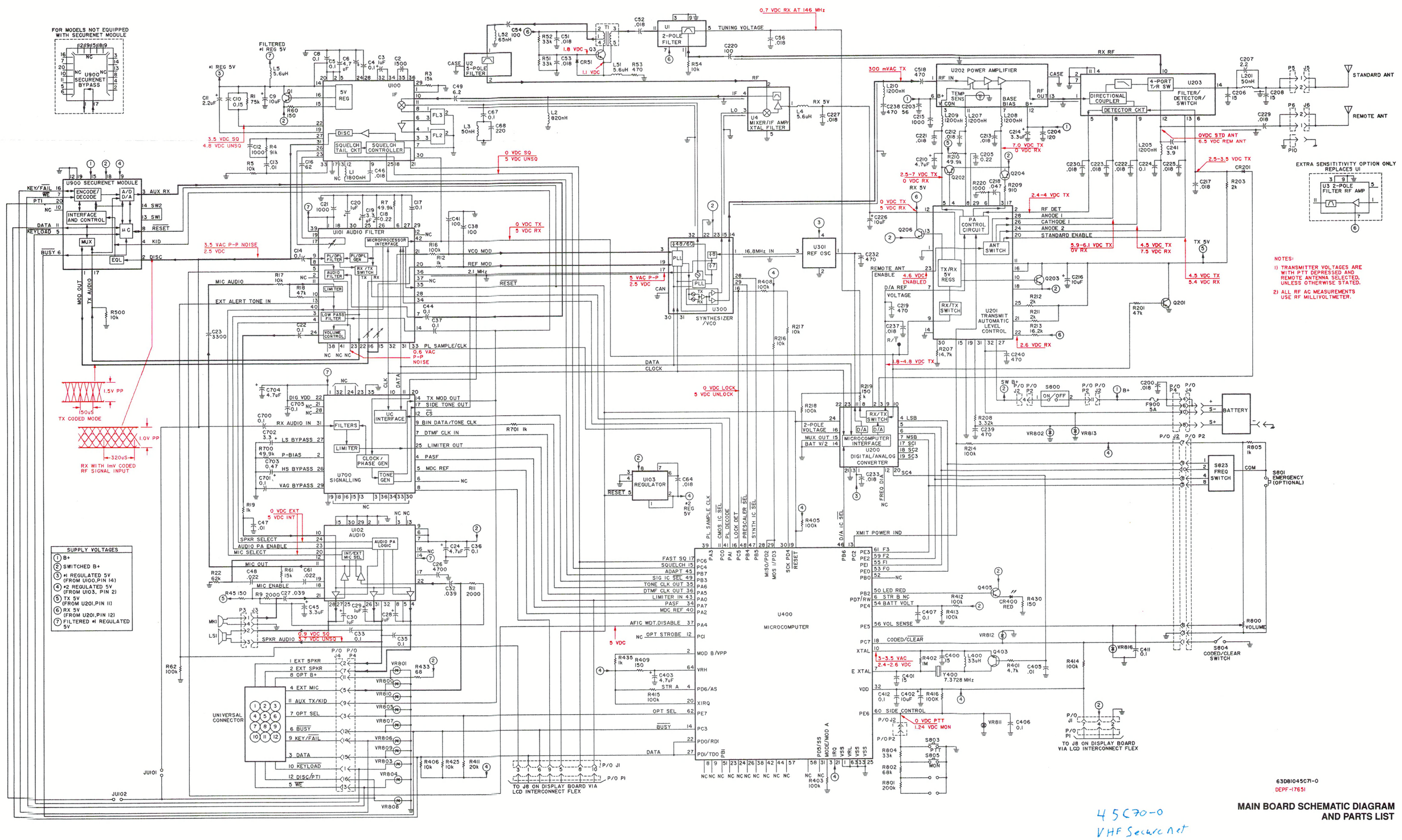
NOTES:

I. 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-O



45C70-O
VHF Securenet

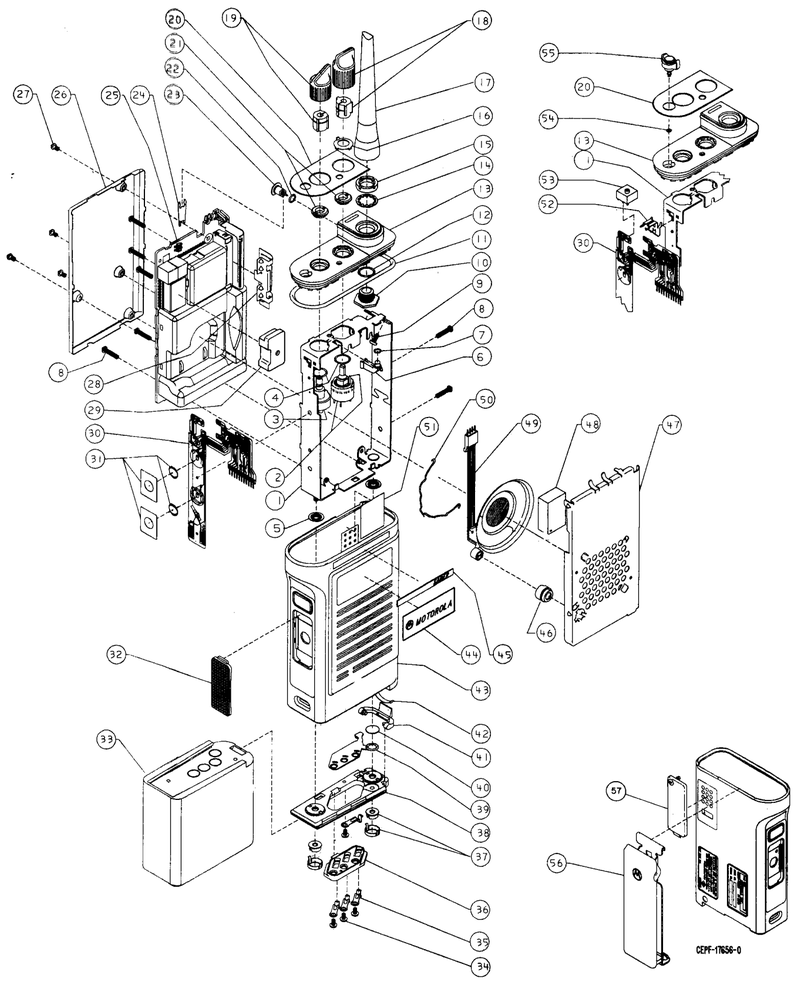
MAIN BOARD SCHEMATIC DIAGRAM AND PARTS LIST

SABER I 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	RPX4693A	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 item11)
14	0400139731	LOCKWASHER, Internal Tooth
15	0205591R01	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)
or	NAD6472A	ANTENNA, VHF Helical (146 - 162 MHz)
or	NAD6473A	ANTENNA, VHF Helical (157 - 174 MHz)
18	RPX4699A	KIT, Frequency Knob
19	RPX4698A	KIT, On/Off/Volume Knob
20	1305622Q09	ESCUTCHEON, SECURENET, No Knob
or	1305622Q07	ESCUTCHEON, SECURENET, Push-Only
or	1305622Q03	ESCUTCHEON, SECURENET, Rotate-Only or Push-and-Rotate
or	1305622Q16	ESCUTCHEON, SECURENET, Submersible, No Knob
or	1305622Q17	ESCUTCHEON, SECURENET, Submersible, Push-Only
or	1305622Q15	ESCUTCHEON, SECURENET, Submersible, Rotate-Only or Push-and-Rotate
21	0205916P01	NUT, Spanner (2 req'd)
22	3205082E61	GASKET, O-Ring (part of item 23)
23	RPX4691A	KIT, RF Connector (includes items 22,24)
24	4205852N01	CONTACT, Ground, RF (part of item 23)
25	NLD8290A	ASSEMBLY, VHF Main PC Board
26	NTN4726A	ASSEMBLY, Back Shield (includes item 27)
27	0305706Q01	SCREW, Captive; 2-56 (4 req'd) (part of item 26)
28	4205577Q01	CLIP, Ground
29	1405343S01	BOOT, Oscillator, SABER I
30	RPX4700A	KIT, PTT/Controls Flex (includes item 31)
or	RPX4723A	KIT, PTT/Controls Flex Assembly (includes items 2,3,31)
31	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
32	4505022P02	LEVER, PTT (part of item 43)
33	NTN4592A	BATTERY, 500 mAh
or	NTN4593A	BATTERY, 900 mAh
or	NTN4595A	BATTERY, 1500 mAh
or	NTN4540A	BATTERY, 3600 mAh Primary
or	NTN4537A	BATTERY, FM, 500 mAh
or	NTN4538A	BATTERY, FM, 900 mAh
or	NTN4596A	BATTERY, FM, 1500 mAh
34	0305706Q02	SCREW, Baseplate Ph Pan Hd;2-56x3/32" (4 req'd) (part of item 43)
35	3905453Q01	CONTACT, Power (4 req'd) (part of item 43)
36	4205437Q01	RETAINER, Baseplate (part of item 43)
37	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
38	6405847N03	BASEPLATE (part of item 43)
39	3205701Q01	SEAL, Elastomer (part of item 43)
40	3205472M01	SEAL, Vacuum Port (part of item 43)
41	5505333Q01	LATCH, Battery (part of item 43)
42	4105775Q01	SPRING, Latch (part of item 43)
43	NHN6400A	ASSEMBLY, Housing, SABER I (includes items 32,34 thru 42)
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	NTN5069A	KIT, Rotate-Only Knob (includes item 54)
or	NTN5068A	KIT, Push-and-Rotate Knob (optional) (includes item 54)
or	NTN5076A	KIT, Push-Only 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.

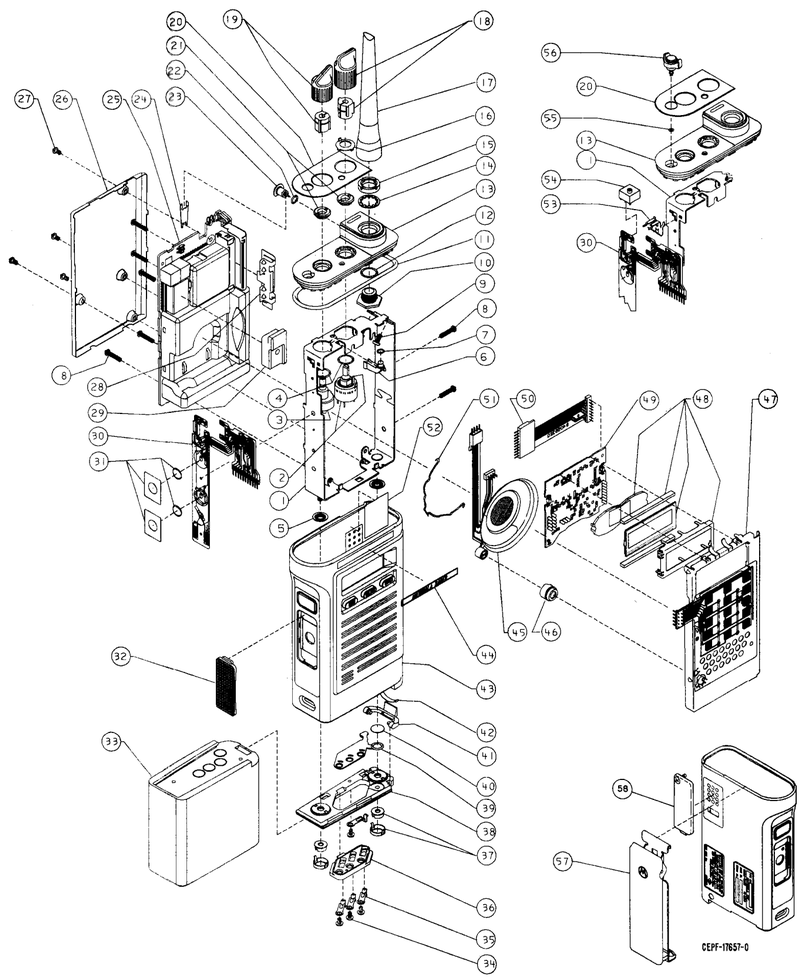


SABER II SECURENET VHF
Exploded View Parts List

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	RPX4693A	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 item11)
14	0400139731	LOCKWASHER, Internal Tooth
15	0205591R01	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)
or	NAD6472A	ANTENNA, VHF Helical (146 - 162 MHz)
or	NAD6473A	ANTENNA, VHF Helical (157 - 174 MHz)
18	RPX4699A	KIT, Frequency Knob
19	RPX4698A	KIT, On/Off/Volume Knob
20	1305622Q09	ESCUTCHEON, SECURENET, No Knob
or	1305622Q07	ESCUTCHEON, SECURENET, Push-Only
or	1305622Q03	ESCUTCHEON, SECURENET, Rotate-Only or Push-and-Rotate
21	0205916P01	NUT, Spanner (2 req'd)
22	3205082E61	GASKET, O-Ring (part of item 23)
23	RPX4691A	KIT, RF Connector (includes items 22,24)
24	4205852N01	CONTACT, Ground, RF (part of item 23)
25	NLD8290A	ASSEMBLY, VHF Main PC Board
26	NTN4726A	ASSEMBLY, Back Shield (includes item 27)
27	0305706Q01	SCREW, Captive; 2-56 (4 req'd) (part of item 26)
28	4205577Q01	CLIP, Ground
29	1405387R01	BOOT, Oscillator, SABER II/III
30	RPX4700A	KIT, PTT/Controls Flex (includes item 31)
or	RPX4723A	KIT, PTT/Controls Flex Assembly (includes items2,3,31)
31	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
32	4505022P02	LEVER, PTT (part of item 43)
33	NTN4592A	BATTERY, 500 mAh
or	NTN4593A	BATTERY, 900 mAh
or	NTN4595A	BATTERY, 1500 mAh
or	NTN4540A	BATTERY, 3600 mAh Primary
or	NTN4537A	BATTERY, FM, 500 mAh
or	NTN4538A	BATTERY, FM, 900 mAh
or	NTN4596A	BATTERY, FM, 1500 mAh
34	0305706Q02	SCREW, Baseplate, Ph Pan Hd; 2-56x3/32" (4 req'd) (part of item 43)
35	3905453Q01	CONTACT, Power (4 req'd) (part of item 43)
36	4205437Q01	RETAINER, Baseplate (part of item 43)
37	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
38	6405847N03	BASEPLATE (part of item 43)
39	3205701Q01	SEAL, Elastomer (part of item 43)
40	3205472M01	SEAL, Vacuum Port (part of item 43)
41	5505333Q01	LATCH, Battery (part of item 43)
42	4105775Q01	SPRING, Latch (part of item 43)
43	NHN6404A	ASSEMBLY, Housing, SABER II (includes items 32, 34 thru 42)
44	3305183R02	LABEL, Nameplate, SABER II
45	0105958M24	ASSEMBLY, Speaker/Microphone Flex, SABER II (8k Display)
or	0105958M34	ASSEMBLY, Speaker/Microphone Flex, SABER II (2k Display)
46	1405490Q01	BOOT, Microphone
47	RPX4722A	ASSEMBLY, LCD/Speaker Bracket
48	RPX4703A	KIT, LCD Assembly (part of item 49)
49	8460999A34	ASSEMBLY, 8k Display PC Board, SABER II (includes item 48)
or	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	NTN5069A	KIT, Rotate-Only Knob (includes item 54)
or	NTN5068A	KIT, Push-and-Rotate Knob (optional) (includes item 54)
or	NTN5076A	KIT, Push-Only Knob (optional) (includes item 54)
or	4305607S01	PLUG, Seal (optional)
57	NTN4788A	ASSEMBLY, Belt Clip
58	NTN5025A	Cover, Universal Connector

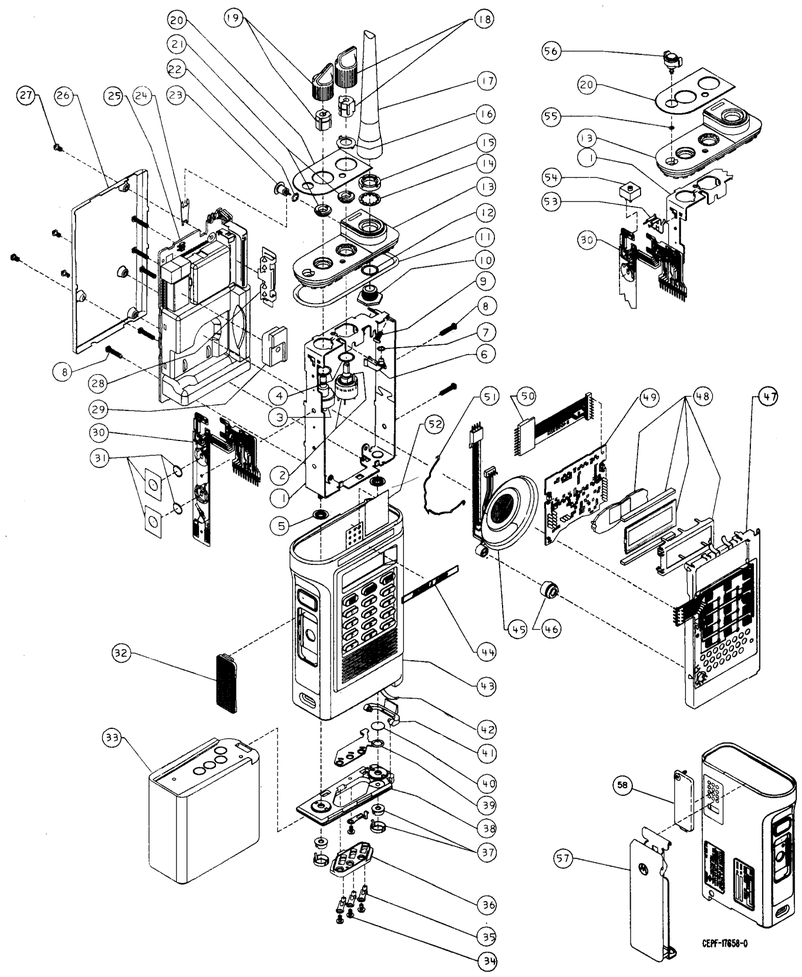
NOTE: Refer to Electrical Parts List for part number and description.



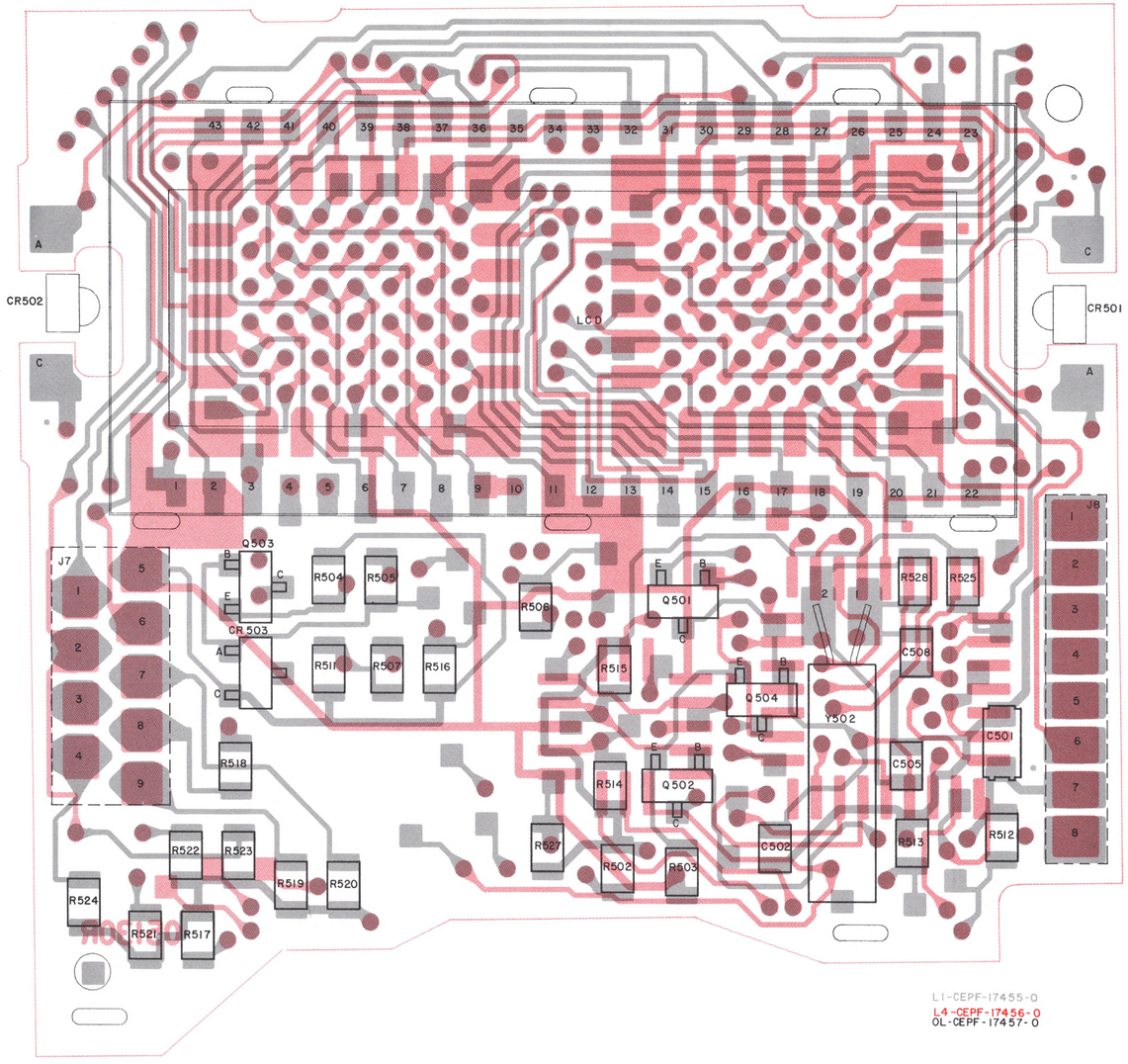
SABER III SECURENET VHF
Exploded View Parts List

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	RPX4693A	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 item11)
14	0400139731	LOCKWASHER, Internal Tooth
15	0205591R01	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)
or	NAD6472A	ANTENNA, VHF Helical (146 - 162 MHz)
or	NAD6473A	ANTENNA, VHF Helical (157 - 174 MHz)
18	RPX4699A	KIT, Frequency Knob
19	RPX4698A	KIT, On/Off/Volume Knob
20	1305622Q09	ESCUTCHEON, SECURENET, No Knob
or	1305622Q07	ESCUTCHEON, SECURENET, Push-Only
or	1305622Q03	ESCUTCHEON, SECURENET, Rotate-Only or Push-and-Rotate
21	0205916P01	NUT, Spanner (2 req'd)
22	3205082E61	GASKET, O-Ring (part of item 23)
23	RPX4691A	KIT, RF Connector (includes items 22,24)
24	4205852N01	CONTACT, Ground, RF (part of item 23)
25	NLD8290A	ASSEMBLY, VHF Main PC Board
26	NTN4726A	ASSEMBLY, Back Shield (includes item 27)
27	0305706Q01	SCREW, Captive; 2-56 (4 req'd) (part of item 26)
28	4205577Q01	CLIP, Ground
29	1405387R01	BOOT, Oscillator, SABER II/III
30	RPX4700A	KIT, PTT/Controls Flex (includes item 31)
or	RPX4723A	KIT, PTT/Controls Flex Assembly (includes items2,3,31)
31	RPX4694A	KIT, Contact Snapdome (S803, 805) (2 req'd) (part of item 30)
32	4505022P02	LEVER, PTT (part of item 43)
33	NTN4592A	BATTERY, 500 mAh
or	NTN4593A	BATTERY, 900 mAh
or	NTN4595A	BATTERY, 1500 mAh
or	NTN4540A	BATTERY, 3600 mAh Primary
or	NTN4537A	BATTERY, FM, 500 mAh
or	NTN4538A	BATTERY, FM, 900 mAh
or	NTN4596A	BATTERY, FM, 1500mAh
34	0305706Q02	SCREW, Baseplate, Ph Pan Hd; 2-56x3/32" (4 req'd) (part of item 43)
35	3905453Q01	CONTACT, Power (4 req'd) (part of item 43)
36	4205437Q01	RETAINER, Baseplate (part of item 43)
37	RPX4696A	KIT, Slotted Spanner Nut (2 req'd) (part of item 43)
38	6405847N03	BASEPLATE (part of item 43)
39	3205701Q01	SEAL, Elastomer (part of item 43)
40	3205472M01	SEAL, Vacuum Port (part of item 43)
41	5505333Q01	LATCH, Battery (part of item 43)
42	4105775Q01	SPRING, Latch (part of item 43)
43	NHN6402A	ASSEMBLY, Housing, SABER III (includes items 32, 34 thru 42)
44	3305183R02	LABEL, Nameplate, SABER III
45	0105958M24	ASSEMBLY, Speaker/Microphone Flex, SABER III
46	1405490Q01	BOOT, Microphone
47	RPX4722A	ASSEMBLY, LCD/Speaker Bracket
48	RPX4703A	KIT, LCD Assembly (part of item 49)
49	8460999A34	ASSEMBLY, Display PC Board, SABER III (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	NTN5069A	KIT, Rotate-Only Knob (includes item 54)
or	NTN5068A	KIT, Push-and-Rotate Knob (optional) (includes item 54)
or	NTN5076A	KIT, Push-Only Knob (optional) (includes item 54)
or	4305607S01	PLUG, Seal (optional)
57	NTN4788A	ASSEMBLY, Belt Clip
58	NTN5025A	Cover, Universal Connector

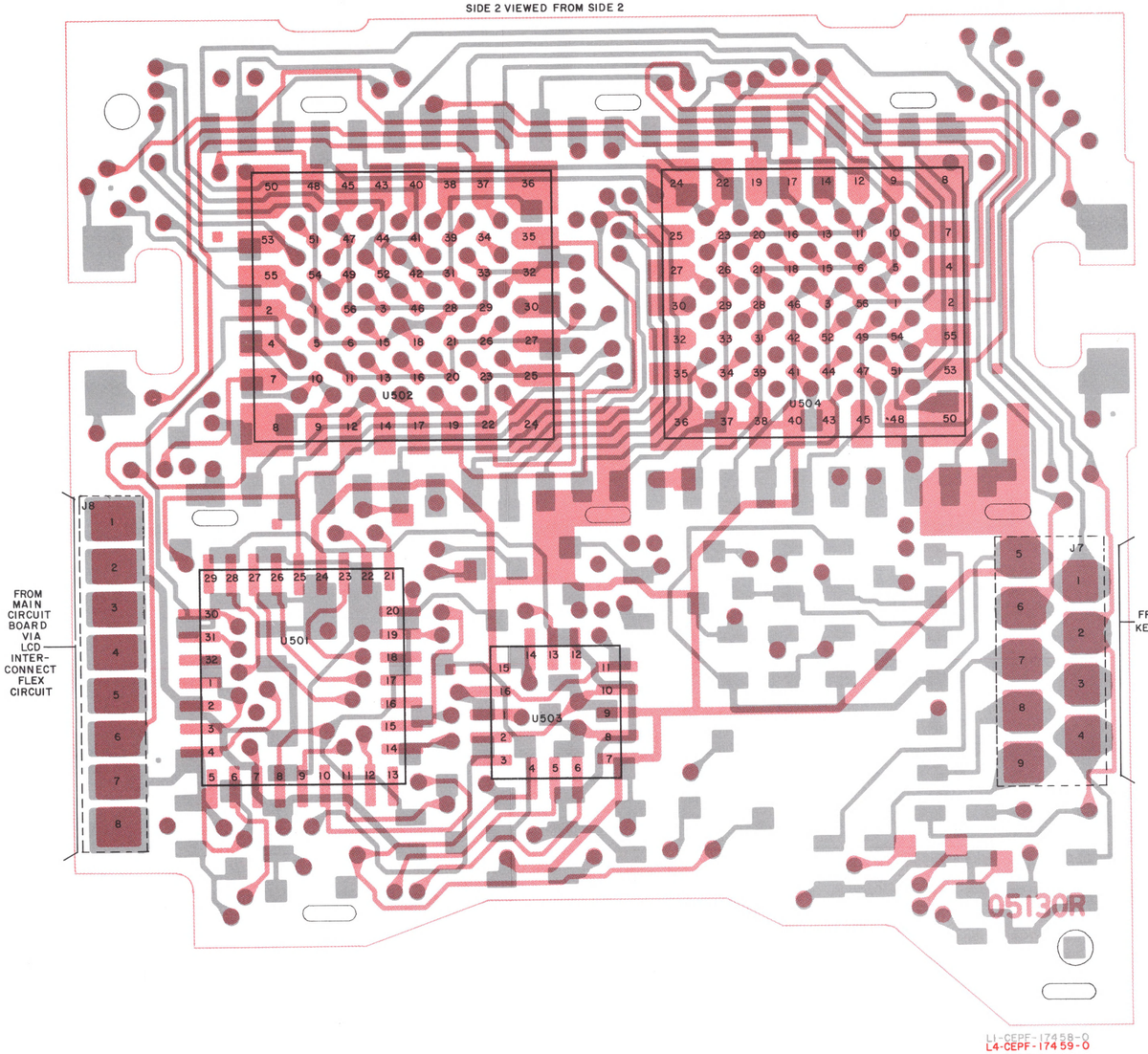


SIDE 1 VIEWED FROM SIDE 1



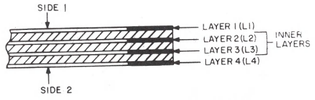
LI-CEPF-17455-0
L4-CEPF-17456-0
OL-CEPF-17457-0

SIDE 2 VIEWED FROM SIDE 2



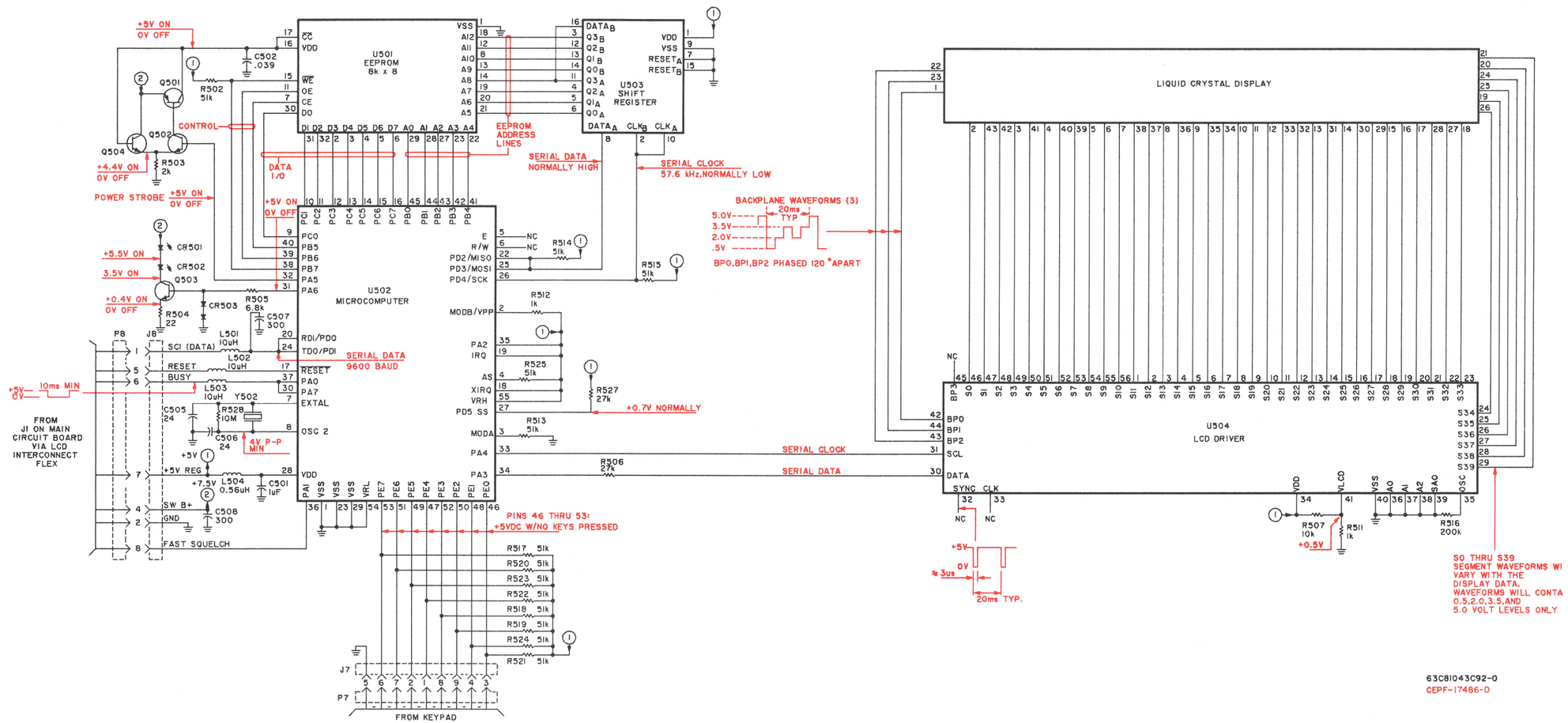
LI-CEPF-17458-0
L4-CEPF-17459-0
OL-CEPF-17460-0

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
		CAPACITOR, Fixed: pF±5%; 50V unless stated
C501	2362998B59	1uF±10%; 20V
C502	2160521C32	.039uF±10%; 25V
C503, 504	- - - - -	Not Used
C505, 506	2160520B10	24
C507, 508	2160520C12	300
		DIODE: See Note I
CR501, 502	4805729G27	LED, Yellow
CR503	4805129M06	Dual; SOT-23
		JACK:
J7	0905287C05	Socket, Printed Circuit (Keypad Switch)(9 req'd)
J8	0905287C05	Socket, Printed Circuit (LCD Interconnect)(8 req'd)
		COIL, RF: unless stated
L501 thru 503	2462575A07	Choke, 10uH
L504	2462575A09	Choke, 0.56uH
		TRANSISTOR: See Note I
Q501	4805128M29	PNP; BCX18 (LH)
Q502 thru 504	4805128M12	NPN; BCW60B (RH)
		RESISTOR, Fixed: Ω±5%;1/8W unless stated
R501	- - - - -	Not Used
R502	0660076A90	51k
R503	0660076A56	2k
R504	0660076A09	22
R505	0660076A69	6.8k
R506	0660076A83	27k
R507	0660076A73	10k
R508 thru 510	- - - - -	Not Used
R511, 512	0660076A49	1k
R513 thru 515	0660076A90	51k
R516	0660076F08	200k±1%
R517 thru 525	0660076A90	51k
R526	- - - - -	Not Used
R527	0660076A83	27k
R528	0660076H49	10M±10%
		CIRCUIT MODULE: See Note I
U501	0105953N82	EEPROM; 2k x 8
U502	0105953N07	Microcomputer, HCMOS
U503	0105953N09	Shift Register, CMOS
U504	0105953N10	LCD Driver
		CRYSTAL:
Y501	- - - - -	Not Used
Y502	4805664G39	3.6864MHz
NONREFERENCED ITEMS		
	7505440S01	PAD, Display Board

NOTES:

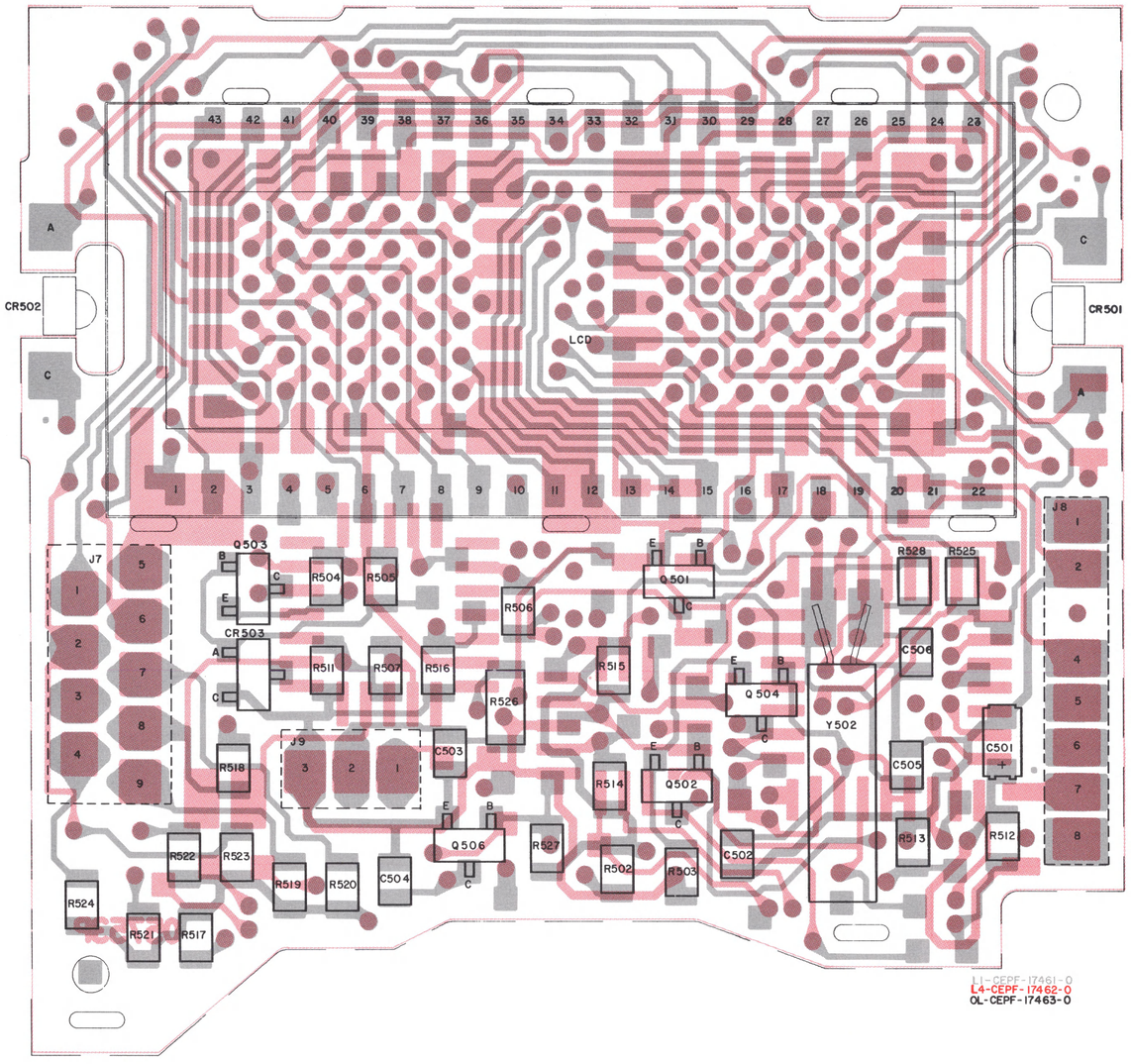
I. For optimum performance, order replacement diodes, transistors, and cir cuit modules by Motorola part number only.

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.

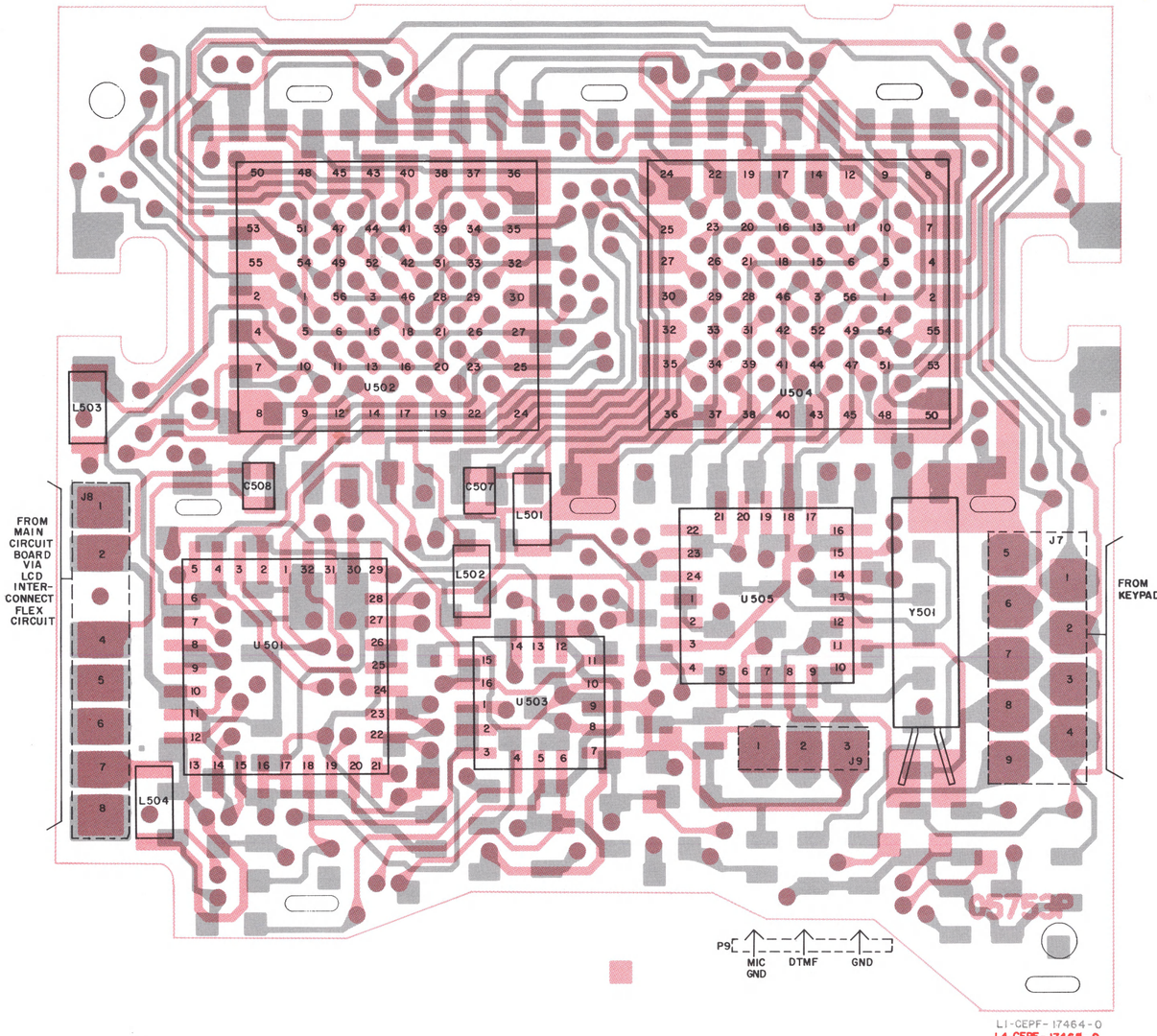
TEPF-17445-O

SIDE 1 VIEWED FROM SIDE 1



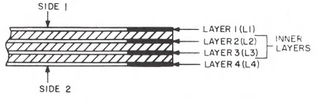
L1-CEPF-17461-0
L4-CEPF-17462-0
OL-CEPF-17463-0

SIDE 2 VIEWED FROM SIDE 2

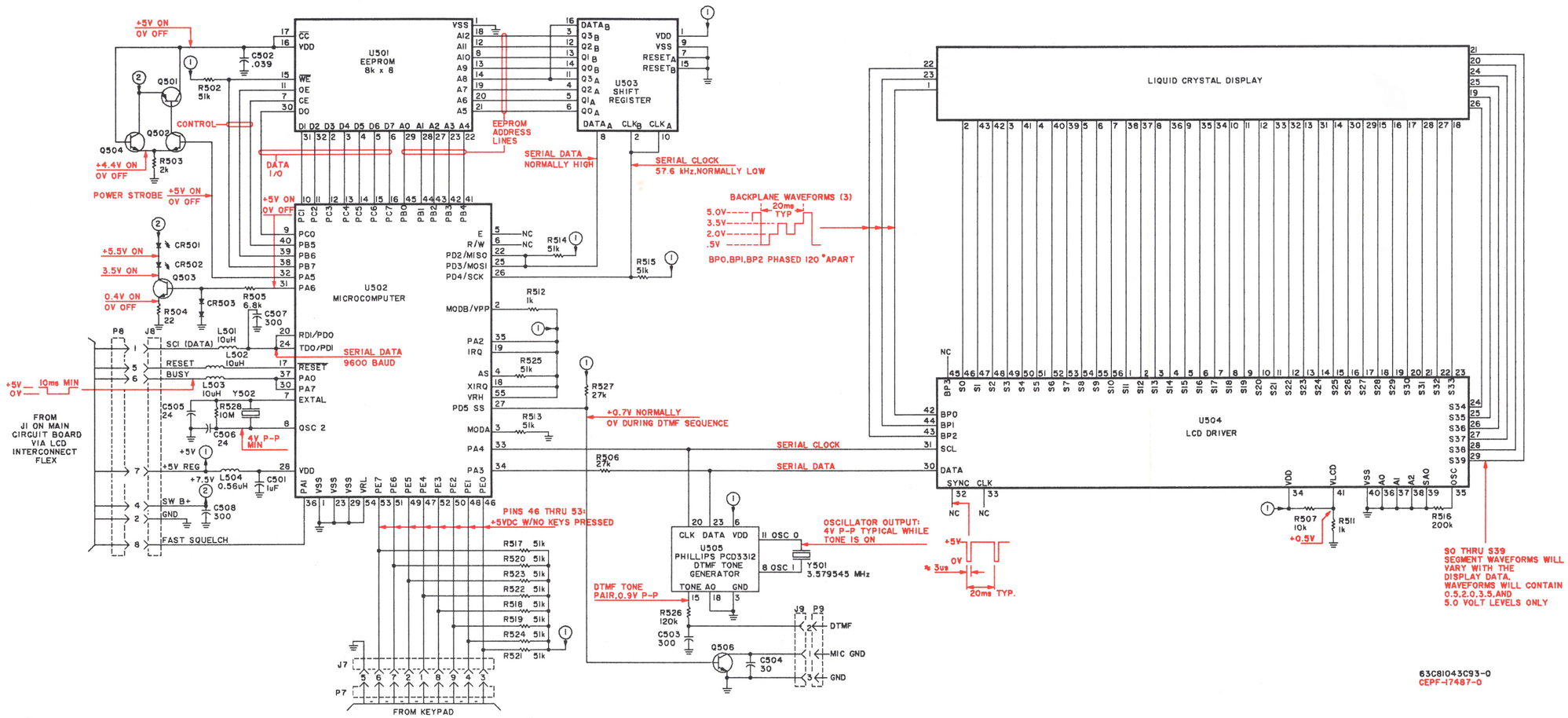


L1-CEPF-17464-0
L4-CEPF-17465-0
OL-CEPF-17466-0

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



AEPF-18099-0



SABER 8k Display Electrical Parts List

TPLF-3407-0

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