MOTOROLA

PUBLIC-SAFETY SPEAKER/MICROPHONE

Models: NMN6247, NMN6250, and NMN6251

I. DESCRIPTION

The NMN6247, NMN6250, and NMN6251 Public-Safety Speaker/Microphones (PSSM) include a speaker, microphone, push-to-talk (PTT) switch, high/low volume switch, swivel clip, and cord connector assembly. All three models are exactly the same, except that the PSSMs' cord lengths are different: NMN6247 is 30", NMN6251 is 18", and NMN6250 is 24". The PSSMs also have a threaded antenna jack located on top of the housing, which accepts any of the following antennas:

Table 1. Antennas

Antenna Kit Number	Frequency	Description	Insulator Color Code
NAE6546	UHF, 403-435 MHz	3" Helical	RED
NAE6547	UHF, 435-470 MHz	3" Helical	GREEN
NAE6548	UHF, 470-512 MHz	3" Helical	BLACK

NOTES

- The antenna is not supplied with the PSSM kit; it must be ordered separately.
- It is not recommended to use these PSSMs with VHF radios, since radio performance is reduced.
- In shipping, a protective rubber seal (Motorola part number 3205782P01) is inserted in the PSSM's antenna port. Use this seal to cover the microphone's antenna port when not in use.

The public safety speaker/microphone (PSSM) includes a 3.5mm earphone jack (J1) located on top of the accessory connector. A seal, which is attached to the accessory connector, is provided to cover the earphone jack when it is not in use.

When the PSSM is attached to the radio, the speaker in the radio is disabled, and the receiver audio is connected to the accessory speaker. Similarly, the accessory microphone is connected to the transmitter, and the accessory PTT switch can now control the PTT function of the radio. The radio microphone and PTT switch are still operational, but since the radio speaker is disabled, you can listen to the received audio only through the accessory speaker.

II. PERFORMANCE TEST

A. General

The PSSM's audio performance is designed to be similar to that of the radio. The receive audio speaker loudness, with the high/low switch on the PSSM set for "high," will equal or exceed the loudness of the radio speaker.

NOTE

The threaded antenna jack on the PSSM is not wired as coaxial. Transmit power measurements should read ZERO at this connector.

The threaded antenna jack (J2) on the PSSM is wired as center and shield shorted together and connected to the radio frequency (RF) coax cable center. The RF coax shield is connected to printed circuit board (PCB) ground for best radiation performance.

B. Audio test

The PSSM accessory can be checked for proper performance by comparison with another new or known good unit on the radio. Start each of the following two tests with the new or known good unit on the radio, which must have an RF adapter attached.

1. Microphone - Transmit to a communications monitor while voicing a tone or the spoken word "four." The speaker/microphone should be held at a distance that causes approximately 3kHz deviation (1.5kHz deviation for 900Mhz radios). Repeat these conditions using the PSSM to be tested. Good units compare to each other within ±2kHz deviation.
2. Speaker - Using the communications monitor, generate an RF signal to the radio. Set the modulation to a 1kHz tone at 3kHz deviation (1.5kHz deviation for 900Mhz radios). Set the high/low switch on the PSSM to "high." Set the volume control on the radio to a loud, yet undistorted, position. Without disturbing any settings, repeat these conditions using the PSSM to be tested. Good units should sound equally loud and undistorted. The "low" setting loudness should compare as above.

C. Antenna test

Refer to Table 1 and verify that the proper antenna is being used. Use one of the following to conduct this test:

- a communications monitor set to spectrum analyzer is best,
- a monitor receiver set to threshold squelch, or
- a field strength meter.

Service Manual

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Connect a new or known good PSSM to the radio, which must have an RF adapter attached. Transmit to the equipment using the microphone's PTT by radiating to an input antenna on the equipment at a distance that causes a mid-scale result. For a receiver set for threshold squelch, set the squelch to just open when transmitting. Next, connect the PSSM to be tested to the radio, and transmit at the same distance as above. The result should compare closely to the known good or new microphone for field intensity.

III. HANDLING PRECAUTIONS

To avoid damage to circuits, observe the following handling, shipping, and servicing precautions.

⚠ CAUTION

Wearing a conductive wrist strap (Motorola No. RSX-4015A) will minimize static buildup during servicing.

⚠ WARNING

When wearing a conductive wrist strap, be careful near high voltage sources. The good ground provided by the wrist strap will also increase the danger of lethal shock from accidentally touching high-voltage sources.

A. Prior to and while servicing a PSSM, particularly after moving within the service area, momentarily place both hands on a bare metal, earth-grounded surface. This will discharge any static charge your body may have accumulated.

B. Whenever possible, avoid touching any electrically conductive part of the unit with your hands.

C. Because they contribute to static buildup, avoid carpeted areas, dry environments, and certain types of clothing (silk, nylon, etc.) when servicing a unit.

D. All electrically powered test equipment should be grounded. Apply the ground lead from the test equipment to the unit before connecting the test probe. Similarly, disconnect the test probe prior to removing the ground lead.

E. If the microphone cartridge is removed from the unit, place it on a conductive surface, such as a sheet of aluminum foil which is connected to ground through 100k ohms of resistance.

⚠ WARNING

If the aluminum foil is connected directly to ground, be cautious of possible electrical shock from contacting the foil and other electrical circuits at the same time.

F. When soldering, be sure the soldering iron is grounded.

G. Prior to replacing circuit components or touching the microphone cartridge, be sure to discharge any static buildup. Since voltage differences can exist across the human body, it is recommended that only one hand be used if it is necessary to touch the microphone cartridge and associated wiring.

H. Replacement microphone cartridges should be kept in conductive packaging until they are placed in the unit.

I. If the PSSM has been exposed to water, turn the unit so that the speaker grille faces the ground and tap the unit against your palm to remove any residual water. Blow out any residual water from the microphone grille area before operating the radio; otherwise, the sound may be distorted until the water has evaporated from these areas.

J. For proper RF performance, avoid damage to, or contamination of, the PSSM's RF interface connector and surrounding environmental seal. The RF interface connector is located near the end of the curved arm that protrudes from the top of the PSSM housing, and is the portion that mates with the RF adapter on a properly equipped radio.

IV. MAINTENANCE

Refer to the schematic diagram, the exploded view, and the parts lists. Every part in the microphone is identified and illustrated for assistance in removal and replacement.

If disassembly of the PSSM is required, do not reassemble it without doing the following (numbers in parentheses refer to item numbers in the exploded view).

- Remove the O-ring gasket (22) from the cover assembly (16).
- Inspect the seal areas around the housing (1) and the cover (16) for foreign material which might prevent the O-ring gasket from sealing properly.
- Inspect O-ring gasket (22) and both cover screw O-ring gaskets (18). If any of these are split, cracked, or damaged in any way, discard and replace them.
- If the main printed circuit board (14) is removed, remove the speaker spacer (27) and inspect the membrane of the seal pad (28) for tears or holes. If the membrane is damaged, remove it, being careful to remove all old adhesive, and replace it with a new seal pad.

NOTE

When placing the seal pad (28), it is critical that the small seal pad opening be aligned with the microphone port in the housing.

- Tighten all hardware loosened or removed during disassembly per the values listed in the Torque Specifications table. Use the recommended torque driver (RSX-4043A Rototorq Tool or equivalent).

If necessary, the external surfaces of the remote speaker microphone may be cleaned with 0.5% solution of mild dishwashing detergent in water (one teaspoon of detergent in a gallon of water).

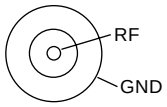
Table 2. Torque Specifications

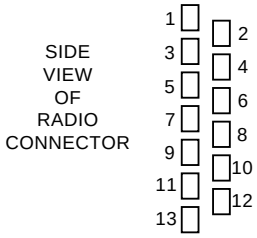
Application	Torque (In. Lbs.)	Torque (N•m)	Torque Bit No.
Cover Screws	6	0.68	6680321B78
PC Board Screws	3	0.34	6680321B78
Clip Screws	4	0.45	6680321B78
Toggle Switch Boot	3	0.34	6680370B99
Connector Assembly Screw	3	0.34	6680381B69
Ear jack Spanner	3	0.34	6680370B89
Antenna Spanner	20	1.13	6680370B90
Retaining Nut	7	.079	6680370B90

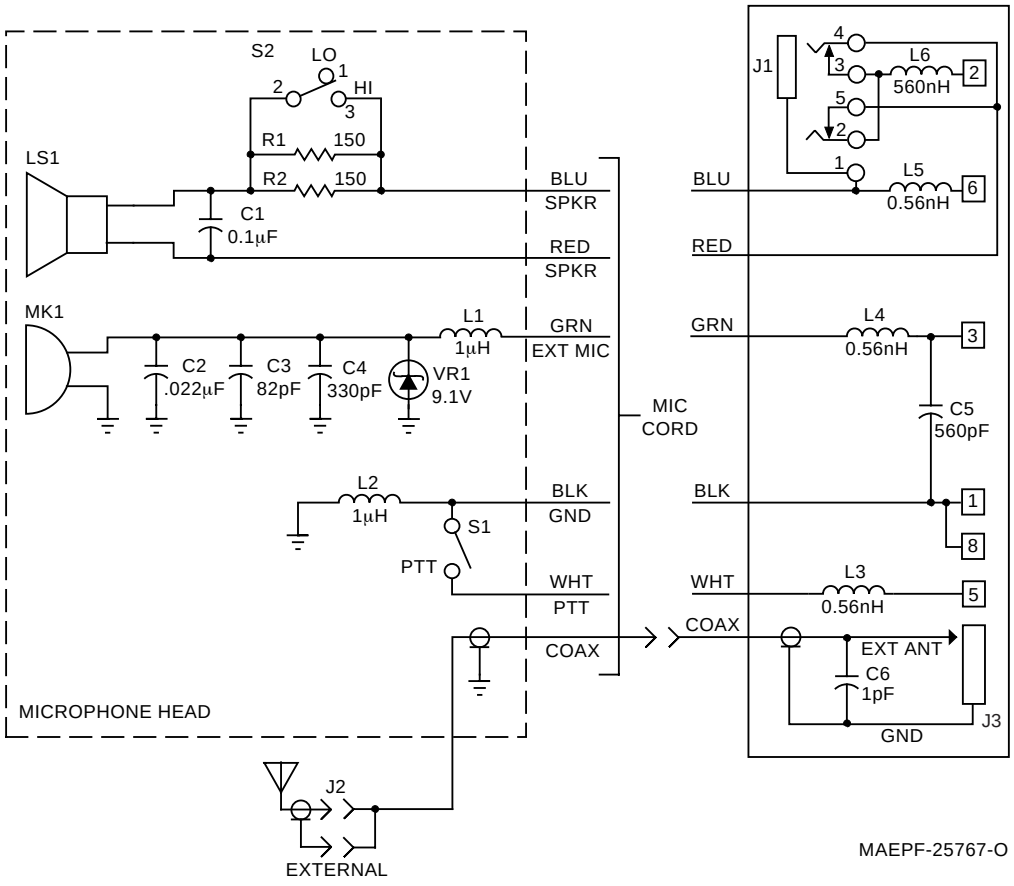
Electrical Parts List

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		CAPACITOR, Fixed: pF±5%; 63V unless stated
C1	2113741B69	0.1µF
C2	2184008H19	.022µF
C3	2113740A53	82
C4	2113740A67	330
C5	2113740A73	560
C6	2113740A03	1
		JACK:
J1	0905100W01	Micro, 3.5mm
J2	- - - - - - - - - -	Mechanical parts; items 2, 3, 5, 6, 8, 9, and 10 on exploded view
J3	0905830Z01	Connector, Coaxial SMT
L1,2	2462575A04	**COIL, RF:** unless stated Choke, 1µH
L3 thru 6	2462587Q44	Choke, 0.56µH
LS1	5005213W01	**SPEAKER:** 1 3/4"; 28Ω
MK1	5005227J06	**MICROPHONE:** Electret
		SWITCH:
S1	3905834K07	Dome, PTT
S2	4005680K04	Toggle
VR1, 2	4880140L14	**DIODE:** Zener, 9.1V (See Note)

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







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Exploded View Parts List

ITEM NO.	MOTOROLA PART NO.	DESCRIPTION
1	0104007J20	ASSEMBLY, Housing, Mic Head (includes items 28, 29, and 31)
2	0405534U01	WASHER
3	4305533U01	BUSHING, Antenna
4	0205791P01	NUT, Toggle Seal
5	2900005369	LUG
6	3205560U01	SEAL, Rubber
7	- - - - - - - - - -	ANTENNA, Typical
8	0305559U01	SCREW, Pin
9	0205543E03	NUT, Spanner
10	0405327S01	WASHER, Bearing
11	7582154D33	PAD, Speaker
12	1405490Q02	BOOT, Microphone
13	SEE NOTE	MICROPHONE
14	8405194S01	PRINTED CIRCUIT BOARD, Main
15	0300139047	SCREW, Cutting
16	0105955P12	ASSEMBLY, Cover
17	3305706X58	LABEL, Kit Number (NMN6247)
	or 3305706X59	LABEL, Kit Number (NMN6250)
	or 3305706X60	LABEL, Kit Number (NMN6251)
18	3205082E03	GASKET, O-Ring (2 req'd)
19	0382210E19	SCREW, Cover-Captive; #4-40 (2 req'd)
20	0300139982	SCREW, Machine #2-56x.188" (4 req'd)
21	0105957Q44	ASSEMBLY, Belt Clip
22	3205082E63	GASKET, O-Ring
23	SEE NOTE	DOME, PTT (S1)
24	3205264L06	SEAL, PTT
25	8405296R03	PRINTED CIRCUIT BOARD, PTT
26	SEE NOTE	SPEAKER (LS1)
27	4305407R01	SPACER, Speaker
28	3205190R05	PAD, Seal
29	7505136L03	PAD, Silicon Sponge (2 req'd)
30	SEE NOTE	SWITCH, Toggle (S2)
31	4505211R02	LEVER, PTT
32	1386324A01	ESCUTCHEON
33	3305269R01	LABEL, Nameplate
34	8405213S01	PRINTED CIRCUIT, Flexible
35	0405465C01	WASHER, PLASTIC (2 req'd)
36	2900003025	LUG
37	SEE NOTE	JACK, Micro (J1)
38	0104007J22	ASSEMBLY, Printed Circuit Board
39	6405241X01	BASEPLATE
40	3205235W01	GASKET
41	3205756Z01	SEAL, Earphone Jack
42	0305731J20	SCREW
43	- - - - - - - - - -	part of item 37
44	- - - - - - - - - -	CABLE and CONNECTOR; factory test required, not field repairable
45	0205770Z02	NUT, Retaining
46	3205082E05	O-Ring
47	2805805Z01	ASSEMBLY, RF Connector
48	3205769Z01	ASSEMBLY, Plunger Seal
49	5505737Z01	LATCH
50	2205541V01	PIN
51	4105538V01	SPRING

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