MOTOROLA

MTM800
with Enhanced Control Head

TETRA Mobile Terminal
380–430 MHz (MT912M)
410–470 MHz (MT512M)

Basic Service Manual

DOCUMENT HISTORY

The following major changes have been implemented in this manual since the previous edition::

Edition	Description	Date
6866539D28-A	Initial Release	Mar. 2007
6866539D28-B	Changes in Accessories. Included info on MACE UCM Board Kit.	Aug. 2007
6866539D28-C	Added GPS – Sirf Module Kit info Updated parts lists and exploded views	Jan. 2008
6866539D28-D	Updated service kits	Aug. 2009

Notes

Product Safety and RF Energy Exposure
for TETRA Mobile Terminals
installed in Vehicles or as Fixed Site Control Stations

> ⚠️ **Caution**
>
> **THIS CHAPTER IS AN EXTRACT OF THE MULTI LINGUAL MOBILE SAFETY BOOKLET PUBLICATION No. 6866537D37_.**
>
> **FOR THE LATEST SAFETY INFORMATION REFER TO THE SEPARATE SAFETY BOOKLET DELIVERED WITH YOUR TERMINAL.**
>
> **BEFORE USING THIS TERMINAL READ THIS INFORMATION WHICH CONTAINS IMPORTANT OPERATING INSTRUCTIONS FOR SAFE USAGE AND RF ENERGY AWARENESS AND CONTROL INFORMATION FOR COMPLIANCE WITH RF ENERGY EXPOSURE LIMITS IN APPLICABLE NATIONAL AND INTERNATIONAL STANDARDS.**

The information provided in this document supersedes information contained in user guides, manuals and other documentation published prior to **February 2002.**

RF Energy Exposure Awareness and Control Information, and Operational Instructions for FCC Occupational Use Requirements.

Note: This terminal is intended for use in occupational / controlled conditions, where users have full knowledge of their exposure and can exercise control over their exposure to meet FCC/ICNIRP limits. This terminal device is NOT authorized for general population, consumer or any other use.

This 2-way terminal uses electromagnetic energy in the radio frequency (RF) spectrum to provide communications between two or more users over a distance. It uses radio frequency (RF) energy or radio waves to send and receive calls. RF energy is one form of electromagnetic energy. Other forms include, but are not limited to, sunlight and x-rays. RF energy, however, should not be confused with these other forms of electromagnetic energy, which when used improperly, can cause biological damage. Very high levels of x-rays, for example, can damage tissues and genetic material.

Experts in science, engineering, medicine, health and industry work with organisations to develop standards for safe exposure to RF energy. These standards provide recommended levels of RF exposure for both workers and the general public. These recommended RF exposure levels include substantial margins of protection.

All Motorola 2-way terminals are designed, manufactured and tested to ensure they meet government-established RF exposure levels. In addition, manufacturers also recommend specific operating instructions to users of 2-way terminals. These instructions are important because they inform users about RF energy exposure and provide simple procedures on how to control it.

Please refer to the following Web sites for more information on what RF energy exposure is and how to control your exposure to assure compliance with established RF exposure limits.

http://www.fcc.gov/oet/rfsafety/rf-faqs.html

http://www.osha.gov/SLTC/radiofrequencyradiation/index.html

Federal Communications Commission Regulations (US markets only)

The FCC rules require manufacturers to comply with the FCC RF energy exposure limits for mobile 2-way terminals before they can be marketed in the U.S. When 2-way terminals are used as a consequence of employment, the FCC requires users to be fully aware of and able to control their exposure to meet occupational requirements. Exposure awareness can be facilitated by the use of a label directing users to specific user awareness information. Your Motorola 2-way terminal has an RF exposure product label. Do not remove this RF exposure label from the device. Also, your Motorola user manual, or separate safety booklet, includes information and operating instructions required to control your RF exposure and to satisfy compliance requirements.

Compliance with RF Exposure Standard

Your Motorola terminal is designed and tested to comply with a number of national and international standards and guidelines (listed below) regarding human exposure to radio frequency electromagnetic energy. **This terminal complies with IEEE and ICNIRP exposure limits for occupational/controlled RF** exposure environments at duty factors of up to 50% talk–50% listen and is authorised by the IEEE/ICNIRP for occupational use. In terms of measuring RF energy for compliance with these exposure guidelines, your terminal antenna radiates measurable RF energy only while it is transmitting (during talking), not when it is receiving (listening) or in standby mode.

Your Motorola two-way terminal complies with the following RF energy exposure standards and guidelines:

- 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

- 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 2003

- ANATEL, Brasil Regulatory Authority, Resolution 256 (April 11, 2001) "additional requirements for SMR, cellular and PCS product certification."

RF Exposure Compliance and Control Guidelines and Operating Instructions

To control exposure to yourself and others and to ensure compliance with the RF exposure limits, always adhere to the following procedures.

Guidelines:

- User awareness instructions should accompany device when transferred to other users.

- Do not use this device if the operational requirements described herein are not met.

Instructions:

- **Transmit no more that the rated duty factor of 50% of the time**. To transmit (talk), push the Push-To-Talk (PTT) button. To receive calls, release the PTT button. Transmitting 50% of the time, or less, is important because this terminal generates measurable RF energy exposure only when transmitting (in terms of measuring for standards compliance).

- **Transmit only when people outside the vehicle are at least the recommended minimum lateral distance away, as shown in Table 1, from the body of a vehicle with a properly installed antenna.** This separation distance will ensure that there is sufficient distance from a properly installed (according to installation instructions) externally-mounted antenna to satisfy the RF exposure requirements in the standards listed above.

    Note: Table 1 lists the recommended lateral distance for bystanders in an uncontrolled environment from the body of a vehicle with an approved, properly installed transmitting antenna (i.e. monopoles over a ground plane, or dipoles) at several different ranges of rated radio power for mobile terminals installed in a vehicle.

Table 1

Mobile terminal Rated Power (see Note below)	Minimum Lateral Distance From Vehicle Body
Less than 7 Watts	20 cm (8 Inches)
7 to 15 Watts	30 cm (1 Ft)
16 to 39 Watts	60 cm (2 Ft)
40 to 110 Watts	90 cm (3 Ft)

Note: If you are not sure of the rated power of your terminal, contact your Motorola representative or dealer and supply the terminal model number found on the terminal model label. If you cannot determine the rated power out, then assure 90cms (3 feet) separation from the body of the vehicle.

Mobile Antenna Installation Guidelines

- These mobile antenna installation guidelines are limited to metal body motor vehicles or vehicles with appropriate ground planes.

- Antennas should be installed in the centre area of the roof or the trunk lid taking into account the bystander exposure conditions of backseat passengers and according to the specific instructions and restrictions in the Radio (Terminal) Installation Manual along with the requirements of the antenna supplier.

- Trunk lid installations are limited to vehicles with clearly defined flat trunk lids, and in some cases, to specific terminal models and antennas. See the Radio (Terminal) Installation Manual for specific information on how and where to install specific types of approved antennas to facilitate recommended operating distances to all potentially exposed persons.

- **Use only Motorola-approved supplied antenna or a Motorola approved replacement antenna**. Unauthorised antennas, modifications, or attachments could damage the terminal and may result in non-compliance with RF Safety Standards.

Approved Accessories

- This terminal has been tested and meets the RF Safety Standards when used with the Motorola accessories supplied or designated for this product. Use of other accessories may result in non-compliance with RF Safety Standards.

- For a list of Motorola approved antennas, please see your dealer or local Motorola contact. Your nearest dealer can be found at the following web site:

http://www.motorola.com/governmentandenterprise

Additional Information

- For additional information on exposure requirements or other training information, visit

http://www.motorola.com/rfhealth

Compliance and Control Guidelines and Operating Instructions for Mobile Two-Way Terminals Installed as Fixed Site Control Stations

If mobile terminal equipment is installed at a fixed location and operated as a control station or as a fixed unit, the antenna installation must comply with the following requirements in order to ensure optimal performance and compliance with the RF energy exposure limits in the standards and guidelines listed on previous page:

- The antenna should be mounted outside the building on the roof or a tower if at all possible.

- As with all fixed site antenna installations, it is the responsibility of the licensee to manage the site in accordance with applicable regulatory requirements and may require additional compliance actions such as site survey measurements, signage, and site access restrictions in order to insure that exposure limits are not exceeded.

Electromagnetic Interference/Compatibility

Note: Nearly every electronic device is susceptible to electromagnetic interference (EMI) if inadequately shielded, designed or otherwise configured for electromagnetic compatibility. It may be necessary to conduct compatibility testing to determine if any electronic equipment used in or around vehicles or near fixed site antenna is sensitive to external RF energy or if any procedures need to be followed to eliminate or mitigate the potential for interaction between the terminal transmitter and the equipment or device.

Facilities

To avoid electromagnetic interference and/or compatibility conflicts, turn off your terminal 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.

Vehicles

To avoid possible interaction between the terminal transmitter and any vehicle electronic control modules, such as, ABS, engine, or transmission controls, the terminal should be installed only by an experienced installer and that the following precautions be used when installing the terminal:

1. Refer to the manufacturer's instructions or other technical bulletins for recommendations on terminal installation.

2. Before installing the terminal, determine the location of the electronic control modules and their harnesses in the vehicle.

3. Route all terminal wiring, including the antenna transmission line, as far away as possible from the electronic control units and associated wiring.

Driver Safety

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

• Give full attention to driving and to the road.

• Pull off the road and park before making or answering a call if driving conditions so require.

 WARNING   OPERATIONAL WARNINGS

For Vehicles With Air Bags

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

Potentially Explosive Atmospheres

Turn off your terminal prior to entering any area with a potentially explosive atmosphere. Sparks in a potentially explosive atmosphere can cause an explosion or fire resulting in bodily injury or even death.

The areas with potentially explosive atmospheres referred to above include fuelling 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. Areas with potentially explosive atmospheres are often but not always posted.

Blasting Caps And Blasting Areas

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

For terminals installed in vehicles fueled by liquefied petroleum gas, refer to the (U.S.) National Fire Protection Association standard, NFPA 58, for storage, handling, and/or container information. For a copy of the LP-gas standard, NFPA 58, contact the National Fire Protection Association, One Battery Park, Quincy, MA.

⚠️ **Caution**

ADDITIONAL IMPORTANT INFORMATION FOR SERVICING AND INSTALLING THE TERMINAL

Only specialized workshops should be contacted for installation, maintenance and repair work.

This unit is equipped with protection fuses in the Power and Ignition Sense Cable.
Replace these fuses only with the original ratings!

Caution: **Failure to use correct manufactures approved parts may result in physical damage to this unit.**

Fuse for Power Cable GKN6270/GKN6274: 10A (Motorola Part Number: 65C80283E05)
Fuse for Ignition Sense Cable HKN9327: 4A (Motorola Part Number: 65C80283E02)

⚠️ **Achtung**

ZUSÄTZLICHE SICHERHEITSINFORMATIONEN FÜR SERVICE UND INSTALLATION DES FUNKGERÄTES

Installations, Wartungs- und Reparaturarbeiten dürfen ausschließlich von autorisiertem und geschultem Personal ausgeführt werden.

Dieses Gerät ist mit einer Schutzsicherung im Stromversorgungskabel ausgestattet.
Bei Austausch ausschließlich den Originalwert verwenden

WARNUNG: **Bei Einsetzen von nicht vom Hersteller freigegebenen Ersatzteilen kann das Gerät zerstört werden.**

Sicherung für Stromversorgungskabel GKN6270/GKN6274: 10A (Motorola Best.-Nr.:65C80283E05)
Sicherung für Zündungserkennungskabel HKN9327: 4A (Motorola Best.-Nr.:65C80283E02)

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APPENDIX B   PRODUCT SPECIFIC INFORMATION

SPEZIELLE PRODUKTINFORMATIONEN

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CHAPTER 1
SCOPE & WARRANTY INFORMATION

SCOPE OF THIS MANUAL

This manual is intended for use by trained service technicians familiar with similar types of equipment only. It contains information required for the installation of 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 planning or starting the installation, please read the Safety Information Section in the front of this manual.**

This manual is divided into the following sections:

- Copyright

- Document History

- User Safety, Training and General Information

- CHAPTER 1   Scope and Warranty Information

- CHAPTER 2   Model Information & Accessories

- CHAPTER 3   Overview

- CHAPTER 4   Programming the Terminal

- CHAPTER 5.1 Test Setup and Testing for 380 & 410MHz

- CHAPTER 6   Maintenance

- APPENDIX A   Replacement Parts and Kits

- APPENDIX B   Product Specific Information

EMEA Manuals & User Guides

Product Information Manual

6866537D87   MTM800/MTM800 with Enhanced Control Head Product Information (and programming) Manual

Installation Instructions

6866539D30   MTM800 with Enhanced Control Head Installation Manual (English)

Service Manuals

6866539D29   MTM800 with Enhanced Control Head 380-430MHz Detailed Service Manual (English)
6866539D31   MTM800 with Enhanced Control Head 410-470MHz Detailed Service Manual (English)
6866539D28   MTM800 with Enhanced Control Head Basic Service Manual (English)

User Guides

6866539D24   MTM800 with Enhanced Control Head Basic User Guide (EN / DE / FR / ES / NL / AR)
6866539D34   MTM800 with Enhanced Control Head Basic User Guide (EN / RU / IT / PL)
6866539D35   MTM800 with Enhanced Control Head Basic User Guide (EN / SV / PT Braz / NO / DK)
6866539D25   MTM800 with Enhanced Control Head Feature User Guide (English) only available on MOL: (https://emeaonline.motorola.com)

Safety Leaflets

6866537D37   Mobile Safety Leaflet (EMEA)

LACR Manuals & User Guides

Product Information Manual

  6866537D87   MTM800/MTM800 with Enhanced Control Head Product Information (and programming)
                Manual

Installation Instructions

  6866539D30   MTM800 with Enhanced Control Head Installation Manual (English)

Service Manuals

  6866539D29   MTM800 with Enhanced Control Head 380-430MHz Detailed Service Manual (English)
  6866539D31   MTM800 with Enhanced Control Head 410-470MHz Detailed Service Manual (English)
  6866539D28   MTM800 with Enhanced Control Head Basic Service Manual (English)

User Guides

  6866539D24   MTM800 with Enhanced Control Head Basic User Guide (EN / DE / FR / ES / NL / AR)
  6866539D34   MTM800 with Enhanced Control Head Basic User Guide (EN / RU / IT / PL)
  6866539D35   MTM800 with Enhanced Control Head Basic User Guide (EN / SV / PT Braz / NO / DK)
  6866539D25   MTM800 with Enhanced Control Head Feature User Guide (English) only available on
                MOL: (https://emeaonline.motorola.com)

CPS Start Up Manual

  6881097C10   MTM800 CPS Start Up Manual (English, Spanish, Portuguese)

CD ROM

  9964416H09   MTM800 Documentation CD
                (includes 6881097C65, 6881097C66, 6881097C67 and 6881097C68)

Safety Leaflets

  6804112J96   Mobile Safety Leaflet (APAC & LACR)
  6804113J25   Mobile Safety Leaflet (APAC & LACR) especially for TETRA Mobiles

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. 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 terminal back to the appropriate Motorola warranty depot, please contact Customer Resources or your Motorola dealer, distributor or reseller. All returns must be accompanied by a Warranty Claim Form, available from your Customer Service representative or Motorola Online Extranet (MOL) or your Motorola dealer, distributor or reseller (refer to list in Appendix A). Products should be shipped back in the original packaging, or correctly packaged to ensure no damage occurs in transit.

After Warranty Period

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

- Motorola's Regional Radio Support Centres offer a repair service to both end users and dealers at competitive prices.

- AAD supplies individual parts and modules that can be purchased by dealers who are technically capable of performing fault analysis and repair.

CHAPTER 2
MODEL INFORMATION & ACCESSORIES

MTM800 with Enhanced Control Head Mobile Terminal Model Information

This manual applies to the following Mobile Terminal Models

Type No.	Sales Model No.	Short Description	Model
MT512M MT912M	M80RCS6TZ5AN M80PCS6TZ5AN	MTM800 ENH 410–470 MHz, DASH MTM800 ENH 380–430 MHz, DASH	M1
MT512M MT912M	M80RCS6TZ4AN M80PCS6TZ4AN	MTM800 ENH 410–470 MHz, DESK MTM800 ENH 380–430 MHz, DESK	M2
MT512M MT912M	M80RCS6TZ6AN M80PCS6TZ6AN	MTM800 ENH 410–470 MHz, REMOTE MTM800 ENH 380–430 MHz, REMOTE	M3
MT512M MT912M	M80RCS6TZ2AN M80PCS6TZ2AN	MTM800 ENH 410–470 MHz, M'CYCLE MTM800 ENH 380–430 MHz, M'CYCLE	M4
MT512M MT912M	M80RCA6TZ5AN M80PCA6TZ5AN	MTM800 ENH 410–470 MHz, Data MTM800 ENH 380–430 MHz, Data	M5

Sales Model Nomenclature

Position:	1	2	3	4	5	6	7	8	9	10	11	12
Typical Model Number:	M	8	0	R	C	N	6	T	Z	5	A	N

Type of Unit

M = Mobile Product

Model Series

80 = MTM800 ENH

Frequency Band

P = 380 - 430 MHz
R = 410 - 470 MHz

Level

C = 1.0 to 3.9 Watts

Physical Packages

C = Expansion/Data Head
S = Enhanced Control Head

Channel Spacing

6 = 20/25 kHz

Unique Variation

N = Standard Package

Version Letter

Feature Level

5 = Dash/Desk Mount
4 = Desk Mount
2 = Motorcycle Mount
6 = Remote Mount

Primary System Type

Z = TETRA

Primary Operation

T = Trunking

Model Specifications*

GENERAL		RECEIVER		TRANSMITTER	
ETSi:	ETS 300 394-1	**Receiver Type:**	Superheterodyne	**Modulation Type:**	π/4DQPSK
Type Number:		**Frequency Range:**		**RF Power:**	
MTM800 ENH 410–470 MHz	MT512M	MTM800 ENH	380–430 MHz	TMO	3,16 W / 35 dBm
MTM800 ENH 380–430 MHz	MT912M	MTM800 ENH	410–470 MHz	DMO	3,16 W / 35 dBm
Temperature Range for Transceiver:		**Channel Spacing:**	25 kHz	**Frequency Range TMO:**	
Operating	-30°C to +60°C			MTM800 ENH	380–430 MHz
Storage:	-40°C to +85°C	**Sensitivity (3.5%) BER:**	-112 dBm	MTM800 ENH	410–470 MHz
Power Supply:		**Frequency Range DMO:**			
Minimum:	10.8 Vdc	**Intermodulation:**	-47 dBm		
Nominal:	13.2 Vdc			MTM800 ENH	380–430 MHz
Maximum:	15.6 Vdc	**Blocking (50–100 kHz):**	-40 dBm	MTM800 ENH	410–470 MHz
Max. Current	Approx. 3.5 A				
Dimensions (HxWxD) in mm:		**Spurious Rejection:**	-45 dBm	**Frequency Stability:**	
Transceiver with		Adjacent Channel		Locked to Base	+/-100 Hz
Enhanced Control Head,		Interference Ratio:	-45 dB	Not Locked to Base	+/- 1 kHz
Dash Mount	60 x 185 x 175				
Weight in grams:		**Frequency Stability:**		**Spurious Emissions:**	
Transceiver with		Locked to Base	+/-100 Hz	Conducted/Radiated	- 36 dBm <=1GHz
Enhanced Control Head,		Unlocked to Base	+/- 1 kHz		- 30 dBm > 1GHz
Dash Mount	1430				
		Audio Rated (@4 Ohms):		**Adjacent Channel Power Ratio** (@ ± 25kHz)	
		For External Speaker:	10 W		
		Distortion at Rated Audio:	5% Max.	380–430 MHz	
				410–470 MHz	-60 dBc

* Technical information may be subject to change without further notice.

Model Descriptions**

Model	Description
M1	Dash Mount with Mobile Terminal with Direct Mount Enhanced Control Head, Speaker, Microphone or Handset, Standard User Guide, and Installation Accessories.
M2	Desk Mount with Mobile Terminal with Direct Mount Enhanced Control Head, Speaker, Microphone or Handset, Standard User Guide, Installation Accessories and Tray with power supply.
M3	Remote Mount with Mobile Terminal with Remote Mount Enhanced Control Head, optional either with Remote Head Enhanced or Data Expansion Head Enhanced, Speaker, Microphone or Handset, Remote Mount cables, Standard User Guide, and Installation Accessories.
M4	Motorcycle Mount with Mobile Terminal with Motorcycle Mount Enhanced Control Head, optional either with Remote Head Enhanced or Data Expansion Head Enhanced, Speaker, Microphone or Handset, Motorcycle cables, Standard User Guide, and Installation Accessories.
M5	Data Mount with Mobile Terminal with Remote Mount Enhanced Control Head, Data Expansion Head Enhanced, Speaker, Microphone or Handset, Remote Mount cables, Standard User Guide, and Installation Accessories.

** Other combinations are not recommend or not possible.

Accessories-to-Model Chart

ACCESSORIES						
Control Heads	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Enhanced Control Head, English Keypad	GMWN4298_	X	X			
Enhanced Control Head, Chinese Keypad	GMWN4299_	X	X			
Enhanced Control Head, Korean Keypad	GMWN4300_	X	X			
Enhanced Control Head, Arabic Keypad	GMWN4301_	X	X			
Enhanced Control Head Bopomofu Keypad	GMWN4302_	X	X			
Enhanced Control Head Cyrillic Keypad	GMWN4303_	X	X			
Remote Mount Enhanced Control Head, English Keypad	GMWN4304_			X		X
Remote Mount Enhanced Control Head, Chinese Keypad	GMWN4305_			X		X
Remote Mount Enhanced Control Head, Korean Keypad	GMWN4306_			X		X
Remote Mount Enhanced Control Head, Arabic Keypad	GMWN4307_			X		X
Remote Mount Enhanced Control Head, Bopomofu Keypad	GMWN4308_			X		X
Remote Mount Enhanced Control Head, Cyrillic Keypad	GMWN4309_			X		X
Motorcycle Mount Enhanced Control Head, English Keypad	GMWN4600_				X	
Motorcycle Mount Enhanced Control Head, Chinese Keypad	GMWN4601_				X	
Motorcycle Mount Enhanced Control Head, Korean Keypad	GMWN4602_				X	
Motorcycle Mount Enhanced Control Head, Arabic Keypad	GMWN4603_				X	
Motorcycle Mount Enhanced Control Head, Bopomofu Keypad	GMWN4604_				X	
Motorcycle Mount Enhanced Control Head, Cyrillic Keypad	GMWN4605_				X	
Remote Mount Enhanced Control Head, English Keypad - Hungarian	GMWN4606_			X		X
Motorcycle Mount Enhanced Control Head, English Keypad - Hungarian	GMWN4607_				X	
Enhanced Control Head, English Keypad - Hungarian	GMWN4608_	X	X			
Expansion & Remote Head Kits	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Data Expansion Head Enhanced	PMLN4908_			X	X	X
Remote Head Enhanced	PMLN4904_			X	X	

ACCESSORIES						
Microphones	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Compact Fist Microphone	RMN5107_	X	X	X	X	X
Heavy Duty Fist Microphone	RMN5111_	X	X	X	X	X
Desktop Microphone, Mobile Microphone Port	RMN5106_	X	X	X	X	X
Compact Fist, Mobile Microphone Port	RMN5052_	X	X	X	X	X
Heavy Duty Fist Microphone, Mobile Microphone Port	RMN5053_	X	X			
Visor Microphone	GMMN4065_	X	X	X	X	X
Loudspeakers	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Loudspeaker, 13W	GMSN4066_	X	X	X	X	X
Small Loudspeaker, 5W	GMSN4078_	X	X	X	X	X
Loudspeaker Extension Cable	GMKN4084_	X	X	X	X	X
Handset	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Telephone-Style Handset[1]	GMUN1006_	X	X	X	X	X
PTT Switches	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
External PTT with Emergency Footswitch	RLN4836_	X	X	X	X	X
Footswitch with Remote PTT	RLN4856_	X	X	X	X	X
Pushbutton with Remote PTT	RLN4857_	X	X	X	X	X
Desktop Mount	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Power Cable (For Supply to Desktop Mobile)	GKN6266_		X			
Desktop Tray without Loudspeaker	GLN7318_		X			
Desktop Tray with Loudspeaker	GLN7326_		X			
Desktop Power Supply	GPN6145_		X			
Power Cable (For Desktop Power Supply GPN6145)	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
US Linecord (3060665A04) Packed	NTN7373_R		X			
Euro Linecord (3060665A05) Packed	NTN7374_R		X			
UK Linecord (3002120F02) Packed	NTN7375_R		X			
Argentina Linecord	NTN9246_		X			
Cables	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Remote Mount Cable (Terminal to C/H), 3m	RKN4077_			X		X
Remote Mount Cable (Terminal to C/H), 5m	RKN4078_			X		X
Remote Mount Cable (Terminal to C/H), 7m	RKN4079_			X		X
Remote Mount Cable (Terminal to C/H), 10m	PMKN4020_			X		X
Accessories Expansion Cable, 2.3m	PMKN4029_			X	X	X
Motorcycle Mount TELCO Cable, 2.3m	PMKN4030_				X	
Accessories Expansion Cable, 4m	PMKN4056_			X	X	X

ACCESSORIES						
Junction Box	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Junction Box	GMLN3002_	X	X	X	X	X
Cable 6m Transceiver to Junction Box	GMKN4192_	X	X	X	X	X
Cable 4m Transceiver to Junction Box	GMKN4193_	X	X	X	X	X
Cable 2m Transceiver to Junction Box	GMKN4194_	X	X	X	X	X
Power Cables (to Mobile Terminal)	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
12V Power Cable to Battery, 3m with Fuse (10A)	GKN6270_	X		X	X	X
12V Power Cable to Battery, 6m with Fuse (10A)	GKN6274_	X		X	X	X
Ignition Sense Cable, 3m with Fuse (4A)	HKN9327_	X		X	X	X
Installation	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
External Alarm Relay	GKN6272_	X	X	X	X	X
Accessory Connector Kit	GMBN1021_	X	X	X	X	X
Buzzer Kit	GLN7282_	X	X	X	X	X
Mounting (Transceiver)	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Key Lock Mount	RLN4779_	X	X	X	X	X
High Profile Mounting Bracket	GLN7317_	X	X	X	X	X
Low Profile Mounting Bracket	GLN7324_	X	X	X	X	X
Mounting Frame to Install Transceiver in DIN-A Slot	PMLN5094_	X	X	X	X	X
Mounting (Control Head)	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Remote Mount Trunnion Kit	PMLN4912_			X		X
Motorcycle Mount Trunnion Kit	PMLN5092_				X	
DIN Mount Bracket	PMLN5093_			X		X
Programming/Data	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
USB Programming Cable (Terminal Rear Port)	3071810M01	X	X	X	X	X
Programming Cable	GMKN4067_	X	X	X	X	X
Active Data Cable	GMKN1022_	X	X	X	X	X
USB Programming Cable (Mobile) Microphone Port)	HKN6184_	X	X	X	X	X
I85S USB Data Cable with Inline Power	NNTN4007_	X	X	X	X	X
Dual Control Head Cables	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Dual NGCH Cable Assy	PMKN4078_	X	X	X	X	X
Dual NGCH Slave Cable	PMKN4080_	X	X	X	X	X
Power Cable 3086026B02	PMKN4081_	X	X	X	X	X
Dual NGCH Cable Assy	PMKN4092_	X	X	X	X	X

1) Requires Junction Box, GMLN3002.

2) The cable, GMKN1022, is only compatible when an Data Expansion Head Enhanced is not fitted as part of a remote mount configuration. In this configuration access to the Tetra PEI for IP Packet Data and SDS services is available on the Data Expansion Head Enhanced and the Active Data Cable GMKN1022 is not required.

CHAPTER 3
OVERVIEW

General

The MTM800 with Enhanced Control Head is Motorola's latest and most advanced digital mobile TETRA terminal. This terminal generation is based on a new digital platform technology which takes care of the linear modulation type of terminals to support the TETRA needs. It covers Trunk Mode Operation (TMO) as well as Direct Mode Operation (DMO) and among other new features it is supplied with extended code and operating memory capacity to support all new market requirements. The MTM800 with Enhanced Control Head TETRA terminal ensures a high audio quality.

To achieve high spectrum efficiency, the MTM800 with Enhanced Control Head uses digital modulation technology and sophisticated voice-compression algorithm. The voice of the person speaking into the microphone is converted into a digital bit stream consisting of zeros (0) and ones (1). This stream is then modulated into a radio-frequency (RF) signal, which is transmitted over the air to another MTM800 with Enhanced Control Head. The process is called digital modulation.

Digital Modulation Technique

The MTM800 with Enhanced Control Head is a 380–430 or 410–470 MHz mobile that can operate in dispatch mode. It uses two digital technologies: $\pi/4$ DQPSK and Time Division Multiple Access (TDMA).

$\pi/4$ DQPSK is a modulation technique that transmits information by altering the phase of the radio frequency (RF) signal. Data is converted into complex symbols, which alter the RF signal and transmit the information. When the signal is received, the change in phase is converted back into symbols and then into the original data.

The TETRA system can accommodate 4-voice channels in the standard 25 kHz channel as used in the two-way terminal.

Time Division Multiple Access (TDMA) is used to allocate portions of the RF signal by dividing time into four slots, one for each unit.

Time allocation enables each unit to transmit its voice information without interference from other transmitting units. Transmission from a unit or base station is accommodated in time-slot lengths of 15 milliseconds and frame lengths of 60 milliseconds. The TDMA technique requires sophisticated algorithms and a digital signal processor (DSP) to perform voice compression/decompression and RF modulation/demodulation.

Voice Compression Technology

Voice is converted into a digital bit stream by sampling the voice at high rate and converting the samples into numbers, which are represented by bits.

Voice compression reduces the number of bits per second while maintaining the voice at an acceptable quality level. The TETRA system uses a coding technique called ACELP (Algebraic Code Excited Linear Prediction). The compressed voice-data bits modulate the RF signal.

CHAPTER 4
PROGRAMMING THE TERMINAL

Note: For programming the terminal, refer to TETRA Customer Programming Software (CPS) Start-up User Guide, Publication No. 6802974C10_.

Notes

CHAPTER 5

TEST SETUP & TESTING

> **WARNING**
>
> **Any level 3 repairs can deeply affect the performance of the MTM800 with Enhanced Control Head terminal and may cause a new tuning procedure. This tuning procedure can only be applied by certain authorized Motorola depots where the appropriate TEST&TUNE EQUIPMENT is available. The appropriate TEST&TUNE EQUIPMENT is a special automated test equipment which is only available at some Motorola factories and Motorola repair centers.**

Section Introduction

This Chapter contains the following Sections:

5.1   Test Setup & Testing for 380–430 MHz & 410–470 MHz

Notes

Notes

CHAPTER 5.1
TEST SETUP & TESTING
for 380–430 MHz and 410–470 MHz

⚠️ **WARNING** **Any level 3 repairs can deeply affect the performance of the MTM800 with Enhanced Control Head terminal and may cause a new tuning procedure. This tuning procedure can only be applied by certain authorized Motorola depots where the appropriate TEST&TUNE EQUIPMENT is available. The appropriate TEST&TUNE EQUIPMENT is a special automated test equipment which is only available at some Motorola factories and Motorola repair centers.**

Typical Test Setup

Before Testing

Carry out the following instructions before testing:

- Connect the DC cable to the DC connector on the terminal.
- Connect the other side of the DC cable to the DC output connector on the power supply
- Connect an RF cable to the N-type RF Connector of the IFR.
- Connect the other side of the RF cable to the antenna connector on the terminal.
- Set the DC voltage on the power supply to 13.2 Volts.
- Switch on the terminal.
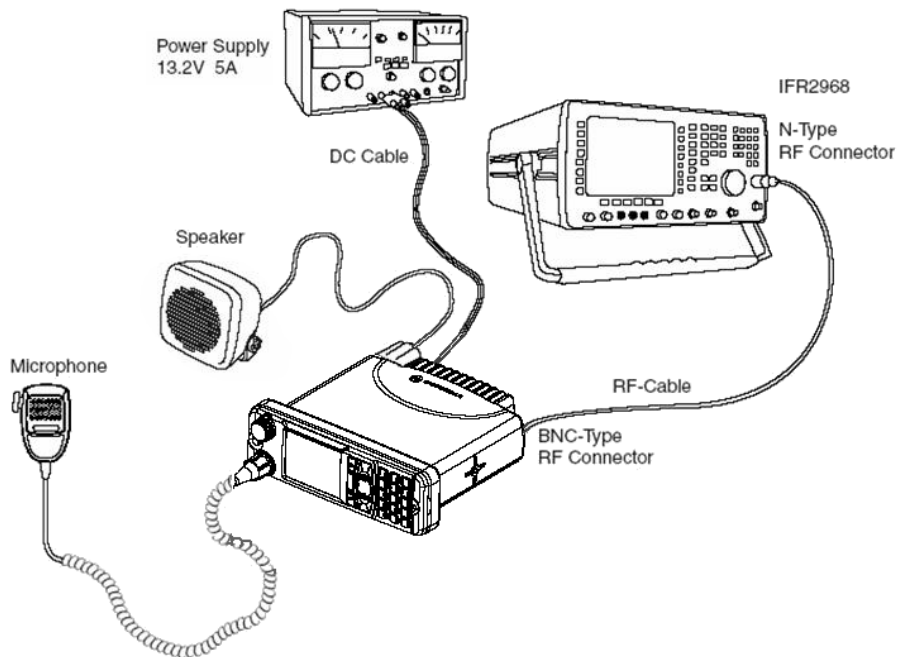
Figure 5.1-1 Typical Test Setup

Test Equipment

The table below lists the special test equipment required for servicing TETRA mobile terminals.

Table 5.1-1 Test Equipment

Name	Part Number
Digital Multimeter	R1072_
220V Power Supply	R1011_/220V
TETRA SVC MON. MOBILES ONLY	WADN4161A
TETRA SVC MON. MOB.+ DIR.MODE	WADN4163A
TETRA SVC MON. MOB.+ BASE ST.	WADN4164A
TETRA SVC MON. MOB.+ BASE ST. + DIRECT MODE	WADN4173A
TETRA SVC MON. MOB.+ DIR.MODE + MPT1327/1343	WADN4233A

Test Check List

The following table summarises the required test setups.

Table 5.1-2   Test Setup

No.	Test Name	Test Setup	Terminal Setup	Test Conditions	Limits
1.	IFR System Setup and Manual Test Screen	Control Channel		For 380–430MHz terminal: 840 For 410–470MHz terminal: 2440	
		Traffic Channel		For 380–430MHz terminal: 840 For 410–470MHz terminal: 2440	
		Time Slot		3	
		Country Code		262	
		Network Code		75	
		Base Color		1	
		Location Area		224	
		Min Rx Level			-110dBm
		Max Tx Level			35dBm (3.2W)
		Access Parameter		-33dBm	
		Mobile Power	35dBm (3.2W)		
		Burst Type		Normal	
2.	Base Station Registration	RF Gen Level	For 380–430MHz terminal: 421.0125MHz For 410–470MHz terminal: 461.0125MHz	-90dBm	
3.	Receiver RSSI	RF Gen Level	Cells Info RSSI TRACE	-90dBm	
4.	Transmitter Tests	RF Gen Level	Range 1 Test Group 1	-90dBm	
		Burst Power			33–37dBm
		Timing Error			<=0.25 Symbols
		Frequency Error			-/+ 100Hz
		Vector Error			Max 10% RMS, Max 30% Peak, Max 5% Residual

Table 5.1-2   Test Setup (Continued)

No.	Test Name	Test Setup	Terminal Setup	Test Conditions	Limits
5.	Call Processing Talk Back	1KHz Test Signal Group Mode	Range 1 Test Group 1	-90dBm	
6.	Call Processing Call to Mobile	Private Mode Private Call	Private Mode		
		RF Gen Level Burst Power		-90dBm	33-37dBm
		Timing Error			<=0.25 Symbols
		Frequency Error			-/+ 100Hz
		Vector Error			Max 10% RMS, Max 30% Peak, Max 5% Residual
7.	Digital Duplex Test (Tx)	RF Gen Level	Private Mode	-50dBm	
		Burst Power			10–22dBm
		Timing Error			<=0.25 Symbols
		Frequency Error			-/+ 100Hz
		Vector Error			Max 10% RMS, Max 30% Peak, Max 5% Residual

Receiver Tests

1. Simulate Base Station (registration)

2. RSSI Test

Transmitter Tests

1. Power Profile

2. Power Burst (Control Range)

3. Tx Burst Timing Error

4. Tx Frequency Error

5. Vector Error RMS, Peak and Residual

Call Processing Tests

1. Talk Back

2. Call to Mobile

Duplex Test

1. Digital Duplex Test (Tx)

Measurement Capabilities:

Bar chart display for Tx Power, Frequency Error, Vector Error RMS, Power Analyzer, Spectrum Analyzer, Vector Analyzer, Vector Diagrams.

Configuration of the IFR 2968 System Setup

The setup depends on the firmware version of the IFR 2968, the firmware version of the terminal and the customer programming of the terminal.
>>The following table should be taken only as an example of how to proceed for setup.<<
Perform the following steps to configure the IFR 2968 System Setup with the terminal settings:

1. Turn ON the IFR.

2. Press the "Systems" Mode Key (wait until the digital system is initialised).

3. Press the "Tetra Mobile" soft key.

4. Press the "Setup" soft key and enter the System Parameters Screen.

5. Press the "Channel Plan" or "System Type" soft key.

6. Press the "Tetra 410MS" soft key for 380–430MHz ("Tetra 450MS" for 410–470MHz) .

7. Press the "More" soft key if the Type cannot be seen.

   Note: If the required Mobile soft key in step 6 and step 7 is not displayed, the system needs to be set up manually as in step 8. If the MS type was chosen in step 6 and step 7 continue with step 9.

8. Perform the following steps to setup the system parameters:

   a. Press the "More" soft key until the "User defined" soft key is displayed.

   b. Press the "User Defined" soft key in the next Menu again.

   c. Press the "User Defined" soft key once more.

   d. Press the "Frequency Band" soft key and press the "4 (380–430MHz/ 410–470MHz)" soft key . Press the "More" soft key if the band is not displayed.

   e. Press the "Offset" soft key and press the "3 (12.5kHz)" soft key.

   f. Press the "Duplex Spacing" soft key and press the "0 (10MHz)" for 380–430MHz/ 410–470MHz soft key

   g. Press the "Reverse Operation" soft key and press the "0 (Normal)" soft key.

   h. Press the "Channel Block 1" soft key.

   i. Press the "Channel Block" soft key and press the "Include" soft key.

   j. Press the "Lowest Channel" soft key and enter "840" for 380–430MHz ("2440" for 410–470MHz) using the data keys followed by the "Lowest Channel" soft key.

     k. Press the "Highest Channel" soft key and enter "1199" for 380–430MHz ("2799" for 410–470MHz) using the data keys followed by the "Highest Channel" soft key.

     l. Press the "Lowest Tx Freq" soft key and enter "411.0125" for 380–430MHz ("461.0125" for 410–470MHz) using the data keys followed by the "MHz" key.

     m.Press the "Duplex Offset" soft key and enter "10" for 380–430MHz/ 410–470MHz using the data keys followed by the "MHz" key.

     n. Press the "Channel Spacing" soft key and enter "25" using the data keys followed by the "kHz" key.

     o. Press the "Return" soft key.

     p. Verify that channel block 2 to 8 are excluded.

     q. Press the "Return" soft key.

9. Press the "Control Channel" soft key and enter "840" for 380–430MHz ("2440" for 410–470MHz) using the data keys followed by the "Control Channel" soft key.

10. Press the "Traffic Channel" soft key and enter "840" for 380–430MHz ("2440" for 410–470MHz) using the data keys. Press the "Traffic Channel" soft key again and check that the marker goes to Timeslot. Press data key "3" followed by the "Traffic Channel" soft key, to change to Timeslot "3".

11. Press the "Country Code" soft key.
Enter "262" and press the "Country Code" soft key.

12. Press the "Network Code" soft key.
Thereafter, enter "75" and press the "Network Code" soft key.

13. Press the "Base Color" soft key.
Thereafter, enter "1" and press the "Base Color" soft key.

14. Press the "Location Area" soft key.
Thereafter, enter "224" and press the "Location Area" soft key.

15. Press the "Min Rx Level" soft key.
Thereafter, enter "-110dBm" and press the "Min Rx Level" soft key.

16. Press the "Max Tx Level" soft key.
Thereafter, enter "35dBm (3.2W)" and press the "Max Tx Level" soft key.

17. Press the "Access Parameter" soft key.
Thereafter, enter "-33dBm" and press the "Access Parameter" soft key.

18. Press the "Test Mode" soft key. Press the "Enable" soft key.

19. Press the "Base Service" soft key.

20. Press the "Suport" soft key if it is displayed
or verify that the following values are displayed:

POWER ON REGISTRATION:	**REQUIRED**
POWER OFF DE-REGISTRATION:	**REQUIRED**
PRIORITY CELL:	**YES**
MINIMUM MODE SERVICE:	**NEVER USED**
MIGRATION:	**SUPPORTED**
SYSTEM WIDE SERVICE:	**NORMAL MODE**
TETRA VOICE SERVICE:	**SUPPORTED**

CIRCUIT MODE DATA SERVICE:	**SUPPORTED**
(RESERVED):	**NOT AVAILABLE**
SNDCP SERVICE:	**NOT AVAILABLE**
AIR INTERFACE ENCRYPTION:	**NOT AVAILABLE**
ADVANCED LINK:	**NOT SUPPORTED**

Note: The displayed values are factory defaults and should not be changed.

21. Press the "Return" soft key.

22. Press the "Neighbr Cell" soft key.

23. Verify that the following values are displayed:

NEIGHBOUR CELL BROADCAST:	**NOT REQUIRED**
BROADCAST INTERVAL:	**10s**
NEIGHBOUR CELL CHANNEL:	**0000**
NEIGHBOUR CELL LOCATION AREA:	**00001**
NEIGHBOUR CELL IDENTIFIER:	**01**
SLOW RE-SELECT THRESHOLD:	**10dB**
SLOW RE-SELECT HYSTERESIS:	**10dB**
FAST RE-SELECT THRESHOLD:	**10dB**
FAST RE-SELECT HYSTERESIS:	**10dB**

Note: The displayed values are factory defaults and should not be changed.

24. Press the "Return" soft key.

25. Verify that "Trunking Type" is set to "Message".

26. Press the "Call Type" soft key to enter the "Call Type" screen.

27. Press the "Private Call" soft key.

28. Press the "Simplex Duplex" soft key and "Simplex Call" soft key.

29. Press the "Signal Type" soft key and "Direct set-up" soft key.

30. Press the "Priority" soft key. Thereafter, enter "00" and press the "Priority" soft key.

31. Leave "Calling Party SSI" setting to default value.

32. Press the "Return" soft key.

33. This completes the System Setup configuration.

Configuration of the IFR 2968 Manual Test Screen

The setup depends on the firmware version of the IFR 2968, the firmware version of the terminal and the customer programming of the terminal. The following procedure is only an example.

1. To enter "Manual test" screen, press the "Manual" soft key.

2. Press the "Control Channel" soft key. Thereafter, enter the control channel Number and press the "Control Channel" soft key. The control channel Number for 380–430MHz is "840" = Rx 421.0125MHz (for 410–470MHz it is "2440" = Rx 461.0125MHz).

3. Press the "Traffic Channel" soft key. Enter "840" for 380–430MHz ("2440" for 410–470MHz) and press the "Traffic Channel" soft key. The marker goes to Timeslot. Enter "3" and press the "Traffic Channel" soft key. (Note that the Traffic Channel number changes automatically after entering the Control Channel number).

4. Press the "RF Gen Level" soft key. Thereafter, enter "-90" and press "dBm" data keys followed by "RF Gen Level" soft key.

5. Press the "Mobile Power" soft key, enter "35 dBm/3.2W", using soft key.

6. Press the "Burst Type" soft key and "Normal" soft key.

7. This completes the Manual test equipment configuration setup.

    Note: The System Setup Configuration Data is saved even after the power is turned off. However, the Manual Test Setup is not saved.

RF Tests

Receiver Tests

Simulate Base Station (registration)

1. Turn the terminal ON
   When the terminal is in Trunked Mode, continue with step 2. Otherwise perform steps a through c.

   a. Press "Options" using the Lower (soft) key
   b. Press the "Down" navigation key to scroll to "Trunked Mode".
   c. Press "Select" using the Lower (soft) key

2. Check that registration and "ITSI: ---/----/01490199" (as example only) is displayed on the IFR "Manual Test" screen.

   Note: The number "01490199" is the terminal ID (ISSI) which is displayed when the terminal is switched on.

RSSI Test

Note: To perform the procedure below the Test Page field must be enabled using the CPS.

Before carrying out the following steps, record the Insertion loss (dB) of the cable loss value - (X) dB.

1. In the IFR Manual Test Mode, press the "RF Gen Level" Soft Key and enter -90 dBm.

2. Before testing, the terminal should be configured to RSSI mode using the following sequence. When performing steps 3 through 6, make sure that you press the control head keys sequentially (less than a second between every consecutive press).

3. Press the "*" key.

4. Press the "#" key.

5. Press the "Menu" key.

6. Press the "Right Navigation" key.

Hereafter, there is no need for quick sequence of pressing the control head keys.

7. Press the "Down" navigation key to scroll to "Cells Info".

8. Press "Select" using the Lower (soft) key.

9. Press the "Right" navigation key to scroll to the RSSI monitoring screen.

10. Press "Trace" using the Lower (soft) key.

Note: RSSI results will flash on the screen every few seconds.
The display shows: **SERV: 0/34348**
                   RSSI: -90
                   CX: 20
                   CHQ: 99/E0
Disregard the "SERV", "CX" and "CHQ" results.

Actual RSSI measured
=IFR RF Gen Level - Cable insertion loss +/- other stray losses.

Range of Actual RSSI measured
= -90dBm - XdB (cable) +/- 1 dB.

Terminal RSSI result should be within the range of Actual RSSI.

To stop the "Trace" process, perform the following. When performing steps 11 trough 14, make sure that you press the control head keys sequentially (less than a second between every consecutive press):

11. Press the "*" navigation key.

12. Press the "#" key.

13. Press the "Menu" key.

14. Press the "Right Navigation" key.

Hereafter, there is no need for quick sequence of pressing the control head keys.

15. Press "Select" using the Lower (soft) key.

16. Press "Stop" using the Lower (soft) key.

17. Press "Back" using the Upper (soft) key twice.

Transmitter Tests

Before you start these tests, make sure that the terminal is in Trunked Mode.

1. Press "Options" using the Lower (soft) key.

2. Press the "Down" navigation key to scroll to "TG by abc".

3. Press "Select" using the Lower (soft) key.

4. Scroll to one of the available groups and press select using the Lower (soft) key.

5. In the IFR Manual Test Mode press the "RF Gen Level" soft key. Enter "-90dBm" by pressing the data keys and "RF Gen Level" key.

6. Press the "PTT" of the terminal and monitor the IFR "Manual Test" screen which displays the Power Profile, Burst Power, Timing Error, Frequency Error and Vector Error.

   Note: You have to hold the PTT in the pressed position long enough to enable you to read the results.

- Power Profile:	**Passed.**
- Burst Power Required Results:	**33–37dBm.**
- Timing Error:	**≤ 0.25 symbols.**
- Vector Error:	**Max 10% RMS,**
	Max 30% Peak,
	Max 5% Residual.
- Frequency Error:	**+/- 100Hz.**

7.   Press the "Clear Down" soft key, to proceed with other tests.

Call Processing Test

Before you start these tests, make sure that terminal and test equipment are configured the same as given in the Transmitter Test.

Talk Back

1.   Press "Options" using the Lower (soft) key on the terminal and change to one of the available groups.

2.   In the IFR Manual Test Mode press the "RF Gen Level" soft key. Enter "-90dBm" by pressing the data keys and "RF Gen Level" key.

3.   Press the "PTT", press the "Talk Back" soft key on the IFR and speak into the mic of the terminal for at least 3sec, then release "PTT". You will hear from the terminal speaker the last three seconds of the speech frames before the "PTT" has been released.

4.   Press the "Test Sound" soft key to provide the 1kHz signal to the terminal speaker.

5.   Press the "Silence" soft key to mute the 1KHz audio signal of the speaker.

6.   Press the "Clear Down" soft key and check that the "Cleardown Complete" status appears on the IFR "Manual Test" screen.

Call to Mobile

1.   In the IFR Manual Test Mode press the "RF Gen Level" soft key. Enter "-90dBm" by pressing the data keys and "RF Gen Level" key.

2.   Press the "Call Mobile" soft key and select "Private Call" on the IFR. Verify that two beeps are heard from the terminal speaker.

3.   Press the "Abort Call" soft key.

Duplex Test (Phone/Private Mode)

Digital Duplex Test (Tx)

1.   In the IFR Manual Test Mode press the "RF Gen Level" soft key. Enter "-50dBm" by pressing the data keys and "RF Gen Level" key.

2. Dial a random 4 digit number (eg "9359") using the alphanumeric keys of the terminal, press "Calltype" using the Lower (soft) key until "Phone #" is displayed and

    press the "Send" Key .

    The following results are displayed on the IFR "Manual Test" Screen

    - **Power Profile:**   **Passed**
    - **Burst Power Required Results:** **10–22dBm**
    - **Timing Error:**   **≤ 0.25 Symbols.**
    - **Frequency Error:**   **-/+ 100Hz**
    - **Vector Error:**   **Max 10% RMS,**
                                            Max 30% Peak.
                                            Max 5% Residual.

3. Press the "Talk Back" soft key.

4. Speak into the terminal microphone and hear your speech (after a short delay) from the terminal loudspeaker.
    Note: If you need more details, press the "Duplex Test" mode key.

5. Press the "duplex test (Tx)" soft key. The "Digital Duplex test" results will be displayed on the IFR screen providing you with either one of the following:

    - **bar charts measurement capabilities showing Tx Power,**
      Frequency Error and Vector RMS in one screen
    - **Tx Power (more details in Power Analyser)**
    - **Frequency Error (more details in Spectrum Analyser)**
    - **Vector RMS (more details in Vector Analyser)**

For Power Analyser Graph:

6. Press "power ana" soft key.

7. Check that the power frame falls within the limits.

For Spectrum Analyser Graph:

8. Press "spec ana" soft key.

9. Monitor the Tx frequency.

For Vector Analyser Diagram:

10. Press the "vector ana" soft key.

11. Monitor the diagram for the following:

    - **press "vector error" soft key for vector error.**
    - **press "mag error" soft key for magnitude error.**
    - **press "phase error" soft key for phase error.**
    - **Vector Error**
    - **Magnitude Error**
    - **Phase Error**

For Vector Diagram:

12. Press the "vector diagram" soft key.

13. View the following:

   - press "symbol constel" soft key for graphical symbol constellation.
   - press "rotated vector" soft key to zoom in on the constellation.
   - press "phase traject" soft key to view trajectory of the constellation.

14. Press the terminal "End" key.

Manual Mode Testing

Preparation for Testing

Verify that the radio is turned off.

Press the "1", "2" and "3" keys together and then, press the On/Off key or the Rotary Push Button to turn the radio on. Keep the "1", "2" and "3" keys pressed until the display turns on.

The display shows "User test mode, Press any key to start, Press SoftKeys to scroll".

Tests

Note: Any key that will be pressed will cause the test to advance from one step to the next. You can use the soft keys to go to the next or back to the previous test. After a test has started you can press the upper soft key to go back to the start of the current test. At any time you can switch off the radio by pressing the On/Off key for 2 seconds.

1. Press any key to start the first test. The display shows "LCD Red-Green-Blue test".

2. Press any key consecutively. First the display shows horizontal red lines that become thicker with every key press, until it becomes fully red. Then the display shows vertical green lines that become thicker with every key press, until it becomes fully green. After that the display shows horizontal blue lines that become thicker with every key press, until it becomes fully blue.

3. Press any key to start the next test. The display shows "LCD Color brightness test"

4. Press any key consecutively. The display shows the color brightness levels "min", "low", "med" and "max". Verify the color brightness of the display.

5. Press any key to start the next test. The display shows "Display backlight test"

6. Press any key consecutively. The display shows the backlight brightness levels "min", "low", "med" and "max". Verify the brightness of the display.
   Note: At level "min" the display contents is not visible.

7. Press any key to start the next test. The display shows "Keypad backlight test"

8. Press any key again. The display shows "Keypad backlight is off". Verify that the keypad backlight is off.

9. Press any key again. The display shows "Keypad backlight is on". Verify that the keypad backlight is on.

10. Press any key to start the next test. The display shows "Emergency backlight test"

11. Press any key consecutively. The display shows the emergency button brightness levels "min", "low", "med" and "max". Verify the brightness of the emergency button.

12. Press any key to start the next test. The display shows "Status LED test"

13. Press any key again. The display shows "Red LED is on" and the Red LED at the right side of the radio is lit.

14. Press any key again. The display shows "Green LED is on" and the Green LED at the right side of the radio is lit.

15. Press any key. The display shows "Orange LED is on" and the orange LED at the right side of the radio lit.

16. Press any key consecutively. The display shows the LED brightness levels "min", "low", "med" and "max". Verify the brightness of the orange LED at the right side of the radio.

17. Press any key to start the next test. The display shows "Keypad test"

18. Press any key again. The display shows all the radio keys.

19. Press every key, one by one. Each key you press causes its respective display to be highlighted. If you press a highlighted key again, the highlighting is removed. To exit this test before all keys are highlighted press the rotary push button.

20. Press any key to start the next test. The display shows "Rotary test"

21. Turn the rotary switch clockwise and counter clockwise. Each step causes the respective displayed arrow sign to be highlighted. Turn the rotary switch until the two respective "OK" labels are highlighted.

22. Press the rotary push button consecutively until "OK" is highlighted.

23. Press any key to start the next test. The display shows "Fist MIC test"

24. Press any key to continue. Connect a fist microphone. The display shows "Accessory connected"

25. Press PTT to highlight all "0".

26. Place the microphone on / off hook to highlight all "0".

27. Press any key again. The display shows "End of user tests", "Press any key to power off or use softkeys to scoll to any previous test".

28. This completes the test. Press any key to turn the radio OFF.
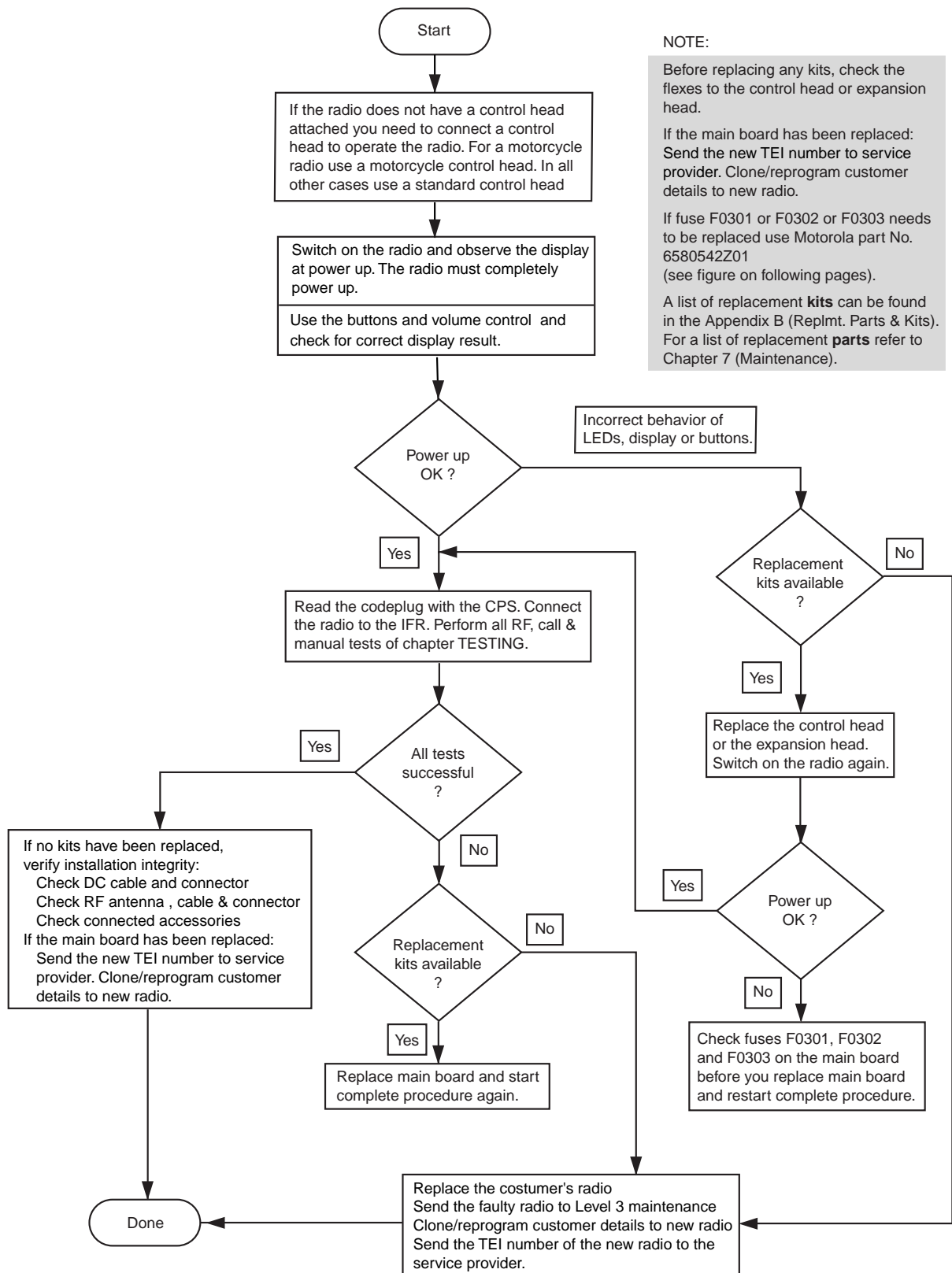
Service Flow Chart (Board Level)

Figure 5.1-2   Servicing the MTM800 with Enhanced Control Head

Fuses on the Mainboard

Figure 5.1-3   Position of Fuse F0301/2/3 (PCB Mainboard – TOP View)

CHAPTER 6
MAINTENANCE

Introduction

This chapter provides details about the following:

- Preventive maintenance (inspection and cleaning)
- Safe handling of CMOS and LDMOS devices
- Pre-baking of Integrated Circuits
- Repair procedures and techniques
- Disassembly and reassembly of the terminal
- Exploded views and parts lists

Preventive Maintenance

The terminals do not require a scheduled preventive maintenance program; however, periodic visual inspection and cleaning is recommended.

Inspection

Check that the external surfaces of the terminal are clean, and that all external controls and switches are functional. It is not recommended to inspect the interior electronic circuitry.

Cleaning

The following procedures describe the recommended cleaning agents and methods to be used when cleaning the external and internal surfaces of the terminal. External surfaces should be cleaned whenever a periodic visual inspection reveals the presence of smudges, compound, or grime. Internal surfaces (circuit boards and components) should be cleaned only when the terminal is disassembled for servicing or repair.

The only recommended agent for cleaning external terminal surfaces is a 0.5% solution (one teaspoon of detergent per gallon of water) of mild dishwashing detergent in water. The internal surfaces should be cleaned only with isopropyl alcohol (100% by volume).

NOTE: **Internal surfaces should be cleaned only when the terminal is disassembled for service or repair.**

> ⚠ **CAUTION: The effects of certain chemicals and their vapors can have harmful results on certain plastics. Avoid using aerosol sprays, tuner cleaners, and other chemicals.**

Cleaning External Plastic Surfaces

Apply the 0.5% detergent-water solution sparingly with a stiff, non-metallic, short-bristled brush to work all loose dirt away from the terminal. Use a soft, absorbent, lintless cloth or tissue to remove the solution and dry the terminal. Make sure that no water remains entrapped near the connectors, cracks, or crevices.

Cleaning Internal Circuit Boards and Components

Isopropyl alcohol (100%) may be applied with a stiff, non-metallic, short-bristled brush to dislodge embedded or caked materials located in hard-to-reach areas. The brush stroke should direct the dislodged material out and away from the inside of the terminal. Make sure that controls or tunable components are not soaked with alcohol. Do not use high-pressure air to hasten the drying process since this could cause the liquid to collect in unwanted places. After completing of the cleaning process, use a soft, absorbent, lintless cloth to dry the area. Do not brush or apply any isopropyl alcohol to the frame, front cover, or back cover.

> **NOTE:** **Always use a fresh supply of alcohol and a clean container to prevent contamination by dissolved material (from previous usage).**

Safe Handling of CMOS and LDMOS Devices

Complementary metal-oxide semiconductor (CMOS) devices are used in this family of terminals, and are susceptible to damage by electrostatic or high voltage charges. Damage can be latent, resulting in failures occurring weeks or months later. Therefore, special precautions must be taken to prevent device damage during disassembly, troubleshooting, and repair. Handling precautions are mandatory for CMOS circuits and are especially important in low humidity conditions. DO NOT attempt to disassemble the terminal without first referring to the following CAUTION statement.

> **CAUTION: This terminal contains static-sensitive devices. Do not open the terminal unless you are properly grounded. Take the following precautions when working on this unit:**
>
> - **Store and transport all CMOS devices in conductive material so that all exposed leads are shorted together. Do not insert CMOS devices into conventional plastic "snow" trays used for storage and transportation of other semiconductor devices.**
>
> - **Ground the working surface of the service bench to protect the CMOS device. We recommend using the Motorola Static Protection Assembly (part number 0180386A82), which includes a wrist strap, two ground cords, a table mat, and a floor mat.**
>
> - **Wear a conductive wrist strap in series with a 100k resistor to ground. (Replacement wrist straps that connect to the bench top covering are Motorola part number 4280385A59).**
>
> - **Do not wear nylon clothing while handling CMOS devices.**
>
> - **Do not insert or remove CMOS devices with power applied. Check all power supplies used for testing CMOS devices to be certain that there are no voltage transients present.**
>
> - **When straightening CMOS pins, provide ground straps for the apparatus used.**
>
> - **When soldering, use a grounded soldering iron.**
>
> - **If at all possible, handle CMOS devices by the package and not by the leads. Prior to touching the unit, touch an electrical ground to remove any static charge that you may have accumulated. The package and substrate may be electrically common. If so, the reaction of a discharge to the case would cause the same damage as touching the leads.**

General Repair Procedures and Techniques

NOTE Environmentally Preferred Products (EPP) (refer to the marking on the printed circuit boards — examples shown below) were developed and assembled using environmentally preferred components and solder assembly techniques to comply with the European Union's **Restriction of Hazardous Substances (ROHS) Directive 2002/95/EC** and **Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC.** To maintain product compliance and reliability, use only the Motorola specified parts in this manual.
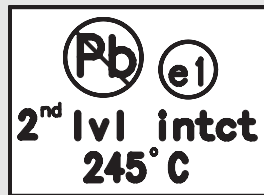
Any rework or repair on Environmentally Preferred Products must be done using the appropriate lead-free solder wire and lead-free solder paste as stated in the following table:

Table 6-1 Lead Free Solder Wire Part Number List

Motorola Part Number	Alloy	Flux Type	Flux Content by Weight	Melting Point	Supplier Part number	Diameter	Weight
1088929Y01	95.5Sn/3.8Ag/0.7Cu	RMA Version	2.7-3.2%	217C	52171	0.015"	1lb spool

Table 6-2 Lead Free Solder Paste Part Number List

Motorola Part Number	Manufacturer Part Number	Viscosity	Type	Composition & Percent Metal	Liquid Temperature
1085674C03	NC-SMQ230	900-1000KCPs Brookfield (5rpm)	Type 3 (-325/+500)	(95.5%Sn-3.8%Ag-0.7%Cu) 89.3%	217°C

Parts Replacement and Substitution

When damaged parts are replaced, identical parts should be used. If the identical replacement component is not locally available, check the parts list for the proper Motorola part number and order the component from the nearest Motorola Radio Products and Solution Organization listed in the "Piece Parts" section of this manual.

Rigid Circuit Boards

The family of radios uses bonded, multi-layer, printed circuit boards. Since the inner layers are not accessible, some special considerations are required when soldering and unsoldering components. The through-plated holes may interconnect multiple layers of the printed circuit. Therefore, care should be exercised to avoid pulling the plated circuit out of the hole.

When soldering near the connector pins:

•   avoid accidentally getting solder in the connector.

•   be careful not to form solder bridges between the connector pins

•   closely examine your work for shorts due to solder bridges.

Chip Components

Use the RLN4062 Hot-Air Repair Station for chip component replacement. Adjust the temperature control to 390 °C (735 °F), and adjust the airflow to a minimum setting. Airflow can vary due to component density.

- **To remove a chip component**:

    1. Use a hot-air hand piece and position the nozzle of the hand piece approximately 0.3 cm (1/8) above the component to be removed.

    2. Begin applying the hot air. Once the solder reflows, remove the component using a pair of tweezers.

    3. Using a solder wick and a soldering iron or a power desoldering station, remove the excess solder from the pads.

- **To replace a chip component using a soldering iron**:

    1. Select the appropriate micro-tipped soldering iron and apply fresh solder to one of the solder pads.

    2. Using a pair of tweezers, position the new chip component in place while heating the fresh solder.

    3. Once solder wicks onto the new component, remove the heat from the solder.

    4. Heat the remaining pad with the soldering iron and apply solder until it wicks to the component. If necessary, touch up the first side. All solder joints should be smooth and shiny.

- **To replace a chip component using hot air**:

    1. Use the hot-air hand piece and reflow the solder on the solder pads to smooth it.

    2. Apply a drop of solder paste flux to each pad.

    3. Using a pair of tweezers, position the new component in place.

    4. Position the hot-air hand piece approximately 0.3 cm (1/8") above the component and begin applying heat.

    5. Once the solder wicks to the component, remove the heat and inspect the repair. All joints should be smooth and shiny.

Shields

Removing and replacing shieldsis recommended to be done with the Air Blower, BOSCH GHG 603 or equivalent.

- **To remove the shield**:

    1. Place the circuit board in the circuit board holder.

    2. Add solder paste flux around the base of the shield.

    3. Position the heat-focus head onto the shield.

    4. Turn on the heater and wait until the shield lifts off the circuit board.

    5. Once the shield is off, turn off the heat, and grab the part with a pair of tweezers.

    6. Remove the circuit board from the circuit board holder.

- **To replace the shield:**

    1. Add solder to the shield if necessary, using a micro-tipped soldering iron.

    2. Next, rub the soldering iron tip along the edge of the shield to smooth out any excess solder. Use solder wick and a soldering iron to remove excess solder from the solder pads on the circuit board.

    3. Place the circuit board back in the circuit board holder.

    4. Place the shield on the circuit board using a pair of tweezers.

5. Position the heat-focus head over the shield.

6. Turn on the heater and wait for the solder to reflow.

7. Once complete, turn off the heat, raise the heat-focus head and wait approximately one minute for the part to cool.

8. Remove the circuit board and inspect the repair. No cleaning should be necessary.

Pre-baking of Integrated Circuits

Electronic components are generally coated with plastic material which has the nature of not being waterproof. If kept unsealed the components can absorb humidity. When soldered to the board (especially with reflow techniques) the sudden change in temperature can cause fissure or crack which can result in malfunction or damage.

To avoid this problem these moisture sensitive components (MS) should be stored and shipped in a sealed wrapping (dry pack). Processing must take place only with "dry components" when an uninterrupted dry storage can be guaranteed, otherwise the components have to be pre-baked.

If a reflow procedure takes place close to MS components the whole board must be pre-baked.

Table 6-3   List of MTM800 with Enhanced Control Head moisture sensitive components

Part. No.	MSL*	Description
5166554A01	3	ADDAG
5109841C71	3	Sirf GPS IC (on GPS option board)
5186988J77	3	JAVELIN
5185956E43	2A	FLASH 16MB
5185963A85	3	ABACUS AD9874
5166541A01	3	Patriot ROM3
5189233U61	3	PSRAM 4MB
5199434A01	2	Serial SPI EEPROM

* Out of dry package Moisture Sensitivity Level (MSL) 2 : 1 year
2A: 1 month
3 : 168 hrs

Repair Procedures and Techniques – General

Parts Replacement and Substitution

When damaged parts are replaced, identical parts should be used. If the identical replacement part is not locally available, check the parts list for the proper Motorola part number and order the part from the nearest Motorola Radio Products and Solution Organization listed in the "SUPPORT CENTRES" section of this manual.

Disassembling and Reassembling the Terminal – General

Since these terminals may be disassembled and reassembled with the use of only six (board to casting) screws, it is important to pay particular attention to the snaps and tabs, and how parts align with each other.

The following tools are required for disassembling the terminal:

- Small flat blade screwdriver
- Dismantling Tool (Motorola Part No.: 6686119B01)
- TORX™ T screwdriver
- **TORQUES: Diecast Top Cover (6x):**   **1.92 Nm … 2.03Nm**   **(17-18 lbin)**
  GPS Cover (5x), GPS Board (1x): 1.13 Nm +/- 10%   **(10 lbin +/- 10%)**
  UCM Board Cover (3x):   **1.13 Nm +/- 10%**   **(10 lbin +/- 10%)**
  Enhanced Control Head Screws: 0.57Nm +/- 0.046Nm (5 lbin +- 0.4 lbin)

NOTE: If a unit requires more complete testing or service than is customarily performed at the basic level, send this unit to a Motorola Authorized Service Center (refer to Appendix A: Support Centers). The following described disassembly procedures should be performed only if necessary.

Terminal Disassembly and Reassembly – Detailed

The procedure to remove and replace a Enhanced Control Head, Top Cover or Transceiver Board is similar for all models of terminal. A typical procedure is therefore shown followed by specific disassembly procedures for Enhanced Control Heads, Remote Head Enhanced and Data Expansion Head Enhanced on terminal models.

Enhanced Control Head Removal

1. Insert the dismantling tool in the groove between the Enhanced Control Head and the terminal assembly as shown in the Figure.
2. Press on the dismantling tool until the snap connectors on the side of the Enhanced Control Head release from the terminal assembly.
3. Pull the Enhanced Control Head away from the terminal assembly as shown below.
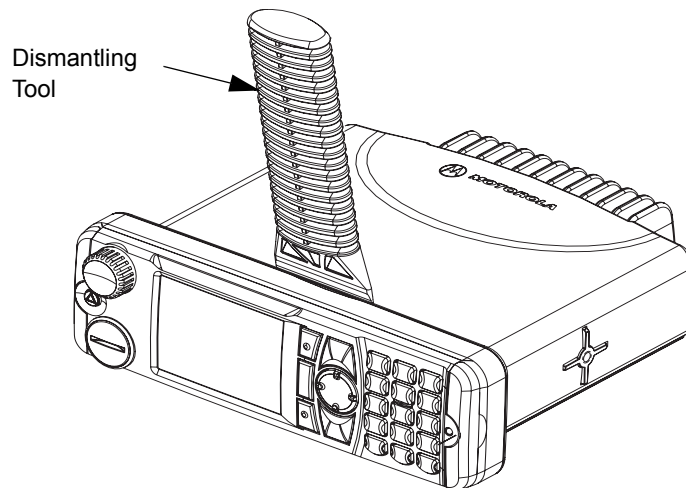

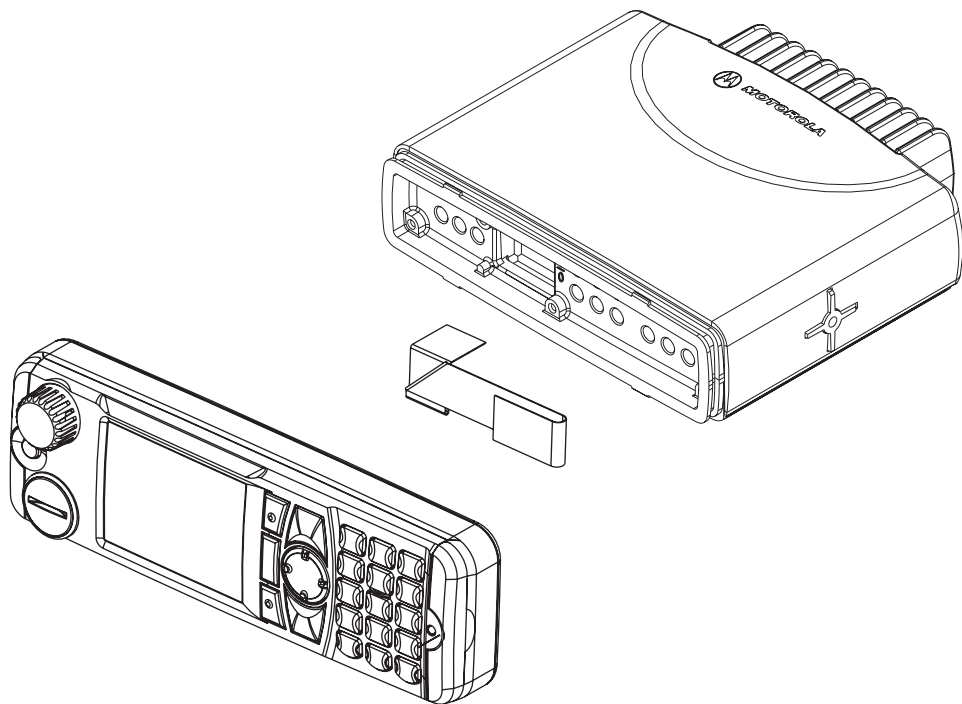**Figure 6-1**   Typical Enhanced Control Head Removal

Figure 6-2 Flexible Connection Removal

4. Remove the flexible connection from the socket on the Enhanced Control Head board.

Top Plastic Cover Removal

1. Insert the dismantling tool in the middle of the terminal assembly side groove as shown in Figure 6-3.

2. Press on the dismantling tool until the snap connectors on the side of the plastic cover release from the terminal chassis.

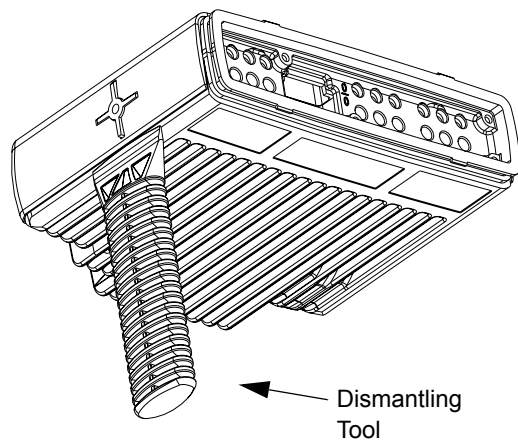3. Lift the plastic cover from the chassis.

Dismantling Tool

Figure 6-3 Top Cover Removal.

Transceiver Board Removal

⚠️ **CAUTION: Some terminals are equipped with a GPS module at the left side bottom of the transceiver and/or an additional UCM Board inside the transceiver cover plate, refer to special label at the cover plate (dotted line at the figure below).**

There are flex cables installed connecting these boards to the main board. Take extra care not to tear off the flex when disassembling or reassembling the board from/to the transceiver or this could damage the GPS/UCM Board and the main board (refer to Figure 6-11, Figure 6-12 for a detailed view).

1. Remove six screws from the diecast cover using the T20 TORX™ driver as shown in Figure 6-4.

2. If existing remove the metal GPS cover from the bottom (5 screws, T10 TORX™). Remove the internal GPS board (one screw) from the transceiver and disconnect the flex cable from the main board.

3. Lift the cover from the chassis.

Position of UCM board

Position of GPS Module
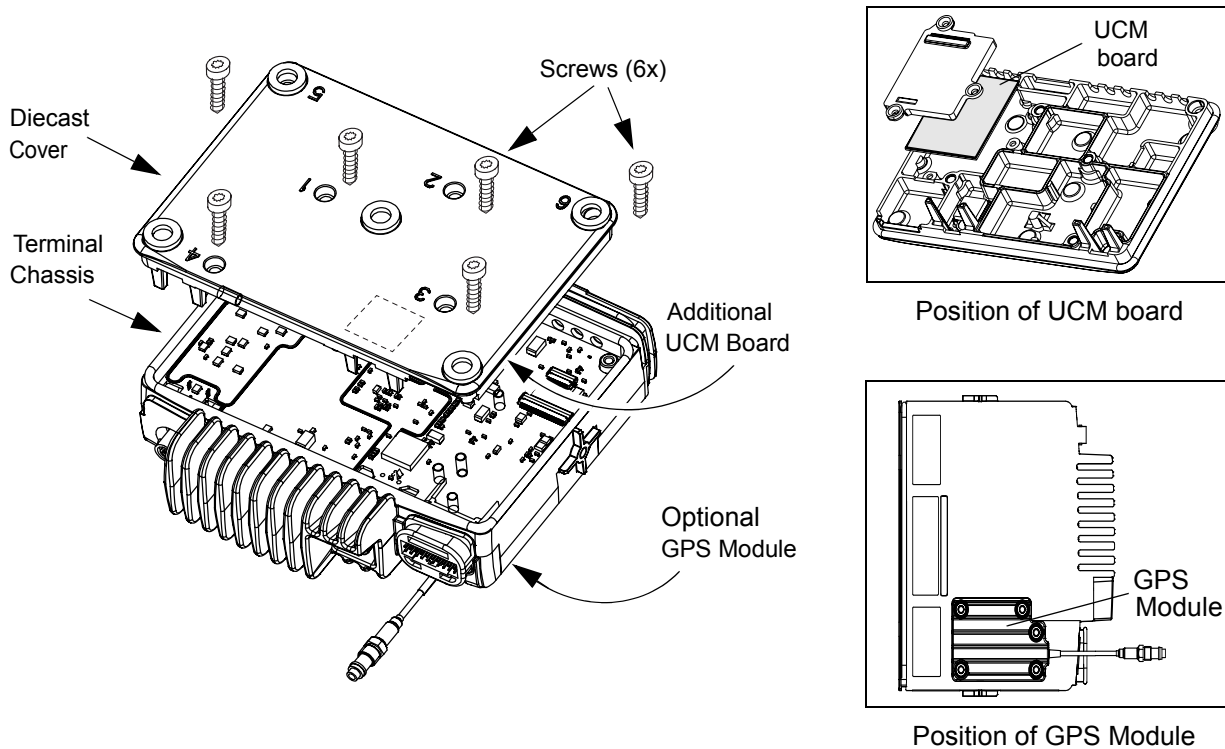
Figure 6-4 Diecast Cover Removal

4. Pull out the plastic accessory connector housing to the back.

5. Slowly lift the transceiver board on the edge at the front of the terminal (the edge that mates with the Enhanced Control Head) and pull gently toward the front of the terminal as shown in Figure 6-5. Take care to slide the antenna connector and power connector out of the chassis towards the front.

6. If existing, take extra care of the UCM Board inside the cover plate and disconnect the flex cable from the mainboard.

> ⚠ **CAUTION: The thermal pad can act as an adhesive and cause the leads of the heat dissipating devices to be over stressed if the board is lifted too quickly.**
> **If the board can't be easily lifted, the chassis must be heated up to 55 degree Celsius.**
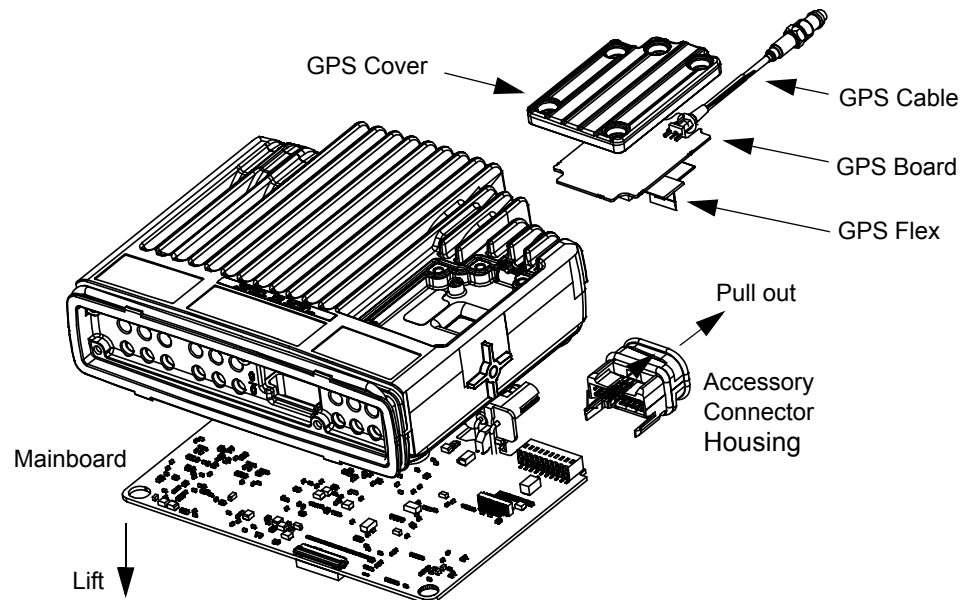

Figure 6-5   GPS and Mainboard Removal (view from bottom side)

Reassembly the Terminal Chassis And Transceiver Board (torques, see page 6-7)

1. Inspect the transceiver board and ONLY if the surface of the thermal pads show signs of damage, remove the thermal pads and apply thermal grease to the heatsink area on the chassis and heat dissipating devices.

2. Insert the transceiver board at an angle (approximately 30°) into the chassis taking care to slide the antenna connector and accessory connector into their cut-outs in the chassis.

3. Lower the transceiver board onto the chassis and align the two locating holes in the board with the locating pins in the chassis.

4. If a UCM board was mounted, reconnect the flex cable to the mainboard. Take care of the specific flex bending. Note: After removal the UCM board has to be reprogrammed (App. C).

5. Secure the cover to the chassis with the six screws previously removed.

6. Torque the six screws to 1.9 NM (17 in lbs) using the T20 TORX™ driver. Begin with screw 6 followed by 5 to 1. Since the screws usually take a set, torque the screws a second time (1.9 NM) in the same order.

7. If existing, reconnect the GPS flex cable and reassemble the GPS module and cover plate.

8. Refit top cover over the assembled terminal chassis. Press cover down until it snaps into place.

Enhanced Control Head Fitting

1. Align the **'dot'** or **'O'** marking on the flex with the **'O'** mark on the chassis to the socket on the terminal assembly as shown in Figure 6-2.

2. Check that the back housing o-ring seal is undamaged and fitted in the groove. Replace the seal if it is damaged (refer to the exploded view diagrams and parts list).

3.   Fit the back housing to the Enhanced Control Head. Ensure that the tags on the back housing align with the snap catch grooves on the Enhanced Control Head. Press the back housing into place until it snaps into place.

4.   Check that the terminal chassis o-ring seal is undamaged and fitted in the groove on the chassis assembly. Replace the seal if it is damaged.

Enhanced Control Head – Disassembly

1.   Remove the middle screw from the back of the Enhanced Control Head using a T10 TORX™ as shown in the following figure.
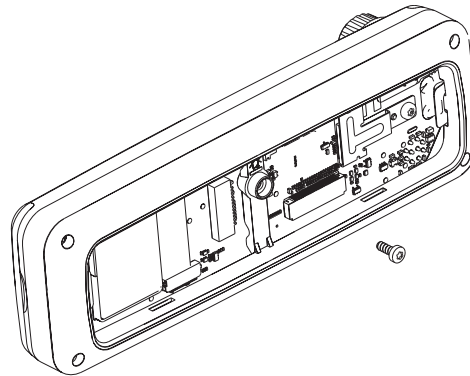

Figure 6-6   Middle Screw Removal

2.   To dismount the Enhanced Control Head front housing from the back housing, insert the dismantling tool in the groove between the two housings as shown in the following figure.
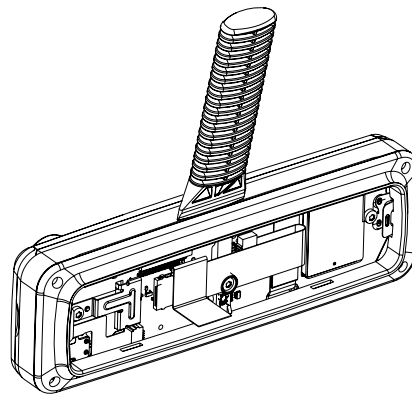

Figure 6-7   Enhanced Control Head Back Housing Removal

3. Press the dismantling tool until the snap connectors on the side of the back housing release from the Enhanced Control Head.
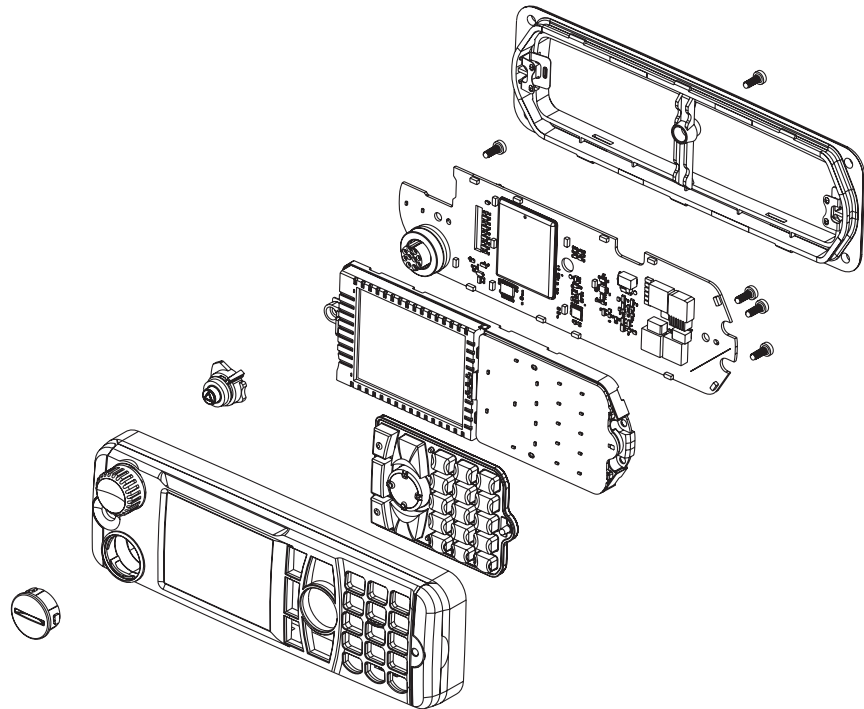
Figure 6-8   Enhanced Control Head Board Removal

4. Remove the board from the Enhanced Control Head front housing by unscrewing the screws using a T10 TORX™ and disassemble the encoder switch flex from the socket on the board.

5. Remove the board from the Enhanced Control Head housing by stretching the Enhanced Control Head housing and pulling up the board.

6. Remove the keypad by gently pressing the keypad out from the Enhanced Control Head front housing.

NOTE   **Care should be taken not to touch or contaminate the conductive pads on the under side of the keypad or the conductive contacts on the printed circuit board.**

Enhanced Control Head – Reassembly

1. Fit the rubber keypad onto the Enhanced Control Head housing and ensure that the keypad is correctly aligned and pressed onto the groove on the front housing.

2. Assemble the board to the Enhanced Control Head front housing.

3. Assemble the encoder switch flex to the socket on the board.

4. Screw the two 8mm self tapping screws and one 14mm self tapping screw.

5. Snap the back housing into the Enhanced Control Head front housing in the orientation shown below.
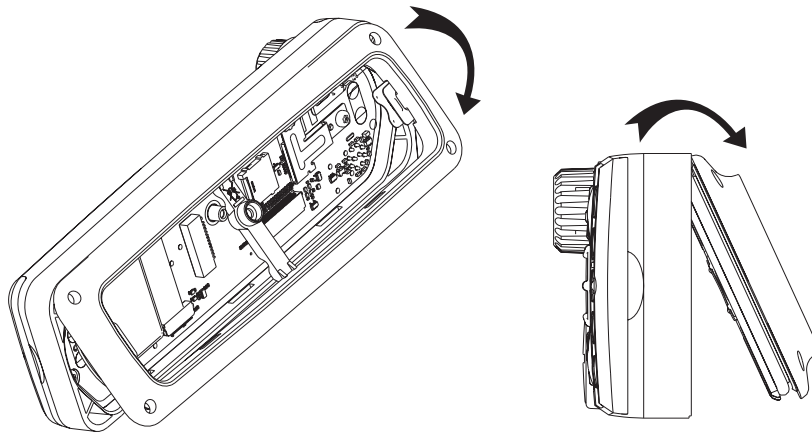
Figure 6-9 Reassemble Enhanced Control Head Housing

6. Screw the middle screw to the back housing.

Remote Head Enhanced – Disassembly

⚠️ **CAUTION: The terminal must be disconnected from the power supply before commencing any disassembly. The Installation Manual should be referred to for more detailed information on warnings and safety.**

To Disassemble the Remote Head Enhanced from the Terminal:

1. Remove the Remote Head Enhanced (PMLN4904_) from the Transceiver by inserting the dismantling tool (Motorola part number 6686119B01) in the recess between the Remote Head Enhanced and the Transceiver.

NOTE: **To minimize cosmetic damage disassemble from the bottom side (label side).**

2. Remove the flex.
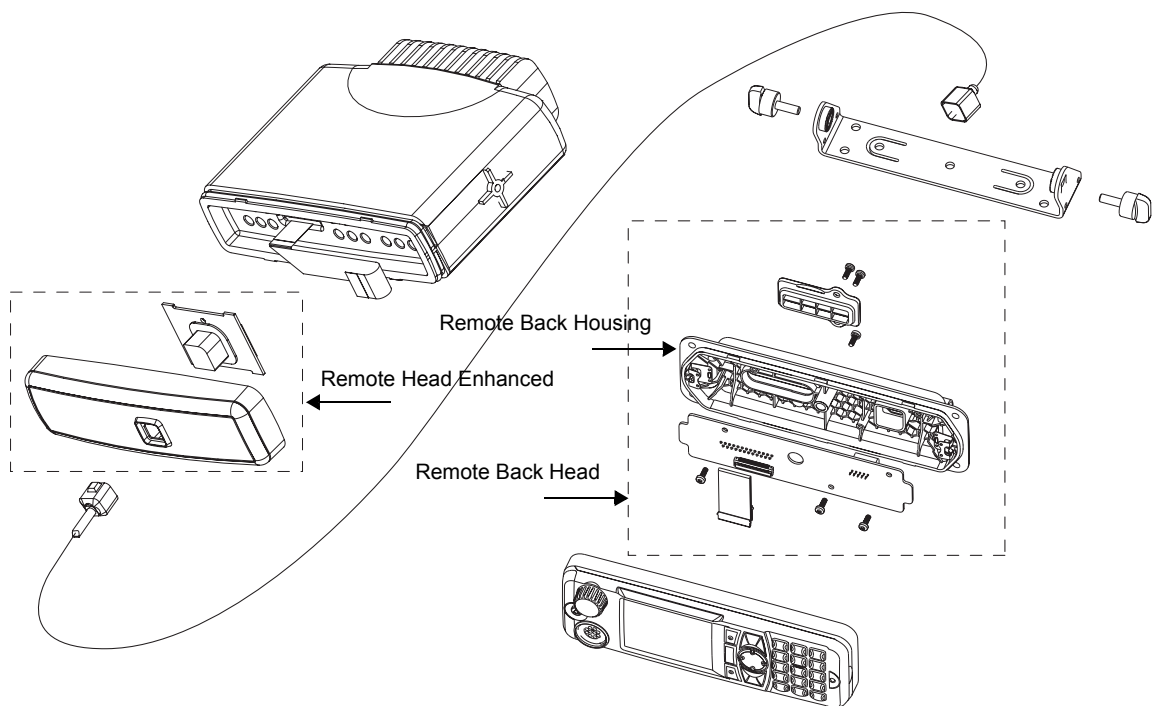
Figure 6-10   Remote Mount Enhanced Control Head with Remote Head Enhanced

Remote Head Enhanced – Reassembly

To Reassemble the Remote Head Enhanced:

1.   Connect the flex from the Remote Head Enhanced to the top small connector in the Transceiver.

NOTE: **For correct orientation of the flex in the Transceiver, the "plastic" tab should be up, contacts facing down. Align the 'dot' or 'O' marking on the flex with the 'O' mark on the Transceiver. The flex must be pushed into the connector until it meets the stop.**

2.   Press the Remote Head Enhanced onto the Transceiver chassis until the chassis tabs snap into place.

Remote Mount Enhanced Control Head – Disassembly

To Disassemble the Remote Mount Enhanced Control Head:

1.   Unscrew the wing screws of the remote trunnion and remove the remote trunnion from the Remote Mount Enhanced Control Head.

2.   Unscrew the middle screw from the back housing.

3.   Remove the back housing by inserting the dismantling tool (Part No. 6686119B01) in the recess between the back housing and Remote Mount Enhanced Control Head front housing.

4.   Remove the flex between the remote PCB and Main PCB.

5.   Remove the board from the Remote Mount Enhanced Control Head front housing by unscrewing the screws using T10 TORX™ ad disassemble the encoder switch flex from the

socket on the board.

6.   Remove the board from the Remote Mount Enhanced Control head front housing by stretching the Remote Mount Enhanced Control Head front housing and pulling up the board.

7.   Remove the keypad by gently pressing the keypad out from the Remote Mount Enhanced Control Head front housing.

8.   Unscrew 3 screws using T10 TORX^{TM} to extract remote PCB from the remote back housing.
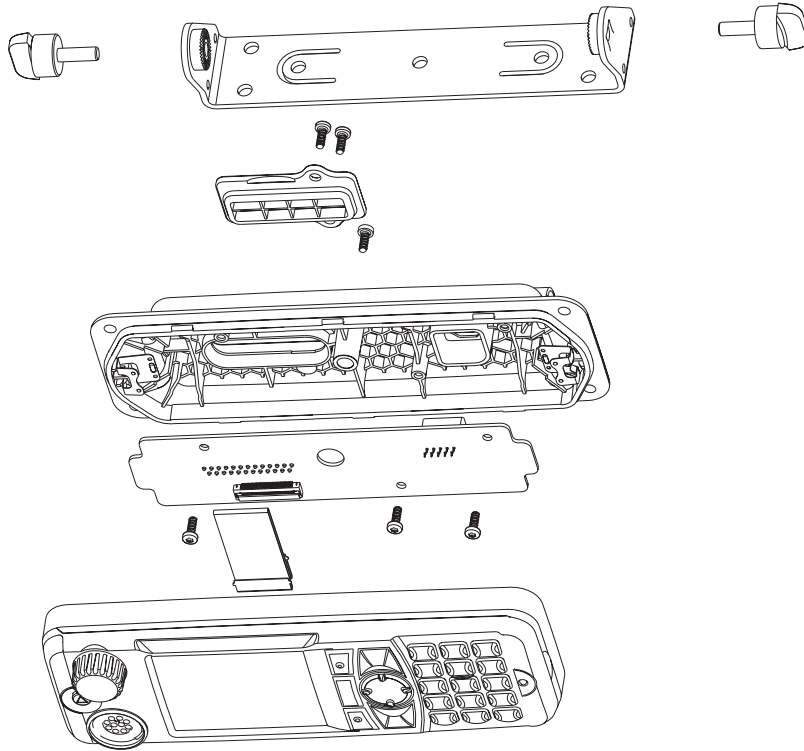
Figure 6-11   Remote Mount Enhanced Control Head

Remote Mount Enhanced Control Head – Reassembly

1.   Fit the rubber keypad onto the Remote Mount Enhanced Control Head front housing and ensure that the keypad is correctly aligned and pressed onto the groove of the front housing.

2.   Assemble the board to the Remote Mount Enhanced Control Head front housing.

3.   Assemble the encoder switch flex to the socket on the board.

4.   Screw the two 8mm self tapping screws and one 14mm self tapping screw.

5.   Assemble the remote PCB into the remote back housing by screwing the 3 screws.

6.   Connect the flex from the remote board on the back housing to the connector on the PCB board of the Remote Mount Enhanced Control Head front housing.

7.   Snap the back housing into the Remote Mount Enhanced Control Head front housing.

8.   Screw the middle screw to the back housing.

Data Expansion Head Enhanced – Disassembly

⚠ **CAUTION: The terminal must be disconnected from the power supply before commencing any disassembly. The Terminal Installation Manual should be referred to for more detailed information warnings and safety.**

To Disassemble the Data Expansion Head Enhanced from the Terminal

1. Remove the Data Expansion Head Enhanced from the transceiver by inserting the dismantling tool (Part No. 6686119B01) in the recess between the expansion head enhanced and the transceiver.

NOTE: **To minimize cosmetic damage disassemble from the bottom side, (label side).**

2. Remove the two flexes from the terminal.

To Disassemble the Expansion Board from Expansion Head Housing

1. Remove the board from the expansion head housing by levering the expansion head housing and pulling up on the expansion board.

NOTE: **The 40 pin connector has a top latch that needs to be lifted before the flex is inserted and closed after flex insertion.**

2. Lift the top latch and remove the 40-Pin flex from connector board.
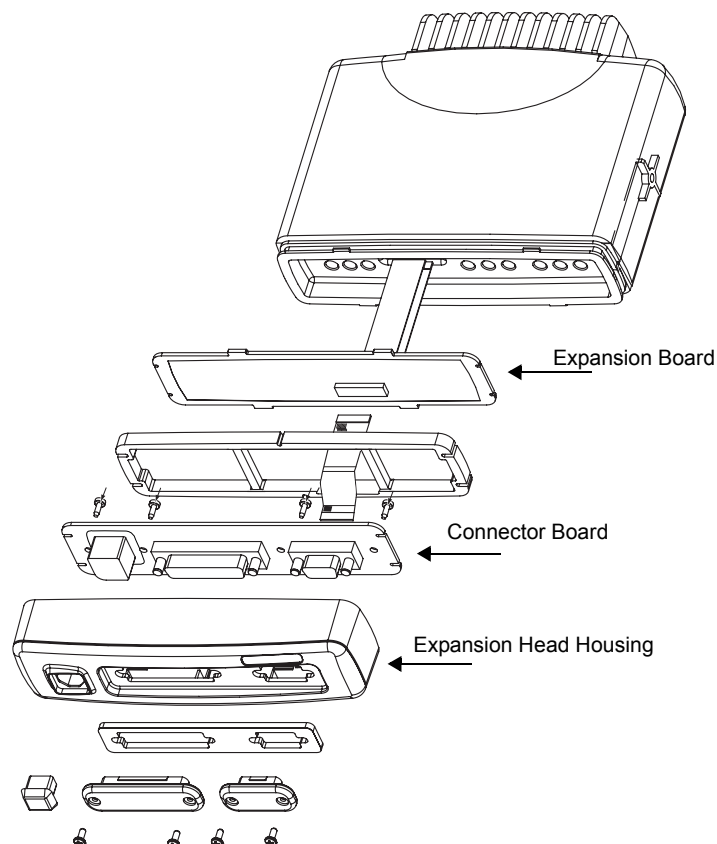
Figure 6-12   Expansion Head Enhanced Exploded View

To Disassemble the Connector Board from Expansion Head Housing

1.   Remove the silicon rubber frame

2.   Remove the four screws from the connector board.

3.   Remove all the protection caps on the front of the expansion head housing.

4.   Lift the connector board from the expansion head housing.

Data Expansion Head Enhanced – Reassembly

To Reassemble the Data Expansion Head Enhanced

1.   Insert the connector board into the expansion head housing.

2.   Secure the connector board with the four screws previously removed.

3.   Insert the rubber frame

4.   Insert the 40 pin flex from the connector board to the Expansion board, ensuring that the top latch is firmly closed.

5.   Snap the Expansion board into the expansion head housing

6.   Connect the 12 line flex to the Terminal, top small connector.

7.   Connect the 40 line flex to the Terminal, bottom large connector

NOTE: **For correct orientation of the flex align the 'dot' or 'O' marking on the flex with the 'O' mark on the PCB.**

8.   Close the top latch after flex insertion

9.   Push the expansion head housing onto the Transceiver until all 4 tabs snap firmly into place.

NOTE: **The Expansion Head has a protection grade of IP54. To maintain IP54 sealing when connecting a RS232 data cable make sure to use a IP54 specified cable. (example: ROLINE AT-Modem cable ST-BU 1,8m order no. 11.01.4518).**

NOTE: **The flex is not designed for continuous insertion, replace after several uses.**

Motorcycle Mount Enhanced Control Head – Disassembly

To disassembly the Motorcycle Mount Enhanced Control Head:

1. Unscrew the screws of the Motorcycle Mount Enhanced Control Head trunnion and remove the Motorcycle Mount Enhanced Control Head from the trunnion.

2. Twist and pull out the telco cable from the connector.

3. Unscrew the middle screw from the back housing.

4. Unscrew the four screws of the two side caps.

5. Remove the back housing by inserting the dismantling tool (Part No. 6686119B01) in the recess between the back housing and Motorcycle Mount Enhanced Control Head front housing.

Motorcycle Back Housing
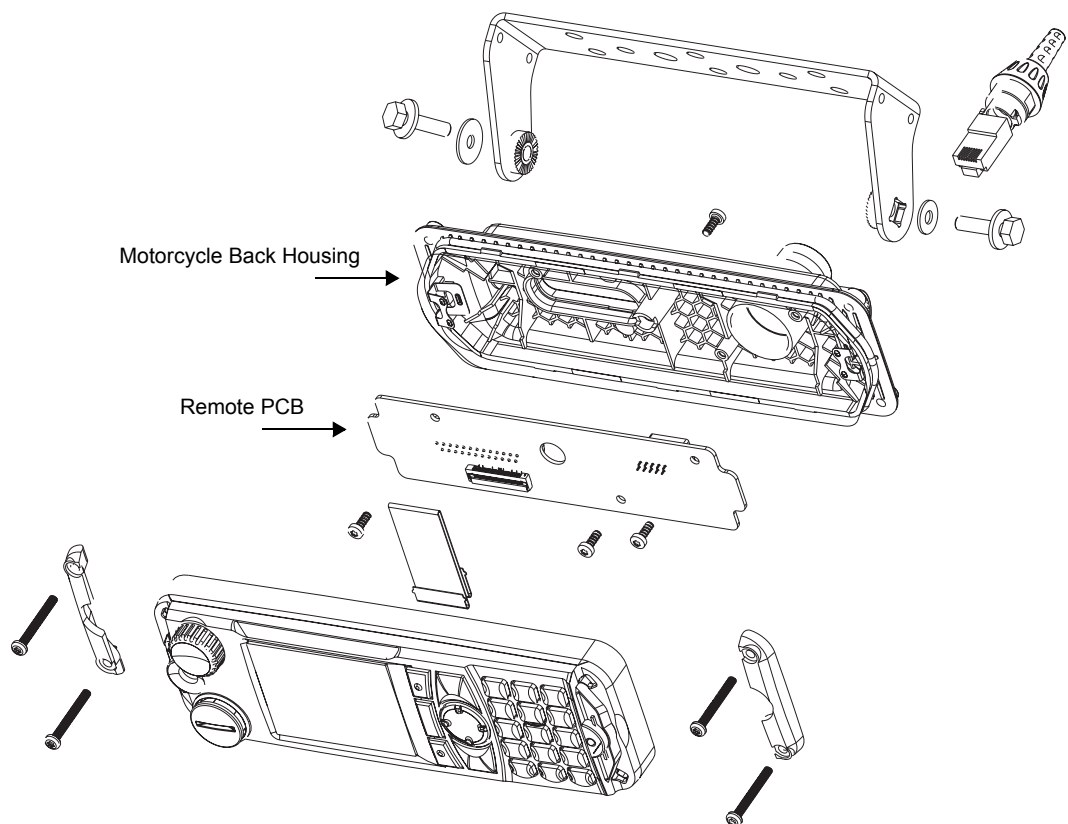
Remote PCB

Figure 6-13   Motorcycle Enhanced Control Head Exploded View

6. Remove the flex between the remote PCB and Main PCB.

7. Remove the board from the Motorcycle Mount Enhanced Control Head front housing by unscrewing the screws using T10 TORX^{TM} and disassemble the encoder switch flex from the socket on the board.

8. Remove the board from the Motorcycle Mount Enhanced Control head front housing by stretching the Motorcycle Mount Enhanced Control Head front housing and pulling up the board.

9. Remove the keypad by gently pressing the keypad out from the Motorcycle Mount Enhanced Control Head front housing.

10. Unscrew 3 screws using T10 TORX^{TM} to extract remote PCB from the motorcycle back housing.

Motorcycle Mount Enhanced Control Head – Reassembly

1. Fit the rubber keypad onto the Motorcycle Mount Enhanced Control Head front housing and ensure that the keypad is correctly aligned and pressed onto the groove of the front housing.

2. Assemble the board to the Motorcycle Mount Enhanced Control Head front housing.

3. Assemble the encoder switch flex to the socket on the board.

4. Screw the two 8mm self tapping screws and one 14mm self tapping screw.

5. Assemble the remote PCB into the motorcycle back housing by screwing the 3 screws.

6. Connect the flex from the remote board on the back housing to the connector on the PCB board of the Motorcycle Mount Enhanced Control Head front housing.

7. Snap the back housing into the Motorcycle Mount Enhanced Control Head front housing.

8. Screw the middle screw to the back housing.

Service Aids

The following table lists the service aids recommended for working on the terminal. While all of these items are available from Motorola, most are standard workshop equipment items, and any equivalent item capable of the same performance may be substituted for the item listed.

Table 6-4   Service Aids

Motorola Part No.	Description	Application
6666500A01	Housing Eliminator	Test Fixture used to bench test the terminal pcb
6686119B01	Dismantling Tool	Assists in the removal of terminal Enhanced Control Head
0180320B16	Torx Screw Driver Kit (T6,8,10,15,25)	
6680321B81	Torx Bit	
6680321B56	Insert Bit extra long	
T-20 TORX (or equivalent)	Screwdriver with torque meter	

EXPLODED VIEWS & PARTS LISTS

> **NOTE:** **For optimum performance, all replacement parts, diodes, transistors and integrated circuits must be ordered by Motorola part numbers.**

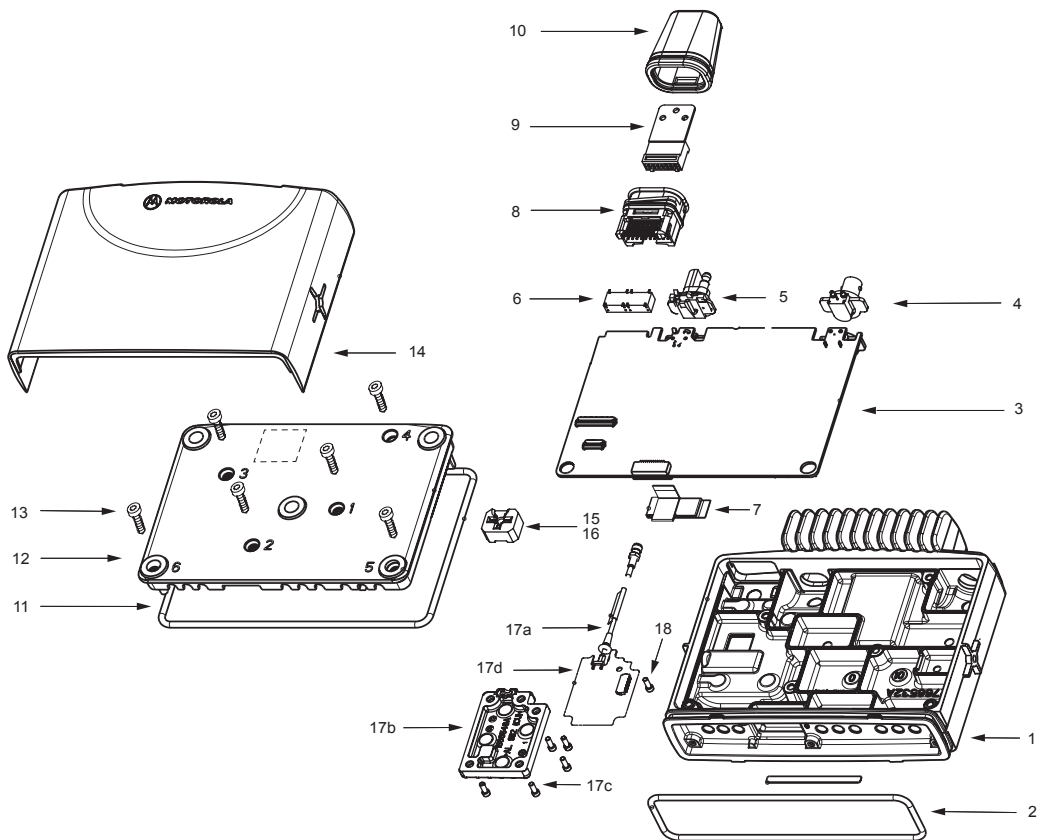## Transceiver – Exploded View and Parts List

Figure 6-14 Transceiver Exploded View

> **NOTE:** **Terminals with special label OPTION BOARD MOUNTED (see dotted lines on figure above) are equipped with an additional board inside the transceiver cover plate.**
> **Refer to the figure next page before disassembling such terminals.**

Table 6-5 Transceiver Parts List

Item No.	Description	Part Number
1	Chassis (item 2 included)	2766532A01
2	Gasket, Enhanced Control Head	3202620Y01
3	Main PCB (items 4 – 7 included)	refer to Appendix: Service Kits
4	BNC Antenna Connector	0986166B01
5	Power Connector	0986165B01
6	Accessory Connector	0986105B01
7	Flex to optional GPS	3066541B01
8	Connector Assembly	2886122B02
9	Connector Housing 16Pos.	1580922V01
10	Gasket Accessory Connector	3202606Y02
11	Gasket Cover	3286095B01
12	Cover (item 11 included)	1566511A02
13	Screw T20, 6x (M4)	0310911A30
14	Cover, Plastic	1586170B01
15	Silicon Pressurepad for UHF only	7566500A01
16	Silicon Pressurepad for 800MHz only	7566502A01
17	Sirf Module Kit (improved sensitivity): – requires MR5.6 and above	PMLD4360_
	17a Coax Cable	3366540B01
	17b GPS Cover	1566548A01
	17c Screw, 5x (M3x8)	0310907A19
17	GPS Module Kit (all software):	0166502N65
	17a Coax Cable	3366540B01
	17b GPS Cover	1566548A01
	17c Screw, 5x (M3x8)	0310907A19
	17d GPS Board with Flex	0166502N20
18	Screw for GPS board, 1x (M3x8)	0310907A19
19	Bushing for IP 54 Protection w/o GPS (not shown)	4366504A02
20	UCM Board Kit:	GMLN4218_
	20a UCM Board Module	CLN8041_
	20b UCM Board Cover	0786183B01
	20c UCM Board Flex	8485615Z02
	20d Screw 3x (M5x8)	0310943R55
20	UCM Board Kit:	GMLN4562_
	20a UCM Board Module AES128	CLN8382_
	20b UCM Board Cover	0786183B01
	20c UCM Board Flex	8485615Z02
	20d Screw 3x (M5x8)	0310943R55
20	UCM-M Board Kit:	GMLN5037_
	20a UCM-M Board Module AES256	CLN8526_
	20b UCM Board Cover	0786183B01
	20c UCM Board Flex	8485615Z02
	20d Screw 3x (M5x8)	0310943R55

20c

20d

UCM board inside the cover plate

20b

20a
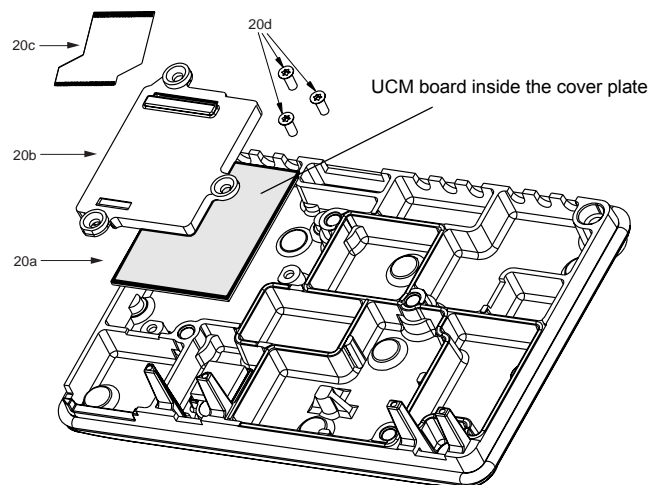
Figure 6-15   Location of additional UCM Board inside the Cover Plate

CAUTION: There is a flex installed connecting the UCM board to the main board. Take extra care not to tear off the flex when dis-assembling or re-assembling the board from/to the transceiver cover plate or this could damage the UCM board and the main board.

NOTE: **CLN8041_ UCM board/CLN8382_ UCM board/CLN8526_ UCM-M board is not repairable. Order a replacement board if necessary.**

Enhanced Control Head – Exploded View and Parts List
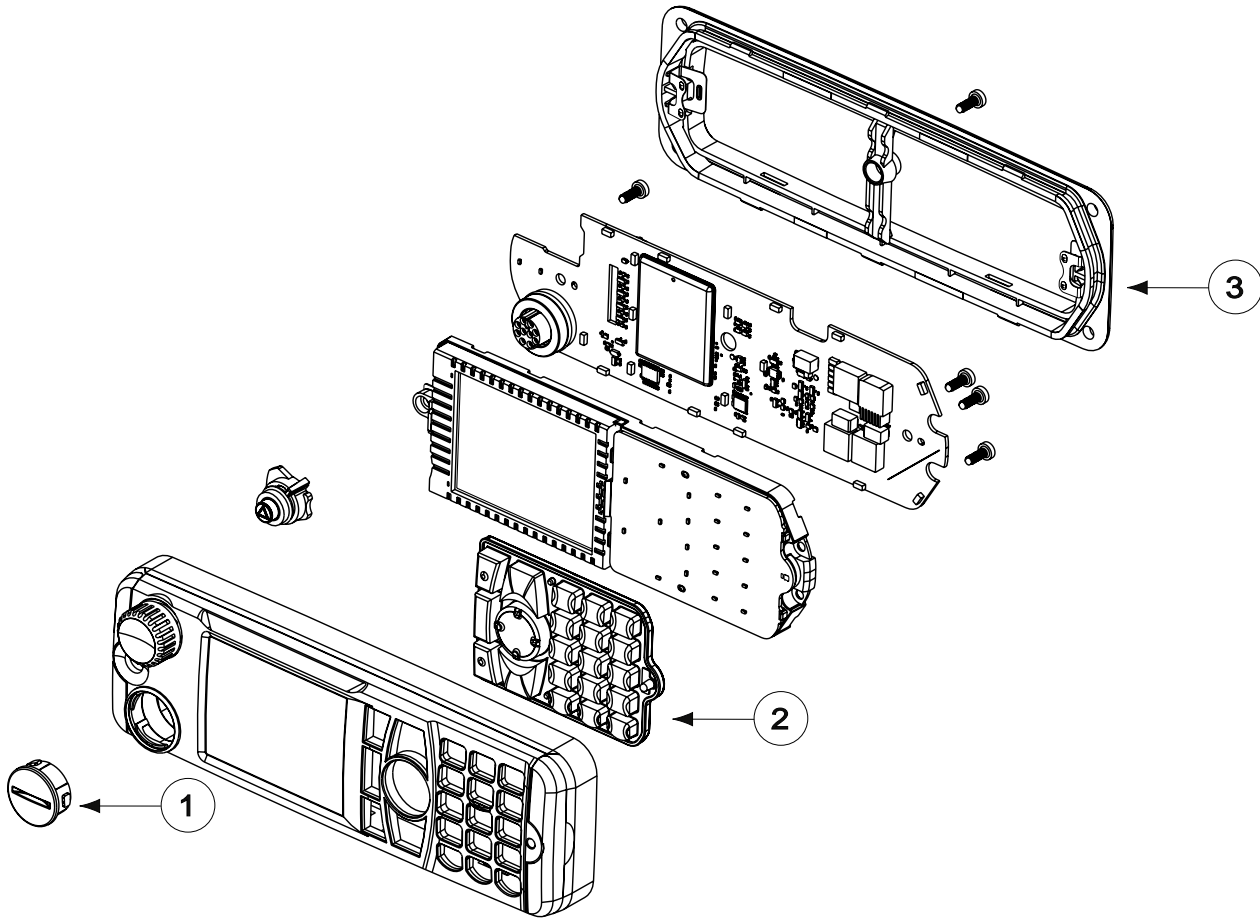
Figure 6-16   Enhanced Control Head – Exploded View 1

Table 6-6   Enhanced Control Head – Parts List 1

Item No	Description	Part No
1	GCAI Cover	1515048C01
2	Keypad Assembly – English Keypad Assembly – Arabic Keypad Assembly – Chinese Keypad Assembly – Cyrillic Keypad Assembly – Korean Keypad Assembly – Bopomofo	7571017L01 7571017L02 7571017L03 7571017L04 7571017L05 7571017L06
3	Head Bridge Assembly	0104025J29
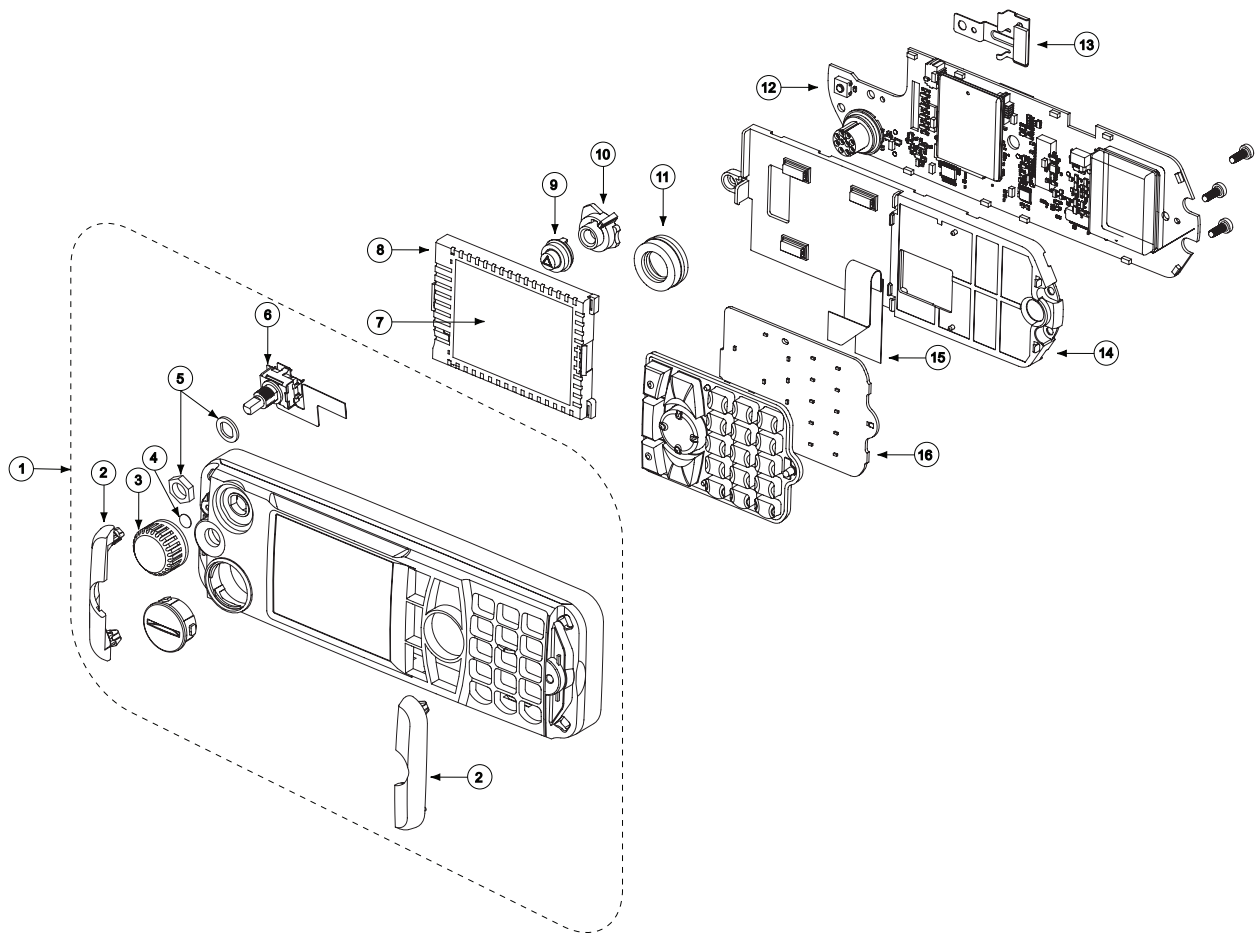
Figure 6-17   Enhanced Control Head – Exploded View 2

Table 6-7   Enhanced Control Head – Parts List 2

Item No	Description	Part No
1	Front Housing Assembly	0104022J38
2	Side Cap	3816950H01
3	Encoder Knob	3616898H01
4	Gore Port	3205472M02
5	Encoder Nut and Seal	PMLN5123_
6	Encoder Assembly	0104025J36
7	LCD Module	7271138D01
8	LCD Rubber Jacket	7516954H01
9	Emergency Key	3816953H01
10	Emergency Key Frame	0716944H01
11	GCAI Seal	3264133H01

Item No	Description	Part No
12	Main PWA Kit	PMLN5226_
13	LCD Metal Retainer	4216900H01
14	Chassis	2716937H01
15	Keypad FFC	8471919L01
16	Keypad PWA Kit	0166501N35

Data Expansion Head Enhanced – Exploded View and Parts List
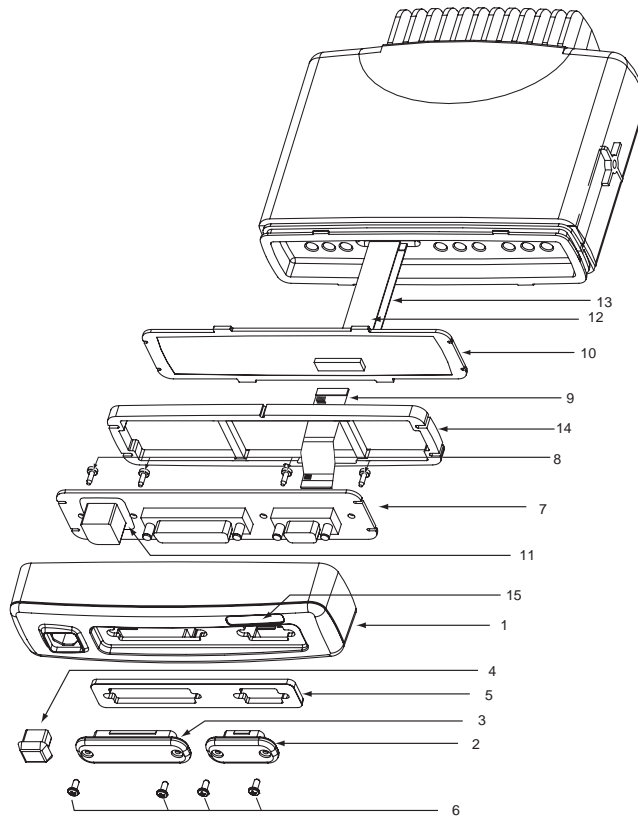
Figure 6-18   Data Expansion Head Enhanced – Exploded View

Table 6-8   Data Expansion Head Enhanced – Parts List

Item No	Description	Part No
1	Expansion Head Housing	1564290B01
2	Cover 9 Sub-D	3864326B01
3	Cover 25 Sub-D	3864326B02
4	Protection Caps/Bung, Telco	GLN7306_
5	Seal, Expansion Head (not available to customers)	–
6	Screw, Protection Caps/Bung (4 required)	0305137Q02
7	Connector Board	PMLN5087A
8	Screw, Connector PCB (4 required)	0385944A02
9	Flex 40 Pin	8415157H01
10	Expansion Board, not part of Housing Kit	PMLN4939_
11	Seal for 10 Pin Telco on PCB	3264291B01
12	Flex 12 Pin	8486127B01
13	Flex 40 Pin	8466543A01
14	Silicone Pressure Pad	3264337B01
15	Label	5464344B07

Remote Mount Enhanced Control Head – Exploded View and Parts List

Figure 6-19   Remote Mount Enhanced Control Head – Exploded View

Table 6-9   Remote Mount Enhanced Control Head – Parts List

Item No.	Description	Part No.
1	Remote FFC (Main to Remote)	8471921L01
2	Remote PWA Kit	0166501N45
3	Remote Back Housing Assembly	0104025J30
4	D Sub Cover	1571012L01
5	Trunnion	0716933H01
6	Middle Screw	0371912L01
7	Self Tapping Screw	0316961H01

Remote Mount Configuration – Exploded View and Parts List
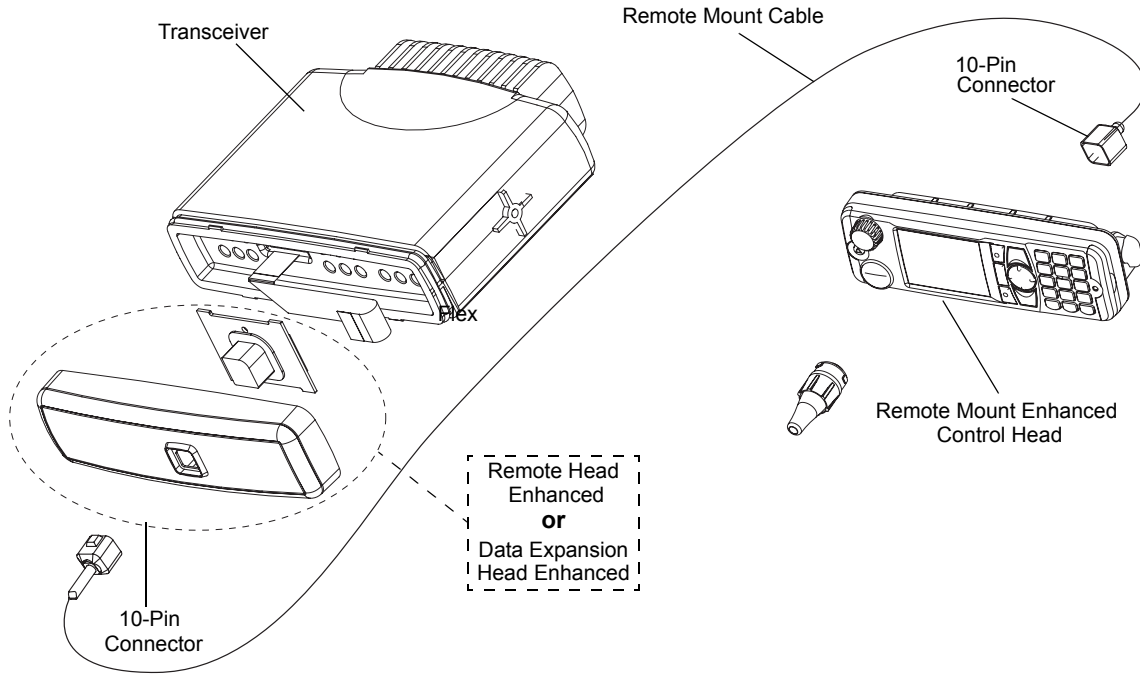
Figure 6-20   Remote Mount Configuration – Exploded View

Table 6-10   Associated Components for Remote Mount Configuration

No.	Description	Part Number
1	Remote Mount Cable, 3 m	RKN4077_
2	Remote Mount Cable, 5 m	RKN4078_
3	Remote Mount Cable, 7 m	RKN4079_
4	Remote Mount Cable, 10 m	PMKN4020_
5	Speaker Extension Cable	GMKN4084_
6	Remote Head Enhanced	PMLN4904_
7	Data Expansion Control Head	PMLN4908_

Motorcycle Mount Enhanced Control Head – Exploded View and Parts List
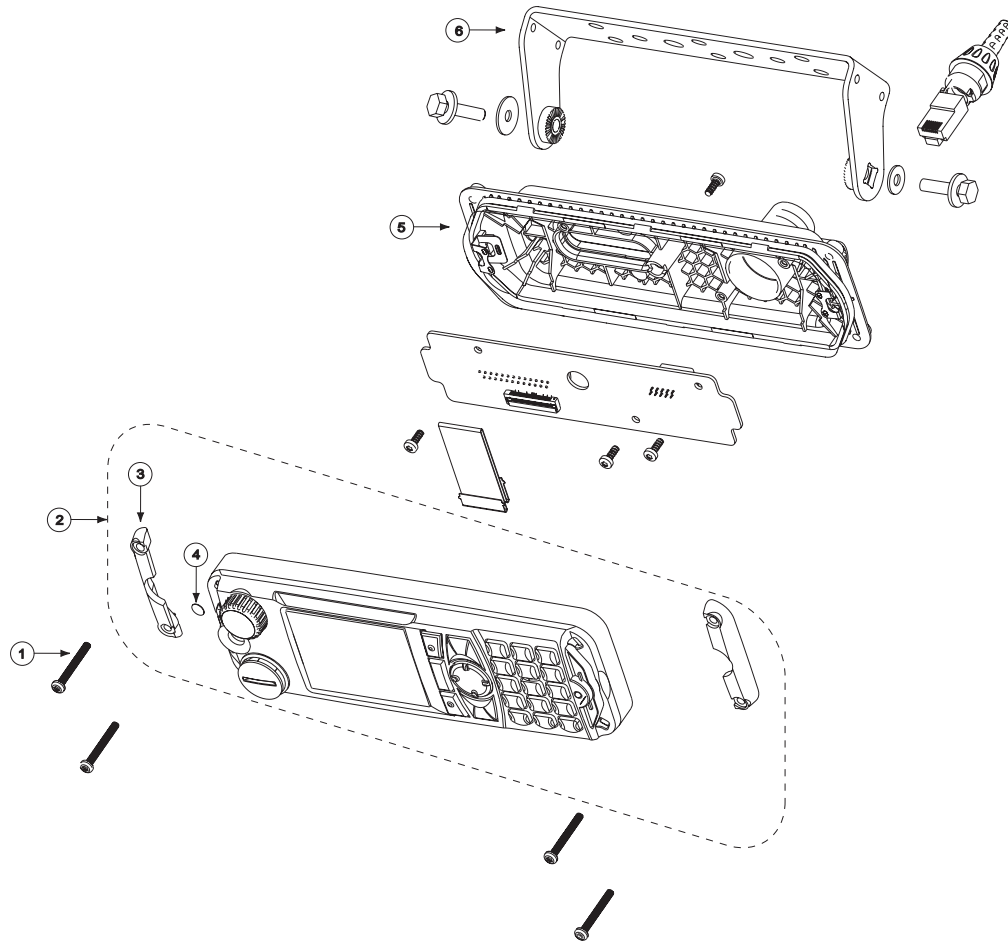
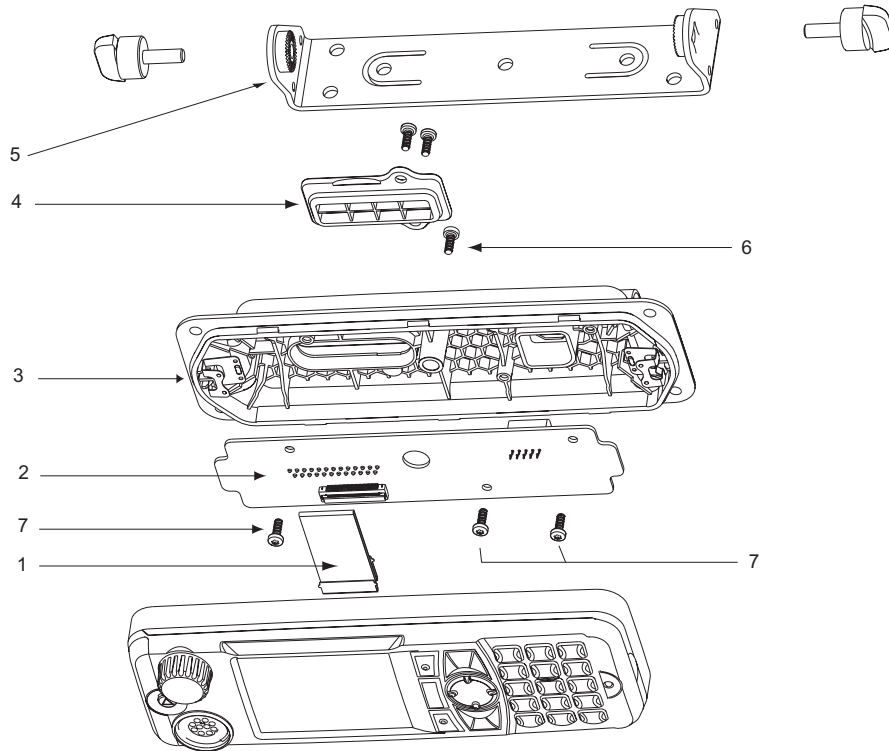**Figure 6-21**   Motorcycle Mount Enhanced Control Head – Exploded View

Table 6-11   Motorcycle Mount Enhanced Control Head – Parts List

Item No.	Description	Part No.
1	Side Cap Screw	0316960H02
2	MC Front Housing Assembly	0104024J34
3	MC Side Cap	3871547L01
4	Gore Port	3271555L01
5	MC Back Housing Assembly	0104025J31
6	MC Trunnion	0771445L01

Notes

APPENDIX A
REPLACEMENT PARTS & KITS

Servicing MTM800 with Enhanced Control Head Mobile Units

Service for the mobile units is based on the substitution method; a faulty part is replaced by a working one, providing quicker service to the customer. For example, if the controller board is faulty, it is replaced. If the mobile requires more complete testing or servicing than that is available at field level, it is sent to the European Radio Service Centre; where it is serviced, and returned to the Regional Service Centre.

Level 1 and Level 2 Maintenance

This manual covers Level 1 and Level 2 Maintenance: at Level 1 maintenance you replace the transceiver and/or accessories and send the faulty transceiver and/or accessories to higher level of maintenance; at level 2 maintenance a transceiver board is replaced.

The MTM800 mobiles are programmed at the factory. They cannot be tuned at the field service level.

Level 3 Maintenance

All Radio Support Depots are level 3 service partners. The depots are capable of performing repairs down to component level where retuning is required. Contact your local CGISS office for information.

Replacement Parts

Damaged parts should be replaced with identical replacement parts.
For complete information on ordering required parts and kits, contact your local customer service representative (see following pages).

SERVICE INFORMATION

Europe, Middle East and Africa Region

European Radio Support Centre (ERSC)

Motorola European Radio Support Centre is available at:

Motorola European Radio Support Centre ERSC
Tel.: +49 (0)30 6686 1555
Fax: +49 (0)30 6686 1579
Am Borsigturm 130
13507 Berlin
Germany

EMEA Systems Support Centre (ESSC)

The Systems Support Centre is available at:

Telephone:	+44 (0) 1256 484448
E-mail:	ESSC@motorola.com

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 a parts list is not included, this generally means that no user-serviceable parts are available for that kit or assembly.

Note on this digital Tetra Terminal: **The CPS has no capability to tune the terminal. Tuning the terminal can only be performed at the factory or at the appropriate Motorola Repair Centre. Components replacement can affect the terminal tuning and must only be performed by the appropriate Motorola Repair Centre.**

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 the Extranet site Motorola Online at: http://motorola.com/emeaonline .

EMEA Test Equipment Support

Information related to support and service of Motorola Test Equipment is available by calling the Motorola Test Equipment Service in Germany at +49 (0) 6128 702179, Telefax +49 (0) 6128 951046, through the Customer Care Organization of Motorola's local area representation, or via the Internet at: http://www.gd-decisionsystems.com/cte/ .

Asia, Pacific Region

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 a parts list is not included, this generally means that no user-serviceable parts are available for that kit or assembly.

Note on this digital TETRA Terminal: **The CPS has no capability to tune the terminal. Tuning the terminal can only be performed at the factory or at the appropriate Motorola Repair Center. Component replacement can affect the terminal tuning and must only be performed by the appropriate Motorola Repair Center.**

All orders for parts/information should include the complete Motorola identification number. All part orders should be directed to your local AAD office. Please refer to your latest price pages.

Technical Support

Technical support is available to assist the dealer/distributor in resolving any malfunction which may be encountered. Initial contact should be by telephone wherever possible.
When contacting Motorola Technical Support, be prepared to provide the product model number and the unit's serial number.

Further Assistance From Motorola

You can also contact the Customer Help Desk through the following web address:
http://www.motorola.com/governmentandenterprise.

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).

Latin America Region

Latin America Radio Support Centres
The Customer Support is available through the following service centres:

Warranty and Repairs:

MOTOROLA DE COLOMBIA SERVICE CENTRE
Torre Banco Ganadero
Carrera 7 No. 71-52
Torre B piso 13
Oficina 1301
Bogota- Colombia
(571) 376-6990

MOTOROLA DE MEXICO SERVICE CENTRE
Bosques de Alisos #125
Col. Bosques de las Lomas
CP 05120 Mexico DF
5252576700

Piece Parts:

To order parts in Latin America and the Caribbean contact your local Motorola CGISS representative.

MOTOROLA, INC.
Latin American Countries Region
789 International Parkway
Sunrise, FL 33325
USA 954-723-8959

MOTOROLA DE ARGENTINA
Ave. del Libertador 1855
B1638BGE, Vicente Lopez
Buenos Aires, Argentina
5411-4317-5300

MOTOROLA DE LOS ANDES C.A.
Ave. Francisco de Miranda
Centro Lido, Torre A
Piso 15, El Rosal
Caracas, 1060 Venezuela
58212-901-4600

MOTOROLA DO BRASIL LTDA.
Av. Chedid Jafet
222 Bloco D Conjuntos 11,12,21,22 E 41
Condominio Millennium Office Park
04551-065- Vila Olimpia, Sao Paulo
Brasil
5511-3847-6686

MOTOROLA CHILE
Ave. Nueva Tajamar 481
Edif. World Trade Center
Of. 1702, Torre Norte
Las Condes
Santiago, Chile
562-338-9000

MOTOROLA DE COLOMBIA, LTDA.
Carrera 7 #71-52
Torre A, Oficina 1301
Bogotá, Colombia
571-376-6990

MOTOROLA DE COSTA RICA
Parque Empresarial Plaza Roble
Edificio El Portico, 1er Piso
Centro de Negocios Internacional
Guachepelin, Escazu
San Jose, Costa Rica
506-201-1480

MOTOROLA DEL ECUADOR
Autopist Gral. Rumiñahui, Puente 2
Conjunto Puerta del Sol Este-Ciudad Jardin
Pasa E, Casa 65
Quito, Ecuador
5932-264-1627

MOTOROLA DE MEXICO, S.A.
Calle Bosques de Alisos #125
Col. Bosques de Las Lomas
05120 México D.F.
México
52-555-257-6700

MOTOROLA DEL PERU, S.A.
Ave. República de Panama 3535
Piso 11, San Isidro
Lima 27, Peru
511-211-0700

Technical Support:

http://motorola.com/businessonline, go to Contact Us to request technical support.

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. 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.

SERVICE KITS

Table 1 Model Numbering Information

Type No.	Sales Model No.	Short Description	Model
MT512M MT912M	M80RCS6TZ5_N M80PCS6TZ5_N	MTM800 ENH 410–470 MHz, DASH MTM800 ENH 380–430 MHz, DASH	M1
MT512M MT912M	M80RCS6TZ4_N M80PCS6TZ4_N	MTM800 ENH 410–470 MHz, DESK MTM800 ENH 380–430 MHz, DESK	M2
MT512M MT912M	M80RCS6TZ6_N M80PCS6TZ6_N	MTM800 ENH 410–470 MHz, REMOTE MTM800 ENH 380–430 MHz, REMOTE	M3
MT512M MT912M	M80RCS6TZ2_N M80PCS6TZ2_N	MTM800 ENH 410–470 MHz, M'CYCLE MTM800 ENH 380–430 MHz, M'CYCLE	M4
MT512M MT912M	M80RCA6TZ5_N M80PCA6TZ5_N	MTM800 ENH 410–470 MHz, Data MTM800 ENH 380–430 MHz, Data	M5

Table 2 Service Kits-To-Model Chart

MTM800 Service Kits						
Description	Part Number	M1	M2	M3	M4	M5
Service Boards 380–430MHz						
MTM800 ENH 380–430 CLEAR [1]	PMUE4464_S	X	X	X	X	X
MTM800 ENH 380–430 TEA1 [1,2]	PMUE4465_S	X	X	X	X	X
MTM800 ENH 380–430 TEA2 [1,2]	PMUE4466_S	X	X	X	X	X
MTM800 ENH 380–430 TEA3 [1,2]	PMUE4467_S	X	X	X	X	X
MTM800 ENH 380–430 CLEAR MAINBOARD [1,3]	PMUE4464_W	X	X	X	X	X
MTM800 ENH 380–430 TEA1 MAINBOARD [1,2,3]	PMUE4465_W	X	X	X	X	X
MTM800 ENH 380–430 TEA2 MAINBOARD [1,2,3]	PMUE4466_W	X	X	X	X	X
MTM800 ENH 380–430 TEA3 MAINBOARD [1,2,3]	PMUE4467_W	X	X	X	X	X
MTM800 ENH 380–430 GPS CLEAR [1]	PMUE4468_S	X	X	X	X	X
MTM800 ENH 380–430 GPS TEA1 [1,2]	PMUE4469_S	X	X	X	X	X
MTM800 ENH 380–430 GPS TEA2 [1,2]	PMUE4470_S	X	X	X	X	X
MTM800 ENH 380–430 GPS TEA3 [1,2]	PMUE4471_S	X	X	X	X	X
MTM800 ENH 380 UCM-M AES128 [1]	PMUE2881_S	X	X	X	X	X
MTM800 ENH 380 UCM-M TEA1 AES128 [1,2]	PMUE2882_S	X	X	X	X	X
MTM800 ENH 380 UCM-M TEA2 AES128 [1,2]	PMUE2883_S	X	X	X	X	X
MTM800 ENH 380 UCM-M TEA3 AES128 [1,2]	PMUE2884_S	X	X	X	X	X
MTM800 ENH 380 UCM-M GPS AES128 [1]	PMUE2885_S	X	X	X	X	X
MTM800 ENH 380 UCM-M GPS TEA1 AES128 [1,2]	PMUE2886_S	X	X	X	X	X

Table 2   Service Kits-To-Model Chart (Continued)

MTM800 Service Kits						
Description	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
MTM800 ENH 380 UCM-M GPS TEA2 AES128 [1,2]	PMUE2894_S	X	X	X	X	X
MTM800 ENH 380 UCM-M GPS TEA3 AES128 [1,2]	PMUE2895_S	X	X	X	X	X
MTM800 ENH 380 UCM-M AES256 [1]	PMUE3270_S	X	X	X	X	X
MTM800 ENH 380 UCM-M TEA1 AES256 [1,2]	PMUE3271_S	X	X	X	X	X
MTM800 ENH 380 UCM-M TEA2 AES256 [1,2]	PMUE3277_S	X	X	X	X	X
MTM800 ENH 380 UCM-M TEA3 AES256 [1,2]	PMUE3279_S	X	X	X	X	X
MTM800 ENH 380 UCM-M GPS AES256 [1]	PMUE3287_S	X	X	X	X	X
MTM800 ENH 380 UCM-M GPS TEA1 AES256 [1,2]	PMUE3260_S	X	X	X	X	X
MTM800 ENH 380 UCM-M GPS TEA2 AES256 [1,2]	PMUE3286_S	X	X	X	X	X
MTM800 ENH 380 UCM-M GPS TEA3 AES256 [1,2]	PMUE3285_S	X	X	X	X	X
MTM800E UCM-M/NO SW GPS TEA2 AES128 [1,2]	PMUE3220_S	X	X	X	X	X
Service Boards 410–470MHz						
MTM800 ENH 410–470 CLEAR	PMUE4480_S	X	X	X	X	X
MTM800 ENH 410–470 TEA1 [2]	PMUE4481_S	X	X	X	X	X
MTM800 ENH 410–470 TEA2 [2]	PMUE4482_S	X	X	X	X	X
MTM800 ENH 410–470 GPS CLEAR	PMUE4483_S	X	X	X	X	X
MTM800 ENH 410–470 GPS TEA1 [2]	PMUE4484_S	X	X	X	X	X
MTM800 ENH 410–470 GPS TEA2 [2]	PMUE4485_S	X	X	X	X	X
MTM800 ENH 410–470 UCM AES 128	PMUE4486_S	X	X	X	X	X
MTM800 ENH 410–470 UCM TEA1 AES 128 [2]	PMUE4487_S	X	X	X	X	X
MTM800 ENH 410–470 UCM TEA2 AES 128 [2]	PMUE4488_S	X	X	X	X	X
MTM800 ENH 410–470 UCM/GPS AES 128	PMUE4489_S	X	X	X	X	X
MTM800 ENH 410–470 UCM/GPS TEA1 AES128 [2]	PMUE4490_S	X	X	X	X	X
MTM800 ENH 410–470 UCM/GPS TEA2 AES128 [2]	PMUE4491_S	X	X	X	X	X
Enhanced Control Head/Kits						
Dash/Desk Mount –English Keypad	GMWN4298_	X	X			
Chinese Keypad	GMWN4299_	X	X			
Korean Keypad	GMWN4300_	X	X			
Arabic Keypad	GMWN4301_	X	X			
BoPoMoFo Keypad	GMWN4302_	X	X			
Cyrillic Keypad	GMWN4303_	X	X			
English Keypad – Hungarian	GMWN4608_	X	X			
Remote Mount –English Keypad	GMWN4304_			X		X

Table 2 Service Kits-To-Model Chart (Continued)

MTM800 Service Kits						
Description	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**
Chinese Keypad	GMWN4305_			X		X
Korean Keypad	GMWN4306_			X		X
Arabic Keypad	GMWN4307_			X		X
BoPoMoFo Keypad	GMWN4308_			X		X
Cyrillic Keypad	GMWN4309_			X		X
English Keypad – Hungarian	GMWN4606_			X		X
Motorcycle –English Keypad	GMWN4600_				X	
Chinese Keypad	GMWN4601_				X	
Korean Keypad	GMWN4602_				X	
Arabic Keypad	GMWN4603_				X	
BoPoMoFo Keypad	GMWN4604_				X	
Cyrillic Keypad	GMWN4605_				X	
English Keypad – Hungarian	GMWN4607_				X	
Expansion & Remote Head Kits						
Data Expansion Head Enhanced	PMLN4908_			X	X	X
Data Expansion Head	GMCE4053_					X
Remote Head Enhanced	PMLN4904_			X	X	
Cables/Kits						
Remote Mount Cable – 3m	RKN4077_			X		X
Remote Mount Cable – 5m	RKN4078_			X		X
Remote Mount Cable – 7m	RKN4079_			X		X
Remote Mount Cable – 10m	PMKN4020_			X		X
Accessories Expansion Cable, 2.3m	PMKN4029_			X	X	X
Motorcycle Mount TELCO Cable, 2.3m	PMKN4030_				X	
Accessories Expansion Cable, 4m	PMKN4056_			X	X	X
Dual Control Head Cables						
Dual NGCH Cable Assy	PMKN4078_	X	X	X	X	X
Dual NGCH Slave Cable	PMKN4080_	X	X	X	X	X
Power Cable 3086026B02	PMKN4081_	X	X	X	X	X
Dual NGCH Cable Assy	PMKN4092_	X	X	X	X	X

NOTE: 1) Only for **MR5.10 and above**.
2) TETRA Encryption Algorithm 1, 2 or 3.
3) Main boards are shipped with new Serial and TEI numbers.

APPENDIX B

PRODUCT SPECIFIC INFORMATION
for TETRA Terminals Type MT912M, MT512M

This section gives the Service Personnel an overview about product specific notes. This is necessary to take special precautions to avoid the introduction of hazards when operating, installing, servicing or storing equipment. This terminal meets the applicable safety standards if it is used as described. All operating and safety instructions are to be followed carefully.

Equipment Electrical Ratings

Rated Voltage: 12 Volt DC

Rated Voltage Range: 10.8 to 15.6 V DC

Rated Current: 3 Amps @ 3Watts RF power

Please be aware when planning the installation that there is a current consumption of approx. 3.5 A during PTT and even 30 mA when terminal is switched off.

Transmitter Frequency Range:
TMO: 380–430MHz (MT912M), 410–470 MHz (MT512M)
DMO: 380–430MHz (MT912M), 410–470 MHz (MT512M)

Receiver Frequency Range:
380–430MHz (MT912M), 410–470 MHz (MT512M)

Normal Load Conditions:

Rated RF Power: 3 Watts

Rated Audio Power: 10 Watts @ 4 Ohms; 6 Watts @ 8 Ohms

Antenna Impedance: 50 Ohms

Operating Temp. Range: -30 to +60°C

Operating Time*: Continuous / Intermittent

*Note: In general, the terminal transmit and receive time (operating cycle time) is determined by the communication system. On overload, respectively on extensive use beyond the systems specifications at high ambient temperatures, the terminal is protected by its thermal control, which cuts down the RF output power, thus reducing the terminal coverage range.

Fuse Identification

In case of blown fuses during the installation only replace those with identically value. **Never insert different values.**

Fuse for Power Cable GKN6270/GKN6274: 10 A (Motorola Part Number: 6580283E05)
Fuse for Ignition Sense Cable HKN9327: 4 A (Motorola Part Number: 6580283E02)

Spezielle Produktinformationen
für Funkgeräte des Typs MT912M, MT512M und MT712M

Dieses Kapitel gibt dem geschulten Servicepersonal einen Überblick über wichtige produktspezifische Informationen. Diese Informationen sind wichtig, um Risiken beim Bedienen, Installieren und Service zu vermeiden. Dieses Funkgerät erfüllt die allgemeinen Sicherheitsstandards, sofern es so betrieben wird, wie in der Bedienungsanleitung beschrieben.

Nennwerte für das Funkgerät

Nennspannung: 12 Volt DC

Nennspannungsbereich: 10.8 bis 15.6 V DC

Nennstrom: 3 A @ 3Watt HF Leistung

Bevor Sie die Installation planen, bedenken Sie, dass das Sprechfunkgerät beim Senden einen Stromverbrauch von ca. 3,5 A hat und auch im ausgeschalteten Zustand einen Strom von ca. 30 mA verbraucht.

Sender-Nennfrequenzbereich:
TMO: 380–430MHz (MT912M), 410–470 MHz (MT512M)
DMO: 380–430MHz (MT912M), 410–470 MHz (MT512M)

Empfänger-Nennfrequenzbereich:
380–430MHz (MT912M), 410–470 MHz (MT512M)

Betriebsbedingungen

HF Nennleistung: 3 Watt

Lautsprecher Nennleistung:10 Watt an 4 Ohm; 6 Watt an 8 Ohm

Antennenimpedanz: 50 Ohm

Betriebstemperatur Bereich: -30 to +60°C

Betriebszeit*: fortwährend / periodisch

*Hinweis: Im allgemeinen wird die Sende- und Empfangsszeit (Betriebszeit) des Funkgerätes durch das Funksystem bestimmt. Bei Überlastung bzw. extensivem Betrieb über die Systemsspezifikationen hinaus bei hohen Umgebungstemperaturen wird das Funkgerät durch eine Temperaturkontrollschaltung geschützt, die die HF-Leitung reduziert. Daraus kann sich eine Verringerung der Leistungsmerkmale des Gerätes ergeben.

Sicherungen

Sollte während der Installation die Sicherung durchbrennen, darf sie **nur durch eine gleichwertige** Sicherung ersetzt werden.

Sicherung für DC Kabel GKN6270/GKN6274: 10 A (Motorola Bestellnummer: 6580283E05)
Sicherung für Ignition Sense Kabel HKN9327: 4 A (Motorola Bestellnummer: 6580283E02)