MTM700

TETRA Mobile Terminal
380-430 MHz (MT912)
806-870 MHz (MT712)

Basic Service Manual

Part Number: 6866534D20-C

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DOCUMENT HISTORY

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

Edition	Description	Date
6866534D20-O	Initial edition	Dec. 2001
6866534D20-A	Update for Rev B and Rev C Radio Tanapas (Packed Data Application via Accessory Connector)	Feb. 2003
	Document History added.	
	Frontpage back: Chapter Copyright added	
	Safety Information updated to new TETRA Standard	
	Chapter 1. Scope: New Safety leaflet numbers added	
	Chapter 2. Model Information: Update for Expansion Head in M2/M6. Active Data Cable and Compatibility Table added, Part Numbers corrected with Underscore	
	Chapter 4. Programming: Set Up and Illustrations updated	
	Chapter 5. Test Setup & Testing, Service Flow Chart: Note for Latin America (LA) added	
	Chapter 6. Maintenance, Explosion views: Note for LA added, Part Numbers corrected, Underscore added	
	Appendix A: Service Kits-To-Model Charts updated, Notes and Service Support Centers for LA added	
6866534D20-B	Junction box added, Phone numbers, Model chart and Part numbers updated.	Feb. 2004
	Model Information, Page 2-3 to 2-6: Accessories-to-Model-Chart updated.	
	Appendix A page 2, Support Centers: ERSC phone call numbers updated.	
	Appendix A page 5: Underscore in Service Kits-To-Model Chart implemented.	
6866534D20-C	Additional connecting cables between MTM700 and junction box added. Now the lengths 6 m, 4 m and 2 m are available.	Mar. 2004

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PRODUCT SAFETY AND RF EXPOSURE FOR MOBILE TWO-WAY RADIOS INSTALLED IN VEHICLES OR AS FIXED SITE CONTROL STATIONS

Caution

BEFORE USING THIS RADIO, 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.

Compliance with RF Energy Exposure Standards

Your Motorola radio is designed and tested to comply with a number of national and international standards and guidelines regarding human exposure to radio frequency electromagnetic energy, including:

- Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- 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
- 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 2001
- ANATEL, Brasil Regulatory Authority, Resolution 256 (April 11, 2001) “additional requirements for SMR, cellular and PCS product certification.”

COMPLIANCE AND CONTROL GUIDELINES AND OPERATING INSTRUCTIONS FOR MOBILE RADIOS

To ensure optimal performance and compliance with the RF energy exposure limits in the above standards and guidelines, always adhere to the following procedures:

Transmit and Receive

- To transmit (talk), push the Push-To-Talk (PTT) button; to receive, release the PTT button.
- **Transmit only when people outside the vehicle are at least the minimum lateral distance away**, as shown in Table 1, from a properly installed, externally-mounted antenna.

Note: Table 1 lists the minimum lateral distance for bystanders in an uncontrolled environment from the transmitting types of antennas, (i.e. monopoles over a ground plane, or dipoles) at several different ranges of rated radio power for mobile radios installed in a vehicle.

Table 1 Rated Power and Lateral Distance

Rated Power of Vehicle-installed Mobile Two-way Radio	**Minimum Lateral Distance from Transmitting Antenna**
Less than 7 Watts	20 cm (8 Inches)
7 to 15 Watts	30 cm (1 Foot)

Mobile Antennas

- Antennas should be installed in locations that assure the recommended separation distance to any person outside or inside the vehicle.
- Install antennas at the center of the roof or the center of the trunk deck, taking into account the bystander exposure conditions of back-seat passengers.
- These mobile antenna installation guidelines are limited to metal body motor vehicles or vehicles with appropriate ground planes.
- Antennas should be installed in locations that assure the recommended distance to any person in Table 1. For example, if a trunk does not provide a 1 foot separation to the passenger or bystander, then another location should be selected.
- The antenna installation must additionally be in accordance with:

  a) The requirements of the antenna manufacturer

  b) Instructions in the Radio Installation Manual

- Use only Motorola approved supplied antenna or Motorola approved replacement antenna. Unauthorized antennas, modifications, or attachments could damage the radio and may violate RF exposure guidelines.

- For a list of Motorola approved antennas, visit the following web site : http://moleurope.comm.mot.com/member/commerce

- For additional information on exposure requirements or other training information, visit http://www.motorola.com/rfhealth.

Fixed Site Antennas

If mobile radio 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 above standards and guidelines:

- The antenna must 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 ensure 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 antenna sites is sensitive to external RF energy and if any procedures need to be followed to eliminate or mitigate the potential for interaction between the radio transmitter and the equipment or device.

Facilities

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

Vehicles

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

1. Refer to the manufacturer’s instructions and or other technical bulletins or recommendations on radio installation.

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

3. Route all radio 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 radios in the area where you drive. Always obey them.
When using your radio while driving, please:

- Give full attention to driving and to the road.
- Pull off the road and park before making or answering a call if driving conditions so require.

WARNING

OPERATIONAL WARNINGS

For Vehicles with an Air Bag

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

Potentially Explosive Atmospheres

Turn off your radio prior to entering any area with a potentially explosive atmosphere. Sparks in a potentially explosive atmosphere can cause an explosion or fire

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 Areas

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

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

Attention: This Unit may use a battery on the PCB.
Risk of Explosion if battery is replaced by an incorrect type.
Dispose of used batteries according to the instructions.

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 SICHERHEITS INFORMATIONEN FÜR SERVICE UND INSTALLATION DES FUNKGERÄTES

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

ACHTUNG: Dieses Gerät kann mit einer Batterie auf der Platine ausgestattet sein.
Explosionsgefahr, bei Einsatz einer falschen Ersatzbatterie.
Entsorgung gebrauchter Batterien entsprechend Vorschrift.

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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CONTENTS

CHAPTER 4 PROGRAMMING THE RADIO

CHAPTER 5 TEST SETUP & TESTING

CHAPTER 6 MAINTENANCE

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CHAPTER 1
SCOPE & WARRANTY INFORMATION

SCOPE OF THIS MANUAL

This manual is intended for use by service technicians familiar with similar types of equipment. 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 Histaory
- User Safety, Training and General Information
- CHAPTER 1 Scope and Warranty Information
- CHAPTER 2 Model Information & Accessories
- CHAPTER 3 Overview
- CHAPTER 4 Programming the Radio
- CHAPTER 5 Test Setup and Testing
- CHAPTER 6 Maintenance
- APPENDIX A Replacement Parts and Kits
- APPENDIX B Product Specific Information

Manuals & User Guides

Radio Installation Instructions

6866534D67MTM700 Radio Installation Instructions (English)

Service Manuals

6866534D19 MTM700 Detailed Service Manual (English)
6804112J73 MTM700 Detailed Service Manual (Mandarin)

6866534D20 MTM700 Basic Service Manual (English)
6804112J71 MTM700 Basic Service Manual (Mandarin)

Basic User Guides (standard version)

6866537D44 MTM700 Basic User Guide (English, German, French, Dutch, Spanish)
6804112J69 MTM700 User Guide (Mandarin)

Basic User Guides (Motorcycle version)

6866537D45 MTM700 Basic User Guide (English, German, French, Dutch, Spanish)
6804112J83 MTM700 User Guide (Mandarin)

Configuration Manual (Expansion Head Radio)

6866534D91 MTM700 Config. Manual (English)
6804112J81 MTM700 Config. Manual (Mandarin)

Safety Leaflets

6864117B25Safety Leaflet (EMEA) or
6866537D36Safety Leaflet (EMEA) especially for TETRA Mobiles

6804112J96Safety Leaflet (APAC & LACR) or
6804113J25Safety 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 radio 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 Centers 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.

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CHAPTER 2

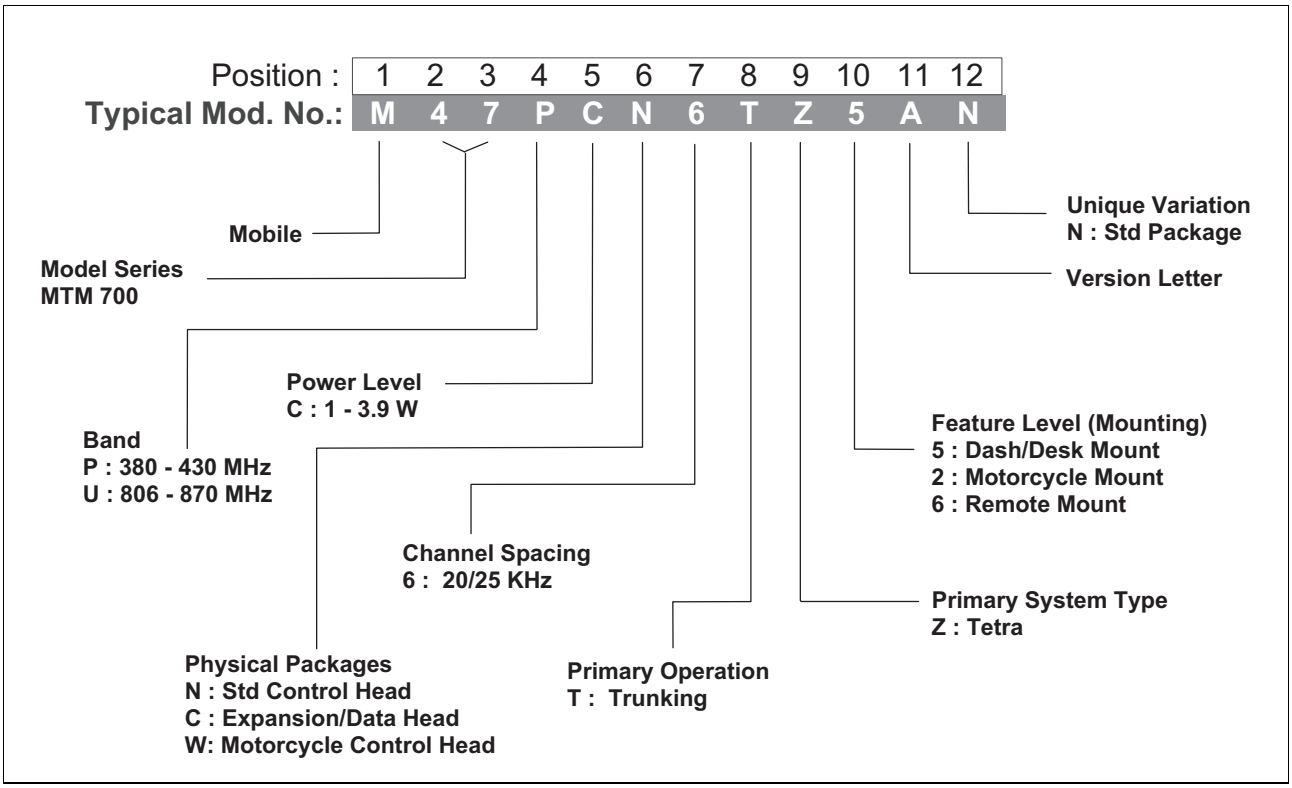
MODEL INFORMATION & ACCESSORIES

MTM700 Mobile Radio Model Information

This manual applies to the following MTM700 Mobile Radio Models

Type No.	Sales Model No.	Short Description	Model
MT912	M47PCN6TZ5AN	MTM700 380-430 MHz, STD DASH/DESK	M1
MT912	M47PCN6TZ6AN	MTM700 380-430 MHz, STD REMOTE	M2
MT912	M47PCC6TZ5AN	MTM700 380-430 MHz, EXP DASH/DESK	M3
MT912	M47PCW6TZ2AN	MTM700 380-430 MHz, M'CYCLE	M4
MT712	M47UCN6TZ5AN	MTM700 806-870 MHz, STD DASH/DESK	M5
MT712	M47UCN6TZ6AN	MTM700 806-870 MHz, STD REMOTE	M6
MT712	M47UCC6TZ5AN	MTM700 806-870 MHz, EXP DASH/DESK	M7
MT712	M47UCW6TZ2AN	MTM700 806-870 MHz, M'CYCLE	M8

Sales Model Nomenclature



MTM700 Model Specifications

GENERAL

ETSi:	ETS 300 394-1
Type Number:	
380-430 MHz	MT912
806-870 MHz	MT712
Temperature Range for Transceiver:	
Operating	-30°C to +60°C
Storage:	-40°C to +85°C
Power Supply:	
Minimum:	10.8 Vdc
Nominal:	13.2 Vdc
Maximum:	15.6 Vdc
max. Current	approx. 3.5 A
Dimensions (HxWxD) in mm:	
Transceiver	48.5 x 169.5 x 155
Standard Control Head	72 x 185 x 53
Weight in grams:	
Transceiver	1350
Standard Control Head	300

RECEIVER

Receiver Type:	Superheterodyne
Frequency Range:	
	380-430 MHz
	851-870 MHz
Channel Spacing:	25 kHz
Sensitivity (3.5%) BER:	-112 dBm
Intermodulation:	-47 dBm
Blocking (50-100 kHz):	-40 dBm
SpuriousRejection:	-45 dBm
Adjacent Channel Interference Ratio:	-45 dB
Frequency Stability:	
Locked to Base	+/-100 Hz
Unlocked to Base	+/- 1 kHz
Audio Rated (@4 Ohms):	
For External Speaker:	10 W
Distortion at Rated Audio:	5% Max.

TRANSMITTER

Modulation Type:	π/4DQPSK
RF Power:	
TMO	3,16 W / 35 dBm
DMO	3,16 W / 35 dBm
Frequency Range:	
TMO	380-430 MHz
	806-825 MHz
DMO	380-430 MHz
	851-870 MHz
Frequency Stability:	
Locked to Base	+/-100 Hz
Not Locked to Base	+/- 1 kHz
Spurious Emissions:	
Conducted/ Radiated	– 36 dBm <=1GHz
	– 30 dBm > 1GHz
Adjacent Channel Power (@ ± 25 kHz):	
380-430 MHz	– 60 dBc

MTM700 Model Descriptions*

Model	Description
M1	Dash/Desk Mount with MTM700 Mobile Radio (380-430MHz) with Direct Mount Control Head, Speaker, Microphone or Handset, Standard User Guide, and Installation Accessories.
M2	Remote Mount with MTM700 Mobile Radio (380-430MHz) with Remote Mount Control Head, optional either with remote mount front housing or expansion control head, Speaker, Microphone or Handset, Remote Mount cables, Standard User Guide, and Installation Accessories.
M3	Expansion Mount with MTM700 Mobile Radio (380-430MHz), with Expansion Control Head, User Guide Data, and Installation Accessories.
M4	Motorcycle Mount with MTM700 Mobile Radio (380-430MHz) with Motorcycle Control Head, Expansion Control Head, Speaker, Microphone, Motorcycle Cables, Motorcycle User Guide, and Installation Accessories.
M5	Dash/Desk Mount with MTM700 Mobile Radio (806-870MHz) with Direct Mount Control Head, Speaker, Microphone or Handset, Standard User Guide, and Installation Accessories.
M6	Remote Mount with MTM700 Mobile Radio (806-870MHz) with Remote Mount Control Head, optional either with remote mount front housing or expansion control head, Speaker, Microphone or Handset, Remote Mount cables, Standard User Guide, and Installation Accessories.
M7	Expansion Mount with MTM700 Mobile Radio (806-870MHz), with Expansion Control Head, User Guide Data, and Installation Accessories.
M8	Motorcycle Mount with MTM700 Mobile Radio (806-870MHz) with Motorcycle Control Head, Expansion Control Head, Speaker, Microphone, Motorcycle Cables, Motorcycle User Guide, and Installation Accessories.

*) Other combinations are not recommend or not possible.

MTM700 Accessories-To-Model Chart

MTM700 ACCESSORIES		380-430 MHz				806-870 MHz			
Control Heads	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Standard Control Head	GMWN4062_	X	X			X	X		
Motorcycle Control Head	SDLN4506_				X				X
Expansion Head	GMCE4053_		X	X	X		X	X	X
Remote Mount Head	GMHN4080_		X				X		
Microphones	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Fist microphone	GMMN4063_	X	X		X	X	X		X
Desktop microphone	GMMN4064_	X				X			
Visor microphone	GMMN4065_	X	X			X	X		
Loudspeakers	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Loud Speaker 13W	GMSN4066_	X	X		X	X	X		X
Small Loud Speaker 5W	GMSN4078_	X	X		X	X	X		X

MTM700 ACCESSORIES		380-430 MHz				806-870 MHz			
Handset	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Telephone Style, Complete Handset	GMUN1006_	X	X	X		X	X	X	
Antennas	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Rooftop Mount Antenna for 380 - 400 MHz	FAE 5521_	X	X	X	X				
Rooftop Mount Antenna for 410 - 430 MHz	FAE 6003_	X	X	X	X				
Rooftop Mount Antenna for 800 MHz (EMEA)	HAF4002_					X	X	X	X
Rooftop Mount Antenna for 800 MHz (APAC)	RRA4976_					X	X	X	X
Mini U to BNC Adapter	5880367B28	X	X	X	X	X	X	X	X
PTT Switches	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Foot switch with remote PTT	RLN4856_	X	X			X	X		
Push button with remote PTT	RLN4857_	X	X		X	X	X		X
Tri-State Emergency Foot switch	RLN4836_	X	X			X	X		
Goose neck with PTT	RLN4858_	X	X			X	X		
Desktop Mount	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Desktop power supply	GPN6145_	X	X			X	X		
Desktop tray without loudspeaker	GLN7318_	X	X			X	X		
Power cable (for supply to desktop mobile)	GKN6266_	X	X			X	X		
Remote Mount	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Back Housing for Remote Mount	GMCN4060_		X				X		
Remote mount cable (radio to C/H) - 3m	RKN4077_		X		X		X		X
Remote mount cable (radio to C/H) - 5m	RKN4078_		X				X		
Remote mount cable (radio to C/H) - 7m	RKN4079_		X				X		
Junction box	GMLN3002	X	X	X	X	X	X	X	X
Cable Junction box -to- MTM700 - 6m	GMKN4192_	X	X	X	X	X	X	X	X
Cable Junction box -to- MTM700 - 4m	GMKN4193_	X	X	X	X	X	X	X	X
Cable Junction box -to- MTM700 - 2m	GMKN4194_	X	X	X	X	X	X	X	X
Remote Mount Kits with Control Head	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Remote Mount Kit 3m	PMLN4492_	X		X	X	X		X	X
Remote Mount Kit 5m	PMLN4493_	X		X	X	X		X	X
Remote Mount Kit 7m	PMLN4494_	X		X	X	X		X	X
Remote Mount Exp. Kit 3m	PMLN4495_	X	X			X	X		
Remote Mount Exp. Kit 5m	PMLN4496_	X	X			X	X		
Remote Mount Exp. Kit 7m	PMLN4497_	X	X			X	X		

MTM700 ACCESSORIES		380-430 MHz				806-870 MHz			
Power Cable	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
US Linecord (3060665A04) packed	NTN7373AR	X	X	X		X	X	X	
Euro Linecord (3060665A04) packed	NTN7374AR	X	X	X		X	X	X	
UK Linecord (3002120F02) packed	NTN7375AR	X	X	X		X	X	X	
Argentina Linecord	NTN9246_	X	X	X		X	X	X	
Power Cables (to mobile radio)	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
12V Power Cable to Batt., 3m with Fuse (10A)	GKN6270_	X	X	X	X	X	X	X	X
12V Power Cable to Batt., 6m with Fuse (10A)	GKN6274_	X	X	X	X	X	X	X	X
Ignition Sense Cable, 3m with Fuse (4A)	HKN9327_	X	X	X	X	X	X	X	X
Fuse 10A	65C80283E05	X	X	X	X	X	X	X	X
Fuse 4A	65C80283E02	X	X	X	X	X	X	X	X
Installation	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
External Alarm Relay	GKN6272_	X	X		X	X	X		X
Accessory Connector Kit	GMBN1021_	X	X	X	X	X	X	X	X
Buzzer Kit	GLN7282_	X	X		X	X	X		X
Mounting	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Key lock mount	RLN4779_	X	X	X	X	X	X	X	X
High Profile Mounting Bracket	GLN7317_	X				X			
Low Profile Mounting Bracket	GLN7324_		X	X	X		X	X	X
DIN Mount Kit for Radio Chassis	RLN4781_		X	X	X		X	X	X
Motorcycle Cables	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Cable, M/C CH to Expansion Head Radio	3066516B01				X				X
Cable Kit, Transceiver to Microphone	GMKN4072_				X				X
Remote mount cable (radio to C/H) - 3m	RKN4077_		X	X	X		X	X	X
Programming / Data	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Clear App. S/W TETRA-P Subscriber	PMVN4065_	X	X	X	X	X	X	X	X
TEA1 App. S/W TETRA-P Subscriber	PMVN4066_	X	X	X	X	X	X	X	X
TEA2 App. S/W TETRA-P Subscriber	PMVN4067_	X	X	X	X	X	X	X	X
Programming Cable	GMKN4067_	X	X	X	X	X	X	X	X
Active Data Cable (see following table *)	GMKN1022_	X*	X **			X*	X **		
Interface Cable	GMKN4079_			X				X	
RS232 Interface Cable	GMKN1016_					X	X	X	X
Service Tool	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Housing eliminator	6666500A01	X	X	X	X	X	X	X	X

*) Compatibility of Active Data Cable GMKN1022

Category	Model / Part No.	Description	Compatible Yes / No
Radio Model UHF / MT 912	M1 / M47PCN6TZ5AN	MTM700 380-430 Dash/Desk	Yes with Rev. B Tanapas only
	M2 / M47PCN6TZ6AN	MTM700 380-430 Remote	Yes ** with Rev. B Tanapas only
	M3 / M47PCC6TZ5AN	MTM700 380-430 EXP DASH/DESK	No
	M4 / M47PCW6TZ2AN	MTM700 380-430 M'cycle	No
Radio Model 800MHz / MT 712	M5 / M47UCN6TZ5AN	MTM700 806-870 Dash/Desk	Yes with Rev. B Tanapas only
	M6 / M47UCN6TZ6AN	MTM700 806-870 Remote	Yes ** with Rev. B Tanapas only
	M7 / M47UCC6TZ5AN	MTM700 806-870 EXP DASH/DESK	No
	M8 / M47UCW6TZ2AN	MTM700 806-870 M'cycle	No
Kit	GMWN4062_	Std Control Head	No
	GMCE4053_	Data Expansion Control Head	No
	SDLN4506_	Motorcycle Control Head Kit	No

**) The cable, "GMKN1022", is only compatible when an Expansion Head 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 Expansion head and the Active Data Cable GMKN1022 is not required.

CHAPTER 3
OVERVIEW

General

The MTM700 is Motorola's latest and most advanced digital mobile TETRA radio. This radio generation is based on a new digital platform technology which takes care of constant envelop type of radios as well as the linear modulation type of radios 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 MTM700 TETRA radio ensures a high audio quality.

To achieve a high spectrum efficiency, the MTM700 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 MTM700. The process is called digital modulation.

Digital Modulation Technique

The MTM700 is a 380-430 MHz or 806-870 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 radio.

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.

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CHAPTER 4
PROGRAMMING THE RADIO

Programming of Software Features and Flashing of Radio Firmware

SETING UP THE HARDWARE

The programming cable interfaces between the radio and an IBM PC (or compatible computer) running the TETRA CPS. To perform the programming, proceed as follows:

1 Make sure the radio is turned off.

2 Connect the programming cable as illustrated on the following pages.

3 Turn the radio on. If your radio has only an expansion head without any control head, connect pin 6 to pin 14 on the 25 pin connector on the expansion head front to switch on the radio and to enter programming mode.

4 Run the Customer Programming Software (CPS) on your computer.

5 Select Tools/Options. Change the Communication setting according to the connection you are using for the programming cable.

6 Follow the instructions on your PC.

7 After programming, remove the programming cable and in case you connected pin 6 to pin 14 on the 25 pin connector, remove this connection again. If the radio does not switch on automatically or cannot be switched on using the On/Off knob or the Ignition input (pin 10 on the accessory connector), disconnect the radio from the battery for about 2 seconds to exit the programming mode.

Note: To program the radio, the following connector pins are used:

On the Accessory Connector	
Pin	**Description**
3	EXT PTT
6	Flash
7	Analog GND
8	Digital GND
13	SWB+
17	RS232 RTS (Radio Output)
18	RS232 CTS (Radio Input)
19	TX (Radio Output)
20	RX (Radio Input)

On the 9-Pin Connector	
Pin	**Description**
2	RX
3	TX
5	GND
7	RTS
8	CTS

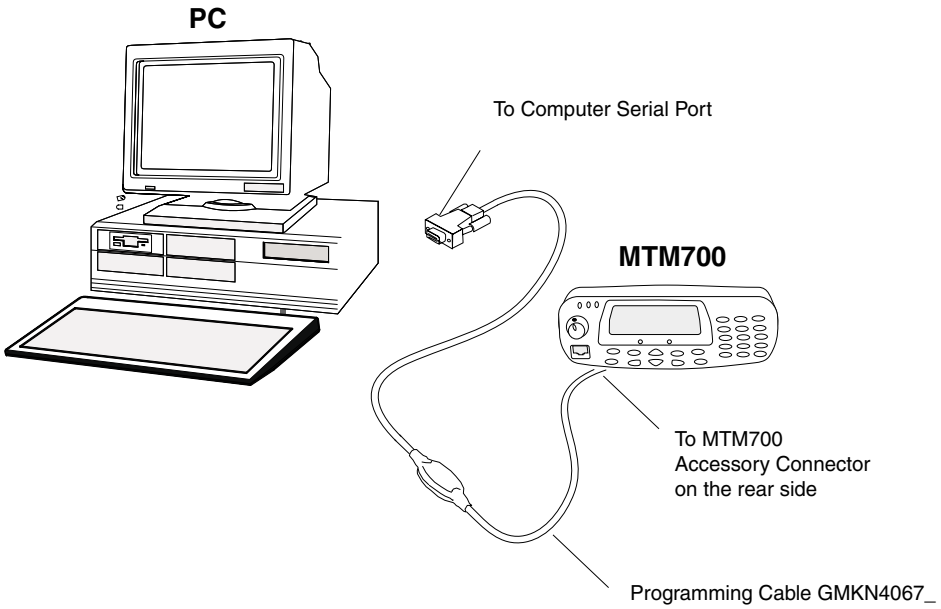

Figure 1 PROGRAMMING WITH STANDARD CONTROL HEAD

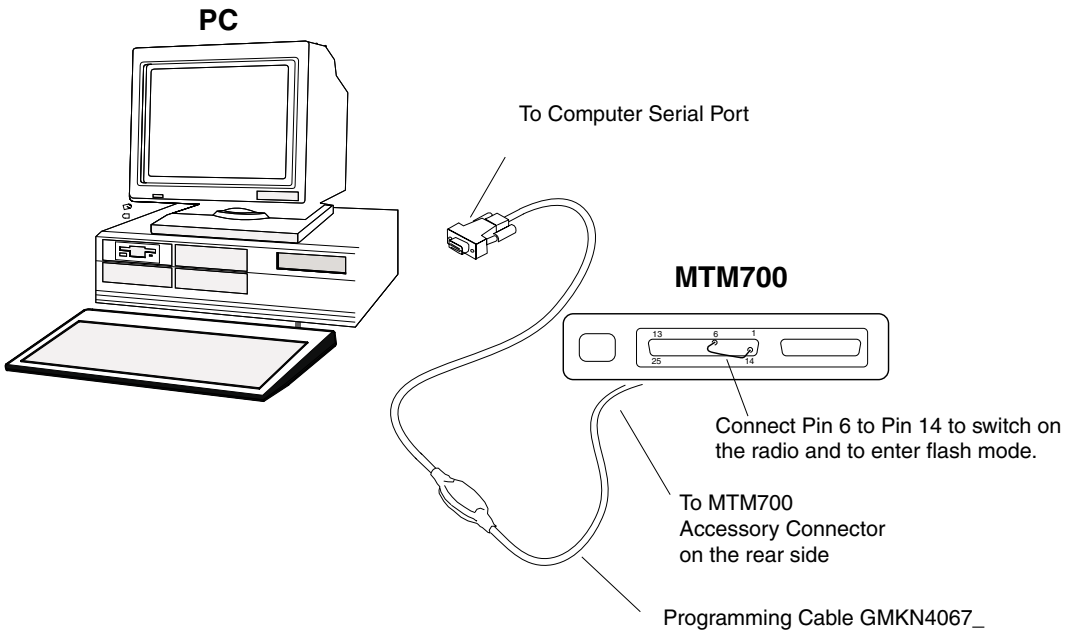

Figure 2 PROGRAMMING WITHOUT CONTROL HEAD VIA ACCESSORY CONNECTOR

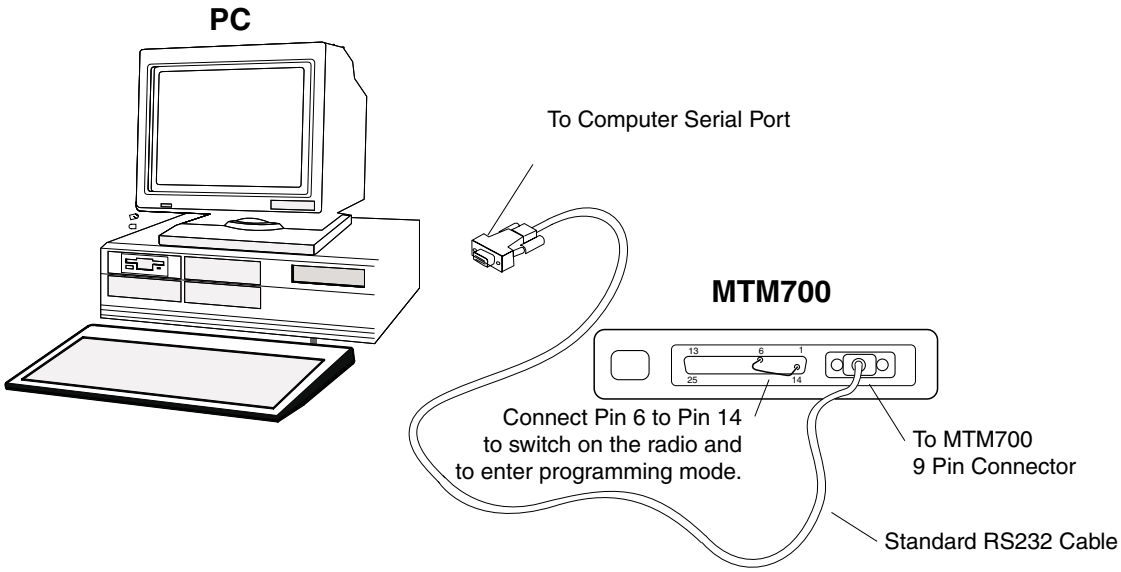

Figure 3 PROGRAMMING WITHOUT CONTROL HEAD VIA 9-PIN CONNECTOR

CodePlug Reading

1. Verify that the supply voltage for the radio is switched off.
2. Run the Customer Programming Software (CPS) on your computer.
3. Switch on the supply voltage for the radio. Verify that no display appears on the LCD screen.
4. Click the Toolbar “Read Phone” icon. *Refer to the CPS Application Window Screen in the CPS User Guide, Publication No. 68P02956C20.* The setup enters an initialization process that takes about 20 seconds. After that, a reading process starts.

A progress bar appears on the computer screen. After the reading process is finished, the radio Codeplug screen appears.

CodePlug Programming

1. On the menu bar, click “File” “Open”.
2. Browse for the required Codeplug file and open the file.
3. The Codeplug window appears on the screen.
4. Click the Toolbar “Write Phone” icon.

Note: The Codeplug is now being written into the radio. A progress bar is displayed on the computer screen showing the writing status.

After a successful writing, the message “The operation was successful” appears on the computer screen.

5. Press the OK button.

Frequency Programming

Carry out the following steps if you need to add or change the radio frequencies.

Note: Save your radio factory frequencies before you start programming by using (Menu Bar located on the CPS Application Window Screen) “File- Save as” (Your selected File name).

1. In the “Codeplug Tree” select “System Parameters”.
   - Click on “Frequency List”.
   - Click on “List No. 2”.
   - At the top of list 2, write the three frequencies which you have selected (the following frequencies are for example only):

For 380-430 MHz Radios

Rx 420.0125MHz (IFR 800)

Rx 425.0125MHz (IFR 1000)

Rx 429.9875MHz (IFR 1199)

For 806-870 MHz Radios

Rx 851.0125MHz (IFR 2040)

Rx 860.0125MHz (IFR 2400)

Rx 869.9875MHz (IFR 2799)

2. Press the write phone icon.
3. Disconnect the radio from the programming kit.

Note: The new programmed frequencies of the radio are now available to be tested with the IFR or for any other use.

List1 and 2 frequencies are saved in the CodePlug and may only be accessed by performing the following steps. When performing steps 4 thru 10, make sure that you press the radio keys sequentially (less then a second between every consecutive press):

4. Press the “Right” navigation key.
5. Press the “1” key, and “Menu” key.
6. Press the “2” key, and “Menu” key.
7. Press the “3” key.

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

8. Press the “Down” navigation key to scoll to “Cell Lists”
9. Press the “Ok” key.
10. Scroll through the lists, select List1 and press the “Ok” key to view the frequencies.

Restore the Frequencies of the Radio from a File

To restore previously saved frequencies of the radio, perform the following steps:

1. After testing your radio on the IFR, connect the setup shown in Figure 1 or Figure 2.
2. Run the CPS software on your PC.
3. In the menu bar click “Tools”, “Copy Wizard”.

- Click on “Read from file”.
- Click on “Browse”.
- Open (Your selected File name) file.
- Click on “Next”.
- Click on “Select All”.
- Click on “Next”.
- Click on “Write”.
- Click on “Done”.

Note: Click on toolbar “Read Phone” to check whether the correct frequencies were entered into the radio.

Application Programming

Note: Login as “Administrator” to perform this task.

1. On the menu bar click “Tools”, “Write Software”.

Note: The CPS reads data from the radio. A progress bar is displayed on the computer screen showing the reading status. After a successful reading, the “Write Software To Phone” window appears on the computer screen.

2. Press the “Write” button.

Note: The application is now being written into the radio. A progress bar is displayed on the computer screen showing the writing status. After a successful writing, the message “The Operation Was Successful” appears on the computer screen.

3. Press the “OK” button.
4. Click the Toolbar “ R” (Reset) icon to put radio into normal operating mode.

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CHAPTER 5
TEST SETUP & TESTING

WARNING

Any level 3 repairs can deeply affect the performance of the MTM700 radio 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 radio.
- 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 radio.
- Set the DC voltage on the power supply to 13.2 Volts.
- Switch on the radio.

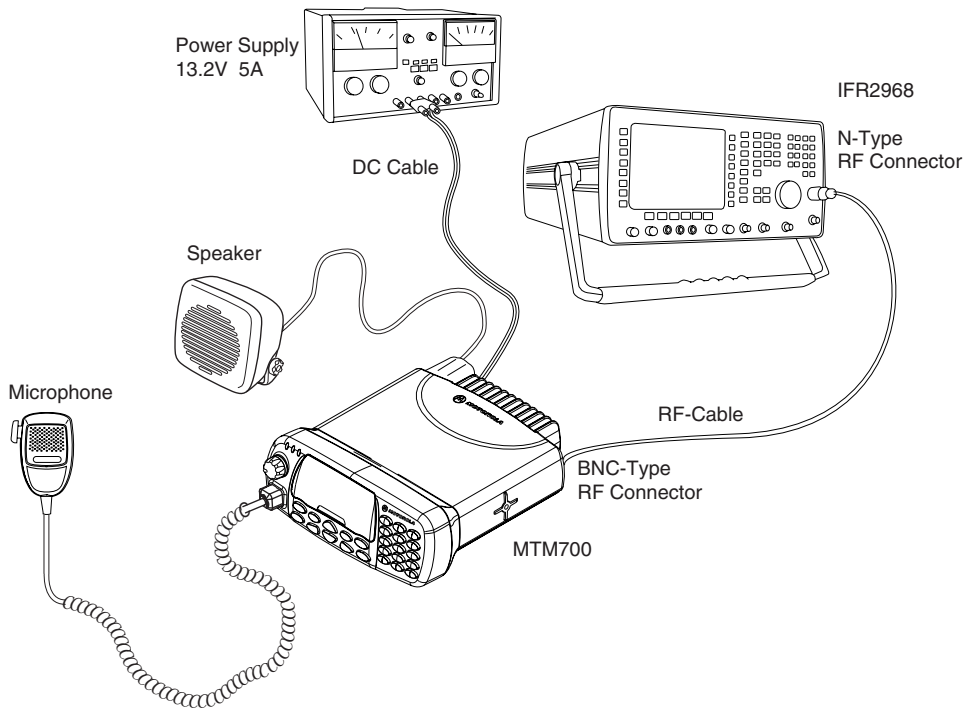

Figure 1 Typical Test Setup

Test Equipment

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

Table 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.
(Values for 380-430 MHz radio in brackets [ ])

Table 2 Test setup

No.	Test Name	Test Setup	Radio Setup	Test Conditions	Limits
1.	Base Station Registration	Control Channel	For 800MHz radio: 851.0125MHz [*For 400MHz radio: 421.0125MHz*]	For 800MHz radio: 2040 [*For 400MHz radio: 840*]	
		Traffic Channel		For 800MHz radio: 2040 [*For 400MHz radio: 840*]	
		Time Slot		3	
		Country Code		262	
		Network Code		75	
		Base Color		1	
		Location Area		224	
		Min Rx Level			-120dBm
		Max Tx Level			35dBm (3.2W)
		Access Parameter		-53dBm	
		Mobile Power	35dBm (3.2W)		
		Burst Type		Normal	
2.	Receiver RSSI	RF Gen Level	4 Cells Info RSSI TRACE	-90dBm	
3.	Transmitter Tests	RF Gen Level	Range 1 Talk Group 1	-90dBm	
		Burst Power			33-37dBm
		Timing Error			<=0.25 Symbols
		Frequency Error			-/+ 80Hz
		Vector Error			Max 10% RMS, Max 30% Peak, Max 5% Residual
4.	Call Processing Talk Back	1KHz Test Signal Group Mode	Range 1 Talk Group 1	-90dBm	
5.	Call Processing Call to Mobile	Private Mode Private Call	Private Mode		
		RF Gen Level Burst Power		-90dBm	33-37dBm
		Timing Error			<=0.25 Symbols

Table 2 Test setup

No.	Test Name	Test Setup	Radio Setup	Test Conditions	Limits
		Frequency Error			-/+ 80Hz
		Vector Error			Max 10% RMS, Max 30% Peak, Max 5% Residual
6.	Digital Duplex Test (Tx)	RF Gen Level	Private Mode	-50dBm	
		Burst Power			18-22dBm
		Timing Error			<=0.25 Symbols
		Frequency Error			-/+ 80Hz
		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 Analyer, Spectrum Analyzer, Vector Analyer, 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 radio and the customer programming of the radio.
>>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 radio settings. **Note:** Terms for 380-430 MHz radio in brackets [ ]:

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 “More” soft key if “User Defined” [“Tetra 410 MS”] cannot be seen.
7. Press the “User Defined” [“Tetra 410MS”] soft key.

   Note: Press the “More” soft key, if any of the following keys is not displayed.

8. For 380-430MHz continue with step 9,
   For 806-870MHz only, perform the following steps to setup the system parameters.
   a. Press the “User Defined” soft key.
   b. Press the “Frequency Band” soft key and press the “8 (800MHz)” soft key.
   c. Press the “Offset” soft key and press the “3 (12.5kHz)” soft key.
   d. Press the “Duplex Spacing” soft key and press the “1 (45MHz)” soft key.
   e. Press the “Reverse Operation” soft key and press the “0 (Normal)” soft key.
   f. Press the “Channel Block 1” soft key.
   g. Press the “Channel Block” soft key and press the “Include” soft key.
   h. Press the “Lowest Channel” soft key and enter “2040” using the data keys followed by the “Lowest Channel” soft key.
   i. Press the “Highest Channel” soft key and enter “2800” using the data keys followed by the “Highest Channel” soft key.
   j. Press the “Lowest Tx Freq” soft key and enter “806.0125” using the data keys followed by the “MHz” key
   k. Press the “Duplex Offset” soft key and enter “45” using the data keys followed by the “MHz” key
   l. Press the “Channel Spacing” soft key and enter “25” using the data keys followed by the “kHz” key
   m. Press the “Return” soft key.
   n. Verify that channel block 2 to 8 are excluded.
   o. Press the “Return” soft key.

9. Press the "Control Channel" soft key and enter "2040" ["840"] using the data keys followed by the "Control Channel" soft key.

10. Press the "Traffic Channel" soft key and enter "2040" ["840"] 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 "-120dBm" 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 "-53dBm" 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 radio and the customer programming of the radio. The following procedure is only an example.

Note: Terms for 380-430 MHz radio in brackets [ ].

1. To enter “Manual test” screen, press the “Manual” soft key.
2. Press the “Control Channel” soft key. Thereafter, enter “2040” [“840”] and press the “Control Channel” soft key (IFR “2040” = Rx 851.0125MHz) [IFR “840” = Rx 421.0125MHz].
3. Press the “Traffic Channel” soft key. Enter “2040” [“840”] 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 radio ON
2. Check that registration and “ITSI: ---/----/01490199” (as example only) is displayed on the IFR “Manual Test” screen.

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

RSSI Test

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 radio 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 “Right” navigation key. 
4. Press the “ 1 “ key, and “Menu” key.
5. Press the “ 2 “ key, and “Menu” key.
6. Press the “ 3 “ key.

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

7. Press the “Down” navigation key  to scroll to “4 Cells Info”.
8. Press “OK” using the Right (soft) key. 
9. Press the “Down” navigation key  to scroll to the RSSI monitoring screen.
10. Press “Trace” using the Right (soft) key. 

    Note: RSSI results will flash on the screen every few seconds.
    The display shows: **SERV: E0**
    RSSI: -90
    SQE: 39
    Disregard the “SERV” and “SQE” results.

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

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

Radio 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 “Right” navigation key. 
12. Press the “ 1 “ key, and “Menu” key.
13. Press the “ 2 “ key, and “Menu” key.
14. Press the “ 3 “ key.

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

15. Press “OK“ using the right (soft) key. 
16. Press “Stop” using the Right (soft) key. 
17. Press “Back” using the Left (soft) key twice. 

Transmitter Tests

1. Press the “Mode” key on the radio until “Range 1” is displayed.
2. Change to one of the available groups using the “Down” navigation key. 
3. 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.
4. Press the “PTT” of the radio 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:	**+/- 80Hz.**

5. Press the “Clear Down” soft key, to proceed with other tests.

Call Processing Test

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

Talk Back

1. Press the "Mode" key on the radio until "Range 1" is displayed.
2. Change to one of the available groups using the "Down" navigation key. 
3. 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.
4. Press the "PTT", press the "Talk Back" soft key on the IFR and speak into the mic of the radio for at least 3sec, then release "PTT". You will hear from the radio speaker the last three seconds of the speech frames before the "PTT" is released.
5. Press the "Test Sound" soft key to provide the 1kHz signal to the radio speaker.
6. Press the "Silence" soft key to mute the 1KHz audio signal of the speaker.
7. Press the "Clear Down" soft key and check that the "Cleardown Complete" status appear on the IFR "Manual Test" screen.

Call to Mobile

1. Press the "Mode" key on the radio until "Private Mode" is displayed.
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 "Call Mobile" soft key and select "Private Call" on the IFR. Verify that two beeps are heard from the radio speaker.
4. 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. Press the "Mode" key of the radio and select "Phone" mode.
3. Dial a random 4 digit number (eg "9359") using the Alphanumeric keys of the radio and press the "Send" Key. 

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

   - Power Profile: Passed

   - Burst Power Required Results: 18-22dBm

   - Timing Error: ≤ 0.25 Symbols.

- Frequency Error: **-/+ 80Hz**

- Vector Error: **Max 10% RMS,**
Max 30% Peak.
Max 5% Residual.

4. Press the “Talk Back” soft key.
5. Speak into the radio microphone and hear your speech (after a short delay) from the radio loudspeaker.

   Note: If you need more details, press the “Duplex Test” mode key.

6. 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:

7. Press “power ana” soft key.
8. Check that the power frame falls within the limits.

For Spectrum Analyser Graph:

9. Press “spec ana” soft key.
10. Monitor the Tx frequency.

For Vector Analyser Diagram:

11. Press the “vector ana” soft key.
12. 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:

13. Press the “vector diagram” soft key.
14. 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.

15. Press the radio “End” key. 

Service Flow Chart (Board Level)

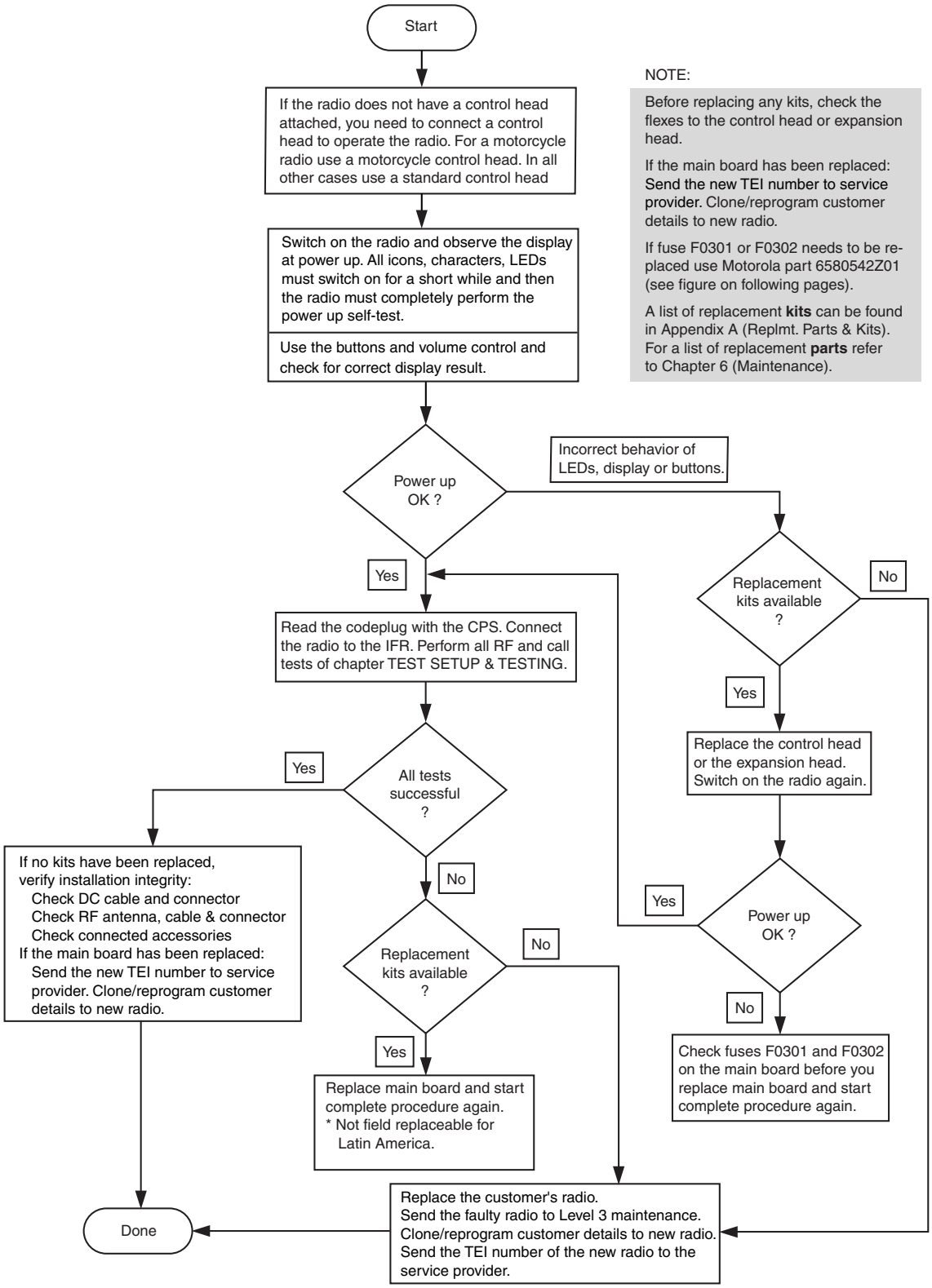

Figure 2 Servicing the MTM700

Self Check (Error & Fail Codes)

Table 1 lists the possible self check error (non fatal) codes for MTM700 Mobile Radios. No corrective action is required.

Table 3 Self Check Error (Non-Fatal) Codes

Message	Cause
Error00001	A non-fatal error was logged during operation
Error00002	Code Plug error log validity error

Table 2 lists the possible self check fail (fatal) codes for MTM700 Mobile Radios. The radio is inoperatable, the user should return the radio to Depot.

Table 4 Self Check Error (Non-Fatal) Codes

Message	Cause
Fail00100	Old CodePlug version failure
Fail00200	New CodePlug version failure
Fail00400	CodePlug model failure
Fail00800	CodePlug validity error
Fail00801	CP-Unknown block
Fail00802	CP-Unknown field
Fail00803	CP-Unknown flag
Fail00804	CP-Unknown format
Fail00805	CP-Invalid pointer
Fail00806	CP-Invalid path
Fail00807	CP-Invalid handler
Fail00808	CP-Invalid length
Fail00809	CP-Invalid index
Fail0080A	CP-Invalid offset
Fail0080B	CP-Invalid header pointer
Fail0080C	CP-Invalid block header
Fail0080D	CP-Initialization failed
Fail0080E	CP-Recovery failed
Fail0080F	CP-Write failure
Fail00810	CP-Corrupted block

Table 4 Self Check Error (Non-Fatal) Codes

Message	Cause
Fail00811	CP-Corrupted codeplug
Fail00812	CP-Radio operation system error
Fail00813	CP-Lower layer error
Fail00814	CP-Too many arguments
Fail00815	CP-Log overflow
Fail00816	CP-Invalid checksum
Fail00817	CP-Not initialized
Fail00818	CP-Ambiguous code
Fail00819	CP-Invalid start entry
Fail0081A	CP-Duplicate data
Fail0081B	CP-Invalid version number
Fail01000	Flash checksum error
Fail02000	A fatal error was logged during operation
Fail10000	Handset communication error
FailF4000	Ergo pre-selftest CodePlug error
FailF8000	Ergo pre-selftest invalid device error

Fuses on the Mainboard

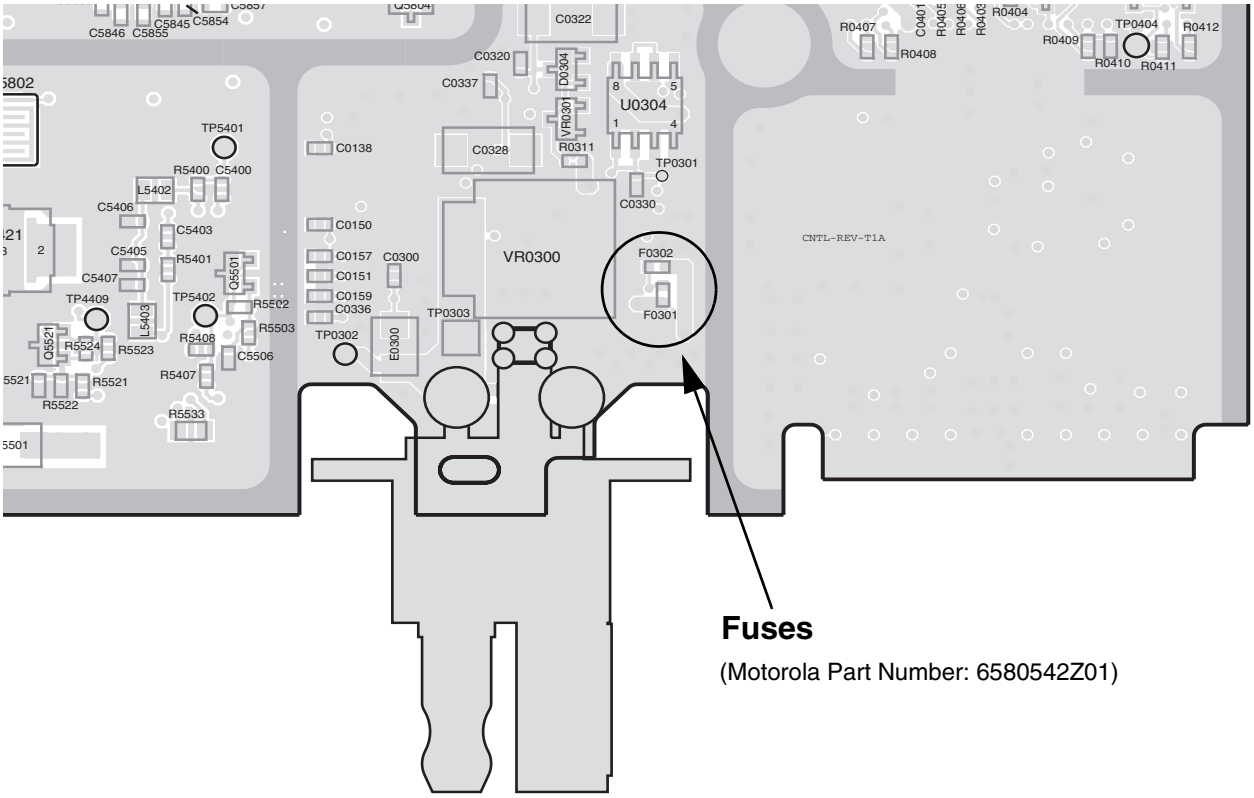

Figure 3 Position of Fuse F0301 and F0302 (PCB Mainboard - Bottom View)

CHAPTER 6
MAINTENANCE

Introduction

This chapter provides details about the following:

- Preventive maintenance (inspection and cleaning).
- Safe handling of CMOS and LDMOS devices.
- Repair procedures and techniques.
- Disassembly and reassembly of the radio.
- Exploded views and parts lists

Preventive Maintenance

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

Inspection

Check that the external surfaces of the radio 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 radio. 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 radio is disassembled for servicing or repair.

The only recommended agent for cleaning external radio 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 (70% by volume).

NOTE: **Internal surfaces should be cleaned only when the radio 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 radio. Use a soft, absorbent, lintless cloth or tissue to remove the solution and dry the radio. Make sure that no water remains entrapped near the connectors, cracks, or crevices.

Cleaning Internal Circuit Boards and Components

Isopropyl alcohol (70%) 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 radio. 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 radios, 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 radio without first referring to the following CAUTION statement.

CAUTION: This radio contains static-sensitive devices. Do not open the radio 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 RSX4015_).**
- **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.**

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 Communications parts center listed in the “SUPPORT CENTRES” section of this manual.

Disassembling and Reassembling the Radio - General

Since these radios 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 radio:

- Small flat blade screwdriver
- Dismantling Tool (Motorola Part No.: 6686119B01)
- TORX™ T screwdriver

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**.**

Radio Disassembly and Reassembly - Detailed

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

Control Head Removal

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

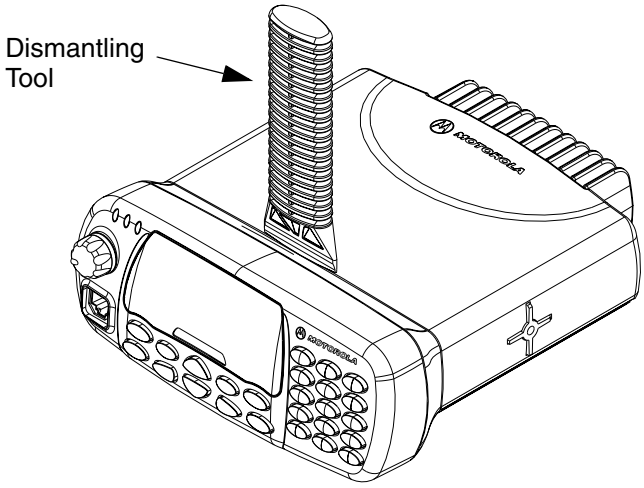

Figure 1 Typical Control Head Removal

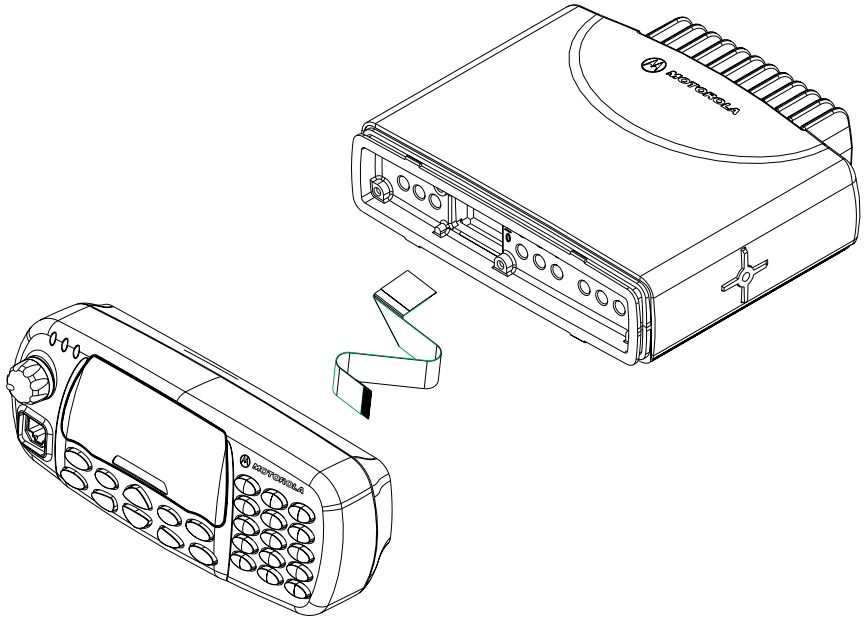

Figure 2 Flexible Connection Removal

4. Remove the flexible connection from the socket on the control head board.

Top Cover Removal

1. Insert the dismantling tool in the middle of the radio assembly side groove as shown in Figure 6 - 3.
2. Press on the dismantling tool until the snap connectors on the side of the cover release from the radio chassis.
3. Lift the top cover from the chassis.

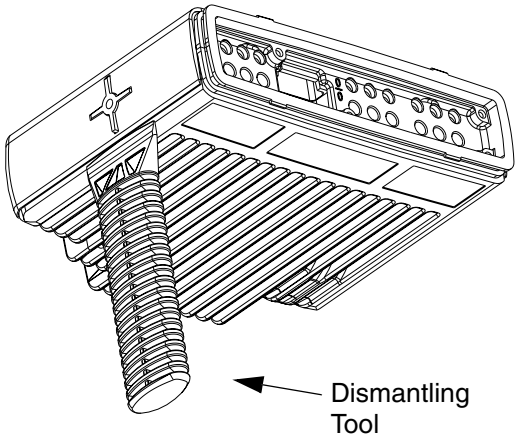

Figure 3 Top Cover Removal.

Transceiver Board Removal

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

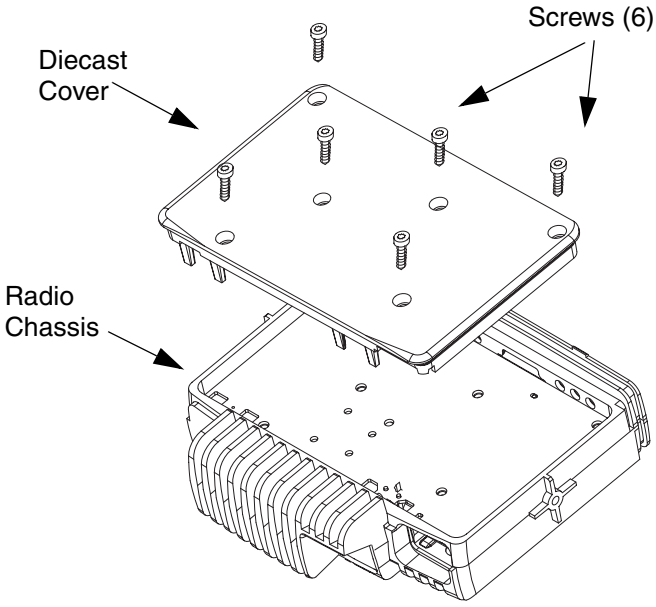

Figure 4 Diecast Cover Removal.

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

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.

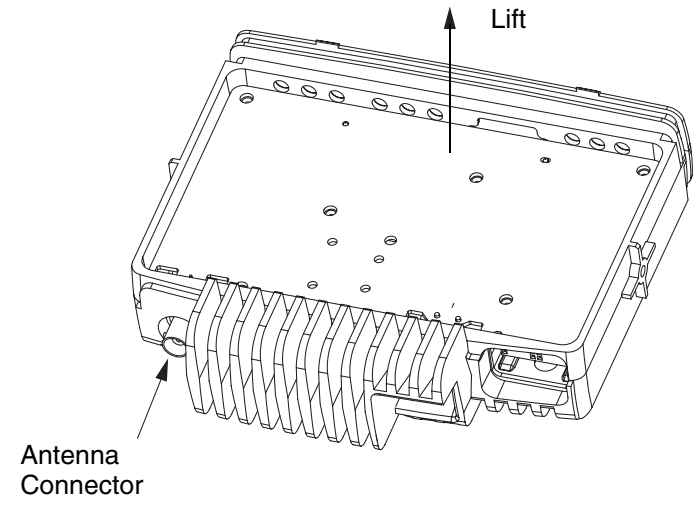

Figure 5 Transceiver Board Removal

Reassembly the Radio Chassis And Transceiver Board

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. Secure the cover to the chassis with the six screws previously removed.
5. 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.
6. Refit the top cover over the assembled radio chassis. Press the cover down until it snaps into place.

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 radio assembly as shown in Figure 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 control head. Ensure that the tags on the back housing align with the snap catch grooves on the control head. Press the back housing into place until it snaps into place.
4. Check that the radio chassis o-ring seal is undamaged and fitted in the groove on the chassis assembly. Replace the seal if it is damaged.

Standard Control Head - Disassembly

1. To dismount the control head housing from the back housing, insert the dismantling tool in the groove between the two housings as shown in the following Figure.

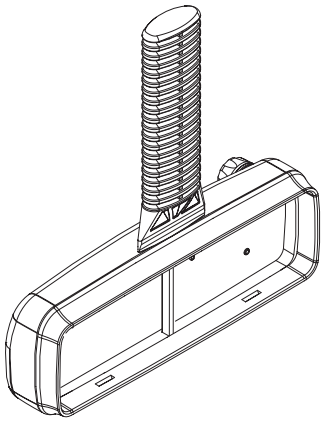

Figure 6 Control Head Back Housing Removal

2. Press the dismantling tool until the snap connectors on the side of the back housing release from the control head.

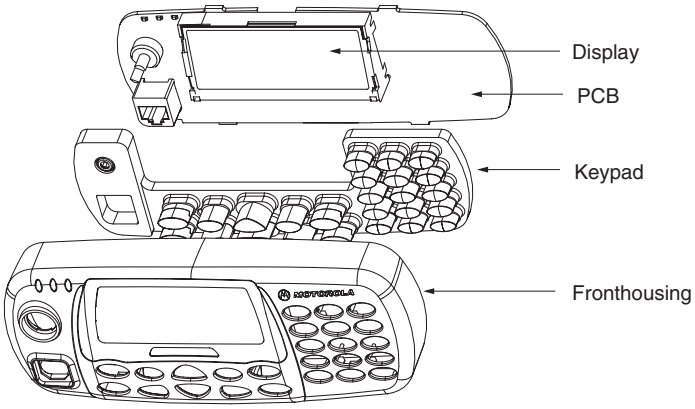

Figure 7 Control Head Board Removal

3. Remove the board from the control head housing by stretching the control head housing and pulling up on the board as shown in the Figures.
4. Remove the keypad from the control head housing by lifting up the rubber keypad.

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.**

Standard Control Head - Reassembly

1. Fit the rubber keypad onto the board ensuring that the on/off control and on the board locate correctly with the cut-outs in the keypad.
2. On the board, rotate the on/off control spindle fully counter-clockwise.
3. Also, rotate the volume knob on the front housing fully counter-clockwise.
4. Align the board with the control head, inserting the on/off control spindle and connector through the holes in the control head.

Ensure that the keypad, on/off control spindle and microphone connector are aligned with the control head then press the board into place until it clicks.

Remote Mount Head - Disassembly

CAUTION: The radio 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 Radio from the Control Head

1. Remove the Control Head from the Transceiver by inserting the dismantling tool (Motorola part number 6686119B01) in the recess between the Control Head and the Transceiver.
2. Split the Controlhead into Front and Back housings by inserting the dismantling tool in the recess between them.

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

3. Remove the flex.

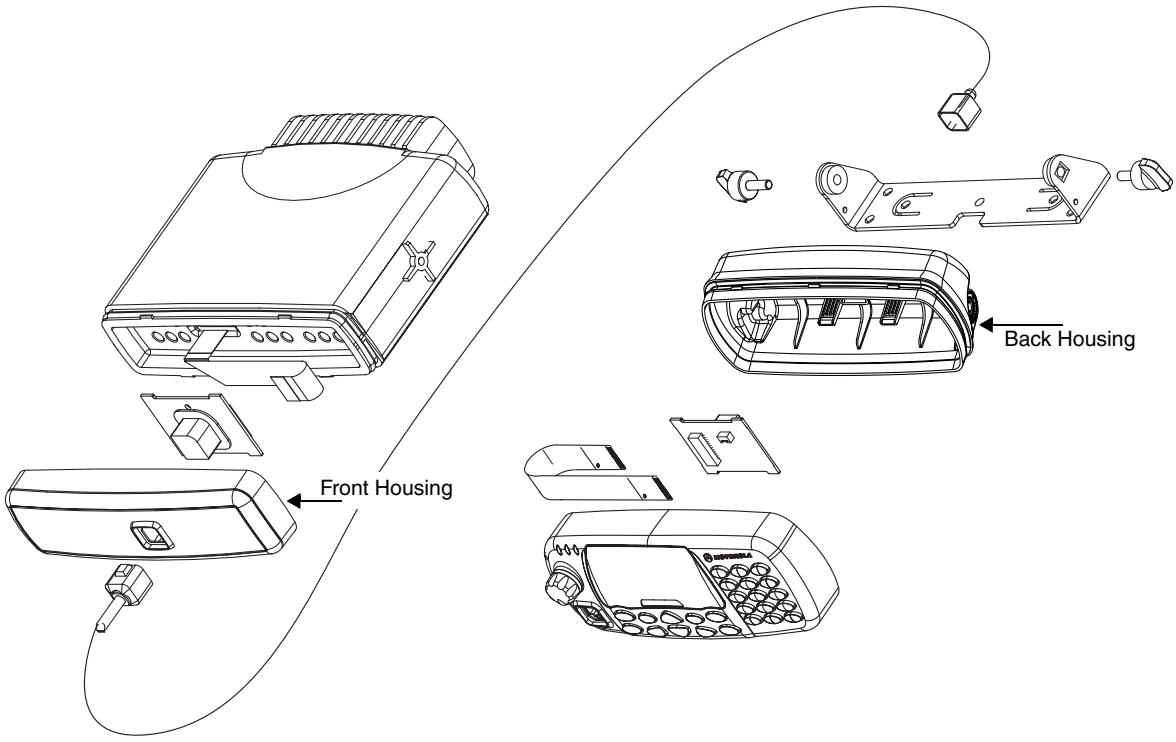

Figure 8 Remote Mount Head

Remote Mount Head - Reassembly

To Reassemble the Remote Front Housing:

1. Connect the flex from the Remote Front Housing 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 Front Housing onto the Transceiver chassis until the chassis tabs snap into place.

To Reassemble the Remote Back Housing

1. Connect the flex from the Remote Back PCB to the Controlhead.

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

2. Depending on the arrangement, orientate the Controlhead in the Back Housing
3. Press the Controlhead onto the Remote Back Housing until **ALL** 6 tabs snap into place.

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

Expansion Head - Disassembly

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

To Disassemble the Expansion Head from the Radio

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

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

2. Remove the two flexes from the radio.

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.

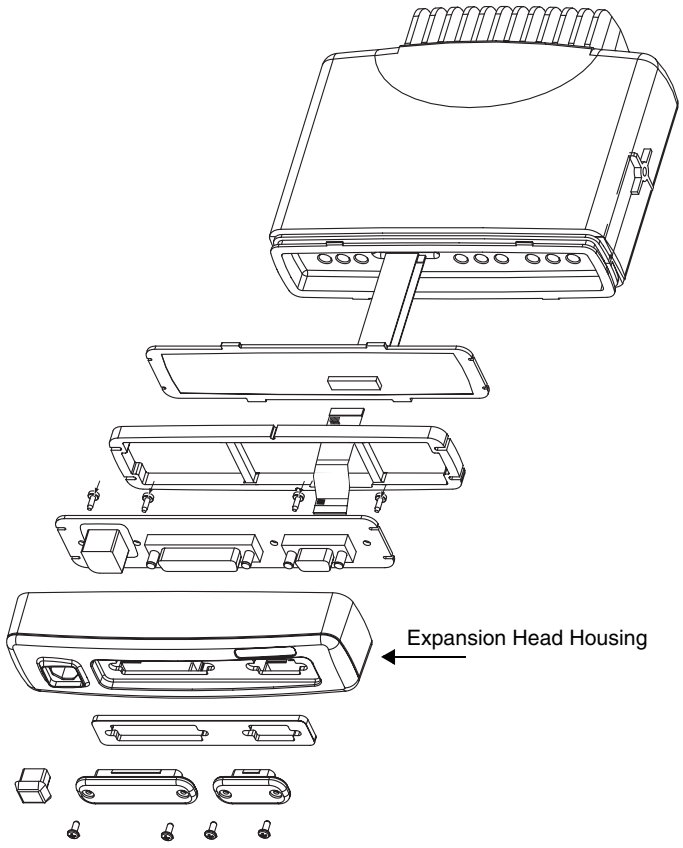

Figure 9 Expansion Head Exploded View

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.

Expansion Head - Reassembly

To Reassemble the Expansion Head

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 Radio, top small connector.
7. Connect the 40 line flex to the Radio, 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.
10. Connect modem cable and sophisticated remote mount controlhead (if applicable).

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 Control Head - Disassembly

For disassembly of the Motorcycle version control head, use the following tools:
Parker's screwdriver, a pair of tweezers.

1. Unscrew the wing screws of the control head trunnion and remove the control head from the trunnion.
2. Unscrew the two screws that hold the connector bracket. Remove the bracket, the cable connector (not shown) and the gasket.
3. Unscrew the screws of the back housing and pull straight off.
4. The housing gasket may fall off when the back housing is removed. Note its location for reassembly. Refer to the exploded view for positioning.
5. The lock plate is aligned with one of the housing sides. Slide the lock plate the other direction and lift straight off. Note its placement for reassembly.
6. Remove the PCB support.
7. Carefully lift the PCB board assembly out holding the socket of the connector for the flexible PCB.
8. Remove the Insert from the Light Guide.
9. Unscrew all the screws of the Light Guide and carefully lift it out. This step is only required to gain access to the keypad.
10. With the light guide removed, the keypad can be pulled from the front housing. Take care not to touch or get contaminants on the conductive pads on the underside of the keypad.
11. Remove the Internal Spacer using a pair of tweezers. From inside the control head carefully press in two of the tabs of the Volume Knob so that the tabs deflect out and disengage from the control head Housing. Pull the Volume Knob straight out.
12. The External Spacer may fall out. Note its location for reassembly. Refer to the exploded view for positioning.

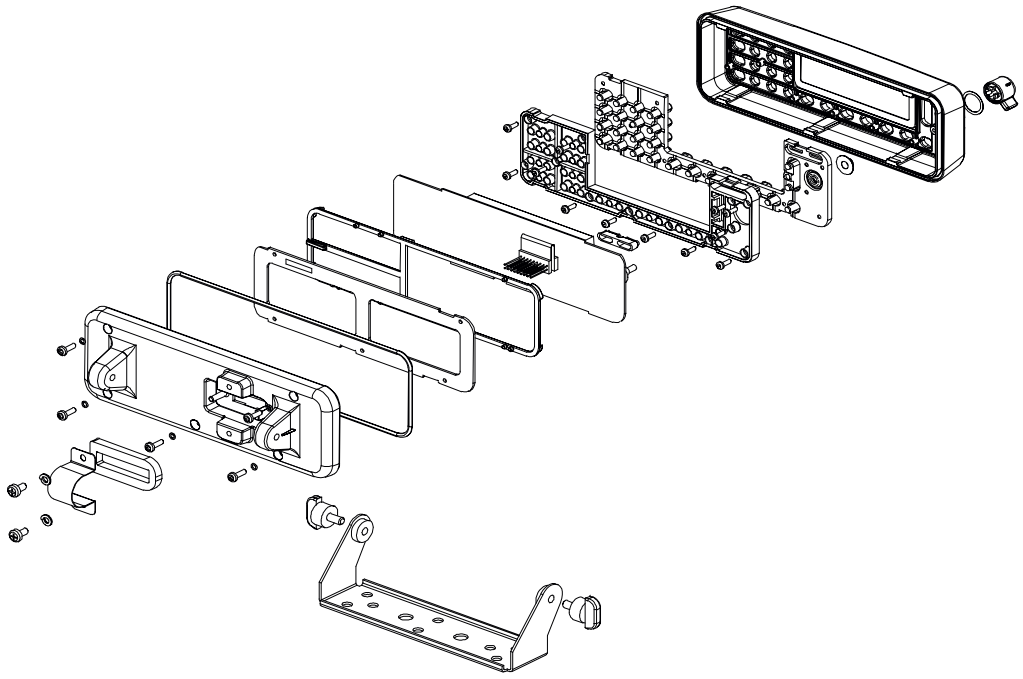

Figure 10 Motorcycle Control Head Exploded View

Motorcycle Control Head - Reassembly

1. Place the volume knob assembly into the opening.
2. Place the keypad into the front housing.
3. Place the light guide into the housing and fasten it with the screws. Be sure that all screws are fastened properly.
4. Make sure that both the volume know and potentiometer are in the fully counterclockwise position before inserting the board assembly into the font housing.
5. Snap the board assembly into the front housing and verify that the volume know turns clockwise and counterclockwise, and that when you push on it, it sounds a sound.
6. Place the PCB support - see the exploded view for proper direction.
7. Slide the Lock Plate into place.
8. Install the black gasket into the back housing and fasten the back housing to the front housing with the screws.
9. Place the gasket, insert the cable connector and mount the connector bracket with the screws.

NOTE: Use only the black gasket (Mot.Part.No. 3202113U01) to achieve full IP 57 protection

Service Aids

The following table lists the service aids recommended for working on the radio. 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 16 Service Aids

Motorola Part No.	Description	Application
6666500A01	Housing Eliminator	Test Fixture used to bench test the radio pcb
6686119B01	Dismantling Tool	Assists in the removal of radio control head
0180320B16 6680321B81 6680321B56	Torx Screw Driver Kit (T6,8,10,15,25) Torx Bit 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.**

Parts contained in this manual are the only ones that will be available for replacement.

* Replacement or repair of all internal boards is not authorized in Latin America.

Transceiver - Exploded View and Parts List

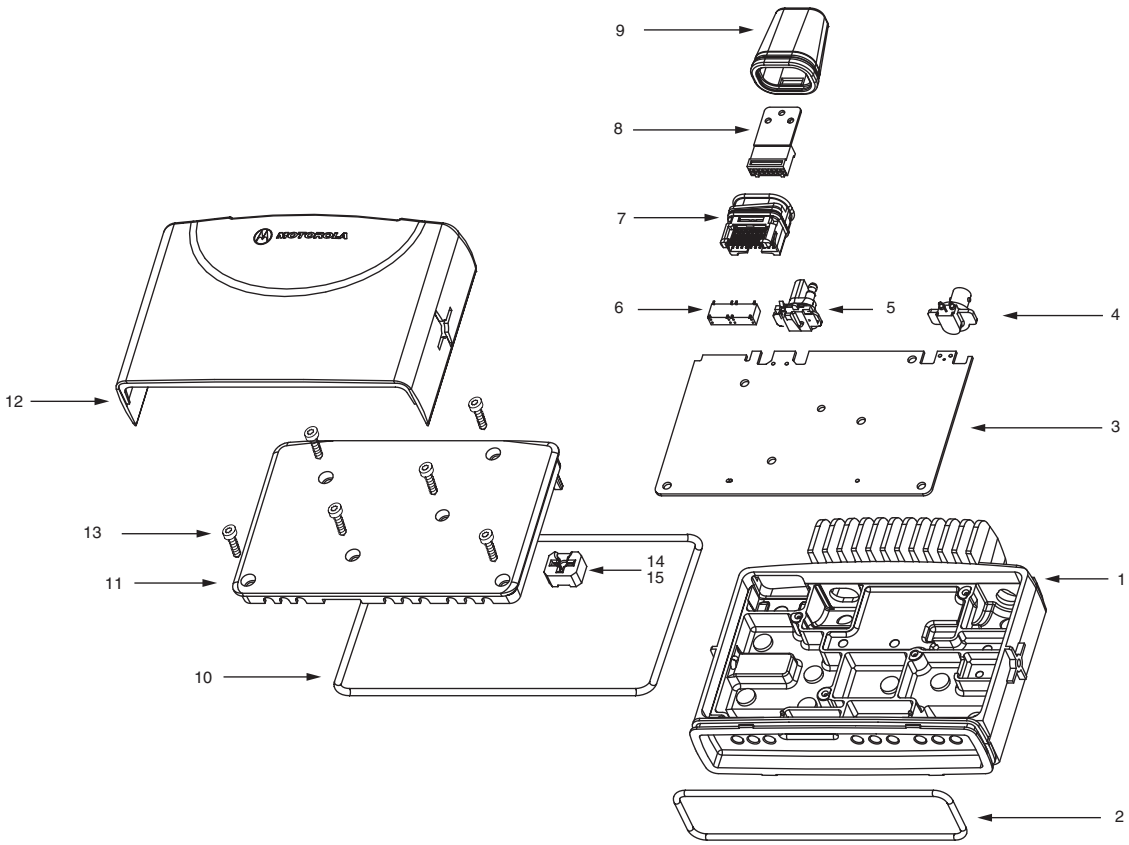

Figure 11 Transceiver Exploded View

Table 17 Transceiver Parts List

Item No.	Description	Part Number
1	Chassis	2766521A02
2	Gasket, Controlhead	3202620Y01
3	Main PCB (items 4, 5 and 6 included)	refer to Appendix A: Service Kits

Table 17 Transceiver Parts List

Item No.	Description	Part Number
4	Antenna Connector	0986166B01
5	Power Connector	0986165B01
6	Connector 20 Pos.	1586184B01
7	Connector Assembly	2886122B02
8	Connector Housing 16Pos.	1580922V01
9	Gasket Accessory Connector	3202606Y02
10	Gasket Cover	3286095B01
11	Cover	1566511A02
12	Cover, Plastic	1586170B01
13	Screw T20, 6x (M4)	0310911A30
14	Silicon Pressurepad for UHF only	7566500A01
15	Silicon Pressurepad for 800MHz only	7566502A01

Standard Control Head - Exploded View and Parts List

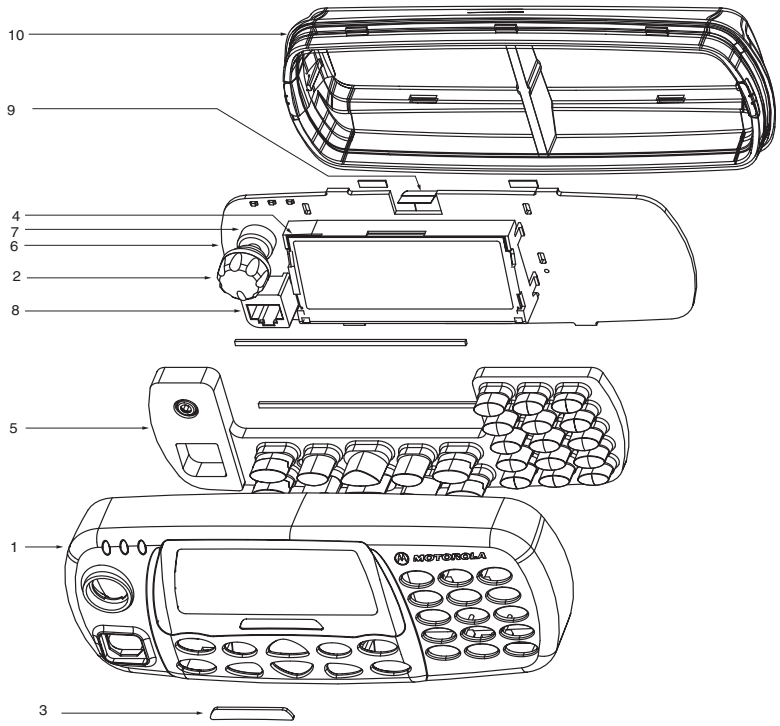

Figure 12 Standard Control Head - Exploded View

Table 18 Standard Control Head - Parts List

Item No	Description	Part No
1	Housing Front, including:Gasket, Lens, Lightguide	0164000B29
2	Knob, Volume	3686098B02
3	Label MTM700	5464311B09
4	LCD Module	7266501A01
5	Keypad, (including Buttons 3886134_)	7564314B03
6	PCB Kit	GLN7354_
7	Potentiometer	1805911V02
8	10 PIN Microphone Jack	2864287B01
9	Flex, Position connector	8464346B02
10	Backhousing, including: Back housing O-ring Grounding Clip, left Grounding Clip, right	0108499X02
(not shown)	Flex, 12 Position Connector	8486127B01

Expansion Head - Exploded View and Parts List

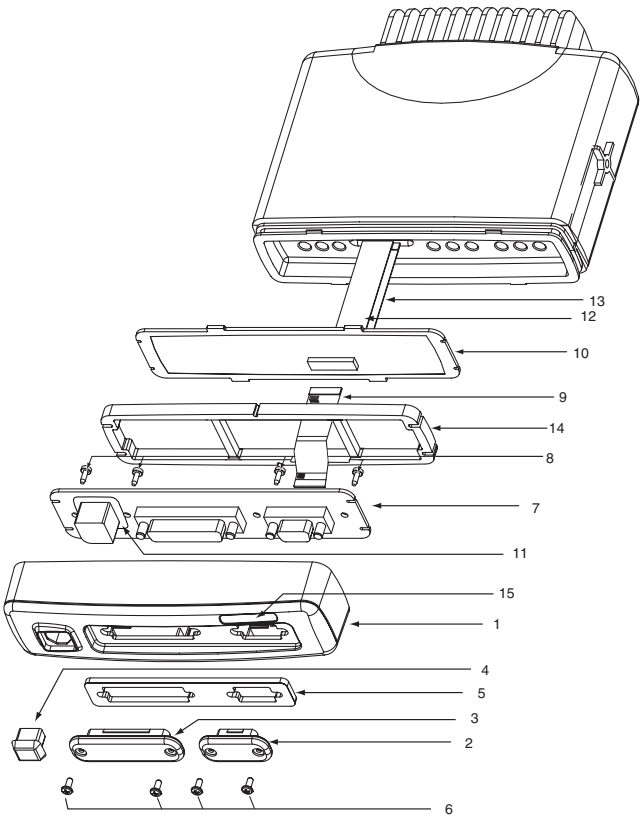

Figure 13 Expansion Head - Exploded View

Table 19 Expansion Head - 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	3264325B01
6	Screw, Protection Caps/Bung (4 required)	0305137Q02
7	Connector Board	0104010J79
8	Screw, Connector PCB (4 required)	0385944A02
9	Flex 40 Pin	8480475Z03
10	Expansion Board, not part of Housing Kit	0166502N67
11	Seal for 10 Pin Telco on PCB	3264291B01
12	Flex 12 Pin	8486127B01
13	Flex 40Pin	8466543A01
14	Silicone Pressure Pad	3264337B01
15	Label	5464344B06

Remote Mount Head - Exploded View and Parts List

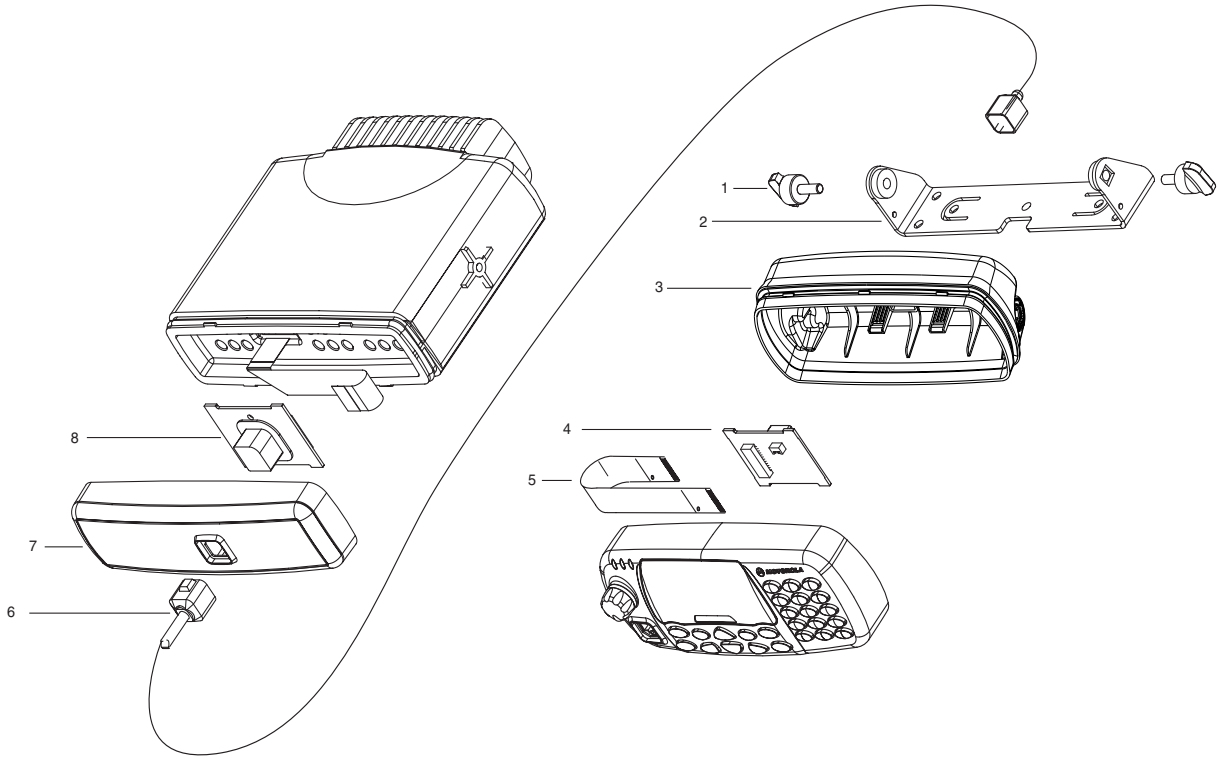

Figure 14 Remote Mount Head - Exploded View

Table 20 Remote Mount Head - Parts List

Item No	Description	Part No
1	Wingscrews	0305760W02
2	Remote Bracket	0708426X02
3	Remote Back Housing	1566508A01
4	Remote PCB (Back Housing)	GLN7362_
5	Flex	8486127B01
6	Cable 3m Cable 5m Cable 7m	RKN4077_ RKN4078_ RKN4079_
7	Remote Mount Front Housing	1564270B01
8	Remote PCB (Front Housing)	GMLN4086_

Motorcycle Control Head - Exploded View and Parts List

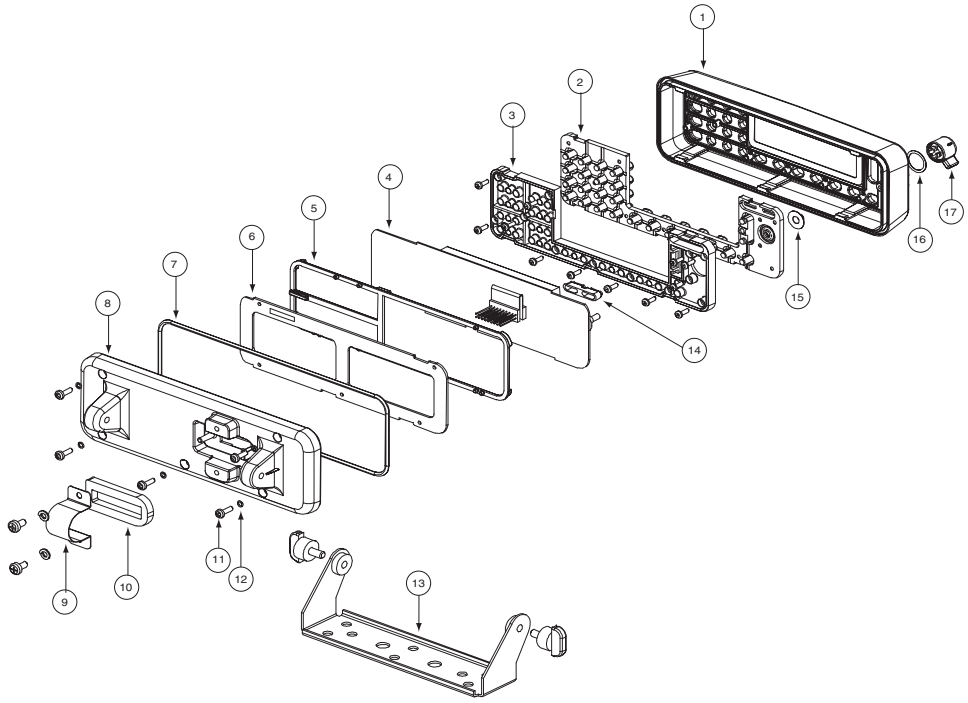

Figure 15 Motorcycle Control Head - Exploded View

Table 21 Motorcycle Control Head - Parts List

Item No.	Description	Part No.
1	Front Housing	1502119U02
2	Keypad	7502102U01
3	Light Guide	6102102U01
4	Control Head Board, includes Flexible PCB 8408133Y01	FLN9434_
5	PCB Support	0702110U01
6	Lock Plate	0702108U01
7	Housing Gasket	3202111U01
8	Back Housing	1502120U01
9	Connector Bracket	0702109U01
10	Gasket, black (for IP 57 protection - refer to “M’cycle Reassembly”)	3202113U01
11	Screws M3 (5 pcs)	0302102U01
12	O-Ring (5 pcs)	3202112U01
13	Trunnion	0780127N02
14	Insert	4302586Y01
15	Internal Spacer	4302104U012
16	External Spacer	0402102U01
17	Volume Knob	3602104U01

APPENDIX A

REPLACEMENT PARTS & KITS

Servicing MTM700 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. For Latin America Level 1 and Level 2 maintenance contact your local Motorola CGISS office for information. For details, please refer to relevant support Depots on pages A-2 to A-4.

The MTM700 mobiles are programmed at the factory. They cannot be tuned at the field service level.

Level 3 Maintenance

All Radio Support Depots outside of Latin America 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).

SUPPORT CENTERS

Europe, Middle East and Africa Region

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

Austria:	08 00 29 75 41	Italy:	80 08 77 387
Belgium:	08 00 72 471	Luxemburg:	08 00 23 27
Denmark:	80 88 05 72	Netherlands:	08 00 22 45 13
Finland:	08 00 11 49 910	Norway:	80 01 11 15
France:	08 00 90 30 90	Portugal:	08 00 84 95 70
Germany:	08 00 18 75 240	Spain:	90 09 84 902
Greece:	00 80 04 91 29 020	Sweden:	02 07 94 307
UK:	08 00 96 90 95	Switzerland:	08 00 55 30 82
Ireland:	18 00 55 50 21	Iceland:	80 08 147

Or dial Customer Care Centre:

Tel: +49 (0)30 6686 1555

Please use these numbers for repair enquiries only.

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 Radio: **The CPS has no capability to tune the radio. Tuning the radio can only be performed at the factory or at the appropriate Motorola Repair Centre. Components replacement can affect the radio 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 Motorola Online (Extranet).

EMEA Test Equipment Support

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

Asia, Pacific Region

The Asia/Pacific Radio Support Center Customer Information Desk is available through the following service numbers:

Toll-Free:

China	800-810-0976	Philippines:	1800-16510271
Indonesia:	0800-1-686868	Singapore:	1800-4855333
Malaysia	(60-3) 7803-922	Thailand:	1800-225412

Non-Toll Free

China:	(86-10) 6843-8231	Malaysia:	(60-3) 703-9922
Hong Kong SAR:	(852) 2966-4188	Philippines:	(63-2) 810-0762
India:	(91) 80-658-7677-7678	Singapore:	(65) 486-7171
Indonesia:	(62-21) 251-3050	Taiwan:	(886) 2-27058000 ext. 6308
Korea:	(822) 3466-5401	Thailand:	(66) 2254-8388
Vietnam:	(84) 8-8294091		

All Other Countries IDD Code +(65)-4855333

Please use these numbers for repair enquiries only.

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 Radio: **The CPS has no capability to tune the radio. Tuning the radio can only be performed at the factory or at the appropriate Motorola Repair Centre. Components replacement can affect the radio tuning and must only be performed by the appropriate Motorola Repair Centre.**

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.

Latin America Region

The Customer support is available through the following service numbers:

Warranty and Repairs

Motorola de Colombia Service Center
Carrera 7 # 71 - 52
Torre B piso 13
Oficina 1301
Bogota - Colombia
Tel: (571) 376-6990

Motorola De Mexico Service Center
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.
Rua Paes Leme, 524, 13 Andar
05424-010 São Paulo, Brasil
5511-3030-5000

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
Oficentro Plaza Mayor
Piso 3, Rohrmoser
San José, Costa Rica
506-296-5385

MOTOROLA DEL ECUADOR
Nuñez de Balboa #OE1-245
y Pedro Alfaro, Villa Flora
Quito, Ecuador
593-2264-1627

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

Motorola On Line (MOL) **https://businessonline.motorola.com** and go to "**Contact Us**"

SERVICE KITS

Table 1 Model Information

Type No.	Sales Model No.	Short Description	Model
MT912	M47PCN6TZ5AN	MTM700 380-430 MHz, STD DASH/DESK	M1
MT912	M47PCN6TZ6AN	MTM700 380-430 MHz, STD REMOTE	M2
MT912	M47PCC6TZ5AN	MTM700 380-430 MHz, EXP DASH/DESK	M3
MT912	M47PCW6TZ2AN	MTM700 380-430 MHz, M'CYCLE	M4
MT712	M47UCN6TZ5AN	MTM700 806-870 MHz, STD DASH/DESK	M5
MT712	M47UCN6TZ6AN	MTM700 806-870 MHz, STD REMOTE	M6
MT712	M47UCC6TZ5AN	MTM700 806-870 MHz, EXP DASH/DESK	M7
MT712	M47UCW6TZ2AN	MTM700 806-870 MHz, M'CYCLE	M8

Table 2 Service Kits-To-Model Chart

MTM700 Service Kits		380-430 MHz				806-870 MHz			
Description	**Part Number**	**M1**	**M2**	**M3**	**M4**	**M5**	**M6**	**M7**	**M8**
Service Boards									
**MTM700 Transceiver 380-430MHz	PMUE1840_S	X	X	X	X				
**MTM700 Transceiver 806-870MHz	PMUF1080_S					X	X	X	X
**MTM700 Transceiver 380-430MHz-TEA1 *	PMUE1844_S	X	X	X	X				
**MTM700 Transceiver 806-870MHz-TEA1 *	PMUF1084_S					X	X	X	X
**MTM700 Transceiver 380-430MHz-TEA2 *	PMUE1848_S	X	X	X	X				
**MTM700 Transceiver 806-870MHz-TEA2 *	PMUF1088_S					X	X	X	X
Control Heads/Kits									
Standard Control Head	GMWN4062_	X	X	X		X	X	X	
Expansion Control Head	GMCE4053_			X	X			X	X
Remote Mount Head	GMHN4080_		X				X		
Remote Mount Back Housing	GMCN4060_		X	X			X	X	
Motorcycle Control Head	SDLN4506_				X				X
Cables/Kits									
Motorcycle to Control Head Cable	3066516B01				X				X
Remote Mount Cable (radio to C/H) - 3m	RKN4077_		X	X	X		X	X	X
Remote Mount Cable (radio to C/H) - 5m	RKN4078_		X	X			X	X	
Remote Mount Cable (radio to C/H) - 7m	RKN4079_		X	X			X	X	

*) Tetra Encryption Algorithm 1 or 2
**) Service Boards: Not Field Replaceable for Latin America.

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APPENDIX B

PRODUCT SPECIFIC INFORMATION

for Digital Radios Type MT912 and MT712

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 radio 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:

MT912 (380-430MHz): 3 Amps @ 3Watts RF power
MT712 (806-870MHz): 3.5Amps @ 3Watts RF power

Please be aware when planning the installation that there is a current consumption of approximately 30 mA even when the installed radio is switched off.

Transmitter Frequency Range:

TMO: 380 to 430 MHz (MT912); 806 to 825 MHz (MT712)
DMO: 380 to 430 MHz (MT912); 851 to 870 MHz (MT712)

Receiver Frequency Range:

380 to 430 MHz (MT912);
851 to 870 MHz (MT712)

Normal Load Conditions:

Rated RF Power: 3Watts

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 radio 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 radio is protected by its thermal control, which cuts down the RF output power, thus reducing the radio 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: 10A (Motorola Part Number: 65C80283E05)
Fuse for Ignition Sense Cable HKN9327: 4A (Motorola Part Number: 65C80283E02)

Spezielle Produkt INFORMATION
für Funkgeräte des Typs MT912 und MT712

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:

MT912 (380-430MHz): 3 A @ 3W HF Leistung
MT712 (806-870MHz): 3,5A @ 3W HF Leistung

Bevor Sie die Installation planen, bedenken Sie, dass das Sprechfunkgerät auch im ausgeschalteten Zustand einen Strom von ca. 30 mA verbraucht.

Sender-Nennfrequenzbereich:

TMO: 380 bis 430 MHz (MT912); 806 bis 825 MHz (MT712)
DMO: 380 bis 430 MHz (MT912); 851 bis 870 MHz (MT712)

Empfänger-Nennfrequenzbereich:

380 bis 430 MHz (MT912);
851 bis 870 MHz (MT712)

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: 10A (Motorola Bestellnummer: 65C80283E05)
Sicherung für Ignition Sense Kabel HKN9327: 4A (Motorola Bestellnummer: 65C80283E02)