MOTOROLA

GP344, GP388 Portable Radio

Detailed Service Manual

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Table of Contents

Chapter 1 Introduction

1.0 Scope of Manual 1-1
2.0 Warranty and Service Support 1-1
2.1 Warranty Period 1-1
2.2 After Warranty Period 1-1
2.3 European Support Centre (ERSC) 1-2
2.4 Piece Parts 1-2
2.5 Technical Support 1-3
2.6 Related Documents 1-3
3.0 Radio Model Information 1-4
4.0 Model Chart and Test Specification VHF (136-174MHz) 1-5
5.0 Model Chart and Test Specification UHF1 (403-470MHz) 1-7
6.0 Model Chart and Test Specification UHF2 (450-527MHz) 1-9

Chapter 2 Theory of Operation

2.1 Introduction 2-1
2.2 Radio Power Distribution 2-1
2.3 Keypad 2-2
2.4 Control Board 2-3
2.4.1 MCU Configuration 2-3
2.4.2 Real Time Clock (RTC) 2-4
2.4.3 Circuit Description 2-4
2.4.4 ModB/Vstby Supply 2-5
2.5 VHF Transmitter 2-5
2.5.1 Power Amplifier 2-6
2.5.2 Antenna Switch 2-6
2.5.3 Harmonic Switch 2-6
2.5.4 Antenna Matching Network 2-6
2.5.5 Power Control Integrated Circuit (PCIC) 2-6
2.6 VHF Receiver 2-7
2.6.1 Receiver Front-End 2-7
2.6.2 Receiver Back-End 2-8
2.6.3 Automatic Gain Control Circuit 2-8
2.6.4 Frequency Generation Circuitry 2-9
2.7 Synthesizer 2-9
2.8 Voltage Controlled Oscillator (VCO) 2-11
2.9 UHF Transmitter (Band1+2) 2-12
2.9.1 Power Amplifier 2-13
2.9.2 Antenna Switch 2-13
2.9.3 Harmonic Switch 2-13

2.9.4Antenna Matching Network 2-13
2.9.5Power Control Integrated Circuit (PCIC) 2-13
2.10 UHF Receiver (Band 1+2) 2-14
2.10.1Receiver Front-End 2-14
2.10.2Receiver Back-End 2-15
2.10.3Automatic Gain Control Circuit 2-15
2.10.4Frequency Generation Circuitry 2-16
2.11 Synthesizer 2-16
2.12 Voltage Controlled Oscillator (VCO) 2-18

Chapter 3 Maintenance

3.1 Introduction 3-1
3.2 Preventive Maintenance 3-1
3.2.1Inspection 3-1
3.2.2Cleaning 3-1
3.3 Safe Handling of CMOS and LDMOS 3-2
3.4 General Repair Procedures and Techniques 3-2
3.5 Recommended Test Tools 3-4
3.6 Service Aids 3-6
3.7 Replacing the Circuit Board Fuse 3-7
3.8 Removing and Reinstalling the Circuit Board 3-8
3.9 Error Codes 3-9
3.10 VHF Troubleshooting Charts 3-10
3.11 UHF (Band 1 Troubleshooting Charts 3-16

Chapter 4 Schematic Diagrams, Overlays, and Parts Lists

4.1 Introduction 4-1
4.1.1Notes For All Schematics and Circuit Boards 4-1
4.2 Keypad-Controller Interconnect Flex 4-3
4.2.1Keypad-Controller Interconnect Flex Schematic 4-3
4.2.2Parts List for Keypad-Controller Interconnect Flex 4-3
4.2.3Layout for Keypad-Controller Interconnect Flex 4-4
4.3 Universal Connector Flex 4-5
4.3.1Universal Connector Flex Layout for GP344 4-5
4.3.2Universal Connector Flex Layout for GP388 4-6
4.3.3Universal Connector Flex Schematic for GP344 4-7
4.3.4Universal Connector Flex Schematic for GP388 4-8
4.4 Controller for Radios with Keypad and Display 4-9
4.5 Controller for Radios without Keypad and Display 4-19
4.6 VHF Circuit Board/Schematic Diagrams and Parts List 4-29
4.7 UHF Band 1, Circuit Board/Schematic Diagrams and Parts List 4-41
4.8 UHF Band 2, Circuit Board/Schematic Diagrams and Parts List 4-53

SAFETY AND GENERAL INFORMATION

IMPORTANT INFORMATION ON SAFE AND EFFICIENT OPERATION
Read this infomation before using your radio.

The information provided in this document supersedes the general safety information contained in user guides published prior to July 2000. For information regarding radio use in a hazardous atmosphere please refer to the Factory Mutual (FM) Approval Manual Supplement or Instruction Card, which is included with radio models that offer this capability.

Radio Frequency (RF) Operational Characteristics

To transmit (talk) you must push the Push-To-Talk button; to receive (listen) you must release the Push-To-Talk button. When the radio is transmitting, it generates radio frequency (RF) energy; when it is receiving, or when it is off, it does not generate RF energy.

PORTABLE RADIO OPERATION AND EME EXPOSURE

Your Motorola radio is designed to comply with the following national and international standards and guidelines regarding exposure of human beings to radio frequency electromagnetic energy:

- United States Federal Communications Commission, Code of Federal Regulations; 47 CFR part 2 sub-part J
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992
- Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition
- National Council on Radiation Protection and Measurements (NCRP) of the United States, Report 86, 1986
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- Ministry of Health (Canada) Safety Code 6. Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz, 1999
- Australian Communications Authority Radiocommunications (Electromagnetic Radiation - Human Exposure) Standard 1999 (applicable to wireless phones only)

To assure optimal radio performance and make sure human exposure to radio frequency electromagnetic energy is within the guidelines set forth in the above standards, always adhere to the following procedures:

Phone operation

When placing or receiving a phone call, hold your phone as you would a wireline telephone. Speak directly into the microphone.

Two-way radio operation

When using your radio hold the radio in a vertical position with the microphone 2.5 to 5 cm away from the lips.

Body-worn operation

To maintain compliance with FCC RF exposure guidelines, if you wear a radio on your body when transmitting, always place the radio in a Motorola approved clip, holder, holster, case, or body harness for this product. Use of non-Motorola-approved body worn accessories may exceed FCC RF exposure guidelines. If you do not use a Motorola approved body-worn accessory and are not using the radio in the intended use positions along side of the head in the phone mode or in front of the face in the two-way radio mode, then ensure the antenna and radio is kept the following minimum distances from the body when transmitting:

- Phone or Two-way radio mode: 2.5 cm (one inch)
- Data operation using any data feature with or without an accessory cable: 2.5 cm (one inch) .

Antenna Care

Use only the supplied or an approved replacement antenna. Unauthorized antennas, modifications, or attachments could damage the radio and may violate FCC regulations.

DO NOT hold the antenna when the radio is "IN USE". Holding the antenna affects call quality and may cause the radio to operate at a higher power level than needed.

Approved Accessories

For a list of approved Motorola accessories please contact your dealer or local Motorola representative.

ELECTROMAGNETIC INTERFERENCE/COMPATIBILITY

NOTE **Nearly every electronic device is susceptible to electromagnetic interference (EMI) if inadequately shielded, designed, or alternately configured for electromagnetic compatibility.**

Facilities

To avoid electromagnetic interference and/or compatibility conflicts, turn off your radio in any facility where posted notices instruct you to do so. Hospitals or health care facilities may be using equipment that is sensitive to external RF energy.

Aircraft

When instructed to do so, turn off your radio when on board an aircraft. Any use of a radio must be in accordance with applicable regulations per airline crew instructions.

Medical Devices

Pacemakers

The Health Industry Manufacturers Association recommends that a minimum separation of 15 cm (6 inches) be maintained between a handheld wireless radio and a pacemaker.These recommendations are consistent with those of the U.S. Food and Drug Administration.

Persons with pacemakers should:

- ALWAYS keep the radio more than 15 cm (6inches) from their pacemaker when the radio is turned ON.
- not carry the radio in the breast pocket.
- use the ear opposite the pacemaker to minimize the potential for interference.
- turn the radio OFF immediately if you have any reason to suspect that interference is taking place.

Hearing Aids

Some digital wireless radio products may interfere with some hearing aids. In the event of such interference, you may want to consult your hearing aid manufacturer to discuss alternatives.

Other Medical Devices

If you use any other personal medical device, consult the manufacturer of your device to determine if it is adequately shielded from RF energy. Your physician may be able to assist you in obtaining this information.

Safety and General

Use While Driving

Check the laws and regulations on the use of radios in the area where you drive. Always obey them. When using your radio while driving, please:

- Give full attention to driving and to the road.
- Use hands-free operation, if available.
- Pull off the road and park before making or answering a call if driving conditions so require.

OPERATIONAL WARNINGS

For Vehicles with an Air Bag



WARNING: Do not place a portable radio in the area over an air bag or in the air bag deployment area. Air bags inflate with great force. If a portable radio is placed in the air bag deployment area and the air bag inflates, the radio product may be propelled with great force and cause serious injury to occupants of vehicle.

NOTE **The areas with potentially explosive atmospheres referred to above include fueling areas such as below decks on boats, fuel or chemical transfer or storage facilities, areas where the air contains chemicals or particles, such as grain, dust or metal powders, and any other area where you would normally be advised to turn off your vehicle engine. Areas with potentially explosive atmospheres are often but not always posted.**

Potentially Explosive Atmospheres



WARNING: Turn off your radio prior to entering any area with a potentially explosive atmosphere, unless it is a radio type especially qualified for use in such areas as "Intrinsically Safe" (for example, Factory Mutual, CSA, UL or CENELEC Approved). Do not remove, install, or charge batteries in such areas. Sparks in a potentially explosive atmosphere can cause an explosion or fire resulting in bodily injury or even death.

Blasting Caps and Areas



WARNING: To avoid possible interference with blasting operations, turn off your radio when you are near electrical blasting caps, in a "*blasting area*" or in areas posted "*Turn off two-way radio*". Obey all signs and instructions.

OPERATIONAL CAUTIONS

Antennas

Do not use any portable radio that has a damaged antenna. If a damaged antenna comes into contact with your skin, a minor burn can result.

Batteries

All batteries can cause property damage and/or bodily injury such as burns if a conductive material such as jewellery, keys, or beaded chains touch exposed terminals. The conductive material may complete an electrical circuit (short circuit) and become quite hot. Exercise care in handling any charged battery, particularly when placing it inside a pocket, purse, or other container with metal objects.

Chapter 1
INTRODUCTION

1.0 Scope of Manual

This manual is intended for use by service technicians familiar with similar types of equipment. It contains service information required for the equipment described and is current as of the printing date. Changes which occur after the printing date may be incorporated by a complete Manual revision or alternatively as additions.

NOTE Before operating or testing these units, please read the Safety Information Section in the front of this manual.

2.0 Warranty and Service Support

Motorola offers long term support for its products. This support includes full exchange and/or repair of the product during the warranty period, and service/ repair or spare parts support out of warranty. Any "return for exchange" or "return for repair" by an authorised Motorola Dealer must be accompanied by a Warranty Claim Form. Warranty Claim Forms are obtained by contacting an Authorised Motorola Dealer.

2.1 Warranty Period and Return Instructions

The terms and conditions of warranty are defined fully in the Motorola Dealer or Distributor or Reseller contract. These conditions may change from time to time and the following notes are for guidance purposes only.

In instances where the product is covered under a "return for replacement" or "return for repair" warranty, a check of the product should be performed prior to shipping the unit back to Motorola. This is to ensure that the product has been correctly programmed or has not been subjected to damage outside the terms of the warranty.

Prior to shipping any radio back to the appropriate Motorola warranty depot, please contact Customer Resources (Please see page 2 and page 3 in this Chapter). All returns must be accompanied by a Warranty Claim Form, available from your Customer Services representative. Products should be shipped back in the original packaging, or correctly packaged to ensure no damage occurs in transit.

2.2 After Warranty Period

After the Warranty period, Motorola continues to support its products in two ways.

1. Motorola's Radio Aftermarket and Accessory Division (AAD) offers a repair service to both end users and dealers at competitive prices.
2. AAD supplies individual parts and modules that can be purchased by dealers who are technically capable of performing fault analysis and repair.

2.3 European Radio Support Centre (ERSC)

The ERSC Customer Information Desk is available through the following service numbers:

Austria:	06 60 75 41	Italy:	16 78 77 387
Belgium:	08 00 72 471	Luxemburg:	08 00 23 27
Denmark:	80 01 55 72	Netherlands:	60 22 45 13
Finland:	08 00 11 49 10	Norway:	80 01 11 15
France:	05 90 30 90	Portugal:	05 05 49 35 70
Germany:	0800 1875240	Spain:	90 09 84 902
Greece:	00 80 04 91 29 020	Sweden:	02 07 94 307
UK:	08 00 96 90 95	Switzerland:	1 55 30 82
Ireland:	18 00 55 50 21	Iceland:	80 08 147

Or dial Customer Care Centre:

Tel: +49 6128 70 2164

Please use these numbers for repair enquiries only

2.4 Piece Parts

Some replacement parts, spare parts, and/or product information can be ordered directly.
If a complete Motorola part number is assigned to the part, it is available from Motorola Radio Aftermarket and Accessory Division (AAD). If no part number is assigned, the part is not normally available from Motorola. If the part number is appended with an asterisk, the part is serviceable by Motorola Depot only. If a parts list is not included, this generally means that no user-serviceable parts are available for that kit or assembly.

Parts identification and ordering

Request for help in identification of non-referenced spare parts should be directed to the Customer Care Organization of Motorola's local area representation. Orders for replacement parts, kits and assemblies should be placed directly on Motorola's local distribution organization or via Motorola Online (Extranet).

EMEA Test Equipment Support

Information related to support and service of Motorola Test Equipment is available via Motorola Online (Extranet), through the Customer Care Organization of Motorola's local area representation or by calling the Motorola switchboard in Germany using phone no. +49 6128 700.

2.5 Technical Support

Motorola Product Services is available to assist the dealer/distributors in resolving any malfunctions which may be encountered.

UK/Ireland - Richard Russell
Telephone: +44 (0) 1256 488 082
Fax: +44 01256 488 080
Email: BRR001@email.mot.com

France - Armand Roy
Telephone: +33 1 6929 5715
Fax: +33 1 6929 5904
Email: armand.roy@motorola.com

East Europe, Turkey and Central Asia
Siggy Punzenberger
Telephone: +49 (0) 6128 70 2342
Fax: +49 (0) 6128 95 1096
Email: TFG003@email.mot.com

Italy - Ugo Gentile
Telephone: +39 0 2822 0325
Fax: +39 0 2822 0334
Email: C13864@email.mot.com

Scandinavia
Telephone: +46 8 735 9282
Fax: +46 8 735 9280

Africa & Middle East - Ralph Schubert
Telephone: +33 (0)4 4230 5887
Fax: +33 (0)4 4230 4784
Email: ralph.schubert@Motorola.com

Central Europe (Germany, Benelux, Austria & Switzerland) - Customer Connect
Telephone: +49 (0) 6128 70 2266
Fax: +49 (0) 6128 95 1685
Email: cgiss.emea@europe.mot.com

2.6 Related Documents

The following documents are directly related to the use and maintainability of this product.

Title	Language	Part Number
GP344/388 Product Manual	English German French Italian Russian Spanish	ENLN4073D ENLN4074D ENLN4075D ENLN4076D ENLN4077D ENLN4130C
GP344 Basic User Guide GP344 Feature User Guide GP388 Basic User Guide GP388 Feature User Guide	Euro Euro Euro Euro	68P64110B54 68P64110B98 68P64110B97 68P64110B99
Basic Service Manual	English	68P64115B18

3.0 Radio Model Information

The model number and serial number are located on a label attached to the back of your radio. You can determine the RF output power, frequency band, protocols, and physical packages. The example below shows one portable radio model number and its specific characteristics.

Table 1-1 Radio Model Number (Example: MDH38KDC9AN3AE)

	Type of Unit	Model Series	Freq. Band	Power Level	Physical Packages	Channel Spacing	Protocol	Feature Level	Model Revision	Model Package
MD = Motorola Internal Use	**H** = Portable	**38**	**K** VHF (136-174MHz)	**D** 4-5W	**C** GP344,	**9** Program-mable	**AN** Conventional 5Tone	**3** GP344	**A**	**E**
			R UHF 1 (403-470MHz)		**H** GP388,			**6** GP388		
			S UHF2 (450-527MHz)							

4.0 Model Chart and Test Specifications (136-174 MHz)

4.1 Model Chart

GP Series, VHF, 136-174 MHz			
Model			**Description**
MDH38KDC9AN3_E			GP344 136-174 MHz 5W 16 CH
	MDH38KDH9AN6_E		GP388 136-174 MHz 5W 255 CH
		Item	**Description**
X		PMUD1742	GP344 Transceiver 136-174 MHz 5W 16CH (Motorola internal use only)
	X	PMUD1743	GP388 Transceiver 136-174 MHz 5W 255CH (Motorola internal use only)
X		JMHD4005	* GP344 Back Cover Kit 136-174 MHz 5W 16CH
	X	PMHD4009	* GP388 Back Cover Kit 136-174 MHz 5W 255CH
X		PMHD4004	* GP344 Front Housing Kit 16CH
	X	PMHD4005	* GP388 Front Housing Kit 255CH
X	X	PMAD4012	Antenna, 136-155 MHz Stubby
X	X	PMAD4013	Antenna,155-174 MHz Stubby
X	X	PMAD4014	Antenna, 136-155 MHz 14 cm
X	X	PMAD4015	Antenna, 155-174 MHz 14 cm
X	X	PMAD4023	Antenna, 150-161 MHz 14 cm
X	X	PMAD4025	Antenna 150-161 MHz Stubby
X		6864110B54	GP344 User Guide
	X	6804110B97	GP388 User Guide

x = Indicates one of each is required.

* = Service replacement boards.

4.2 Specifications GP344/ GP388

General

	VHF	
Frequency:	136-174 MHz	
Channel Capacity:	GP344: 16 Channels	GP388: 255Channels
Power Supply:	7.5 Volts	
Dimensions Standard High Capacity Lithium Battery: Ultra High Capacity Lithium Battery:	GP344 101,5mm x 55.5mm x 30.5mm 101,5mm x 55.5mm x 35,5mm	GP388 101,5mm x 55.5mm x 33.0mm 101,5mm x 55.5mm x 38,0mm
Weight: Standard High Capacity Lithium Battery: Ultra High Capacity Lithium Battery::	GP344 250 g 270 g	GP388 265 g 285 g
Average battery life: Standard High Capacity Lithium Battery: Ultra High Capacity Lithium Battery::	Low Power 9Hrs 13Hrs	High Power 7Hrs 10Hrs
Sealing:	Passes rain testing per MIL-STD-810-C,D & E and IP54	
Shock:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	
Vibration:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	
Dust:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	
Humidity:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	

Transmitter

	VHF	
RF Output Li Ion @ 7.5V:	Low 1W	High 5W
Frequency	136-174 MHz	
Channel Spacing	12.5/20/25 kHz	
Freq. Stability (-30×C to +60×C)	0.00025%	
Spurs/Harmonics:	-36 dBm < 1 GHz -30 dBm > 1 GHz	
Audio Response: (from 6 dB/oct. Pre-Emphasis, 300 to 3000Hz)	+1, -3 dB	
Audio Distortion: @ 1000 Hz, 60% Rated Max. Dev.	<5%	
FM Noise:	-40 dB	

Receiver

	VHF 12.5kHz	VHF 20/25kHz
Frequency:	136-174MHz	
Sensitivity 12dB EIA SINAD:	0.35 microV	
Adjacent Channel Selectivity ETS	-60 dB	-70 dB
Intermodulation ETS	-65 dB	
Freq. Stability (-30×C to +60×C):	0.00025%	
Spur Rejection:	-70 dB	
Image Rejection:	-70 dB	
Audio Output @ <5% Distortion	500 mW	

All specifications are subject to change without notice.

5.0 Model Chart and Test Specifications (403-470 MHz)

5.1 Model Chart

GP Series, UHF Band 1, 403-470 MHz			
Model			**Description**
MDH38RDC9AN3_E			GP344 403-470 MHz 4W 16CH
	MDH38RDH9AN6_E		GP388 403-470 MHz 4W 255CH
		Item	**Description**
X		PMUE1817	GP344 Transceiver 403-470 MHz 4W 16CH (Motorola internal use only)
	X	PMUE1818	GP388 Transceiver 403-470 MHz 4W 255CH (Motorola internal use only)
X		JMHE4001	* GP344 Back Cover Kit 403-470 MHz 4W 16CH
	X	PMHE4015	* GP388 Back Cover Kit 403-470 MHz 4W 255CH
X		PMHE4006	* GP344 Front Housing Kit 16CH
	X	PMHE4007	* GP388 Front Housing Kit 255CH
X	X	NAE6483	Monopole (Whip) antenna (403-520 MHz)
X	X	PMAE4002	UHF 9 cm antenna (403-433 MHz), Stubby
X	X	PMAE4003	UHF 9 cm antenna (430-470 MHz)
X	X	NAE6522	UHF antenna (438-470 MHz), Stubby
X		6864110B54	GP344 User Guide
	X	6864110B97	GP388 User Guide

x = Indicates one of each is required.

* = Service replacement boards.

5.2 Specifications GP344/ GP388

General

	UHF	
Frequency:	403-470 MHz	
Channel Capacity:	GP344: 16 Channels	GP388: 255Channels
Power Supply:	7.5 Volts	
Dimensions Standard High Capacity Lithium Battery: Ultra High Capacity Lithium Battery:	GP344 101,5mm x 55.5mm x 30.5mm 101,5mm x 55.5mm x 35,5mm	GP388 101,5mm x 55.5mm x 33.0mm 101,5mm x 55.5mm x 38,0mm
Weight: Standard High Capacity Lithium Battery: Ultra High Capacity Lithium Battery::	GP344 250 g 270 g	GP388 265 g 285 g
Average battery life: Standard High Capacity Lithium Battery: Ultra High Capacity Lithium Battery::	Low Power 9Hrs 13Hrs	High Power 7Hrs 10Hrs
Sealing:	Passes rain testing per MIL-STD-810-C,D & E and IP54	
Shock:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	
Vibration:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	
Dust:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	
Humidity:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	

Transmitter

	UHF	
RF Output Li Ion @ 7.5V:	Low 1W	High 4W
Frequency	403-470 MHz	
Channel Spacing	12.5/20/25 kHz	
Freq. Stability (-30×C to +60×C)	0.00025%	
Spurs/Harmonics:	-36 dBm < 1 GHz -30 dBm > 1 GHz	
Audio Response: (from 6 dB/oct. Pre-Emphasis, 300 to 3000Hz)	+1, -3 dB	
Audio Distortion: @ 1000 Hz, 60% Rated Max. Dev.	<5%	
FM Noise:	-40 dB	

Receiver

	UHF 12.5kHz	UHF 20/25kHz
Frequency:	403-470MHz	
Sensitivity 12dB EIA SINAD:	0.35 microV	
Adjacent Channel Selectivity ETS	-60 dB	-70 dB
Intermodulation ETS	-65 dB	
Freq. Stability (-30×C to +60×C):	0.00025%	
Spur Rejection:	-70 dB	
Image Rejection:	-70 dB	
Audio Output @ <5% Distortion	500 mW	

All specifications are subject to change without notice.

6.0 Model Chart and Test Specifications (450-527 MHz)

6.1 Model Chart

GP Series, UHF Band 2, 450-527 MHz			
Model			**Description**
MDH38SDC9AN3_E			GP344 450-527 MHz 4W 16 CH
	MDH38SDH9AN6_E		GP388 450-527 MHz 4W 255CH
		Item	**Description**
X		PMUE1819	GP344 Transceiver 450-527 MHz 4W 16CH (Motorola internal use only)
	X	PMUE1820	GP388 Transceiver 450-527 MHz 4W 255CH (Motorola internal use only)
X		PMHE4004	* GP344 Back Cover Kit 450-527 MHz 4W 16CH
	X	PMHE4016	* GP388 Back Cover Kit 450-527 MHz 4W 255CH
X		PMHE4008	* GP344 Front Housing Kit 16CH
	X	PMHE4009	* GP388 Front Housing Kit 255CH
X	X	NAE6483	Monopole (Whip) antenna (403-520 MHz)
X	X	PMAE4008	Monopole (Whip) antenna (470-530 MHz)
X	X	PMAE4006	UHF 9 cm antenna (465-495 MHz)
X	X	PMAE4007	UHF 9 cm antenna (490-527 MHz)
X		6864110B54	GP344 User Guide
	X	6864110B97	GP388 User Guide

x = Indicates one of each is required.

* = Service replacement boards.

6.2 Specifications GP344/ GP388

General

	UHF2	
Frequency:	450-527 MHz	
Channel Capacity:	GP344: 16 Channels	GP388: 255Channels
Power Supply:	7.5 Volts	
Dimensions Standard High Capacity Lithium Battery: Ultra High Capacity Lithium Battery:	GP344 101,5mm x 55.5mm x 30.5mm 101,5mm x 55.5mm x 35,5mm	GP388 101,5mm x 55.5mm x 33.0mm 101,5mm x 55.5mm x 38,0mm
Weight: Standard High Capacity Lithium Battery: Ultra High Capacity Lithium Battery::	GP344 250 g 270 g	GP388 265 g 285 g
Average battery life: Standard High Capacity Lithium Battery: Ultra High Capacity Lithium Battery::	Low Power 9Hrs 13Hrs	High Power 7Hrs 10Hrs
Sealing:	Passes rain testing per MIL-STD-810-C,D & E and IP54	
Shock:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	
Vibration:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	
Dust:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	
Humidity:	Meets MIL-STD-810-C,D & E and TIA/EIA 603	

Transmitter

	UHF2	
RF Output Li Ion @ 7.5V:	Low 1W	High 4W
Frequency	450-527 MHz	
Channel Spacing	12.5/20/25 kHz	
Freq. Stability (-30×C to +60×C)	0.00025%	
Spurs/Harmonics:	-36 dBm < 1 GHz -30 dBm > 1 GHz	
Audio Response: (from 6 dB/oct. Pre-Emphasis, 300 to 3000Hz)	+1, -3 dB	
Audio Distortion: @ 1000 Hz, 60% Rated Max. Dev.	<5%	
FM Noise:	-40 dB	

Receiver

	UHF2 12.5kHz	UHF2 20/25kHz
Frequency:	450-527MHz	
Sensitivity 12dB EIA SINAD:	0.35 microV	
Adjacent Channel Selectivity ETS	-60 dB	-70 dB
Intermodulation ETS	-65 dB	
Freq. Stability (-30×C to +60×C):	0.00025%	
Spur Rejection:	-70 dB	
Image Rejection:	-70 dB	
Audio Output @ <5% Distortion	500 mW	

All specifications are subject to change without notice.