



MOTOROLA

"MX300-S" SERIES "Handie-Talkie" Portable Radios

136-174 MHz

SPECIFICATIONS

GENERAL

POWER SUPPLY: One rechargeable nickel-cadmium battery, or one primary (Mercury) battery (H23 & H33 only)

SIZE: 2.84" wide × 1.41" deep × "H" (see chart below) high (72mm × 36mm × "H" mm)

HEIGHT ("H"):	MX330-S Housing	MX340-S Housing	MX350-S Housing	MX360-S Housing
Radio Only	4.59" (117mm)	4.98" (127mm)	5.76" (146mm)	6.35" (161mm)
Radio with 1-hr. Rapid-Charge Battery:				
Light Capacity	6.06" (154mm)	6.45" (164mm)	7.23" (183mm)	7.82" (198mm)
Medium Capacity	6.43" (164mm)	6.82" (174mm)	7.60" (193mm)	8.19" (208mm)
High Capacity	8.15" (207mm)	8.54" (217mm)	9.32" (236mm)	9.91" (251mm)
Radio with 3500mAh Mercury Battery:				
	8.00" (204mm)	8.39" (214mm)	9.17" (233mm)	9.76" (248mm)

WEIGHT:

Radio Only (Carrier Squelch, 1W)	16.0 oz. (453g)		Batteries Only	
Add for Medium Power	0.5 oz. (14g)		1-hr. Rapid Charge	
Add for High Power	1.8 oz. (50g)	Mercury 17.2 oz. (489g)	Light Capacity	4.9 oz. (139g)
Add for "Private-Line" (PL)	0.5 oz. (14g)		Medium Capacity	7.8 oz. (220g)
Add for "Digital Private-Line" (DPL)	1.7 oz. (49g)		High Capacity	13.3 oz. (377g)

Weights and dimensions are typical and subject to variation depending upon housing size and model configuration.

TRANSMITTER

RF Power Output – (7.5V Nickel-Cadmium Battery): 1W, 2.5W, 6.0W

Frequency Stability: (–30°C to +60°C; +25°C Ref.): ±0.0005%

Modulation: (±5kHz for 100% modulation at 1000Hz): 16F3

FM Noise – (Companion Receiver Method): –50dB

Audio Response: (6dB/octave pre-emphasis from 300 to 3000Hz): +1, –3dB

Audio Distortion – (at 1000Hz, 3kHz deviation): 3%

Spurious/Harmonics –

1W: –67/–67dB 2.5W: –71/–71dB 6.0W: –75/–65dB

Maximum Frequency Separation: 6MHz

Current Drain – (with 7.5V Supply):

740mA (1W) 1290mA (2.5W) 2660mA (6.0W)

CHANNEL EXPANSION OPTIONS

CHANNEL SELECTOR (OPTION)	ZONE SWITCH (OPTION)			
	None	2-Pos. (H256)	3-Pos. (H257)	4-Pos. (H258)
4-Position (None)	4	8	12	16
6-Position (H252)	6	12	18	24
8-Position (H253)	8	16	24	32
10-Position (H254)	10	20	30	40
12-Position (H255)	12	24	36	48

RELATED PUBLICATIONS AVAILABLE SEPARATELY

Operating Instructions	68P81022C05
Theory/Maintenance Manual	68P81013C70

RECEIVER

Frequency Stability: (–30°C to +60°C; +25°C Ref.): ±0.0005%

Channel Spacing: 30kHz

Modulation Acceptance: ±7.0kHz

Spurious & Image Rejection: 80dB

Audio Output – (at less than 5% distortion): 500mW

Current Drain – (with 7.5V Supply): 194mA (500mW Audio) 43mA (Standby)

Sensitivity:

	Std.	RF Preamp Option
20dB Quieting:	0.50uV	0.25uV
12dB SINAD:	0.35uV	0.18uV
Squelch/PL:	0.25uV	0.13uV

Maximum Frequency Separation –

No Degradation: 4MHz 1dB Sensitivity Degradation: 6MHz

Selectivity (EIA SINAD):

Adjacent Channel:	–80dB	–80dB
Alternate Channel:	–85dB	–85dB
Fourth Channel:	–90dB	–90dB

Intermodulation (EIA SINAD): –80dB –75dB

*Add 4mA for "Private-Line" Models.

STANDARD MODELS

MODEL	Carrier Sq.	Tone "Private-Line"	"Digital Private-Line"
1W (H23SSU-)	1140A	3140A	6140A
2.5W (H33SSU-)	1140A	3140A	6140A
6W (H43SSU-)	1140A	3140A	6140A

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

SAFETY INFORMATION

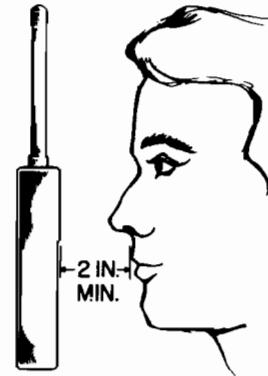
The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic energy safety standard which applies to the use of this equipment. Proper use of this radio will result in exposure below the OSHA limit.

DO NOT hold the radio such that the antenna is very close to, or touching, exposed parts of the body, especially the face or eyes, while transmitting. The radio will perform best if the microphone is two or three inches away from the lips and the radio is vertical.

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

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

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



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FACTORY MUTUAL (FM) APPROVED

All standard "MX300-S" Series portable radios are FM approved as intrinsically safe and non-incendive.

FCC REGULATIONS

State that:

1. Radio transmitters may be tuned or adjusted only by persons holding a general radiotelephone operator license or by personnel working under their immediate supervision.
2. The rf power output of a radio transmitter shall be no more than that required for satisfactory technical operation considering the area to be covered and the local conditions.
3. Frequency and deviation of a transmitter must be checked before it is placed in service and rechecked once each year thereafter.

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FCC DESIGNATIONS

1W AZ489FT3614 2.5W AZ489FT3615 6W AZ489FT3616

COMPUTER SOFTWARE COPYRIGHTS

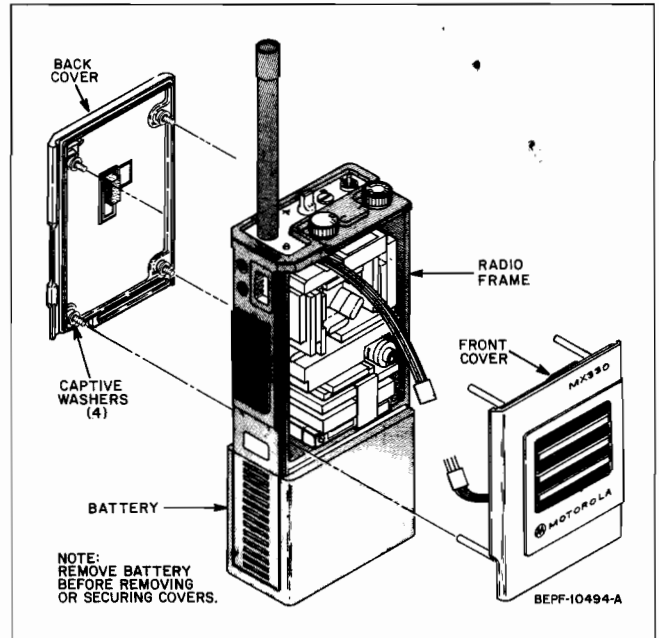
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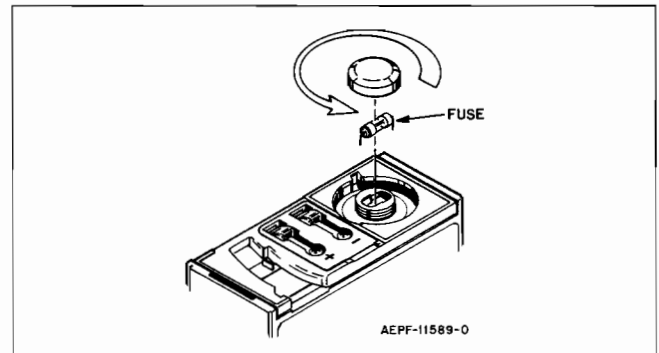
DISASSEMBLY PROCEDURE

To gain access to both sides of the printed circuit board for troubleshooting and module removal, only the front and rear covers need to be removed. Turn the radio off and remove the battery before disassembly, reassembly, and module replacement.

1. Loosen the four captive screws on the back cover until the back cover is free.
2. Remove the back cover and note the captive washers on each screw. Do not remove or loosen these washers as they prevent excessive pressure from being applied to the back cover by the front cover studs when the front and rear covers are secured in place.
3. Carefully lift the front cover away from the frame.
4. Unplug the front cover assembly to completely free the cover from the radio frame. If necessary, the cover assembly may be left interconnected to the radio during troubleshooting.
5. Should removal of the four layer printed circuit board be required, unsolder the battery B+, B- leads, and the antenna jumper wires connecting the antenna jack to the printed circuit board. Carefully spread out the sides of the frame and remove the printed circuit board from its mounting position.
6. When reassembling the radio, use care to replace the printed circuit board, and resolder all connections. Also use care when replacing the front and rear covers. Slide the front cover straight into the frame. Align the rear cover over the radio and tighten all four screws. Make sure that all modules are properly seated and the leads and contour pad do not interfere with the proper closure of the covers. Proper cover to frame seating is required for adequate water sealing of the radio.



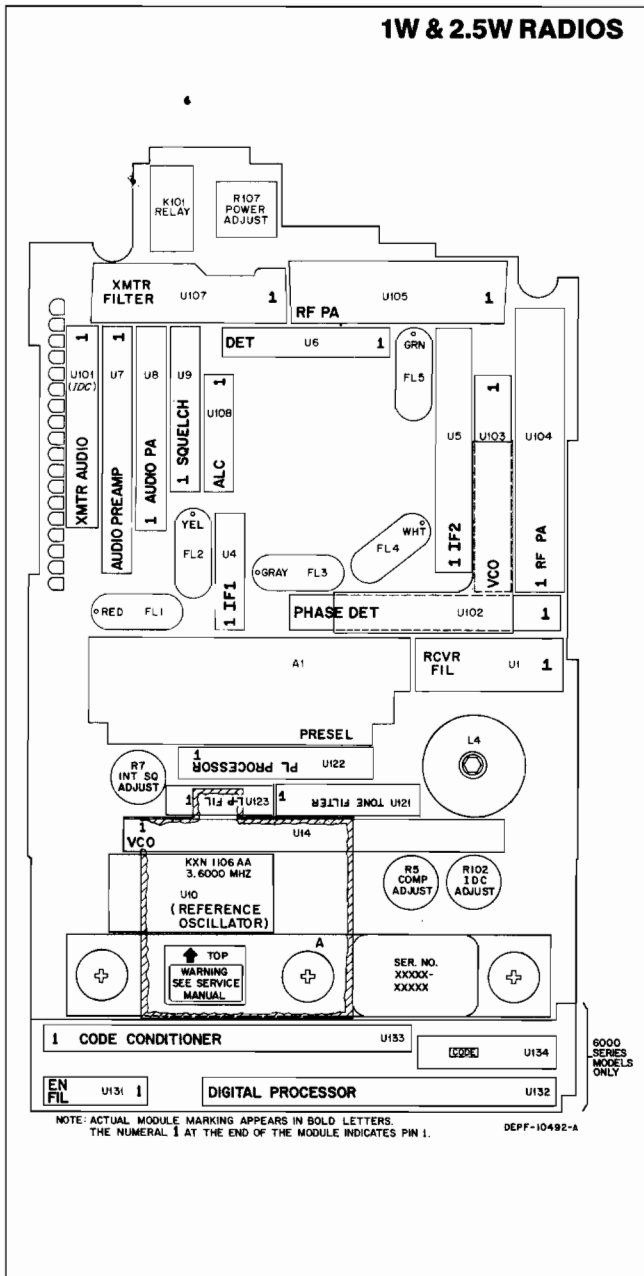
Radio Disassembly Detail



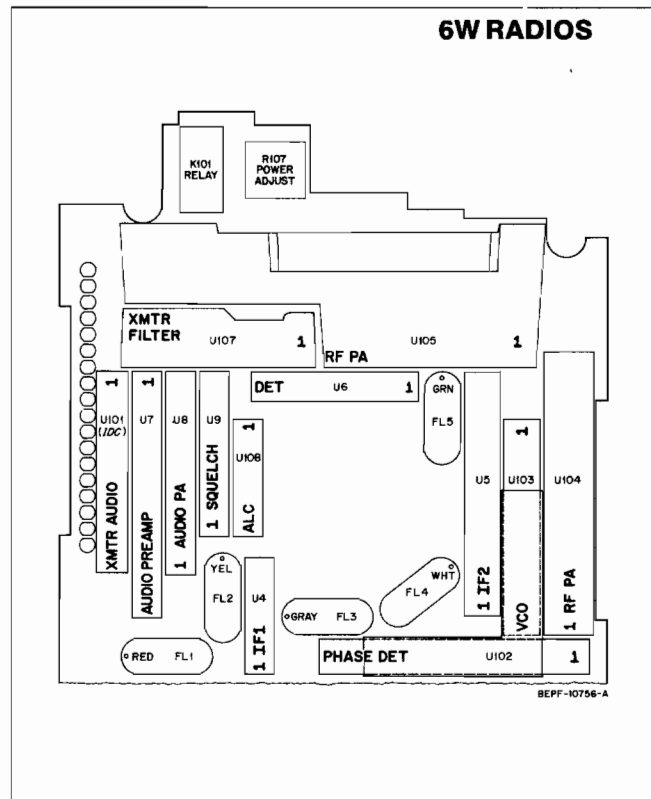
Fuse Installation/Replacement

MODULE LOCATIONS & REMOVAL INSTRUCTIONS

1W & 2.5W RADIOS



6W RADIOS



CAUTION

Use the module pusher tool and remove modules with care. Avoid bending pins. Modules A2, U132, and U133 contain MOS devices which are susceptible to damage in handling due to static discharge. Handle with grounded tools and transport in conductive foam or a metallic tray. See MOS circuits handling precautions in the Theory/Maintenance manual.

MODULE	REMOVAL PROCEDURE
PRESELECTOR AND TRANSMITTER FILTER U107	REMOVE THE THREADED NUTS SECURING THE MODULE TO THE BOARD. THEN PRESS ON THE THREADED STUDS AND PULL THE MODULE STRAIGHT OUT FROM THE COMPONENT SIDE.
REFERENCE OSCILLATOR U10	PUSH ON THE GUIDE PIN AND THE COIL FORM FROM THE SOLDER SIDE OF THE BOARD USING MODULE PUSHER ST-1179. THEN GRASP THE MODULE WITH SEIZERS AND PULL STRAIGHT OUT FROM THE COMPONENT SIDE.
U105, U122, U131, U132, AND U133	GRASP THE MODULE WITH SEIZERS AND PULL STRAIGHT OUT. OBSERVE MOS CIRCUIT HANDLING PRECAUTIONS IN THEORY/MAINTENANCE MANUAL.
CONTROLLER/PHASE DETECTOR A2; INCLUDES U11 AND U13	LOOSEN THE THREE CAPTIVE SCREWS SECURING THE MODULE TO THE BOARD. DO NOT REMOVE THE CAPTIVE SCREWS FROM THE SUPPORT PLATE. THEN, USING MODULE PUSHER ST-1179, PUSH ON THE TWO GROUND PINS TO REMOVE THE MODULE FROM THE COMPONENT SIDE. (NOTE: IF MODULE DOES NOT FALL OUT EASILY, LOOSEN THE THREE SCREWS MORE UNTIL THE MODULE GROUND PINS CAN BE EASILY PUSHED OUT.)
MEMORY MODULE U12	LOOSEN THE THREE CAPTIVE SCREWS SECURING THE MEMORY MODULE COVER TO ASSEMBLY A2. DO NOT REMOVE THE CAPTIVE SCREWS FROM THE COVER. WITH THE SCREWS LOOSE, THE MEMORY MODULE COVER, INSULATOR, AND PC BOARD ASSEMBLY CAN BE REMOVED BY LIFTING STRAIGHT UP. (CAUTION: CARE SHOULD BE TAKEN NOT TO TOUCH OR DAMAGE THE EXPOSED MULTI-FLEX CONNECTOR.) REFER TO THE "DISASSEMBLY" SECTION IN THE THEORY/MAINTENANCE MANUAL (68P81013C70) FOR ADDITIONAL INFORMATION.
ALL OTHER MODULES	PUSH ON THE GUIDE PINS FROM THE SOLDER SIDE OF THE BOARD USING THE MODULE PUSHER ST-1179. THEN GRASP THE MODULE WITH SEIZERS AND PULL STRAIGHT OUT FROM THE COMPONENT SIDE.

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ALIGNMENT

1. GENERAL

Radios are aligned at the factory to provide peak performance. Realignment may be required if components are replaced or aged. To perform these procedures, it is only necessary to remove the front and back covers of the radio, as described in the "Disassembly Procedure."

Refer to the Main Circuit Boards layout diagrams for the location of adjustments. A special alignment procedure for radios with wide channel spacing (greater than 4MHz) is given in the Theory/Maintenance Manual 68P81013C70).

RECOMMENDED TEST EQUIPMENT AND SERVICE AIDS

EQUIPMENT IDENTIFICATION	APPLICATION
Motorola R-1200 Service Monitor	Signal generator and frequency-deviation meter
Motorola S-1053 AC Voltmeter	AC and audio measurements
Motorola S-1063 DC Multimeter	DC voltage, current, and resistance measurements
Motorola S-1350 Wattmeter	Transmitter power-output measurements
Motorola S-1067 Oscillator	Generates tones for PL and Tone Signalling
Motorola ST-1175 Dummy Battery Block	Connects radio to bench 7.5V power supply
Motorola NKN6222 Tune-Up Cable and S-1349 MX300 Portable Test Set or Motorola RTX4005 "Handie-Talkie" Test Set and RTK4021 Test Cable	Connects test equipment to the antenna jack on the radio and also enables convenient connections to the accessory jack; includes switching functions. Enables convenient connections to the accessory jack; includes switching functions.
Motorola ST-1180 RF Jack Wrench/Preselector Spanner Wrench	To remove the antenna jack and the nuts securing the preselector to the printed circuit board
Motorola SLN6413 DPL Test Set	Encodes and decodes digital PL signals
Motorola S-1347 Power Supply	Provides DC voltage to radio
Motorola T-1013 Dummy RF Load	Transmitter power-output measurements
Motorola R-1004 Oscilloscope	Waveform measurements
Motorola R-1013 SINAD Meter	Receiver performance testing
Motorola R-1801 Programmer	Programming code plugs and memory modules

2. PHASE-ON-OR-NEAR RADIOS

A Phase-on-or-Near MX300-S radio is one which is shipped from the factory tuned to a transmit frequency and a receive frequency close to the center of the expected operating range. These test frequencies are noted on the orange CAUTION label attached to the side of the radio. After the radio has been aligned to the customer FCC licensed operating frequencies, the CAUTION label should be removed.

a. Operational Checkout at Phase-on-or-Near Frequencies

- (1) Turn radio off.
- (2) If radio has a zone switch, set it to position B.
- (3) Set the frequency-select switch to position 6. If radio is a four-frequency unit, set the frequency-select switch between detents.
- (4) Turn radio on.
- (5) Check the receiver and transmitter on the frequencies listed on the orange CAUTION label attached to the unit.

b. Alignment On Licensed Channels

- (1) Remove battery from unit.
- (2) Remove front and back covers.
- (3) Remove wire jumper between Y7 and Y13 located on the solder side of the PC board.
- (4) Remove the memory module, U12, and program it to the licensed operating frequencies. Use the "expand" mode, as given in the R1801 Field Programmer manual.
- (5) Replace the programmed memory module. Align the arrow on the top of the module toward the top of the radio.
- (6) Use a torque screwdriver to tighten the three screws on the memory module to 2 inch-pounds.
- (7) Proceed to the Synthesizer Adjustment Procedure paragraph and align the synthesizer.

NOTE

The synthesizer adjustment must be performed before the unit is aligned. The synthesizer may fail to lock at edge frequencies if the channel spacing is greater than 6MHz and the unit is to be operated at temperature extremes markedly different from those at which it was aligned.

3. SYNTHESIZER ADJUSTMENT

Synthesizer adjustment requires tuning of L4 (VCO) coil to ensure that the synthesizer will lock on each channel under conditions of varying battery voltage and temperature changes.

The maximum frequency spread that the VCO can tune is 6MHz (lowest-receive to highest-receive, lowest-transmit to highest-transmit, or receive-to-transmit frequency spread).

- To adjust L4, monitor the VCO control voltage (pin 12 of U14) with a dc voltmeter. Set the frequency to the **lowest receive frequency (LRF)**. Adjust L4 until the control voltage is as close as possible to 1.4V, but not less than 1.4V (remove the tuning tool when taking a voltage reading).
- Set the frequency to the **lowest transmit frequency (LTF)**, key the transmitter (into a 50Ω load) and check the control voltage. If the voltage is less than 1.4, readjust L4 for a reading of 1.4V.
- Next, check the highest receive frequency and the highest transmit frequency. The control voltage should not be greater than 4.75V ($1.4 < V_{dc} < 4.75$).

4. RECEIVER ALIGNMENT

Preliminary Adjustments:


1. Turn PL switch off (if applicable).
2. Set squelch control (R311 or R7) to maximum ccw position.
3. Set the frequency select switch to the channel nearest the center of $(F_L + F_H)/2$, where F_L = lowest frequency in band and F_H = highest frequency band. Refer to the frequency designation label found on the inside back cover.
4. Turn preselector slugs Z1 thru Z4 until they are flush with the circuit board.
5. Turn preselector slugs Z5 thru Z7 to their maximum cw position.

STEP	PROCEDURE	MEASURED AT	USING	NOTES
1	Adjust L4 (VCO coil) to lock synthesizer to injection frequency	Pin 12 of U14	Oscilloscope or High Impedance DC Voltmeter	See Synthesizer Adjustment Procedure
2	Check to see if $f_{vco} = (f_c - 21.4 \text{ MHz}) / 2$	Pin 7 of U14	Frequency Counter or Service Monitor	
3	If $f_{vco} \neq (f_c - 21.4 \text{ MHz}) / 2$, adjust warp coil of U10 to correct frequency	Pin 7 of U14	Frequency Counter or Service Monitor	
4	Set frequency select switch to highest frequency in band	Pin 12 of U14	Oscilloscope or DC Voltmeter	Voltage should be $< 4.75 \text{ Vdc (max.)}^*$
5	Repeat step 2			
6	Set frequency select switch to lowest frequency band	Pin 12 of U14	Oscilloscope or DC Voltmeter	Voltage should be $> 1.4 \text{ Vdc (min.)}^*$
7	Repeat step 2			
8	Return to channel setting in step 3 of preliminary adjustments			
9	Adjust Z5 & Z6 out two turns for increase in Vdc	M2	DC Voltmeter (DC Multimeter)	Repeat until Vdc increase occurs
10	Adjust Z5, Z6, & Z7 for maximum Vdc (0.8 V min.)	M2	DC Voltmeter (DC Multimeter)	Do not repeat
11	Adjust Z1, Z2, Z3, & Z4 for lowest quieting voltage	J402 pin 10 to pin 2 (Accessory connector)	AC Voltmeter with 1:1 isolation transformer	Inject carrier freq. at J401 to produce 20 dB quieting. While tuning Z1 thru Z4, adjust the input to maintain 20 dB quieting.
20 dB QUIETING TEST				
1	Adjust volume control for 1.73 Vac noise out	J402, pin 10 to pin 2	AC Voltmeter with 1:1 isolation transformer	Establishes reference noise level for no signal input
2	Adjust signal generator to carrier frequency, 0 output level	Gen. output connector	Signal Generator on Service Monitor	Connect signal gen. to J401 (Ext. Ant. Jack)
3	Adjust signal generator output level slowly until noise decreases 20 dB	J401, pin 10 to pin 2	AC Voltmeter with 1:1 isolation transformer	Signal must be less than 0.5 μV (0.25 μV with H903AA RF Preamp Option)
INTERNAL SQUELCH ADJUSTMENT				
	Adjust R7 until audio noise just stops	Speaker		Threshold squelch

*If these voltages are not obtained, refer to Synthesizer Adjustment Procedure.

5. TRANSMITTER ALIGNMENT

Measurements are made with transmitter keyed and a 50Ω load connected to J401.

STEP	PROCEDURE	MEASURED AT	USING	NOTES
1	Set frequency select switch to $(F_L + F_H) / 2$, where F_L = lowest freq. in band F_H = highest freq. in band			
2	Check to see if $f_{vco} = f_c / 3$	Pin 9 of U14	Frequency Counter or Service Monitor	
3	Set frequency select switch to highest frequency in band	Pin 12 of U14	Oscilloscope or DC Voltmeter	Voltage should be < 4.75 Vdc (max.)*
4	Repeat step 2			
5	Set frequency select switch to lowest frequency in band	Pin 12 of U14	Oscilloscope or DC Voltmeter	Voltage should be > 1.4 Vdc (min.)*
6	Repeat step 2			
7	Return to channel setting in step 1			
8	Adjust R107 for the following power levels: H23SSU- : 1 W H33SSU- : 2.5 W H43SSU- : 6 W	J401 DC supply	Wattmeter Ammeter (DC Multimeter)	DC current should not exceed the following limits: H23SSU- : 740 mA H33SSU- : 1290 mA H43SSU- : 2660 mA
9	Adjust R102 for an audio deviation of ±5 kHz	Radiated J402	Service Monitor Audio Oscillator	Set to 1 kHz, 0.025 V
10	For PL/DPL models, set service monitor to $(F_L + F_H) / 2$		Service Monitor	
10A	Remove U121 (PL) or U131 (DPL)			
10B	Inject a 1 V (p-p), 20 Hz, square wave	I4 or pin 2 of U131	Square-Wave Generator	
10C	Adjust R5 to compensate for any initial droop in square wave	Radiated	Service Monitor  compensated under compensated over compensated	
10D	Replace U121 (PL) or U131 (DPL) and recheck deviation	Radiated	Service Monitor	
10E	Inject a 1 kHz audio tone into test box and adjust R102 for ±5 kHz deviation with PL/DPL modules in circuit	Radiated	Audio Oscillator (set to 1 kHz, 0.025 V) Service Monitor	

*If these voltages are not obtained, refer to Synthesizer Adjustment Procedure.

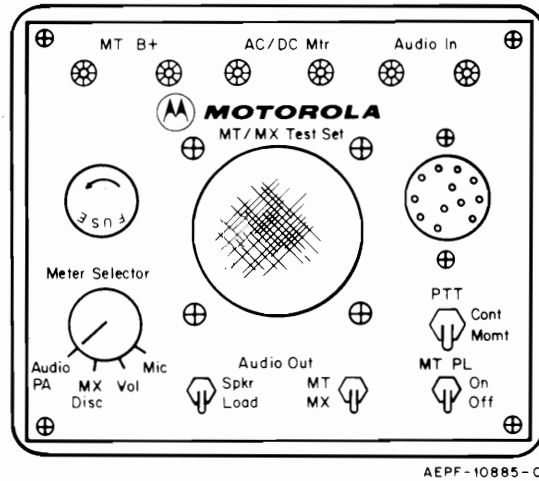
**TYPICAL TEST AND ADJUSTMENT PROCEDURES
FOR "MX300-S" SERIES RADIOS USING RTX4005 "HANDIE-TALKIE" TEST SET**

TEST OR ADJUSTMENT	B +	AC/DC METER	AUDIO IN	METER SELECTOR	SPKR LOAD	A B	MT PL	PTT
Receiver Alignment	Not Used	To ac voltmeter	Not Used	AUDIO PA	Any	B	Not Used	Center
NOTE: Receiver audio output measured on ac voltmeter. Adjust for best quieting.								
Receiver Sensitivity	Not Used	To ac voltmeter or SINAD Meter	Not Used	AUDIO PA	Any	B	Not Used	Center
NOTE: Receiver audio output measured on ac voltmeter. Check for 20 dB quieting or 12 dB SINAD.								
Receiver Audio Output	Not Used	To ac voltmeter	Not Used	AUDIO PA	Any	B	Not Used	Center
NOTE: Apply a 1000 μ V on-frequency carrier modulated with 1000 Hz tone at ± 3 kHz deviation to the radio. Set VOLUME control to maximum. The ac voltmeter should indicate no less than 3.74 Vac.								
Transmitter Frequency and Power Output	Not Used	Not Used	Not Used	Any	Any	B	Not Used	CONT or MOMT
NOTE: Makes it possible to key transmitter for test purposes.								
Transmitter Deviation Adjustment	Not Used	To ac voltmeter	Audio Osc. at 1000 Hz and 25 mV	MIC	Any	B	Not Used	CONT or MOMT
NOTE: Adjust "IDC" for ± 5 kHz deviation.								
Transmitter Modulation Sensitivity	Not Used	To ac voltmeter	Audio Osc. at 1000 Hz and 3.5 mV	MIC	Any	B	Not Used	CONT or MOMT
NOTE: With PL tone filter removed, deviation should be no less than ± 3 kHz.								
Discriminator Output Measurement	Not Used	To ac voltmeter and then to dc voltmeter	Not Used	DISC	Any	B	Not Used	Center
NOTE: ACVM should indicate 250 to 400 mV of noise (audible from speaker) or recovered audio if 1000 μ V carrier frequency is applied with a 1000 Hz tone at ± 3 kHz deviation. The dc voltmeter should indicate 1.2 to 1.8 Vdc with no carrier applied.								
Audio Filter and Regulator Module U7 Output Check	Not Used	To ac voltmeter	Not Used	VOL	Any	B	Not Used	Center
NOTE: Apply a 1000 μ V on-frequency carrier modulated with 1000 Hz tone at ± 3 kHz. The ac voltmeter should indicate an output of more than 62 mV ac.								
To inject audio into Audio Power Amplifier	Not Used	To ac voltmeter	Audio Osc. at 1000 Hz and 40 mV	VOL	Any	B	Not Used	Center
NOTE: Apply a 1000 μ V on-frequency carrier (unmodulated) to the radio. Set audio oscillator level to 40 mV. Adjust volume control to maximum. Verify 3.74 Vac minimum (rated audio output) is available at output.								
Microphone Output Measurement	Not Used	To ac voltmeter	Not Used	MIC	Any	B	Not Used	Center
NOTE: Key transmitter with PTT switch on <i>radio</i> . Ac voltmeter measures microphone output. A loud whistle or "four" into microphone should cause a meter indication of 25 mV minimum.								

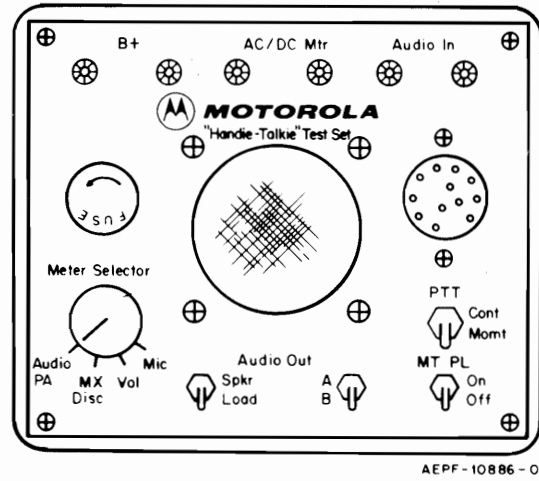
*An early version of the RTX4005 "Handie-Talkie" Test Set has some differences in labeling. See RTX4005 diagrams.

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RTX4005 TEST SETS

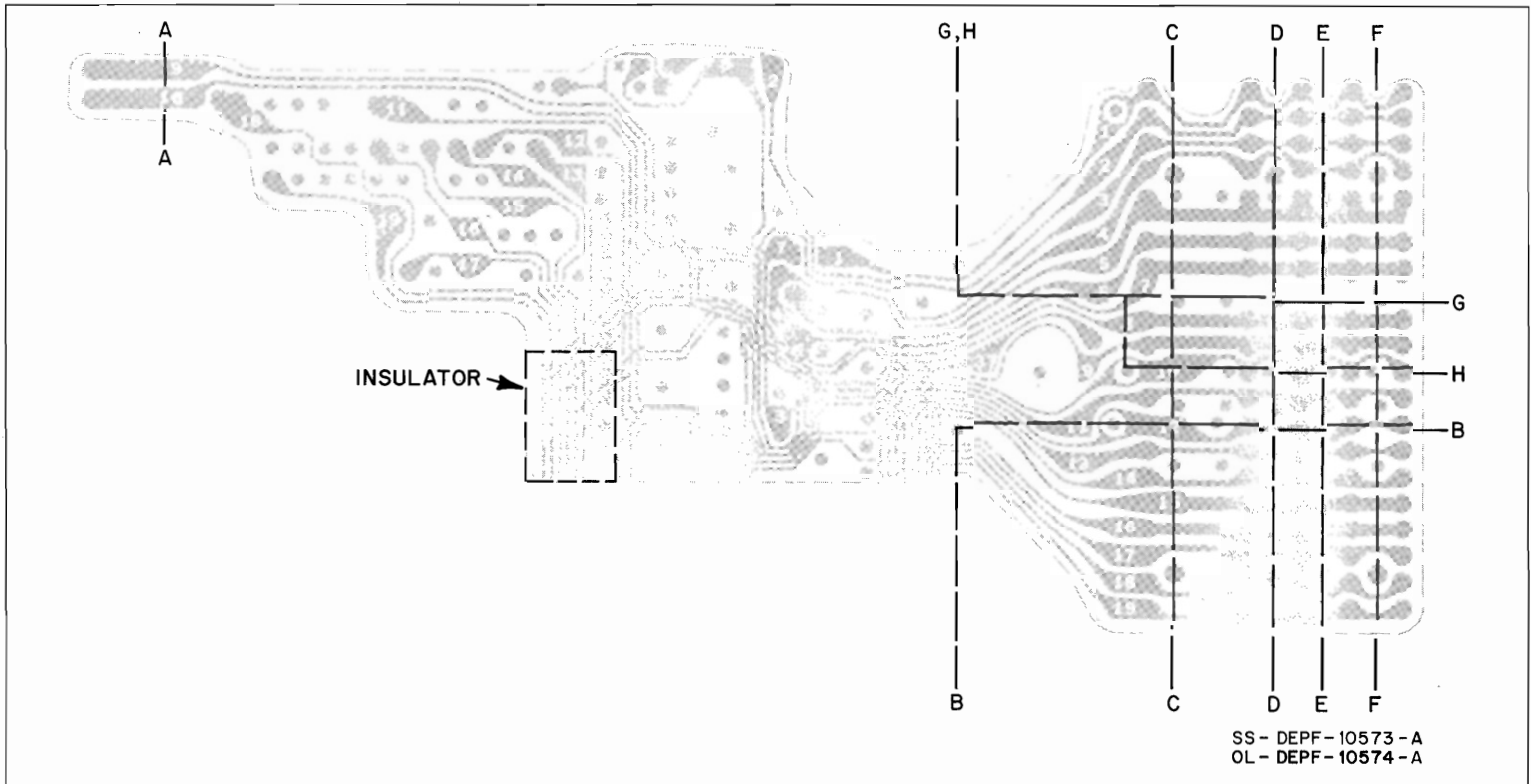


EARLY VERSION

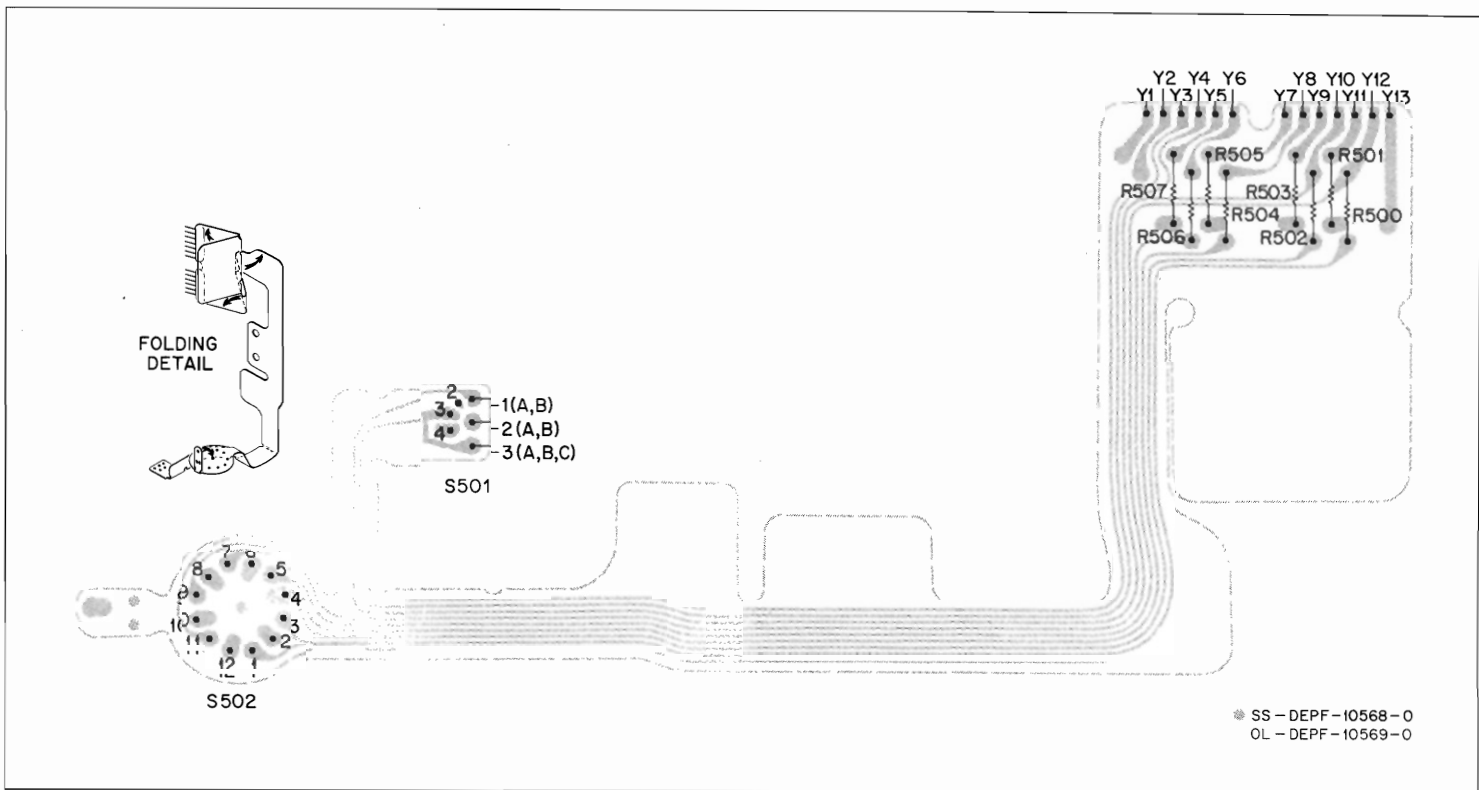


CURRENT VERSION

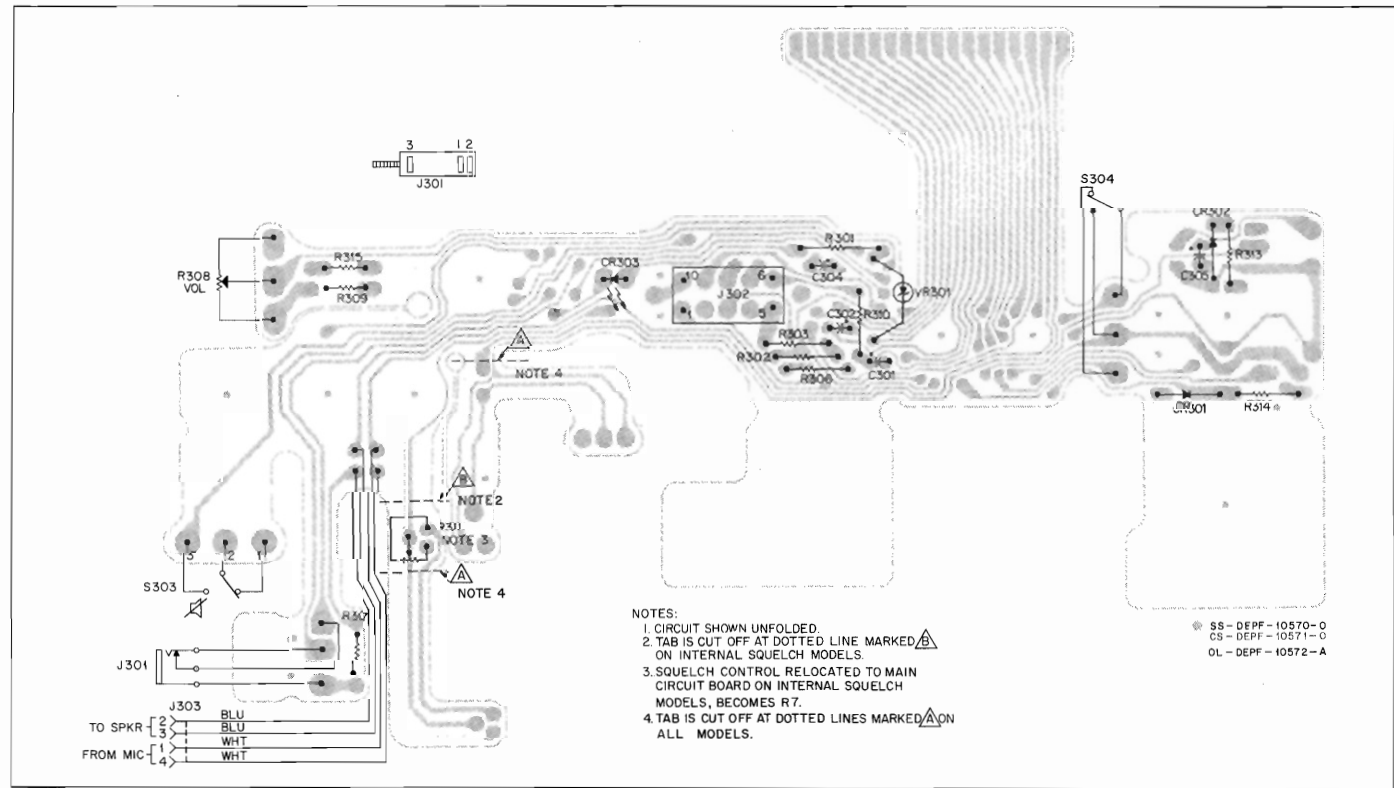
OPTION FLEXIBLE CIRCUIT
(NLN7562A)



FREQUENCY SELECT FLEXIBLE CIRCUIT
(NLN7291A, NLN7292A, NLN7293A, NLN7294A)



CONTROL FLEXIBLE CIRCUIT
(NLN7561A & NLN7561A-1)



NOTES:

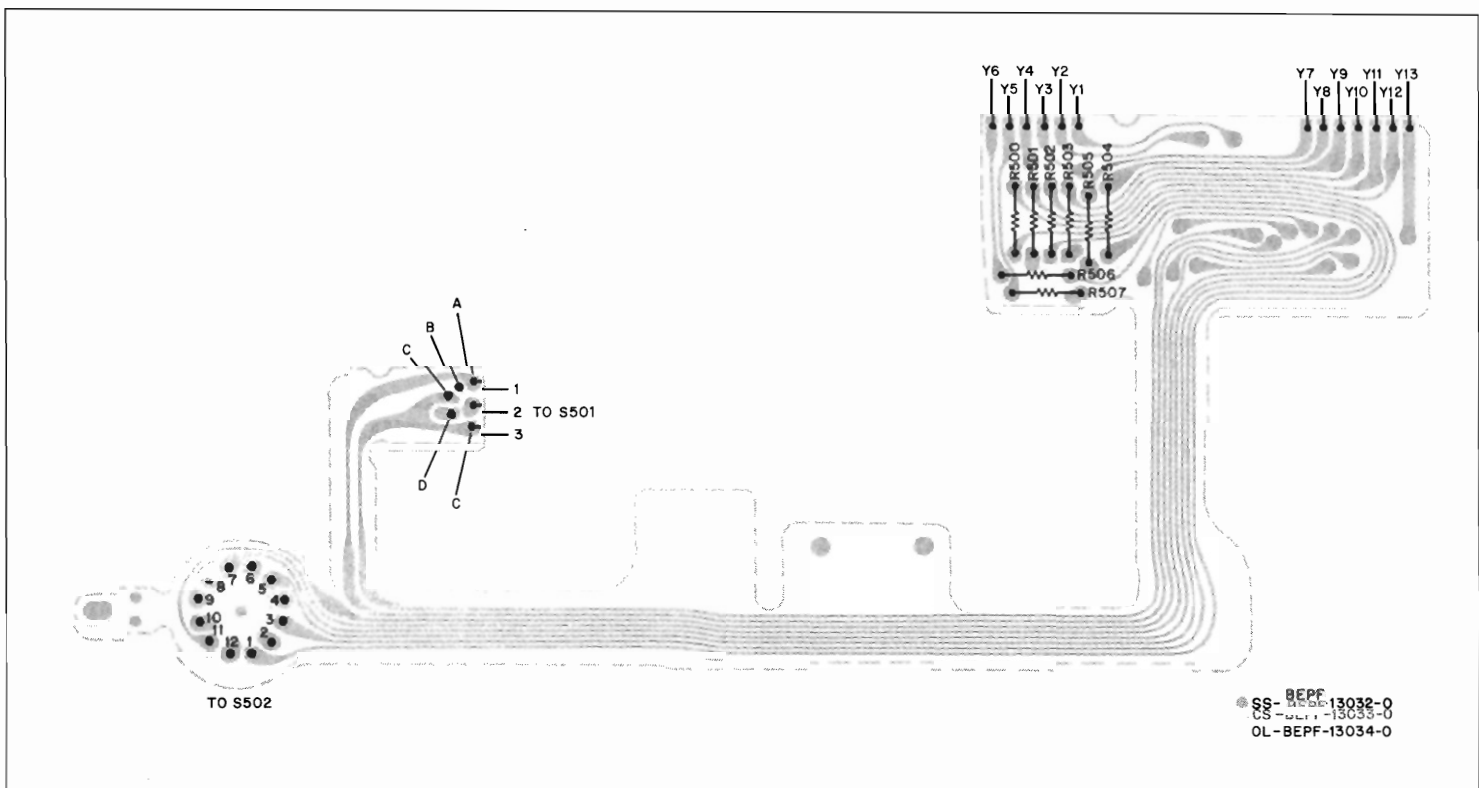
1. The numbered terminals on the option flex circuits connect to the corresponding number (prefixed with the letter "I") on the circuit boards and schematic diagrams.
2. Cut circuit as follows:

POINT CUT ON CIRCUIT	APPLICATION
A-A	ALL 1W, 2W, and 2.5W RADIOS
B-B	WHEN RADIO CONTAINS ONLY THE "DIGITAL PRIVATE-LINE" BOARD AT THE BOTTOM
C-C	WHEN RADIO CONTAINS ANY SINGLE BOARD ADDED TO THE RADIO
D-D	WHEN RADIO CONTAINS A 2-UNIT BOARD FOLLOWED BY ANY OTHER OPTION BOARD
E-E	WHEN RADIO CONTAINS A 3-UNIT BOARD FOLLOWED BY ANY OTHER OPTION BOARD
F-F	WHEN RADIO CONTAINS THREE 2-UNIT OPTION BOARDS
G-G	WHEN RADIO CONTAINS UNIT ID ONLY
H-H	WHEN RADIO CONTAINS UNIT ID/EMERGENCY OR MANUAL ID ONLY. (ALSO INSTALL WIRE JUMPER FROM I37 TO PIN 12 OF ENCODER BOARD)

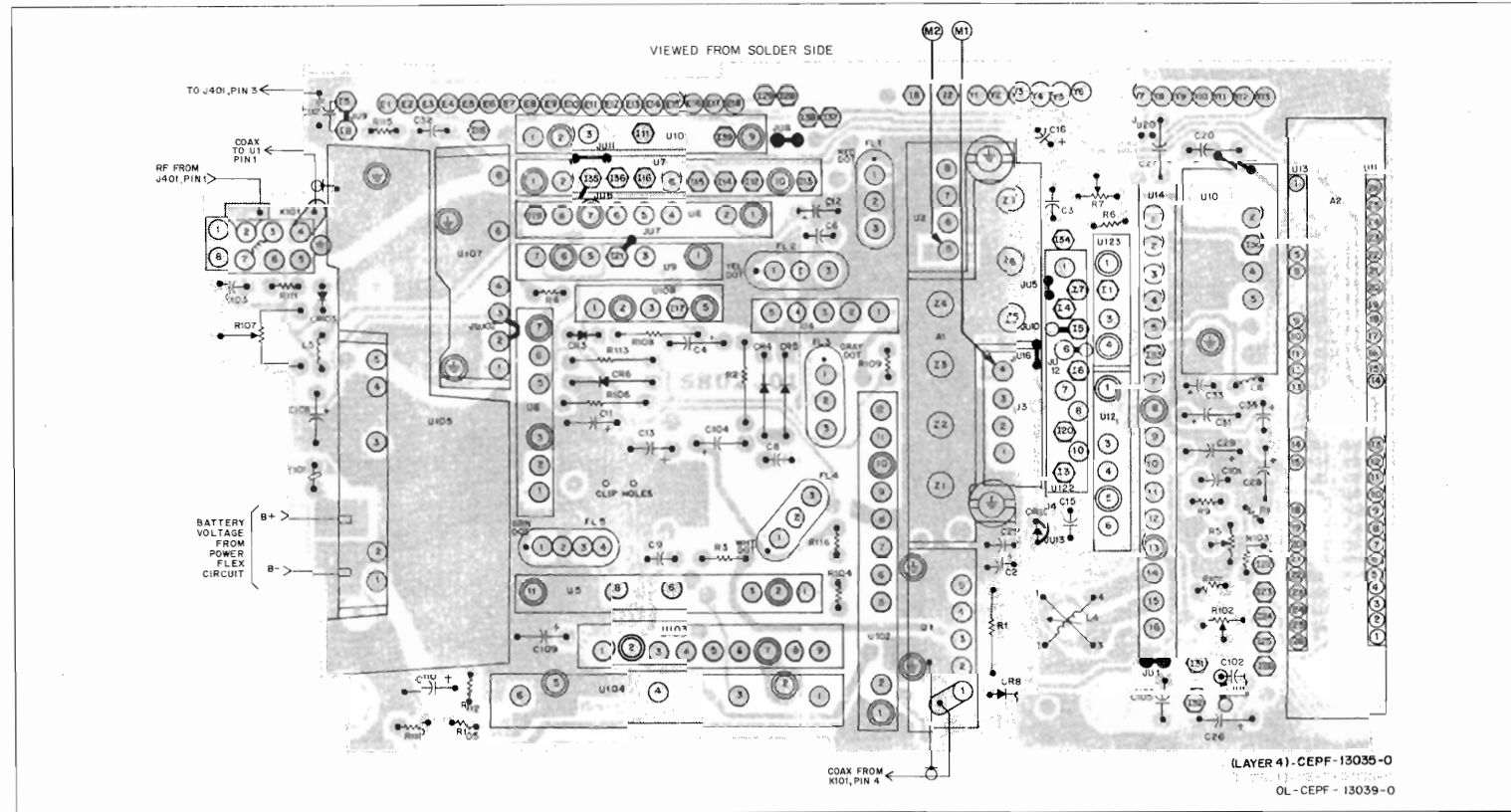
WHEN THE CIRCUIT IS CUT, THE EDGE MUST BE SEALED. FOLD A THIN STRIP OF MYLAR TAPE OVER THE CUT EDGE AND PRESS TIGHT ALONG BOTH SIDES OF THE FLEX CIRCUIT.

TEPP-10705-A

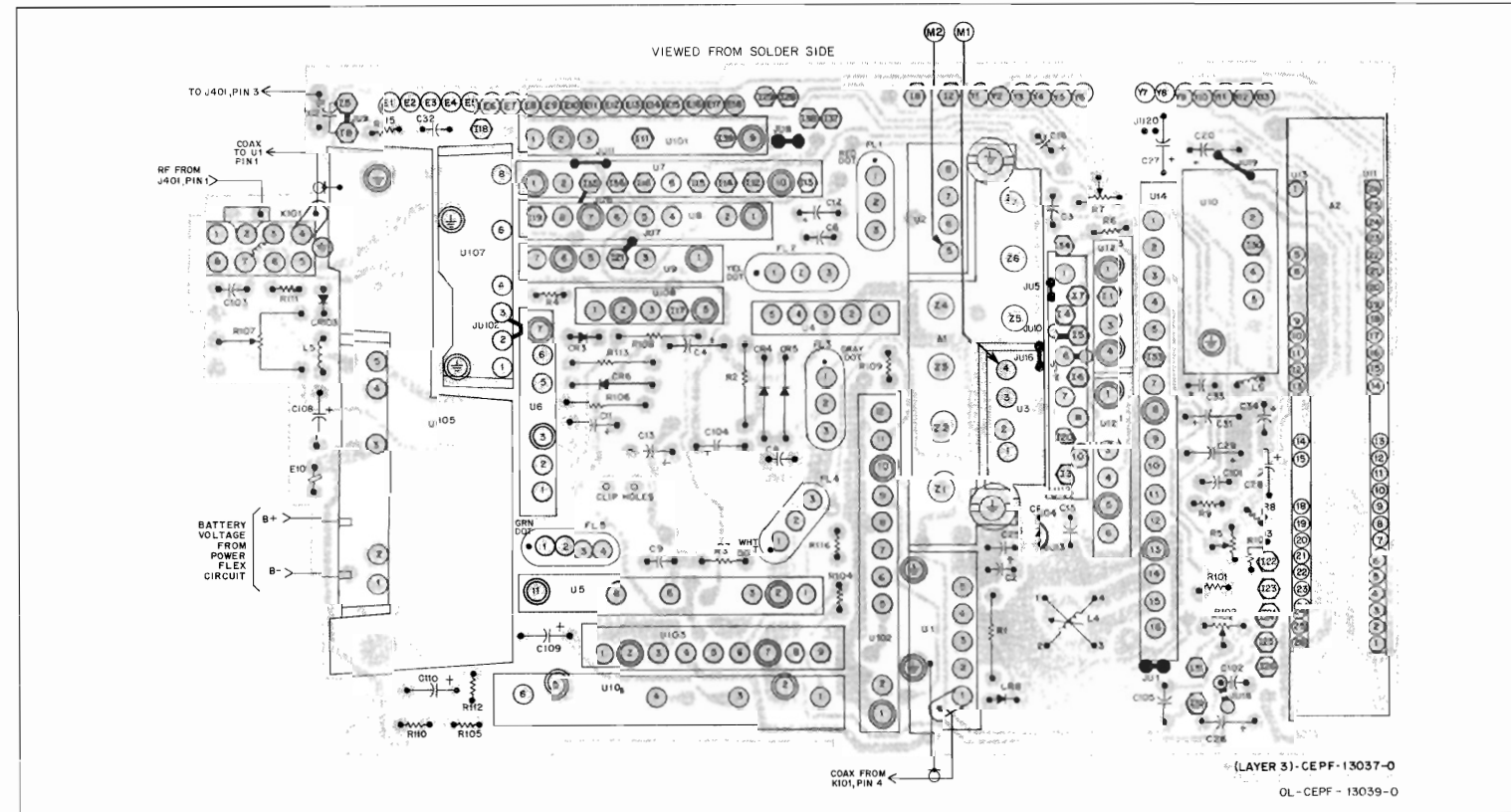
FREQUENCY SELECT FLEXIBLE CIRCUIT
(NLN7291A-1, NLN7292A-1, NLN7293A-1, NLN7294A-1)



OUTER LAYERS 1 (RED) AND 4 (BLACK)



INNER LAYERS 2 (RED) AND 3 (BLACK)



SCHEMATIC DIAGRAM NOTES

- ① INDICATES METERING POINT.
BOXED ENTRIES APPEAR SCREENED OR LABELLED ON CIRCUIT BOARD.
□ INDICATES MODULE TO MODULE INTERCONNECTION.
○ INDICATES CONNECTION TO INTERCONNECT FLEXIBLE CIRCUIT.
- UNLESS OTHERWISE STATED, RESISTANCES ARE IN OHMS, CAPACITANCES ARE IN pF AND ALL VOLTAGES ARE DC.
- COMPONENT LOCATED ON SOLDER SIDE OF BOARD.
- JUMPER INFORMATION: (SEE CHART).
- R103 USED ONLY WHEN JU1 IS CUT.
- SEE PARTS LIST.
- R113 IS USED ONLY IN 2.5W MODELS OPERATING IN THE 136-150.8MHz RANGE AND 6W MODELS OPERATING IN THE 162-174MHz RANGE. JU102 IS NOT CUT WHEN R113 IS USED.
- DIODE CR131 IS REMOVED FROM DPL CIRCUIT WHEN ANY UNIT ID OPTION IS USED IN DPL MODELS.
- 12-CHANNEL FREQUENCY SELECT SWITCH SHOWN.
- 6W MODELS ONLY.
- 2.5W MODELS ONLY.
- 1W MODELS ONLY.
- 1.29V MIN. (136-150.8MHz); 1.1V MIN. (150.8-174MHz).
- R7, C16 ARE ADDED TO THE MAIN CIRCUIT BOARD AND R311, C301 ARE DELETED FROM THE CONTROL FLEX WHEN INTERNAL SQUELCH OPTION IS USED. INTERNAL SQUELCH OPTION IS MANDATORY ON ZONE SWITCH MODELS.
- CR104 USED ONLY WHEN JU3 IS CUT.
- C112 USED ONLY ON RADIOS WITH INTERCONNECT (OPTION) FLEX.
- SEE ELECTRICAL PARTS LIST.
- SEE BACK-DATING INFORMATION.
- FOR 1W AND 2.5W MODELS, SEE PARTS LIST. TEPF-10623-A

REF. DESIG.	JUMPER CUT FOR
JU1	FUTURE OPTION USE (SEE NOTE 5)
JU2	DVP OPTION
JU3	DVP OPTION (SEE NOTE 15)
JU4-JU7	DVP OPTION
JU8	ALL RADIOS EXCEPT FOR SELECTIVE CALL OPTIONS H701, H702, AND H703
JU9	PL/DPL MODELS
JU10	PL/DPL ON TRANSMIT-ONLY OPTIONS H820 AND H850
JU11-JU16	NOT USED
JU17	ALL 1 & 2.5W MODELS (NOT USED ON 6W MODELS)
JU18	ALL RADIOS
JU19	NOT USED
JU102	ALL RADIOS EXCEPT 2.5W MODELS IN 136-150.8MHz RANGE, 6W MODELS IN 162-174MHz RANGE (SEE NOTE 7)
JU201	30 SEC. TIME-OUT TIMER (UNCUT = 60 SEC. TOT) (P/O U12) (FACTORY PROGRAMMED)
J202	TOT ENABLE (P/O U12) (FACTORY PROGRAMMED)

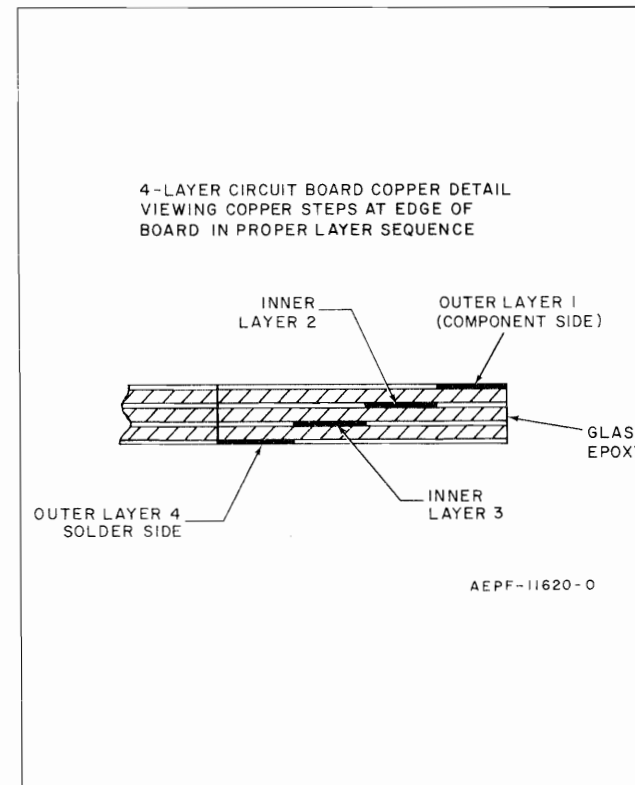
SERVICING NOTES

- The main printed circuit board is a 4-layer board with two layers of printed circuit bonded inside the board.
- Before removing the 4-layer board from the frame, unsolder the red B+ and black B- wires, and the jumper wires connecting the antenna jack to the board.
- The audio output to the speaker is a balanced output. Do not measure with a grounded voltmeter. Use a battery powered voltmeter or a 1:1 transformer, such as the Motorola part number 2584903H01. This transformer has two secondary windings which must be connected in series to provide 1:1 turns ratio.

CAUTION

Use a temperature-controlled soldering iron with a 600°F or 700°F tip. Avoid prolonged contact with the flexible circuit.

- Flexible printed circuits are used in this radio. The foil pattern is bonded between two layers of flexible material. Use care when handling, avoid excessive bending. Do not overheat.
- Modules A2, U132 and U133 (DPL models) contain MOS devices which are susceptible to damage in handling due to static discharge. Handle with grounded tools and transport in conductive foam or a metallic tray. See MOS circuits handling precautions in the Theory/Maintenance manual.
- To connect the radio to a 7.5V bench power supply, use battery block ST-1175 and a current limiting power supply set at 3A maximum.



MAIN CIRCUIT BOARDS COMPONENT LAYOUT DIAGRAMS

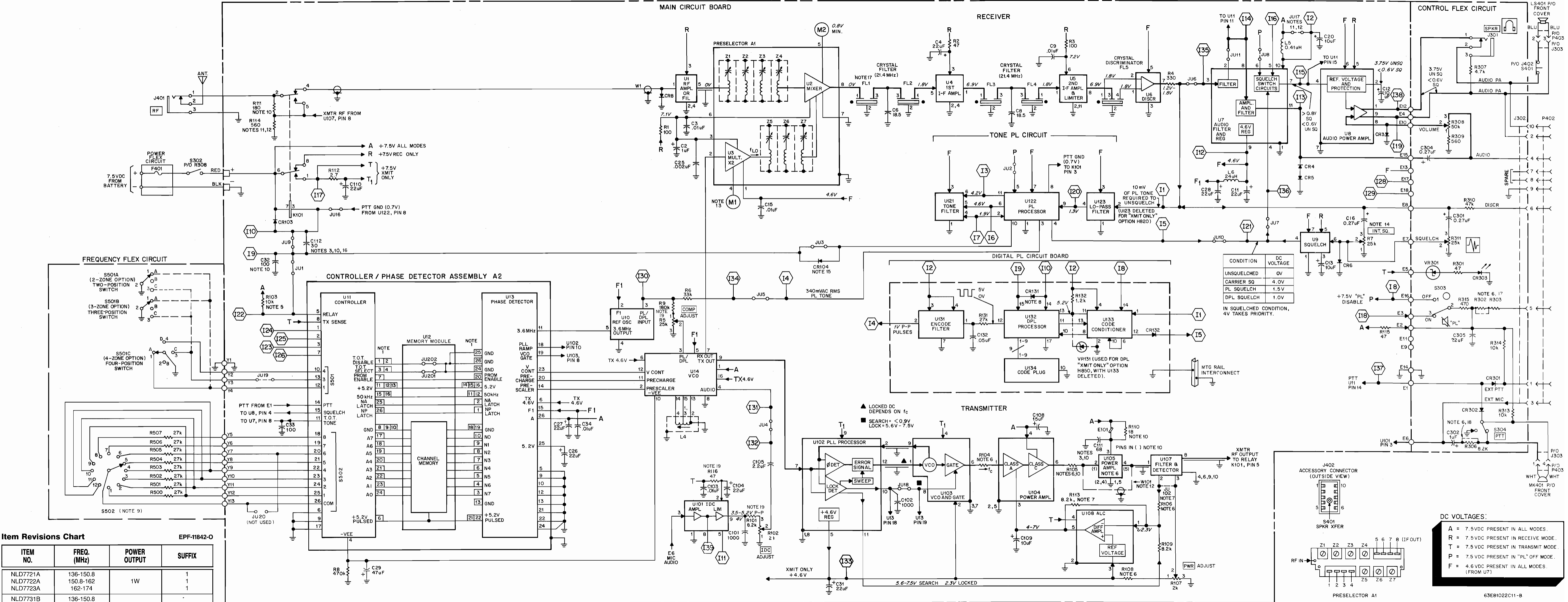
NLD7721A, NLD7721A-1, NLD7722A, NLD7722A-1, NLD7723A, NLD7723A-1 (1W)
NLD7771A, NLD7771A-1, NLD7772A, NLD7772A-1, NLD7773A, NLD7773A-1 (2.5W)
(LAYER 4 SHOWN ONLY)

NLD7731B, NLD7732B, NLD7733B (6W)

Item Revisions Chart

ITEM NO.	FREQ. (MHz)	POWER OUTPUT	SUFFIX
NLD7721A	136-150.8		1
NLD7722A	150.8-162	1W	1
NLD7723A	162-174		1
NLD7731B	136-150.8		
NLD7732B	150.8-162	6W	
NLD7733B	162-174		
NLD7771A	136-150.8		1
NLD7772A	150.8-162	2.5W	1
NLD7773A	162-174		1

EPF-11842-O



DC VOLTAGES:

A	= 7.5VDC PRESENT IN ALL MODES.
R	= 7.5VDC PRESENT IN RECEIVE MODE.
T	= 7.5VDC PRESENT IN TRANSMIT MODE.
P	= 7.5VDC PRESENT IN "PL" OFF MODE.
F	= 4.6VDC PRESENT IN ALL MODES. (FROM U7)

Electrical Parts List

PLF-1847-B

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
A1	NLD6571A or NLD6572A or NLD6573A NLD7350A	MODULE: Preselector, Contains U2 & U3 136 - 150.8 MHz 150.8 - 162 MHz 162 - 174 MHz Controller/Phase Detector; Contains U11 & U13 CAPACITOR, Fixed: pF ± 10%; 20V unless stated Not Used C1 1uF ± 20% C2 .01uF; 50V C3 22uF ± 20%; 15V C4 Not Used C5 18.5 ± 2%; 25V C6 Not Used C7 18.5 ± 2%; 25V C8 .01uF; 50V C9 Not Used C10 22uF ± 20%; 10V C11 10uF ± 20%; 6V C12, 13 Not Used C14 .01uF ± 20%; 50V C15 0.27uF C16 Not Used C17, 18, 19 10uF ± 20% C20 Not Used C21 thru C24 .002uF + 100 - 20%; 75V C25 22uF ± 20%; 10V C26 thru C28 47uF ± 20%; 6V C29 Not Used C30 22uF ± 20%; 10V C31 100; 75V C32, 33 .01uF; 50V C34 1000 ± 5%; 100V C101, 102 .01uF; 50V C103 22uF ± 20%; 15V C104 2.2uF ± 20%; 15V C105 Not Used C106, 107 15uF ± 20%; 15V C108 10uF ± 20% C109 22uF ± 20%; 15V C110 68 ± 5%; 75V (6W Models) C111 30; 75V (6W Models) C112 Not Used C113 thru C131 .05uF ± 20%; 25V (Option H850 only) C132 0.27uF C301 1uF C302 Not Used C303 0.27uF C304 22uF ± 20%; 15V C305 DIODE: See Note Not Used CR1, 2 Silicon CR3 thru CR6 Not Used CR7 Silicon CR8 Not Used CR101, 102 Silicon CR103 Hot - carrier (DVP Option) CR104 4883654H01 Silicon (Option H850 only) CR131, 132 4805824C01 Silicon CR301, 302 0105952G54 LED CR303 CORE: Ferrite Bead FUSE: 5-Amp FILTER: Matched Pair, FL1 coded RED FL2 coded YEL Matched Pair, FL3 coded GRAY FL4 coded WHT Discriminator, crystal; coded GRN JACK: Speaker, 2-conductor Socket, miniature; accessory connector Assembly, cable; speaker microphone

J401 J402	0905505C02 1505673C01	Antenna, 2-conductor Accessory connector, housing; contains S401
K101	8005037E01	RELAY: 8-pin DPDT COIL, RF: unless stated Not Used Closewound, includes 7682451B12 CORE, Tuning (162-174MHz) 6W models Closewound, includes 7682451B12 CORE, Tuning (136-162MHz) 1W, 6W models Closewound, includes 7682451B12 CORE, Tuning (162-174MHz) 1W models Choke, 0.41uH Choke, 23uH SPEAKER: 2-inch dynamic; freq. response 300-3500Hz MICROPHONE Assy, Microphone (for 1W & 2.5W models), includes exploded view items 55, 58, 59, 60, 100, and 101 Assy, microphone (for 6W models), includes exploded view items 55, 58, 59, 60, 100, and 101 PLUG: Part of MK401 Assembly RESISTOR, Fixed: Ω ± 10%; ½W unless stated 100 47 ± 5%; flameproof 100 330 Pot. 25k; Comp. Adjust ½W (6W models) Pot. 200k (1W & 2.5W models) 33k Pot. 25k (internal squelch) ½W 470k (6W models only) 180k ± 5% (6W models only) 8.2k (6W models only) Pot. 2k; IDC Adjust (6W) Pot. 10k; (1W & 2.5W) 10k 10 ± 5%; ¼W; flameproof (1W & 2.5W models) and (6W models 136-150.8MHz) 33 ± 5%; ¼W; flameproof (6W models 150.8-174MHz) Not Used on 1W & 2.5W models Wire jumper (6W models 136-150.8MHz) 10 ± 5%; flameproof ¼W (6W models 150.8-174MHz) 680 (1W models) 4.7k (2.5W models 136-150.8MHz) 3.3k (2.5W models 150.8-174MHz) 15k (6W models 136-162MHz) 4.7k (6W models 162-174MHz) Pot. 2k; Power Adjust ± 20%; ½W 1.8k (1W models) Jumper (2.5W models 136-150.8MHz) 2.2k (2.5W models 150.8-174MHz) 390 (6W models 136-150.8MHz) 470 (6W models 150.8-174MHz) 8.2k ± 5% 18 ± 5%; flameproof (6W models only) 180 (6W models only) 2.7 ± 5%; ¼W flameproof 8.2k (2.5W models 136-150.8MHz) and (6W models 162-174MHz only) 560; ¼W (1W & 2.5W models) 47 ± 5% flameproof Not Used 27k ± 5% (Option H850 only) 1.2k (Option H850 only) 47 ± 5%; ¼W flameproof Not Used 1k ± 5% Not Used
L1, 2, 3 L4	2405594J02 or 2405594J03 or 0105956H63	
L5 L6	2482723H05 2482723H03	
LS401	5005181E02	
MK401	0105953D67 or 0105953C39	
P403	-----	
R1 R2 R3 R4 R5	0600185B67 0605139G10 0600185B67 0600185B73 1805501C11	
R6 R7 R8 R9 R101 R102	or 1805501C12 0600185B97 1805501C11 0600185C12 0600185B04 0600185B90 1805501C01 or 1805501C03 0600185B91 0605139G03	
R103 R104	or 0605139G09	
R105	-----	
R106	0600185B77 or 0600185B87 or 0600185B85 or 0600185B95 or 0600185B87 1805690G01 0600185B82 or or 0600185B83 or 0600185B74 or 0600185B75 0600185A71 0605139G06 0600185B70 0605139G01 0600185B90	
R107 R108	0600124C43 0605139G10	
R109 R110 R111 R112 R113	0600185A83 0600185B80 0605139G12	
R114 R115, 116 R117 thru R130 R131 R132 R301 R302 R303 R304 thru R306	0600124C43 0605139G10 0600185A83 0600185B80 0605139G12 0660075A49	

R307 R308 R309 R310 R311 R312 R313, 314 R315 R500 thru R507	0660075A65 1805466L02 0660075A43 0660075A89 1805430C02 0660075A73 0660075A41 0660075C83	4.7k ± 5% Pot. 50k; contains S302 560 ± 5% 47k ± 5% Pot. 25k (external squelch) Not Used 10k ± 5% 470 ± 5% 27k ± 5% SWITCH: Not Used ON/OFF, part of R308 Toggle, SPDT; PL Sub-miniature, SPDT; Push-to-Talk Part of J402 Toggle, SPDT (2-zone option) Toggle, SPTT (3-zone option) Rotary 4-position (4-zone option) Rotary 4 thru 12-position HYBRID, Encapsulated: RF Filter, 0.5uV sensitivity (136-150.8MHz) RF Filter, 0.5uV sensitivity (150.8-174MHz) RF Amplifier, 0.25uV sensitivity (136-150.8MHz) RF Amplifier, 0.25uV sensitivity (150.8-174MHz) Part of A1 First I-F Amplifier Second I-F Amplifier Discriminator Audio Filter & Regulator Audio Power Amplifier Squelch Reference Oscillator Part of A2 Memory Module (No T.O.T.) Memory Module (30 sec. T.O.T.) Memory Module (60 sec. T.O.T.) Part of A2 VCO IDC Phase-Lock-Loop Processor VCO & Gate (136-150.8MHz) VCO & Gate (150.8-162MHz) VCO & Gate (162-174MHz) Power Amplifier, 2.5W models 136-150.8MHz Power Amplifier, 2.5W models 150.8-162MHz Power Amplifier, 2.5W models 162-174MHz Power Amplifier, 1W & 6W models 136-150.8MHz Power Amplifier, 1W & 6W models 150.8-162MHz Power Amplifier, 1W & 6W models 162-174MHz Power Amplifier, 2.5W models 136-150.8MHz Power Amplifier, 2.5W models 150.8-162MHz Power Amplifier, 2.5W models 162-174MHz Power Amplifier, 6W models 136-150.8MHz Power Amplifier, 6W models 150.8-162MHz Not Used Filter/Detector (136-150.8MHz) Filter/Detector (150.8-174MHz) Automatic Level Control Not Used Tone Filter PL Processor Lo-Pass Filter Not Used Encoder Filter DPL Processor Code Conditioner
S301 S302 S303 S304 S401 S501A S501B S501C S502	4005190D01 4082159D01 4005728G01 4005745G01 4005830H01 4005605501	
U1	NFD6011A or NFD6012A or NLD6561A or NLD6562A	
U2, 3 U4 U5 U6 U7 U8 U9 U10 U11 U12	NLN8917A NLN8773A NLN8774A NLN8777B NLN8775B NLN8776A KXN1106AA NLN5096A or NLN7302A or NLN7303A	
U13 U14	NLD7330B or NLD8020A NLN5832A NLD6592A NLD6601A or NLD6602B or NLD6603A NLD6610A	
U101 U102 U103	or NLD6611A or NLD6612B or NLD6621A or NLD6622A or NLD6623A	
U104	or NLD6611A or NLD6612B or NLD6621A or NLD6622A or NLD6623A	
U105	NLD6631A or NLD6632B or NLD6633B or NLD6641A or NLD6642A or NLD6643A	
U106 U107	NFD6021A or NFD6022A NLN8779A	
U108 U109 thru U120 U121 U122 U123 U124 thru U130 U131 U132 U133	NFN6010A NLN4052B NFN6009A NFN6011B NLN8921B NFN6012B	

U134	NLN8922A	Code Plug
VR131	4883461E47	DIODE: See Note 5.2V Zener (DPL "Xmit Only") Option H850) 4.75V Zener
VR301	4883461E48	CABLE: Assy, Coaxial; 1W & 2.5W models Assy, Coaxial; 6W models Assy, Coaxial; 1W models only
W1	0105952D58 or 0105953D84 0105952D59	
W101		
NONREFERENCED ITEMS		
	NAD6282A	Antenna, Helical; 136-150.8MHz (includes Antenna Cap 3884733H02)
	NAD6283A	Antenna, Helical; 150.8-162MHz (includes Antenna Cap 3805571C01)
	NAD6284A	Antenna, Helical; 162-174MHz (includes Antenna Cap 3805571C01)
	0205863A01 0300139835 0300140107 0305628C01	Nut, for Preselector Screw (for U107) Screw, filter mounting Slug and Mounting Stud for Preselector A1 Screw (for A2)
	0305485J03 0400115361 0405683D01 0705196A02 0705312E01 0405587G07 0705590J01 0705778D01 0905287C06 0905604C06 1405601C01 1405736C01 1405844J01 2205794E01 2205306C01 2605498J01 2905254F01	Lockwasher, for Preselector Lockwasher, for Filter U107 Boot for Crystals FL1, FL3 Boot for Crystals FL2, 4, 5 Washer, Support (for spkr jackey) Plate, Support Boot (for U108) Socket, Module Socket, for Guide Pin Insulator, for K101 Insulator, for Crystal (3-spot) FL5 Insulator, Plate Pin, for option flex connection Pin, Contact Can, Coil; VCO Lug, Grounding; between J401 and P.C. Board Socket, Post; option (e.g.: I11-I17) Pad, for Crystals FL1-FL4 Insulator for S501C Insulator for S501A and B Clip for U102, U103
	4705598C01 7505295B01 1405140L01 1408239C05 4205360G01	

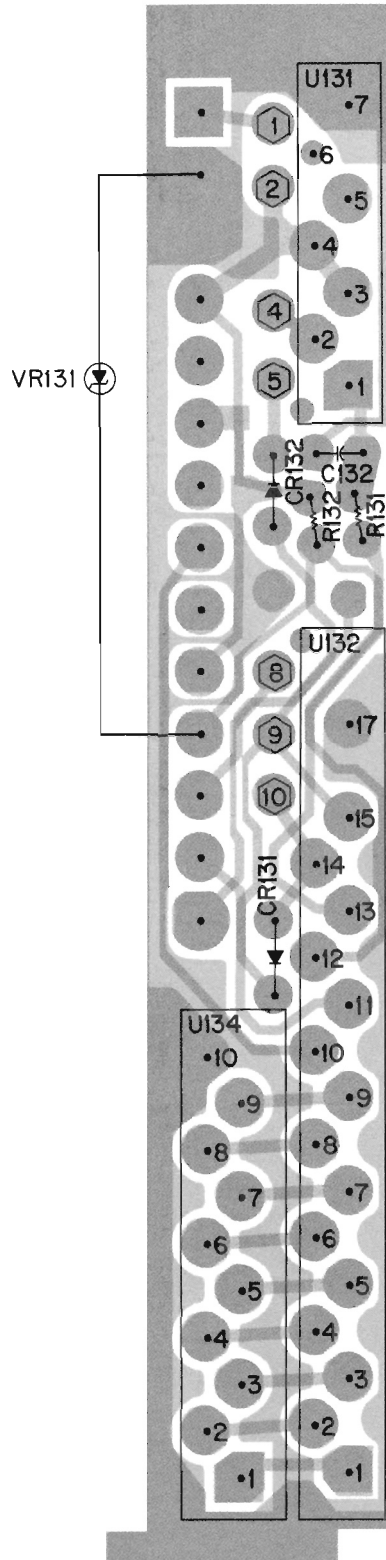
NOTE: For optimum performance, order replacement diodes by Motorola part number only.

ITEM NO.	REFERENCE SYMBOL	CHANGES
NLN7561A	R303 R308	WAS 0600185B75; 470 WAS 1805602C02
NLN7561A-1	R302	DELETED (was connected from C305 in series with R303); 0600185B75, 470
	R306	DELETED (was connected to S304 in series with capacitor C302); 0600185B90, 8.2k AS SHOWN
		Revised flexible circuit
NLN7291A-1 NLN7292A-1 NLN7293A-1 NLN7294A-1		AS SHOWN
NLD7721A NLD7722A NLD7723A NLD7771A NLD7772A NLD7773A	W1 L4	WAS 0105953D83 WAS 2405594J03
NLD7731A NLD7732A NLD7733A	MK401 K101 L4 W1	WAS 0105953C39 WAS 8005037F01 WAS 2405594J03 WAS 0105953D83
NLD7721A-1	R5	WAS 1805501C12, pot., 200k
NLD7722A-1 NLD7723A-1 NLD7771A-1 NLD7772A-1 NLD7773A-1	R107 C29	WAS 1805310C02, pot., 2k WAS 2382397D16; 22uF
NLD7731A-1 NLD7732A-1 NLD7733A-1	R102 R107	WAS 1805501C03; pot., 10k WAS 1805318C02, pot., 2k
NLD7721A-1 NLD7722A-1 NLD7723A-1 NLD7771A-1 NLD7772A-1 NLD7773A-1		AS SHOWN
NLD7731B NLD7732B NLD7733B	R9 R101 R116 C30	ADDED (from R5-1 to R6) ADDED (from R102-3 to U101-9) ADDED (from C103 to C104) DELETED (was connected across C29); 2382397D16, 22uF Revised P.C. Board AS SHOWN

TEPF-11734-O

DPL BOARD

VIEWED FROM SOLDER SIDE















● SOLDER SIDE DEPF-6163-0
 ■ COMPONENT SIDE DEPF-6164-0
 OVERLAY DEPF-10008-0

DPL VOLTAGE MEASUREMENTS

TEST PRECAUTION

FOR ENCODE (XMIT) TESTS, DO NOT TRANSMIT INTO SERVICE MONITOR RF INPUT. USE WATTMETER AND MONITOR ON RECEIVE PORTION OF SERVICE MONITOR VIA ANTENNA.

PIN	ENCODE (XMIT)		DECODE (RECEIVE)		PIN	ENCODE (XMIT)		DECODE (RECEIVE)	
	DC VOLTAGE	WAVEFORM & AC V	DC VOLTAGE	WAVEFORM & AC V		DC VOLTAGE	WAVEFORM & AC V	DC VOLTAGE	WAVEFORM & AC V
CODE CONDITIONER MODULE U133 (2)					DIGITAL "PL" PROCESSOR MODULE U132				
1	---	---	---	 135 Hz @ 120-270 mV p-p	1	0 V or 5.2 V	---	0V or 5.2 V	---
2	Ground	---	Ground	---	thru	(1)	---	(1)	---
3	N/A	---	---	---	9	---	---	---	---
4	7.5 V	---	7.5 V	---	10	---	---	2.6 V	 135 Hz @ 5.2 V p-p
5	3.75 V	---	3.75 V	 135 Hz @ 0.6 - 1.35 V p-p	11	0 V	---	0, 5.2 V (5)	---
6	3.75 V	---	3.75 V	 135 Hz @ 6.1 V p-p	12	2.6 V	 (1) Random 5.2 V p-p	2.6 V	 135 Hz @ 5.2 V p-p
7	N/A	---	---	---	13	5.2 V	---	5.2 V	---
8	---	---	2.6 V	 135 Hz @ 5.2 V p-p	14	Less than .8 V	---	7.5 V	---
10	3.75 V	---	3.75 V	 135 Hz @ 6.1 V p-p	15	0 V	---	6.8 V	---
11	5.2 V	---	5.2 V	---	17	0 V	---	0 V	---
12	5.2 V (3) or <0.2 V (4)	---	5.2 V (3) or <0.2 V (4)	---	ENCODER FILTER MODULE U131				
13	<0 V	---	0, 5.2 V (5)	---	1	2.6 V	 Random 3.0 V p-p	2.6 V	 135 Hz @ 3.0 V p-p
14	≈0 V (3) 7.5 V (4)	---	≈0 V (3) 7.5 V (4)	---	2	0 V	 (1) Random 1.0 V p-p	0V	 135 Hz @ 1.0 V p-p
SOCKET FOR CODE PLUG (U134 REMOVED)					3	7.5 V	---	7.5 V	---
1-9	5.2 V	---	5.2 V	---	4	7.5 V	---	7.5 V	---
10	0 V	---	0 V	---	5	3.5 V	Same as pin 2 but inverted	3.5 V	Same as pin 2 but inverted
					6	N/A	---	N/A	---
					7	Ground	---	Ground	---

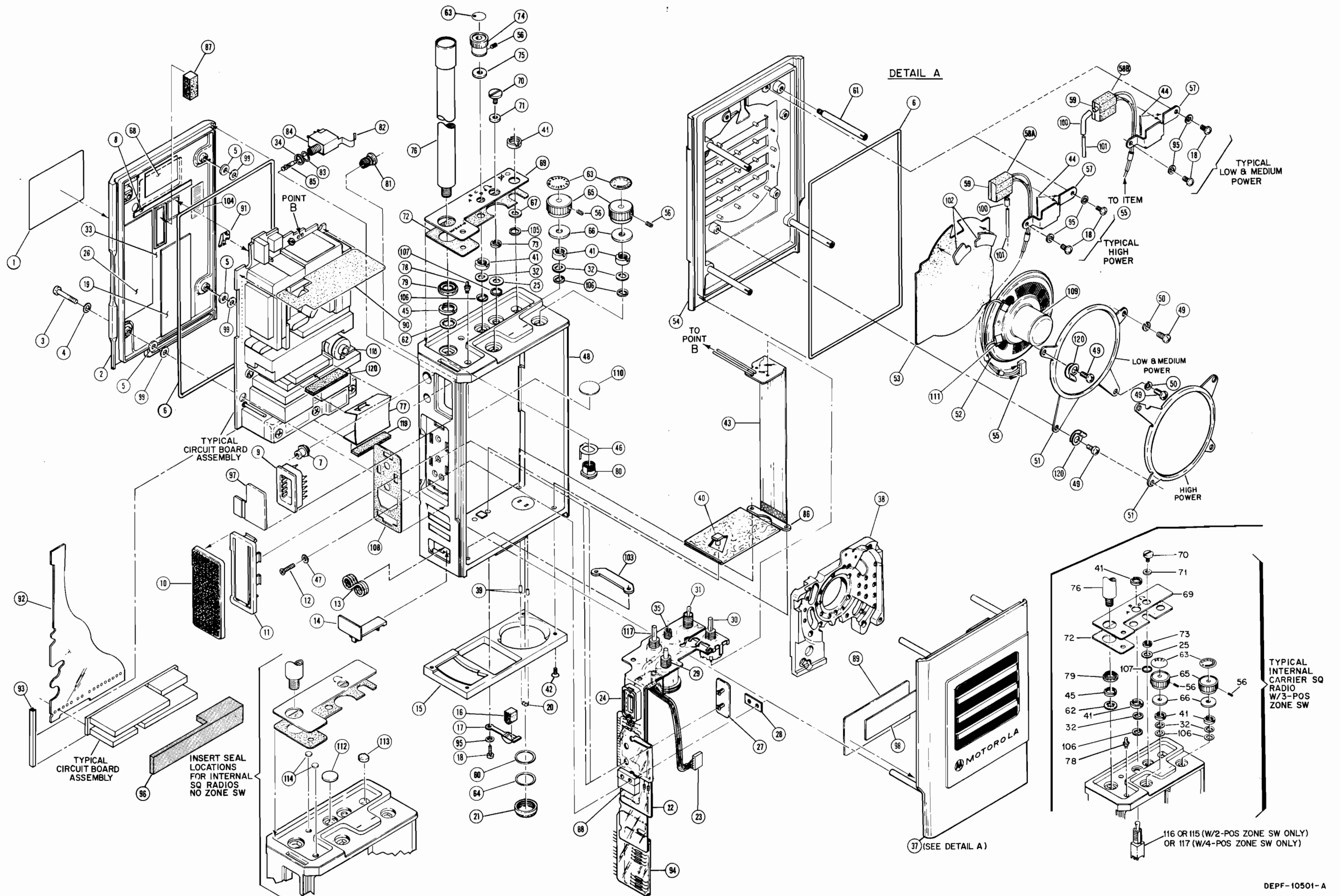
TEST MEASUREMENTS ARE NOMINAL; PL SWITCH ON OR OFF AND NO CARRIER INPUT. NUMBERS IN () REFER TO THE FOLLOWING NOTES:

- (1) DETERMINED BY CODE PLUG U134.
- (2) SLN6413A DIGITAL ENCODER-DECODER SHOULD BE IN THE DECODE (RECEIVE) MODE WITH PTT ON FIXTURE NOT DEPRESSED.
- (3) PL SWITCH ON.
- (4) PL SWITCH OFF.
- (5) PL SWITCH ON AND PROPER DPL CODE INPUT.

EPF 7450-C

SERVICING NOTE

The digital PL modulation observed on the service monitor (without audio) is a group of random square-wave pulses with various widths, depending on the code plug. The pattern repeats every 178msec. When the transmitter is unkeyed, the 135kHz sine wave turn-off code appears at a reduced level for 120msec. Measure the pulse peak-to-peak amplitude for deviation.



Exploded View Parts List

PLF-1845-A

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	NLN7475A NLN7476A NLN7477A NLN7478A	LABEL, Serial; domestic: MX330 MX340 MX350 MX360
2		BACK COVER KITS:* NLN7322A, NLN7323A, NLN7324A, NLN7325A include: a. COVER, Back; (item 2) 1505315F09 MX330 1505315F10 MX340 1505315F11 MX350 1505315F12 MX360 b. Items 3, 4, 5, 6, 8, 19, 26, 33, 68, 87, 99, & 104
3	0382210E15	SCREW, Captive
4	0405465C01	WASHER, Seal; .112 x .245 x .012
5	0405818D01	WASHER, Flat; .180 x .096 x .010
6		GASKET, "O" Ring; 0105957C66 MX330 0105957C67 MX340 0105957C68 MX350 0105957C69 MX360
7	0205785C01	NUT, Retainer; special
8	5405171E01	LABEL, Intrinsically safe
9	See Note	HOUSING, Connector; J402
10	3205427C04	BOOT
11	4505509C02	ACTUATOR
12	0305685F01	SCREW, Phillips; 2-64
13	4105414C01	SPRINT, Latch
14	5505417C01	LATCH, Battery
15	0705528C01	BASE, Frame Support
16	0705830C01	SUPPORT, Battery Contact
17	3905421C01	CONTACT, Battery
18	0300138651	SCREW, Slotted; 2-56 x 1/8"
19	NLN7355A	LABEL, Freq. (Zones C & D)
20	See Note	FUSE (F401)
21	3805881D01	CAP, Fuse
22	NLN7561A	FLEX CIRCUIT, Control
23	See Note	CONNECTOR, Plug (J303)
24	See Note	SOCKET (J302)
25	0405342C02	WASHER, Steel
26	NLN7355A	LABEL, Frequency
27	4205506C01	STRAIN RELIEF, Snap-in
28	6405683F01	PLATE, Nut
29	See Note	SWITCH (S502)
30	See Note	RESISTOR (R308)
31	See Note	SWITCH (S303)
32	0405342C03	WASHER
33	6405535D06	INSULATOR, Ground Shield
34	3205295F01	GASKET
35	See Note	JACK (J301)
36	See Note	RESISTOR (R311A)
37		FRONT COVER KITS; includes: items 6, 18, 44, 49, 50, 51, 52, 53, 54, 57, 58, 59, 61, 95, 100, 101, and 102 NLN7420A MX330 Series (Lo/Med Power) NLN7421A MX340 Series (Lo/Med Power) NLN7422A MX350 Series (Lo/Med Power) NLN7423A MX360 Series (Lo/Med Power) NLN7424A MX340 Series (High Power) NLN7425A MX350 Series (High Power) NLN7426A MX360 Series (High Power)
38	7505589E02	PAD, Contour
39	0905604C07	SOCKET, Fuse; p/o item 43
40	4605461C01	STUD, Battery Contact
41	0282653D05	NUT, Mounting; special
42	0305714J01	SCREW, Phillips; 2-56
43		FLEX CIRCUIT, Power 0105953C38 MX330 Series 0105953C39 MX340 Series 0105953C40 MX350 Series 0105953C41 MX360 Series
44	1405424D04	INSULATOR, Teflon
45	0205543E01	NUT, Mounting
46	2905548E01	LUG, Antenna
47	0400129740	LOCKWASHER
48		FRAME* 0105956G81 MX330 Series (NLN5298A) 0105956G84 MX340 Series (NLN5299A) 0105956G86 MX350 Series (NLN5300A) 0105956G92 MX360 Series (NLN5301A)
49	0305466C01	SCREW, 4-40

50	0400009743	WASHER, No. 4 Split
51	0705423C01	BRACKET, Ring
	0705875C01	or BRACKET, Ring; for Hi Power Models
52	See Note	SPEAKER (LS401)
53	7505396C01	COVER, Speaker; felt
54		COVER 0105957B51 MX330 Series 0105959B38 MX340 Series 0105959B39 MX350 Series 0105959B40 MX360 Series
55	2805551D01	CONNECTOR, Plug (P403)
56	0305480E02	SETSCREW
57	0705462C01	BRACKET, Microphone
58	1405445G02	INSULATOR (for Hi Power Models)
58B	1045445G01	INSULATOR (for Low & Medium Power Models)
59	See Note	MICROPHONE (MK401)
60	0405342C04	WASHER, Rubber Seal
61	4305467C02	SPACER, Stand-Off
62	0400139731	WASHER
63	3305737J01	INSERT, Decal
64	0405342C05	WASHER, Mylar
65	3605510C01	KNOB, Short
	3605430G07	or KNOB, Long
66	0405555C02	WASHER, Thrust
67	0405342C06	WASHER, Nylon
68	1305436E01	DECAL, Patent No.
69		ESCUTCHEON Multi-Channel Internal Carrier Squelch Models, with LED; no zone switch Multi-Channel External Carrier Squelch Models, with LED; no zone switch Multi-Channel Internal Carrier Squelch Models, with LED and 2-position zone switch Multi-Channel Internal Carrier Squelch Models, with LED and 3-position zone switch Multi-Channel Internal Carrier Squelch Models, with LED and 4-position zone switch Multi-Channel "Private-Line" Models, with Internal Carrier Squelch, LED, and no zone switch Multi-Channel "Private-Line" Models, with External Carrier Squelch, LED, and no zone switch Multi-Channel "Private-Line" Models, with Internal Carrier Squelch, LED, and 2-position zone switch Multi-Channel "Private-Line" Models, with Internal Carrier Squelch, LED, and 3-position zone switch Multi-Channel "Private-Line" Models, with Internal Carrier Squelch, LED, and 4-position zone switch Multi-Channel External Squelch Models, with LED; no zone switch
70	0305857C01	SCREW, Cap
71	0483799H04	WASHER, Insulating
72	1105092E02	ADHESIVE TAPE, Escutcheon
73	0205256C02	NUT, Speaker Jack
74	3605429G07	KNOB
	3606529G07	or KNOB, Rotary Switch
75	0405342C01	WASHER, Thrust
76		ANTENNA, Refer to Electrical Parts List (NONREFERENCED ITEMS)
77	4205896J01	CLAMP, Ground
78	See Note	LED (CR303)
79	1405545E01	INSULATOR
80	4305545E02	BUSHING, Antenna
81	-----	P/O Item 48
82	2605767C01	SHIELD, Jack
83	0405294F01	WASHER
84	See Note	JACK (J401)
85	0105585H01	ASSEMBLY, Plug; spring; 2nd insulator
86	6405781J01	NUT PLATE, Right
87	7505585C01	PAD, Pressure
88	See Note	SWITCH (S304)
89		PAD, Front Cover 7505599K01 MX330 Series, Low Power, and MX340 Series, High Power 7505599K02 MX340 Series, Low Power, and MX350 Series, High Power 7505599K03 MX350 Series, Low Power, and MX360 Series, High Power 7505599K04 MX360 Series, Low Power
90	1405939D01	INSULATOR

91	3905188D03	SPRING, Grounding
92	NLN7562A	FLEX CIRCUIT, Interconnect
93		BRACKET, Rail Mounting 0705829C01 1-unit length (0.93") 0705829C02 2-unit length (1.125") 0705829C03 3-unit length (1.320") 0705829C04 4-unit length (1.515") 0705829C05 5-unit length (1.710") 0705829C06 6-unit length (1.905") 0705829C07 7-unit length (2.100") 0705829C08 8-unit length (2.295") 0705829C09 9-unit length (2.490")
94	NLN7292A	FLEX, Freq.
95	0400002625	LOCKWASHER, Internal Tooth
96	7505890C01	PAD, "Digital PL" Contour
97	3205428C01	BOOT
98		INSULATOR 1405576E02 MX330 Series 1405576E03 MX340 Series 1405576E04 MX350 Series 1405576E05 MX360 Series
	0484345A06	WASHER, Nylon
99	3705144E01	TUBING, Flexible (for High Power Models)
100	3705412F01	or TUBING, Flexible (for Low & Medium Power Models)
101	4705143E01	PIPE, Sound
102	7505705D01	PAD (High Power Only)
103	6405782J01	NUT PLATE, Left
104	5400865436	LABEL, FCC
105	0405126L01	SEAL
106	0405757E03	SEAL
107	0405757E01	SEAL, Rubber
108	3205255G01	SEAL, PTT
109	7505191E01	BOOT, Speaker
110	0482519J01	WASHER, Sponge Seal
111	1482392E07	INSULATOR, Speaker Lug (Qty 2)
112	4305358G01	SEAL, Insert (for Squelch Control)
113	4305359G01	SEAL, Insert (for PL Switch)
114	4305360G01	PLUG, Insert (for LED & screw hole)
115	See Note	SWITCH, Toggle (2-position)
116	See Note	SWITCH, Toggle (3-position)
117	See Note	SWITCH, Rotary (4-position)
118	4205540J01	CLIP, Ground
119	7505897J01	PAD, Shock
120	4205624L01	STRAP

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

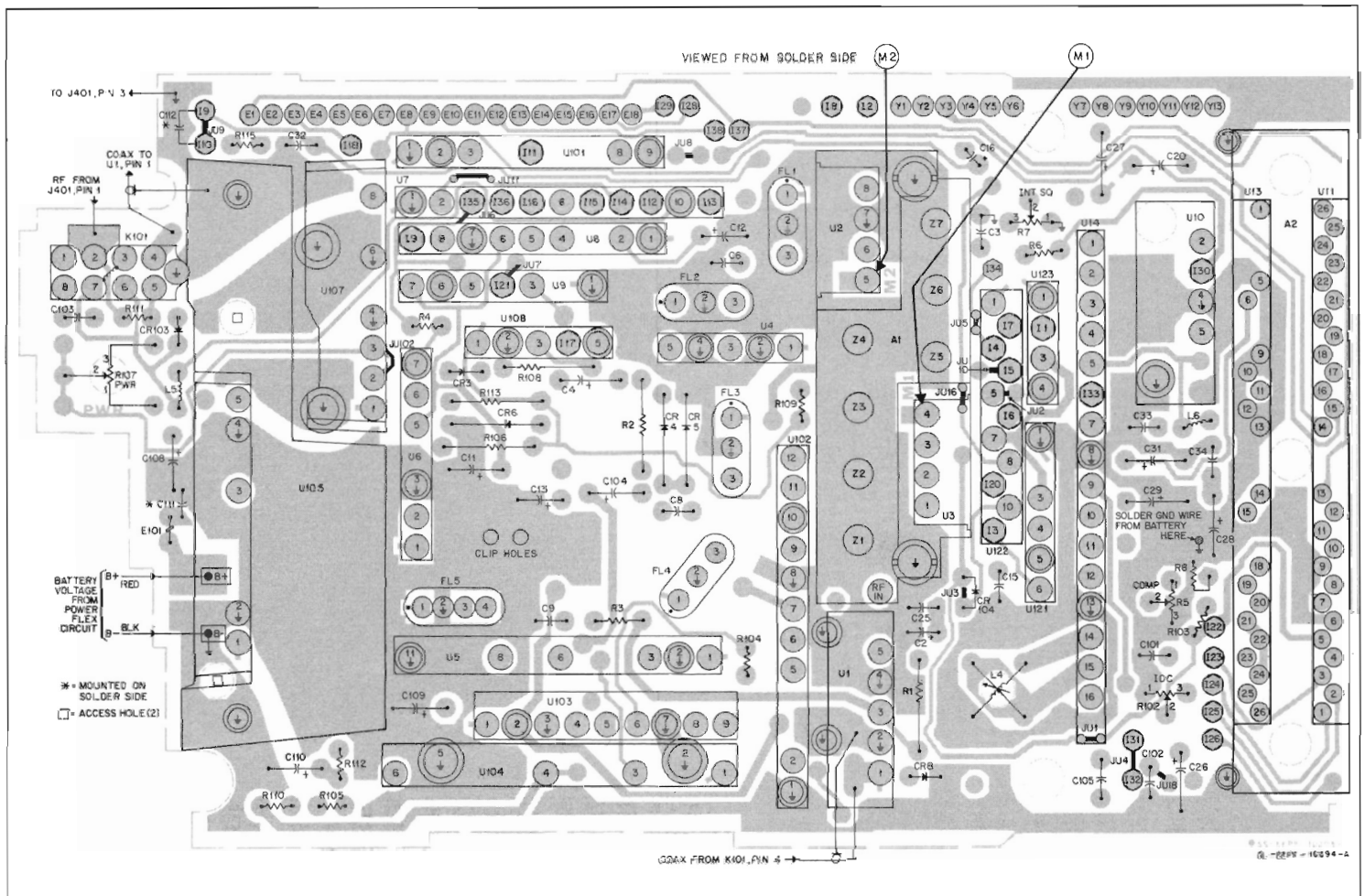
*High power radios with Unit ID option require different Frame and Back Cover Kits. Refer to Unit ID Manual.

Filler Pads

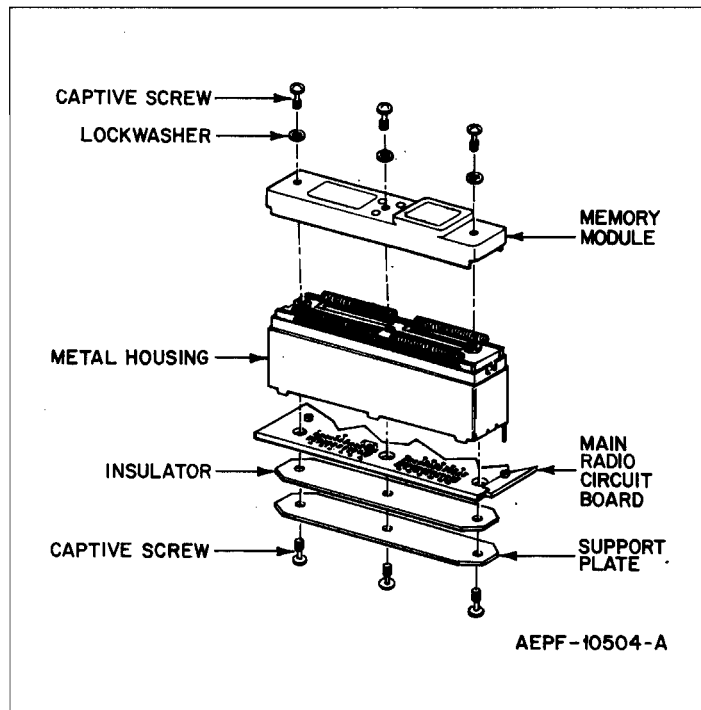
PLF-1846-O

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	7505117E02	2-Unit length (1.125"), for growth in frame
	7505117E03	3-Unit length (1.320"), for growth in frame
	7505117E04	4-Unit length (1.515"), for growth in frame
	7505117E05	5-Unit length (1.710"), for growth in frame
	7505117E06	6-Unit length (1.905"), for growth in frame
	7505117E07	7-Unit length (2.100"), for growth in frame

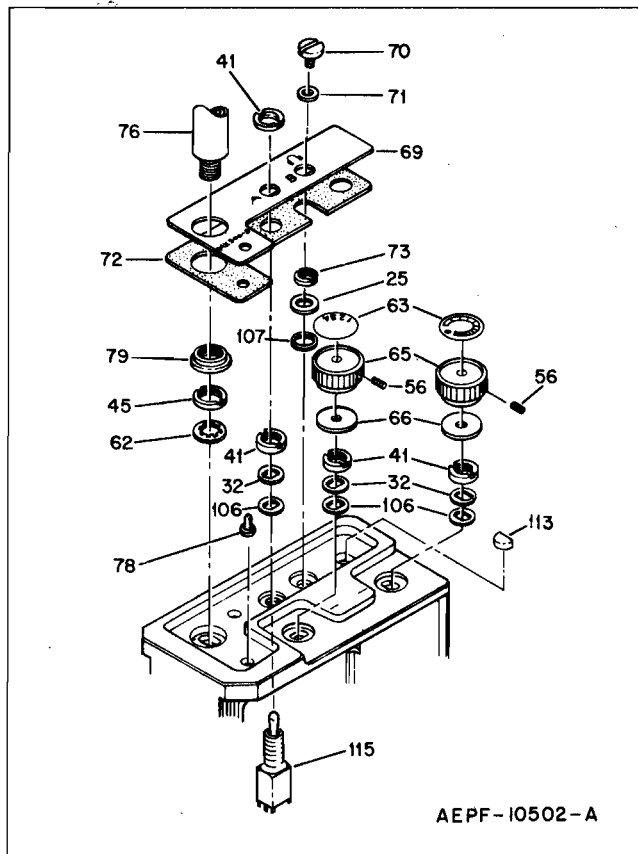
NOTE: Filler pads listed are used to fill empty areas not currently in use.



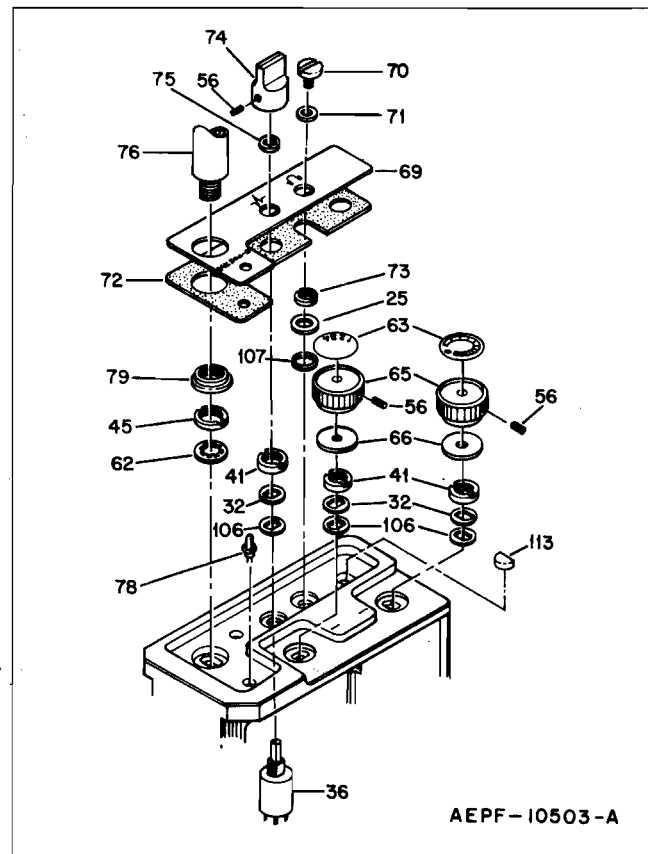
MODULE A2 DISASSEMBLY



TYPICAL INTERNAL CARRIER SQUELCH RADIO WITH 2-POSITION ZONE SWITCH



TYPICAL EXTERNAL CARRIER SQUELCH RADIO 4-12 CHANNELS





for
Manual No. 68P81022C10-A
"MX300-S" SERIES RADIOS
136-174

This revision outlines changes that have occurred since the printing of your instruction 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	ITEM NO.	SUFFIX
1	General Information
2	Parts List
3	Parts List, Schematic Diagram	NLD7721A	...
		NLD7722A	...
		NLD7723A	...
		NLD7731A	...
		NLD7732A	...
		NLD7733A	...
		NLD7771A	...
		NLD7772A	...
		NLD7773A	...
4	Parts List, Schematic Diagram, Circuit Board Layout Diagram	NLD7721A	2
		NLD7722A	2
		NLD7723A	2
		NLD7731A	2
		NLD7732A	2
		NLD7733A	2
		NLD7771A	2
		NLD7772A	2
		NLD7773A	2
5	Parts List	NLD7721A	2
		NLD7722A	2
		NLD7723A	2
		NLD7731A	2
		NLD7732A	2
		NLD7733A	2
		NLD7771A	2
		NLD7772A	2
		NLD7773A	2

CHANGES

Replace the Synthesizer Adjustment Procedure on page 5 with the following.

SYNTHESIZER ADJUSTMENT PROCEDURE

STEP	PROCEDURE (NOTE: These adjustments must be performed before proceeding with the receiver and transmitter alignment.)						
1	<p>Synthesizer adjustment requires the radio be set to a specific frequency determined by the transmit-receive frequency separation. Determine the lowest receive frequency (LRF) and the lowest transmit frequency (LTF).</p> <p style="text-align: center;">NOTE:</p> <p>This radio operates over a frequency range shown below. If a wider range of frequencies is programmed into the memory module, the radio may fail to operate reliably on the edge frequencies at extremes of temperature (- 30°C or + 60°C)</p> <table> <tr> <td>Maximum Transmitter Spread</td><td>6MHz</td></tr> <tr> <td>Maximum Receiver Spread</td><td>6MHz</td></tr> <tr> <td>Maximum Transceiver to Receiver Spread</td><td>6MHz</td></tr> </table>	Maximum Transmitter Spread	6MHz	Maximum Receiver Spread	6MHz	Maximum Transceiver to Receiver Spread	6MHz
Maximum Transmitter Spread	6MHz						
Maximum Receiver Spread	6MHz						
Maximum Transceiver to Receiver Spread	6MHz						
2	<p>a. Set frequency select switch to LRF, and adjust coil L4 (VCO coil) until the voltage measured at pin 12 of U14 is $1.4 \pm 0.1\text{Vdc}$.*</p> <p>b. Set frequency select switch to LTF. Key the transmitter with the PTT switch (or switch on the test set if used) and measure the voltage at pin 12 of U14. If this voltage is less than $1.4 \pm 0.1\text{Vdc}$, readjust L4 to obtain a voltage reading of $1.4 \pm 0.1\text{Vdc}$.</p> <p>c. Set frequency select switch to HRF and note the voltage reading on pin 12 of U14. Voltage should be $1.4 \pm 0.75\text{Vdc}$.</p> <p>d. Set frequency select switch to HTF. Key the transmitter as described above, and note the voltage reading on pin 12 of U14. Voltage should be $1.4 \pm 0.75\text{Vdc}$.</p>						

* Remove tuning tool when measuring voltage

NO.	REF. SYM.	ACTION	ITEM NUMBER	DESCRIPTION
2	S502	changed to	4005605J01	Switch, Rotary
	R106	changed to	0600185B93	Res., 15k (6W Models, 136-162MHz)
	W1	changed to	0105953E28	Cable, Coax; Assy (6W Models)
3	C28	changed to	2382397D21	Cap., 47uF $\pm 20\%$; 6V
4	L6	deleted	2482723H03	Choke (replaced by R10)
	R10	added	0605139G10	Res., 471 $\pm 5\%$; 1/2W flameproof (replaced L6)
5	MK401	corrected to	0105954C39	Assy, Microphone (for 6W Models)
	R308	changed to	1805466L03	Pot., 50k; contains S302
	U107	corrected to	NFD6011A	Filter/Detector (136-150.8MHz)
			or NFD6012A	Filter/Detector (150.8-174MHz)