MOTOROLA SOLUTIONS

MXM600 Installation Manual

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European Union (EU) and United Kingdom (UK) Waste of Electrical and Electronic Equipment (WEEE) Directive

The European Union's WEEE directive and the UK's WEEE regulation require that products sold into EU countries and the UK must have the crossed-out wheelie bin label on the product (or the package in some cases). As defined by the WEEE directive, this crossed-out wheelie bin label means that customers and end users in EU and UK countries should not dispose of electronic and electrical equipment or accessories in household waste.

Customers or end users in EU and UK countries should contact their local equipment supplier representative or service center for information about the waste collection system in their country.

Disclaimer

Please note that certain features, facilities, and capabilities described in this document may not be applicable to or licensed for use on a specific system, or may be dependent upon the characteristics of a specific mobile subscriber unit or configuration of certain parameters. Please refer to your Motorola Solutions contact for further information.

Safety Information

RF Energy Exposure and Product Safety Guide for Mission Critical Devices

ATTENTION!

This radio is restricted to Occupational use only. Before using your radio, read the RF Energy Exposure and Product Safety Guide for Mission Critical Devices that contains important operating instructions for safe usage and RF energy awareness and control for Compliance with applicable standards and Regulations.

For a list of Motorola Solutions-approved antennas and other accessories, visit the following website:

https://www.motorolasolutions.com

Installation Requirements for Compliance with Radio Frequency (RF) Energy Exposure Safety Standards

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

To ensure compliance to RF Energy Safety Standards:

- Install only Motorola Solutions approved antennas and accessories.
- Be sure that antenna installation is per Vehicle Antenna Installation on page 123.
- Be sure that Product Safety and RF Safety Booklet enclosed with this radio is available to the end user upon completion of the installation of this radio.

Read Me First

This manual is intended for use by service technicians familiar with similar types of equipment. This manual contains information required for the installation of the equipment described and is current as of the printing date. Changes that occur after the printing date are incorporated as a complete Manual revision or alternatively as additions. The radio platform is available in different software versions and various hardware configurations around the mobile radio. Different configurations are reflected in the product names. This manual separates information between the different products when a difference occurs.

WARNING: The junction box (GMLN7825_) is only compatible with MXM600.

NOTE: Only trained personnel can install the mobile terminal. All installations must take place in accordance with the requirements of the vehicle and antenna manufacturer or supplier.

Notations Used in This Guide

This guide is designed to give you more visual cues. The following graphic icons are used throughout the user guide.

DANGER: The signal word DANGER with the associated safety icon implies information that, if disregarded, will result in death or serious injury.

WARNING: The signal word WARNING with the associated safety icon implies information that, if disregarded, could result in death or serious injury, or serious product damage.

CAUTION: The signal word CAUTION with the associated safety icon implies information that, if disregarded, could result in minor or moderate injury, or serious product damage.

ATTENTION: The signal word ATTENTION may be used without the safety icon to state potential damage or injury that is not related to the product.

IMPORTANT: IMPORTANT statements contain information that is crucial to the discussion at hand, but is not CAUTION or WARNING. There is no warning level associated with the IMPORTANT statement.

NOTE: NOTICE contains information more important than the surrounding text, such as exceptions or preconditions. They also refer the reader elsewhere for additional information, remind the reader how to complete an action (when it is not part of the current procedure, for instance), or tell the reader where something is on the screen. There is no warning level associated with a notice.

The following special notations highlight certain information:

Table 1: Special Notations

Example	Description
Menu key or **PTT** button	Bold words indicate a name of a key, button, or soft menu item.
Entering TMO tone	Italic words indicate a name of the tone.
`Powering Off`	Typewriter words indicate the HMI strings or messages displayed on your radio.
Setup → **Tones** → **All Tones**	Bold words with the arrow between indicate navigation structure in the menu items.

Chapter 1

Model Information and Accessories

This section provides information on your radio specifications and accessories.

1.1 Model Descriptions

Table 2: Radio Model Descriptions

Model	Description
M1	The M1 radio model includes the following items: • Dash/Desk Mount with Mobile Terminal, with Dash/Desk Control Head • Speaker • Microphone or handset • Standard user guide • Installation accessories • Optional power supplies
M2	The M2 radio model includes the following items: • Single Remote Mount with Mobile Terminal, with Single Remote Expansion Head (SREH) • One control head • Optional with IP54 or IP67 Ethernet Remote Control Head (RECH) or Telephone Style Control Head (TSCH) • Speaker • Microphone or handset • Remote Mount Ethernet cables • Standard user guide • Installation accessories **NOTE:** M2 is suitable for Motorcycle Mount.
M3	The M3 radio model includes the following items: • Dual Remote Mount with Mobile Terminal, with Dual Remote Expansion Head (DREH) • Two Control Heads • Optional with IP54 RECH, IP67 RECH, or TSCH • Speaker • Microphone or handset

Model	Description
	• Remote Mount Ethernet cables • Standard user guide • Installation accessories **NOTE:** M3 is suitable for Motorcycle Mount.
M4	The M4 radio model includes the following items: • Databox Mount Configuration, with Expansion Head Options of SREH or DREH or DEH, without Control Head and Remote Mount Cables • Standard user guide • Installation accessories • Power supply

NOTE: No other combinations are permitted.

1.2 Sales Model Nomenclature

Table 3: Sales Model Nomenclature

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

Table 4: Sales Models – Description of Position

Position	Description	Value
0	Region	AZ = Asia
		AN = Australia or New Zealand
		MD = Europe
1	Type of Unit	M = Mobile Product
2 and 3	Model Series	79 = MXM600
4	Frequency Band	T = 350–470 MHz
5	Power Level	F = 10.0 W
6	Physical Packages	T = Standard
7	Channel Spacing	6 = 20/25 kHz
8	Primary Operation	T = TDMA Digital Dual Mode
9	Primary System Type	Z = TETRA
10	Feature Level	1 = Basic (Dash)
		2 = Limited Package (Databox)

Position	Description	Value
		3 = Limited Plus (Serial Legacy Expansion Head and Serial Control Heads)
		5 = Standard Package (Single Remote)
		6 = Standard Plus (Dual Remote)
11	Version	Model Version – for example A, B, and C
12	Unique Variation	N = Standard Package
		G = BSI Models

1.3

Mobile Terminal Model Information

Motorola Solutions uses sales model prefixes to denote regional kit differences. AZ or MD can be found in use.

Table 5: Type and Model Numbers

Type No.	Sales Model No.	Region	Short Description	Model
MTC953DE	MDM79TFT6TZ1AN	EMEA	MXM600 Dash/Desk 350-470 MHz MTC953DE	M1
	MDM79TFT6TZ1AG		MXM600 BSI Dash/Desk 350-470 MHz MTC953DE	M1
	MDM79TFT6TZ5AN		MXM600 Single Remote 350-470 MHz MTC953DE	M2
	MDM79TFT6TZ5AG		MXM600 BSI Single Remote 350-470 MHz MTC953DE	M2
	MDM79TFT6TZ6AN		MXM600 Dual Remote 350-470 MHz MTC953DE	M3
	MDM79TFT6TZ6AG		MXM600 BSI Dual Remote 350-470 MHz MTC953DE	M3
	MDM79TFT6TZ2AN		MXM600 Databox 350-470 MHz MTC953DE	M4
	MDM79TFT6TZ2AG		MXM600 BSI Databox 350-470 MHz MTC953DE	M4
	AZM79TFT6TZ1AN	APAC/LACR	MXM600 Dash/Desk 350-470 MHz MTC953DE	M1
	AZM79TFT6TZ6AN		MXM600 Data/Single/Dual REM 350-470 MHz MTC953DE	M2/M3/M4
	ANM79TFT6TZ1AN	AUS/NZ	MXM600 Dash/Desk 350-470 MHz MTC953DE	M1

Type No.	Sales Model No.	Region	Short Description	Model
	ANM79TFT6TZ5AN		MXM600 Single Remote 350-470 MHz MTC953DE	M2

WARNING: Single Remote Expansion Head (SREH), Dual Remote Expansion Head (DREH), or Databox Expansion Head (DEH) are only compatible with Ethernet Remote Heads. Do **not** mix Ethernet control heads with non-Ethernet control heads. Ensure the use of appropriate RJ50 Ethernet cables for connecting a SREH, DREH or DEH with a Telephone Style Control Head (TSCH), IP54 Remote Ethernet Control Head (RECH), IP67 RECH, or for connecting a DREH with another DREH. Incorrect connections can damage the transceiver.

1.4 Model Specifications

Technical information can change without further notice.

Table 6: General Specifications

Parameter	Value			
ETSI	ETSI 300 394 1			
	MXM600 350–470 MHz	MTC953DE		
Temperature Range for Transceiver	Operating	–30 °C to +60 °C (+70 with limited performance)		
	Storage	–40 °C to +85 °C		
Power Supply	Minimum	10.8 VDC		
	Nominal	13.2 VDC		
	Maximum	15.6 VDC		
	Maximum Current	Approximately 5.5 A		
GNSS Performance	Acquisition Sensitivity	GPS: –145 dBm (guaranteed), –146 dBm (typical)		
	Tracking Sensitivity	GPS: –163 dBm (guaranteed); –164 dBm (typical) BeiDou: –155 dBm (guaranteed); –156 dBm (typical) Glonass: –157 dBm (guaranteed); –160 dBm (typical) Galileo: –155 dBm (guaranteed); –157 dBm (typical)		
Bluetooth		Bluetooth Class 1, 90 m range (line-of-sight)		
Wi-Fi		2.4 GHz 5 GHz		
Control Head Dimension and Weight				
Control Head			Dimension H x W x D (mm)	Weight (g)
Dash/Desk Mount	Transceiver and Control Head		60 x 188 x 200	1530
	Control Head		60 x 188 x 31	235

Parameter	Value		
Single Remote	Transceiver, Remote Expansion Head, and Top Cover	45 x 172 x 186	1355
Dual Remote	Transceiver, Remote Expansion Head, and Top Cover	45 x 172 x 194	1415
IP54 Remote Ethernet Control Head (RECH)		60 x 188 x 39	332
IP67 Remote Ethernet Control Head (RECH)		60 x 188 x 39	338
Telephone Style Control Head (TSCH)		220 x 65 x 75	450 (excluding cable)
Databox	Transceiver, Expansion Head, and Top Cover	45 x 172 x 192	1450
Transceiver Dimension			
Transceiver		Dimension H x W x D (mm)	
With Top Cover		44.5 x 171.4 x 167	
Without Top Cover		44.5 x 169.5 x 167	

Table 7: Receiver Specifications

Parameter	Value	
Receiver Type	Direct Conversion	
Frequency Range	MTC953DE	350–470 MHz
Channel Spacing	25 kHz	
Sensitivity (3.5%) BER	Static: –116 dBm (guaranteed); –118 dBm (typical) Dynamic: –107 dBm (guaranteed); –110 dBm (typical)	
Intermodulation	–47 dBm	
Blocking (50–100 kHz)	–40 dBm	
Spurious Rejection	–45 dBm	
Adjacent Channel Interference Ratio	–45 dBm	
Frequency Stability	Locked to Base	+/– 100 Hz
	Unlocked to Base	+/– 1 kHz
Audio Rated (@4 Ω)	For External Speaker:	10 W
	Distortion at Rated Audio:	5% Maximum

Table 8: Transmitter Specifications

Parameter	Value	
Modulation Type	π/4DQPSK (pi/4DQPSK)	
RF Power	Adjustable to Class 2 (10 W) and Class 3 (3 W) only.	
Frequency Range	MTC953DE	350–470 MHz
Frequency Stability	Locked to Base	+/– 100 Hz
	Not Locked to Base	+/– 1 kHz
Spurious Emissions (Conducted/Radiated)	–36 dBm <= 1 GHz	
	–30 dBm > 1 GHz	
Adjacent Channel Power Ratio (@ ± 25 kHz)	–60 dBc	

1.5 MXM600 Accessories-to-Model Chart

NOTE: M1, M2, M3, M4, and M5 refer to radio combinations. Refer to Model Descriptions on page 14.

Table 9: Antennas

Part Number and Description	M1	M2	M3	M4
GMAE4255_ Antenna TETRA Panel Mount 380–430 MHz	x	x	x	x
GMAE4256_ Antenna TETRA MAG MT 380–430 MHz	x	x	x	x
GMAE4258_ Antenna TETRA Covert Strip 380–410 MHz	x	x	x	x
GMAE4259_ Antenna TETRA Covert Strip 410–430 MHz	x	x	x	x
GMAE4262_ Antenna TETRA Wall Mount 380–400 MHz	x	x	x	x
GMAE4263_ Antenna TETRA Wall Mount 410–430 MHz	x	x	x	x
GMAE4266_ Antenna Motorcycle TETRA 380–400 MHz		x	x	
GMAE4267_ Antenna Motorcycle TETRA 410–430 MHz		x	x	
AN000459A01 Antenna, Mobile, Bluetooth-Wi-Fi, Magnetic Mount	x	x	x	x
GMAE4270_ Antenna Glass Mount 450–470 MHz	x	x	x	x

Part Number and Description	M1	M2	M3	M4
GMAE4271_ Antenna Panel or Roof Mount 430–470 MHz	x	x	x	x
GMAE4272_ Antenna Magnetic Mount 430–470 MHz	x	x	x	x
GMAE4273_ Antenna, Stamped Metal, Antenna Covert Glass Strip 450–470 MHz	x	x	x	x
GMAE4275_ Antenna Wall Mount 450–470 MHz	x	x	x	x
GMAE4507_ Antenna Combined TETRA or GPS 380–430 MHz SMA	x	x	x	x
GMAG4253_ Antenna GPS Only Panel Mount SMA	x	x	x	x
GMAG4254_ Antenna GPS Only Magnetic Mount SMA	x	x	x	x
PMAE4115_ Antenna, Mobile, 350–470 MHz, UHF-Bluetooth-Wi-Fi-GNSS, Panel Mount	x	x	x	x
PMAE4116_ Antenna, Mobile, 350–470 MHz, UHF-Bluetooth-Wi-Fi-GNSS, Magnetic Mount	x	x	x	x

Table 10: Cables

Part Number and Description	M1	M2	M3	M4
PMKN4320_ RJ50 Ethernet Cable, 3 m (IP67 RECH)		x	x	
PMKN4321_ RJ50 Ethernet Cable, 5 m (IP67 RECH)		x	x	
PMKN4322_ RJ50 Ethernet Cable, 7 m (IP67 RECH)		x	x	
PMKN4323_ RJ50 Ethernet Cable, 10 m (IP67 RECH)		x	x	
PMKN4324_ RJ50 Ethernet Cable, 15 m (IP67 RECH)		x	x	
PMKN4325_ RJ50 Ethernet Cable, 40 m (IP67 RECH)		x	x	
PMKN4280_ Remote Ethernet Cable, 0.5 m		x	x	
PMKN4141_ Remote Ethernet Cable, 3 m		x	x	

Part Number and Description	M1	M2	M3	M4
PMKN4140_ Remote Ethernet Cable, 5 m		x	x	
PMKN4139_ Remote Ethernet Cable, 7 m		x	x	
PMKN4138_ Remote Ethernet Cable, 10 m		x	x	
PMKN4136_ Remote Ethernet Cable, 12 m		x	x	
PMKN4146_ Remote Ethernet Cable, 15 m		x	x	
PMKN4135_ Remote Ethernet Cable, 40 m		x	x	
PMKN4176_ Cable, Transceiver Cross Over Ethernet Cable, 0.5 m			x	
PMKN4177_ Cable, Assembly, Transceiver Cross Over Ethernet Cable, 3 m			x	
PMKN4178_ Cable, Assembly, Transceiver Cross Over Ethernet Cable, 7 m			x	
PMKN4429_ Expansion Cable, 2.3 m (IP67 RECH)		x	x	
PMKN4456_ Expansion Cable, 4 m (IP67 RECH)		x	x	
PMKN4134_ TSCH Y-Cable		x	x	
PMKN4133_ TSCH Y-Cable (IP54 RECH)		x	x	
PMKN4333_ TSCH Y-Cable (IP67 RECH)		x	x	
GMDN3836_ Expansion Cable 2 m, 25-Pin, GCAI (Non-PVC)		x	x	
PMKN4120_ Ignition Sense Cable	x	x	x	x

Table 11: Transceiver Rear Connector

Part Number and Description	M1	M2	M3	M4
PMKN4303_ Cable, Assembly, 26-Pin Connector Universal Cable	x	x	x	x

Part Number and Description	M1	M2	M3	M4
PMLN8541_ MXM600 Rear Accessory Connector (with Dust Cover)	x	x	x	x
PMLN6487_ Accessory Connector Kit		x	x	
PMLN5072_ Rear Accessory Connector Kit (MTM5000 Accessory)	x	x	x	x

Table 12: Control Heads

Part Number and Description	M1	M2	M3	M4
PMVN4508_ IP54 Remote Ethernet Control Head (IP54 RECH) Roman		x	x	
PMVN4509_ IP54 Remote Ethernet Control Head (IP54 RECH) Arabic		x	x	
PMVN4510_ IP54 Remote Ethernet Control Head (IP54 RECH) Cyrillic		x	x	
PMVN4511_ IP54 Remote Ethernet Control Head (IP54 RECH) Taiwanese		x	x	
PMVN4512_ IP54 Remote Ethernet Control Head (IP54 RECH) Chinese		x	x	
PMVN4513_ IP54 Remote Ethernet Control Head (IP54 RECH) Korean		x	x	
PMVN4514_ IP54 Remote Ethernet Control Head (IP54 RECH) Japanese		x	x	
PMVN4525_ Telephone Style Control Head (TSCH) Roman		x	x	
PMVN4530_ Telephone Style Control Head (TSCH) Arabic		x	x	
PMVN4579_ IP67 Remote Ethernet Control Head (IP67 RECH) Roman		x	x	
PMVN4580_ IP67 Remote Ethernet Control Head (IP67 RECH) Chinese		x	x	
PMVN4582_ IP67 Remote Ethernet Control Head (IP67 RECH) Arabic		x	x	
PMVN4586_ Dash/Desk Control Head Roman	x			
PMVN4587_ Dash/Desk Control Head Chinese	x			
PMVN4588_ Dash/Desk Control Head Korean	x			

Part Number and Description	M1	M2	M3	M4
PMVN4589_ Dash/Desk Control Head Arabic	x			
PMVN4590_ Dash/Desk Control Head Taiwanese	x			
PMVN4591_ Dash/Desk Control Head Japanese	x			
PMVN4592_ Dash/Desk Control Head Cyrillic	x			

Table 13: Control Heads Legacy

Part Number and Description	M1	M2	M3	M4
PMVN4386_ Control Head Dash/Desk English	x			
PMVN4387_ Control Head Dash/Desk Chinese	x			
PMVN4388_ Control Head Dash/Desk Korean	x			
PMVN4389_ Control Head Dash/Desk Arabic	x			
PMVN4390_ Control Head Dash/Desk Taiwanese	x			
PMVN4391_ Control Head Dash/Desk Japanese	x			
PMVN4392_ Control Head Dash/Desk Cyrillic	x			
PMVN4393_ Control Head Dash/Desk Hebrew	x			
PMVN4408_ Ethernet ECH Remote Roman		x	x	
PMVN4409_ Ethernet ECH Remote Arabic		x	x	
PMVN4410_ Ethernet ECH Remote Cyrillic		x	x	
PMVN4411_ Ethernet ECH Remote Hebrew		x	x	
PMWN4025_ Telephone Style Control Head (TSCH) Roman		x	x	
PMWN4030_ Telephone Style Control Head (TSCH) Arabic		x	x	

Part Number and Description	M1	M2	M3	M4
PMWN4009_ Control Head Dash/Desk English	x			
PMWN4010_ Control Head Dash/Desk Chinese	x			
PMWN4011_ Control Head Dash/Desk Korean	x			
PMWN4012_ Control Head Dash/Desk Arabic	x			
PMWN4013_ Control Head Dash/Desk Taiwanese	x			
PMWN4014_ Control Head Dash/Desk Cyrillic	x			
PMWN4015_ Control Head Dash/Desk Hungarian	x			
PMWN4016_ Control Head Dash/Desk Hebrew	x			
PMWN4024_ Ethernet ECH Remote Roman		x	x	
PMWN4031_ Telephone Style Control Head (TSCH) Cyrillic		x	x	
PMWN4032_ Telephone Style Control Head (TSCH) Hebrew		x	x	
PMWN4033_ Telephone Style Control Head (TSCH) Chinese		x	x	
PMWN4034_ Telephone Style Control Head (TSCH) Taiwanese		x	x	
PMWN4035_ Telephone Style Control Head (TSCH) Korean		x	x	
PMWN4036_ Ethernet ECH Remote Arabic		x	x	
PMWN4037_ Ethernet ECH Remote Cyrillic		x	x	
PMWN4038_ Ethernet ECH Remote Hebrew		x	x	
PMWN4042_ Control Head Dash/Desk Japanese	x			

Table 14: Expansion Head Kits

Part Number and Description	M1	M2	M3	M4
PMLN9068_ Single Remote Expansion Head		x		x
PMLN8597_ Dual Remote Expansion Head			x	x
PMLN9069_ Databox Expansion Head				x
PMLN4904_ Serial Expansion Head (Serial Control Head Compatible)				x

Table 15: Junction Box

Part Number and Description	M1	M2	M3	M4
GMLN7825_ MXM600 Data Junction Box with Accessory Connector	x	x	x	
PMKN4300_ 2 m Junction Cable to Transceiver (MXM600)	x	x	x	
PMKN4301_ 4 m Junction Cable to Transceiver (MXM600)	x	x	x	
PMKN4302_ 5 m Junction Cable to Transceiver (MXM600)	x	x	x	

Table 16: Microphones

Part Number and Description	M1	M2	M3	M4
PMMN4086_ Hearer Speaker Microphone with Jack Vol C, and Emergency Button	x	x	x	
PMMN4087_ Audio Accessory-Headset, Visor Mounted Microphone	x	x	x	
RMN5054_ Smart Visor Microphone	x	x	x	
RMN5107_ Compact Mobile Microphone	x	x	x	
RMN5111_ Heavy-Duty Microphone	x	x	x	
PMMN4127_ Operational Critical Wireless Remote Speaker Mic WM500	x	x	x	
RMN5106_ Desktop Microphone	x			
MDHLN7016_ IMPRES Telephone Style Handset Kit	x	x	x	

Table 17: Mounting (Control Head)

Part Number and Description	M1	M2	M3	M4
PMLN4912_ Trunnion Kit		x	x	
PMLN5093_ Enhanced Control Head DIN Trunnion		x	x	
PMLN5092_ Bracket, Motorcycle Enhanced Control Head Trunnion, SS		x	x	

Table 18: Mounting (Transceiver)

Part Number and Description	M1	M2	M3	M4
PMLN8620_ Trunnion Standard Kit (MXM600)	x	x	x	x
PMLN5094_ DIN Mounting Kit	x	x	x	x
RLN4779_ Key Lock Mounting Kit	x	x	x	x

Table 19: Desktop Mount

Part Number and Description	M1	M2	M3	M4
GLN7318_ Base Tray without Speaker Ariane	x			
RSN4005_ Desktop Tray with Speaker	x			

Table 20: Power Cables (to Mobile Terminal)

Part Number and Description	M1	M2	M3	M4
PMKN4289_ Cable, Assembly, DC Power Cable, 1.0 m with 15 A Fuse (MXM600)	x	x	x	x
PMKN4243_ Cable, Assembly, DC Power Cable, 3.1 m with 15 A Fuse (MXM600)	x	x	x	x
PMKN4275_ Cable, Assembly, DC Power Cable, 6.2 m with 15 A Fuse (MXM600)	x	x	x	x
GKN6270_ Cable, Assembly, Power Cable 3 m with 10 A Fuse	x	x	x	x
GKN6274_ Cable, Assembly, Power Cable 6 m with 10 A Fuse	x	x	x	x

Table 21: Power Supplies

Part Number and Description	M1	M2	M3	M4
PMPN4076_ Wedge Power Supply	x			
WAPN4005_ 12–18 Amp Switched-Mode Isolated Converter	x	x	x	x
WAPN4008_ 12–18 Amp Switched-Mode Converter	x	x	x	x
PMKN4305_ DC Power Cable for AC-DC Adapter, 2.4 m (MXM600)	x			
PMKN4165_ DC Power Cable for AC-DC Adapter (MTM5000 Accessory)	x			

Table 22: Line Cords for Power Supply

Part Number and Description	M1	M2	M3	M4
3085801L01 Argentina AC Cord	x			
3087791G22 Brazil Connector AC Power	x			
NTN7373_ 110 V Charger Line Cord	x			
NTN7374_ 220 V Charger Line Cord	x			
NTN7375_ UK 240 V Power Supply	x			

Table 23: Programming or Data

Part Number and Description	M1	M2	M3	M4
HKN6184_ Cable, Assembly, USB Programming Cable (Mobile Micro-phone Port)	x	x	x	
PMKN4104_ Active Data Cable	x	x	x	x
PMKN4105_ Programming Cable	x	x	x	x
PMKN4108_ KVL Cable for Mobile	x	x	x	x
PMKN4110_ USB Flash Cable (Terminal Rear Port)	x	x	x	x

Table 24: Push-To-Talk (PTT) Switches

Part Number and Description	M1	M2	M3	M4
RLN4858_ Gooseneck PTT	x	x	x	
RLN5926_ Push-Button PTT	x	x	x	

Table 25: Speakers

Part Number and Description	M1	M2	M3	M4
RSN4002_ Accessory Kit, 13 W External Speaker	x	x	x	
RSN4003_ 7.5 W, External Speaker	x	x	x	
RSN4004_ 5 W, External Speaker	x	x	x	
AC000240A02 Wideband External Speaker (MXM600)	x	x	x	
PMKN4119_ Speaker Extension Cable	x	x	x	

Table 26: Telephone Style Control Head Identification

Part Number and Description	M1	M2	M3	M4
PMLN6335_ Color Code (White) Pack of Five		x	x	
PMLN6336_ Color Code (Green) Pack of Five		x	x	
PMLN6337_ Color Code (Red) Pack of Five		x	x	
PMLN6338_ Color Code (Yellow) Pack of Five		x	x	
PMLN6339_ Color Code (Blue) Pack of Five		x	x	

Table 27: Miscellaneous

Part Number and Description	M1	M2	M3	M4
01015001001 Toroids Kit		x	x	
PMLN6488_ Ferrites Pack of Three		x	x	

Part Number and Description	M1	M2	M3	M4
GMLN5091_ External Alarm Relay	x	x	x	
RLN4836_ Emergency Foot Switch	x	x	x	

Table 28: Serial Expansion Head Compatible Control Heads and Accessories

Part Number and Description	M1	M2	M3	M4
PMVN4379_ Motorcycle Control Head English				x
PMVN4380_ Motorcycle Control Head Chinese				x
PMVN4381_ Motorcycle Control Head Korean				x
PMVN4382_ Motorcycle Control Head Arabic				x
PMVN4383_ Motorcycle Control Head Taiwanese				x
PMVN4385_ Motorcycle Control Head Cyrillic				x
PMVN4394_ Remote Control Head English				x
PMVN4395_ Remote Control Head Chinese				x
PMVN4396_ Remote Control Head Korean				x
PMVN4397_ Remote Control Head Arabic				x
PMVN4398_ Remote Control Head Taiwanese				x
PMVN4399_ Remote Control Head Japanese				x
PMVN4400_ Remote Control Head Cyrillic				x
PMVN4425_ Remote Control Head Hebrew				x
PMWN4002_ Motorcycle Control Head English				x
PMWN4003_ Motorcycle Control Head Chinese				x

Part Number and Description	M1	M2	M3	M4
PMWN4004_ Motorcycle Control Head Korean				x
PMWN4005_ Motorcycle Control Head Arabic				x
PMWN4006_ Motorcycle Control Head Taiwanese				x
PMWN4007_ Motorcycle Control Head Cyrillic				x
PMWN4008_ Motorcycle Control Head Hungarian				x
PMWN4017_ Remote Control Head English				x
PMWN4018_ Remote Control Head Chinese				x
PMWN4019_ Remote Control Head Korean				x
PMWN4020_ Remote Control Head Arabic				x
PMWN4021_ Remote Control Head Taiwanese				x
PMWN4022_ Remote Control Head Cyrillic				x
PMWN4023_ Remote Control Head Hungarian				x
PMWN4044_ Motorcycle Control Head Japanese				x
PMWN4046_ Remote Control Head Hebrew				x
PMWN4043_ Remote Control Head Japanese				x
PMKN4030_ Next Generation Control Head (NGCH) Motorcycle TELCO Cable, 2.3 m				x
RKN4077_ Remote Mount Cable, 3 m				x
RKN4078_ Remote Mount Cable, 5 m				x
RKN4079_ Remote Mount Cable, 7 m				x

Part Number and Description	M1	M2	M3	M4
PMKN4020_ Cable, Assembly, Remote Mount Cable - 10 m				x
PMKN4029_ Cable, Assembly, Expansion Cable, 25-Pin, GCAI, USB				x
PMKN4056_ Cable, Assembly, GCAI Accessory Expansion Cable 4 m				x

NOTE:
Complex installations requiring extended cable runs and Remote Mount Control Heads with Audio Accessories such as the Telephone Style Handset (HLN7016_) can benefit from careful routing of cables, and in some cases additional Electro Magnetic Compatibility (EMC) reduction techniques such as using Ferrite or Toroid accessories. Suitable examples of Ferrite or Toroid accessories are as follows:

- Ferrite Clamp, Part Number 91012044001, 91012044002, or 91012044003
- Toroid, Part Number 01015001001

Chapter 2

Vehicle Preparation

This section provides guidelines on preparing your vehicle for radio installation.

2.1 General Guidelines for Radio Installation

Install this product in a vehicle according to the vehicle manufacturer guidelines, and the instructions detailed in this manual. Use only the Motorola Solutions parts specified in this manual.

Failure to do so could result in noncompliance to the Automotive Directive (72/245/EEC, as amended by 95/54/EC). For products fitted to two and three wheeled vehicles, Directive 97/24/EC applies.

This radio is designed and certified for terrestrial use only.

An accessory connector at the rear of your radio enables you to attach different accessories (see Accessory Connection Plan on page 97).

A mobile microphone port at the front control head panel provides the connection for various types of microphones.

Install your radio in a vehicle, using one of the following methods:

- Using the direct mounting trunnion and power cables supplied with a standard radio package.
- Remote mounted in the car radio cut-out (using the required DIN mounting kit PMLN5094), per ISO7736.
- Single Remote Expansion Head.
- Dual Remote Expansion Head.

Mount your radio horizontally near the driver seat for ease of view, access, and operating the controls, microphone (location of the microphone clip), and other accessories. Before installation, consider the following factors:

- Ensure that the location for your radio installation is not exposed to dirt and moisture.
- Verify that the space around the mobile unit is sufficient for air flow and installation.
- Check that there is enough routing space for the power cable connector and the antenna coaxial cable.
- To minimize pinching, crushing, and overheating of wires and cables, plan the best place to run connections.
- In a vehicle with an airbag, ensure that the mounting location of your radio, or radio accessory, is not in the deployment path of the air bag.

Power Supply Requirements

Your radio uses a standard 12 V power supply connection. In vehicles with 24 V power supply, a DC/DC converter is required. Use only DC/DC converter vendors, who provide a certification for vehicle installation and meet your radio power supply specification. Motorola Solutions recommends a suitable range of DC/DC converters available from Alfatronix LTD UK. Some models are also available through Motorola Solutions Service Organization. For more information, check with your account manager.

If it is not possible to add a DC/DC converter, keep the supply voltage of your radio at a level of 10.8 V or above regardless of vehicle battery condition.

When planning the installation, be aware that the maximum current consumption is 5.5 A during PTT and up to 33 mA (non-Ethernet) or 90 mA (Ethernet) when your radio is switched off. For power supply specification, see Model Specifications on page 17.

For low supply voltage, consider the following factors:

- If the supply voltage measured on the power supply terminal of your radio drops below 10.8 V for more than 500 ms, the display shows `Battery Low`.
- If the supply voltage measured on the power supply terminal of your radio drops below 9.7 V for more than 500 ms, the display shows `Battery Empty` and turns off.
- For vehicles with heavy electrical loads such as ambulances or fire trucks, add a backup battery supply separated from the electrical installation.
- If your radio turns off due to low supply voltage conditions, it remains in boot loader mode. When the supply voltage rises enough, your radio consumes over 500 mA of power supply. This condition can drain a weak or old battery that is left overnight or for a longer time in low temperatures. Recharge the battery using an external charger. To trigger the power-up sequence, the ignition pin voltage must go below 3.1 V and rise again above 9.7 V.

2.2 Disconnecting Your Radio Power Supply

Procedure:

1. Before uninstalling your radio, perform the following:
   a. Turn off your radio.
   b. Wait for a minimum of four seconds after your radio switch is released.
   c. Disconnect the 13.2 V main power supply.
2. Alternatively, turn off the main power supply without turning off your radio.

2.3 Installing DC Power Cable

CAUTION: Your radio must be operated only in negative ground electrical systems. Operating your radio on a positive ground system causes the cable fuse to short-circuit. Check the vehicle ground polarity before you begin the installation.

Prerequisites:
Determine a routing plan, keeping in mind where to mount your radio as well as the following factors:

- Whenever possible, avoid routing the cable above the catalytic converter.
- Make sure that the power cable never rests on sharp edges.
- Use grommets whenever a cable has to pass through a hole in a metal panel.

CAUTION: Improper handling of the power cable can cause shorting to the ground. Ensure that during radio installation the power cable fuse is removed. Ensure that your power cable is not placed in parallel with the antenna. Interference can cause your radio to hang.

Procedure:

1. Locate an existing hole with the grommet in the vehicle fire wall, or use a 9.5 mm (3/8 in.) bit to drill an access hole in the fire wall.

   CAUTION: Be careful not to damage existing wires.

2. To protect the power cable, install a grommet with a 5 mm (3/16 in.) inside diameter into the hole.
3. From inside the vehicle, feed the red and black leads (without the lugs attached) through the access hole and into the engine compartment.

Figure 1: Power Cabling Routing to the Engine Compartment

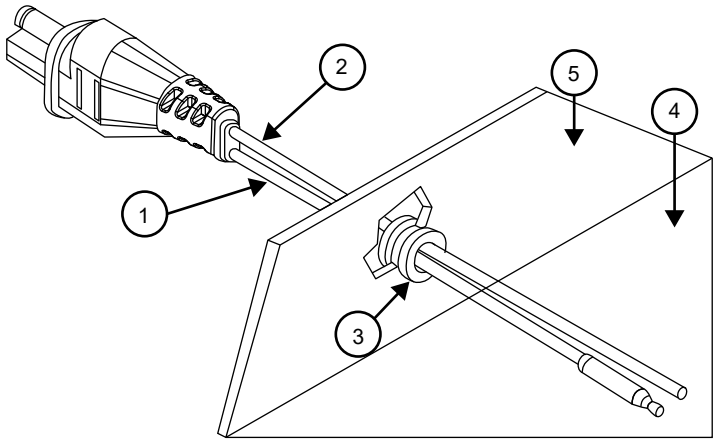


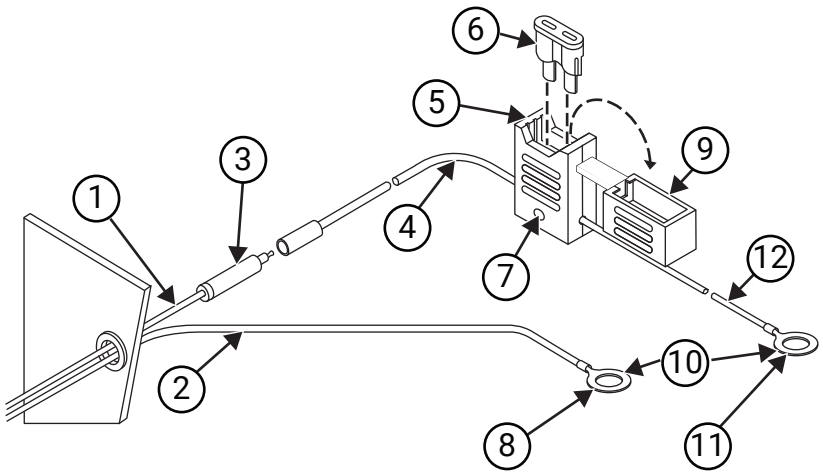
Table 29: Associated Components

Annotation	Description
1	Red lead
2	Black lead
3	Grommet
4	Engine Compartment
5	Firewall

4. Connect the black lead of the DC power cable to the nearest vehicle chassis ground point (using the provided ring lug, if required). Shorten the black lead to remove any excess cable.

NOTE: Locate a good vehicle ground point. The vehicle frame provides the best ground. Optimum radio performance can only be achieved with a low-resistance ground connection. Verify that the connections between the battery negative terminal, vehicle chassis, and engine block have low resistance.

Figure 2: Power Cable Assembly



1FL08302470

Table 30: Associated Components

Number	Description
1	Red lead
2	Black lead (min. 2.5 mm)
3	Adapter
4	Red lead (min. 2.5 mm)
5	Fuse holder
6	Fuse (15A)
7	Mounting hole
8	To battery (-) or chassis
9	Cover
10	Ring lugs
11	To battery (+)
12	Red lead (min. 2.5 mm)

5. Place the fuse holder close to the battery and ensure that the fuse holder is not near any hot engine component. Mount the fuse holder using the mounting hole and dress the wires as required.
6. Insert the stripped end of the red lead of the fuse holder into the ring lug hole and crimp it. Connect the fuse holder red adapter lead plug to the mating receptacle on the red lead of the power cable.
7. Connect the red lead ring lug from the fuse holder to the positive (+) battery terminal. Ensure that the adapter cable is connected to the main power cable red lead.
8. Carefully check that all connections are proper. Insert the fuse into the fuse holder and close the cover.

Postrequisites: See DC Power Cables on page 36 for power cables available for this radio.

2.3.1
DC Power Cables

Table 31: DC Power Cables

Number	Description	Rating
PMKN4289	Power Cable to Battery with fuse 15 A	12 V Power Cable to Battery, Length: 1.0 m
PMKN4243_	Power Cable to Battery with fuse 15 A	12 V Power Cable to Battery, Length: 3.1 m
PMKN4275_	Power Cable to Battery with fuse 15 A	12 V Power Cable to Battery, Length: 6.2 m
6580283E06	Fuse 15 A for Power Cable	
6580283E02	Fuse 4 A for Ignition Sense Cable	
CP000122A01	Fuse 2 A for Y-Cable	
6580283E03	Fuse 5 A for Y-Cable	

CAUTION: In cases of blown fuses, replace only with fuses of identical value. Never insert ones of different values.

NOTE: For more information on ignition cables, see Installing Ignition Sense Cable on page 36. The Ignition Sense Cable allows your radio to be turned on and off by the vehicle ignition switch.

2.4
Installing Ignition Sense Cable

The Ignition Sense Cable (PMKN4120_) allows the terminal to be turned on and off by the vehicle ignition switch.

CAUTION: In cases of blown fuses, replace only with fuses of identical value. Never insert ones of different values. Ensure that the fuse is removed during cable installation.

Procedure:

1. Plug the lead of the ignition sense cable that has a terminal crimped on it into #25 socket of the accessory plug.
2. Route and secure the cable with the attached tie wrap.
3. Connect the other lead of the accessory cable to the ignition switch of the vehicle.
4. Insert the fuse into the fuse holder and close the cover.

Figure 3: 26-pin Accessory Connector (PMLN8541_)

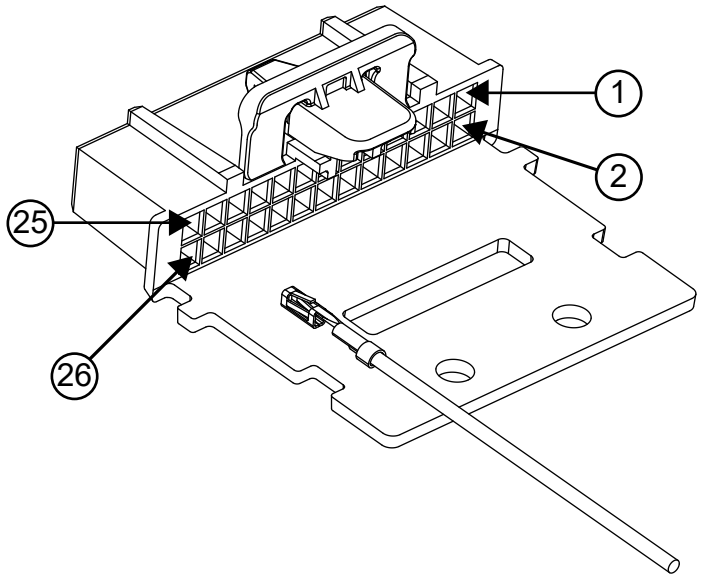


Table 32: Associated Components

Label	Description
1	Socket number one
2	Socket number two
25	Socket number 25
26	Socket number 26

CAUTION: If the ignition line is not used, it must be grounded. Interference can cause your radio to hang.

NOTE:
The terminal accepts a 12 V or 24 V input for the Ignition Sense line. For 24 V installations, convert the main supply from 24 V to 12 V. For more information, see General Guidelines for Radio Installation on page 32. Motorola Solutions recommends a suitable range of DC/DC converters available from Alfatronix LTD UK. Some models are also available through Motorola Solutions Service Organization. For further information, refer to your Account Manager.

The ignition sense cable kit contains a thin cable and a fuse holder.

2.4.1
Ignition Sense Cables

Table 33: Ignition Sense Cables

Part Number	Description	Rating
PMKN4120_	Ignition Sense Cable with fuse 4 A	Ignition Sense Cable, Length: 3 m
6580283E02	Fuse 4 A for Ignition Sense Cable	

Chapter 3

Radio Installation

This section provides installation setup for your radio.

NOTE: Ensure that the power supply is off when assembling the control head or expansion head to the transceiver. Turn on the power supply after you have finished assembling the control head or expansion head to the transceiver.

3.1 MXM600 Dashboard Installation

This section explains the Dashboard Installation for M1.

3.1.1 Installing Your Radio in an Automotive DIN Slot Dashboard

Procedure:

1. Open the cut-out (DIN Slot) in the dashboard of your radio.
2. Remove the top plastic cover from your radio.
3. Insert the mounting frame into the cut-out and retain it by bending back the relevant fixing tabs, using all six where possible, to hold it in place.

   NOTE:
   The tabs are easily bent back by twisting a large flat-bladed screwdriver into the slot behind the tabs.

   For a more secure installation, secure the top and rear of the frame with screws.

   The demount tool can be used as an aid to mounting as well as demounting.

3.1.2 Mounting Your Radio in the Frame

Procedure:

1. Connect the electrical connections to your radio for power, antenna, and accessories.
2. Plug in all the connectors and push your radio with the Control Head, firmly onto the mounting frame until the two springs snap into place.

   NOTE: Check the fixing tabs for tightness each time your radio is removed. The tabs are easily tightened by twisting a large flat-bladed screwdriver in the slot behind the tabs. The frame is not designed for daily mounting and demounting.

Figure 4: Radio with Mount Kit

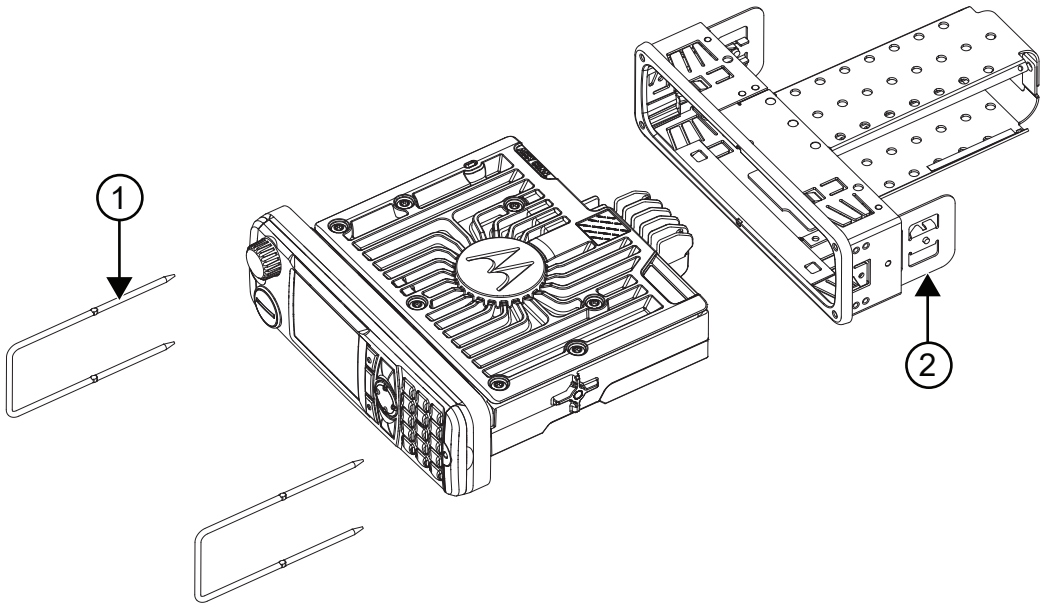


Table 34: Radio with Mount Kit Annotations

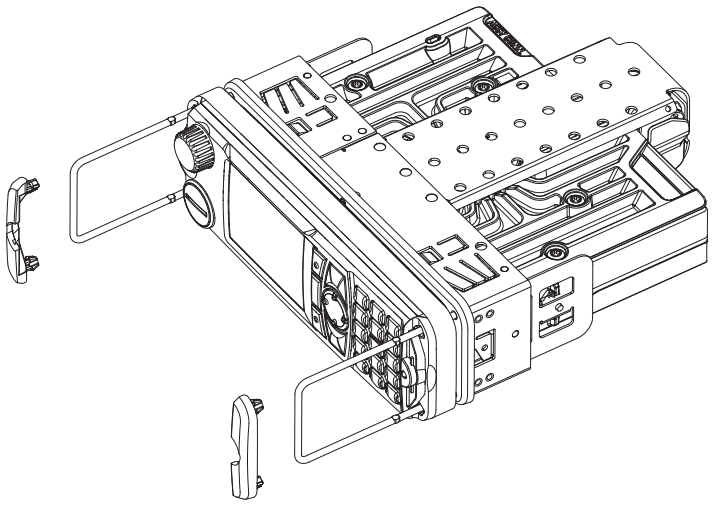
Label	Description
1	Demount Tool (8166514A01) – includes in DIN Mount Kit
2	DIN Mount Kit (PMLN5094_) – includes Demount Tool

3.1.3
Removing Your Radio from the DIN Frame

Procedure:

1. Remove both rubber side caps from the Dash Mount Control Head.
2. Insert the demount tools into the two openings.
3. Push the demount tools through the openings in the frame.
4. Slide out your radio.

Figure 5: Radio with Demount Tools



3.2 MXM600 Desktop Installation

This section explains the Desktop Installation for the M1 model.

The Desktop Station option provides the terminal with the desk microphone, power supply with tray, or desktop tray (optional with or without a speaker), and external loudspeaker.

CAUTION: If an outdoor antenna is used, a proper grounded Lightning Protector with Quarter-Wave Shorting Stub must be inserted between the outdoor antenna and the transceiver antenna input. The line voltage power supply must have a proper ground connection (see IEC61312-1). The installation must meet the requirements of any applicable local codes and regulations.

3.2.1 Planning Desktop Installation

Only trained personnel can plan the desktop installation to ensure that the installation fulfills the regulatory requirements, such as Electro Magnetic Compatibility (EMC) and International Electrotechnical Commission (IEC).

Procedure:

1. Inspect the location before drilling a hole or running a wire.
2. Determine a way and a place to mount the antenna, terminal, and accessories.
3. Plan wire and cable run to provide maximum protection from pinching, crushing, and overheating.

3.2.2 Setting Up Desktop Installation

Prerequisites:

- Ensure that line voltage power is available but the unit is not turned on.
- Ensure sufficient air flow around the terminal for adequate cooling.

Procedure:

1. Choose a flat surface when using one of the following:
   - Desktop tray without speaker and external loudspeaker.
   - Desktop tray with speaker.
   - Power supply tray and external loudspeaker.
   - Transceiver and desktop microphone with loudspeaker.
2. Ensure that the mounting surface is able to adequately support the weight of the terminal and tray.
3. In an outdoor antenna, choose a location for the terminal as close as possible to the antenna cable inlet of the building.
4. Ensure that the installation of the surge protector is in accordance with the manufacturer specifications and safety hints.
5. Ensure that the line power supply is grounded properly.

Figure 6: Typical Desktop Mounting

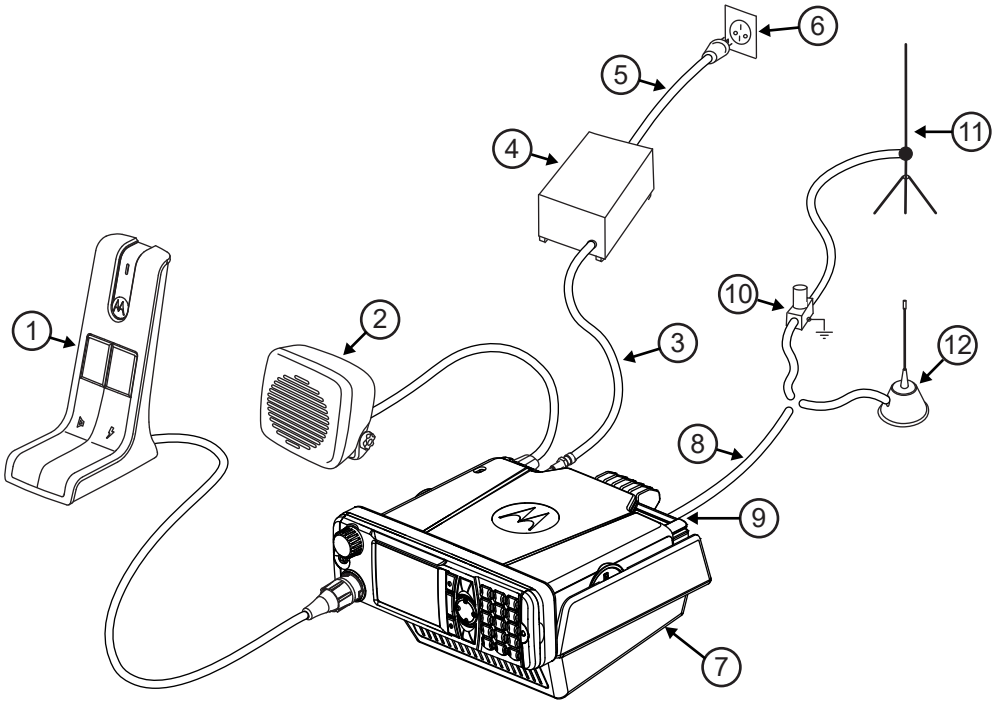


Table 35: Associated Components

Label	Description	Part Number
1	Desk Microphone	RMN5106_
2	External Speaker	RSN4002_, RSN4003_, RSN4004_, or AC000240A02

Label	Description	Part Number
3	DC Power Cable	PMKN4305_(to be used with PMPN4076_)
4	AC-DC Power Adapter	PMPN4076_
5	Line Cord with Ground	–
6	Wall Outlet	–
7	Desktray, Desktray with inbuilt Loud-speaker, or Power Supply tray	GLN7318_, or RSN4005_
8	Antenna Cable	
9	Antenna Connector BNC	–
10, 11, 12	Typical Antennas: Lighting Protector with Quarter-Wave Shorting Stub, Outdoor Antenna, Indoor Antenna	–

3.3

MXM600 Remote Mount Installation

NOTE:

Ensure that the battery terminals are removed or the transceiver is turned off during the whole installation.

The following are for Remote Installation:

- IP54 Remote Ethernet Control Head (RECH)
- IP67 Remote Ethernet Control Head (RECH)
- Telephone Style Control Head (TSCH)

MXM600 Expansion Heads

Figure 7: Expansion Heads

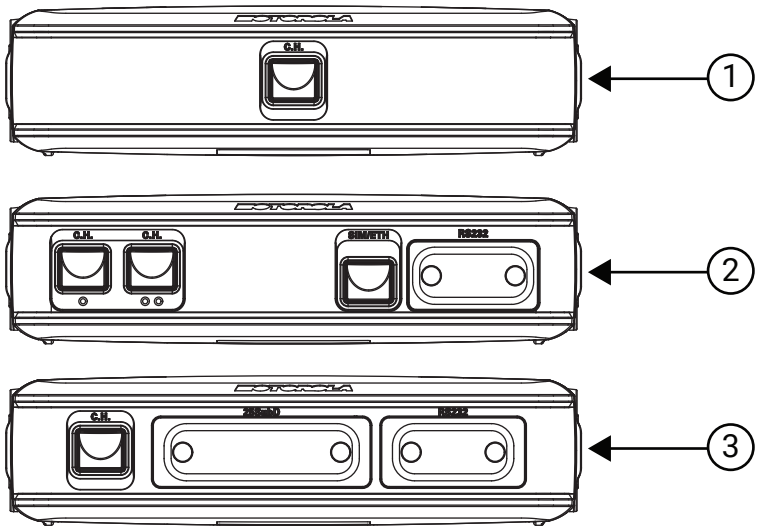


Table 36: Expansion Heads Description

Number	Description
1	Single Remote Expansion Head
2	Dual Remote Expansion Head
3	Databox Expansion Head

NOTE: Ensure that the dust covers of the Ethernet Connector, DSUB Connector, and TELCO Connector fit properly when not in use.

Single Remote Expansion Head (SREH) and Databox Expansion Head (DEH) Installation

This section explains the Single Remote Mount installation - M2 and Databox Expansion Head - M4.

The Single Remote Mount and Databox Mount options provide the terminal with the option of an IP54 or IP67 Remote Mount Control Head (RECH), or Telephone Style Control Head (TSCH).

Figure 8: Remote Mount Installation with IP54 RECH or IP67 RECH and SREH

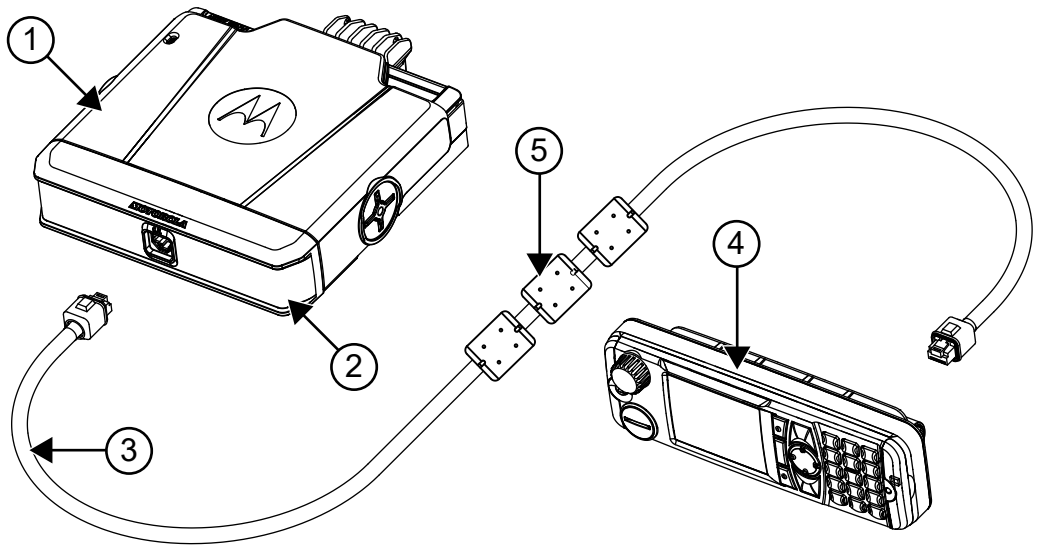


Figure 9: Remote Mount Installation with TSCH and DEH

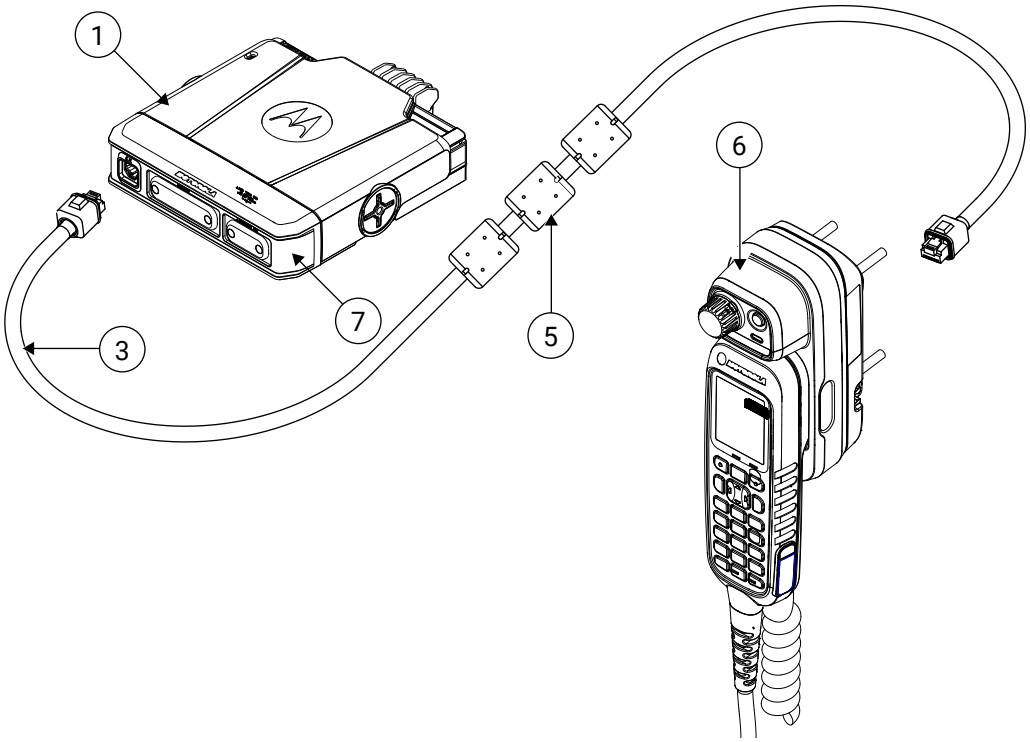


Table 37: Configurations – Graphics Description

Number	Description
1	Transceiver
2	Single Remote Expansion Head (SREH)
3	Remote RJ50 Ethernet Cable or IP67 RECH RJ50 Ethernet Cable
4	IP54 or IP67 Remote Ethernet Control Head (RECH)
5	Ferrite Clamps – 91012044001
6	Telephone Style Control Head (TSCH)
7	Databox Expansion Head (DEH)

Table 38: Associated Components for Remote Mount

Item	Description	Part Number
1	Remote Ethernet Cable	See Table 10: Cables on page 20.
2	IP67 RECH Ethernet Cable	See Table 10: Cables on page 20.

Item	Description	Part Number
3	Expansion Heads	See Table 14: Expansion Head Kits on page 25.

NOTE:
Pay attention to the effects of Electro Magnetic Compatibility (EMC) in vehicle installations. Also, over long cable requires additional protection. Motorola Solutions has suitable suppression kits such as Part Number 01015001001 Toroid EMC Suppression Kit.

Wind the Remote Mount Cable ten times around each toroid.

Place each toroid 30.0±2.5 cm respectively from the expansion head and the control head.

Winding at both ends reduces the effective cable length by approximately 0.8 m.

Fix the toroids firmly to a stable surface once the Remote Mount Cable is connected.

Dual Remote Expansion Head (DREH) Installation

This section explains the Dual Remote Mount installation - M3.

The Dual Remote Mount option provides the terminal with the option of an IP54 RECH, IP67 RECH, or TSCH.

The following are the possible configurations:

- Remote Mount installation with IP54 RECH
- Remote Mount installation with IP67 RECH
- Remote Mount installation with TSCH
- Dual Control Head with two IP54 RECH
- Dual Control Head with two IP67 RECH
- Dual Control Head with two TSCH
- Dual Control Head with a combination of IP54 RECH and TSCH
- Dual Control Head with a combination of IP67 RECH and TSCH
- Dual Control Head with a combination of IP54 RECH and IP67 RECH
- Multi-Radio Control Installation with TSCH
- Multi-Radio Control installation with IP54 RECH
- Multi-Radio Control installation with IP67 RECH

IMPORTANT:

- The Ethernet cables shown in the following illustrations require three ferrite clamps (part number: 91012044001), with two turns of wire around them. Manually install the first ferrite clamp approximately 60 cm away from the control head, and with a minimum spacing of 3 cm between the next two ferrite clamps.
- Connect the control head to Port 1 of the Dual Remote Expansion Head.

Figure 10: Remote Mount Installation with IP54 or IP67 RECH

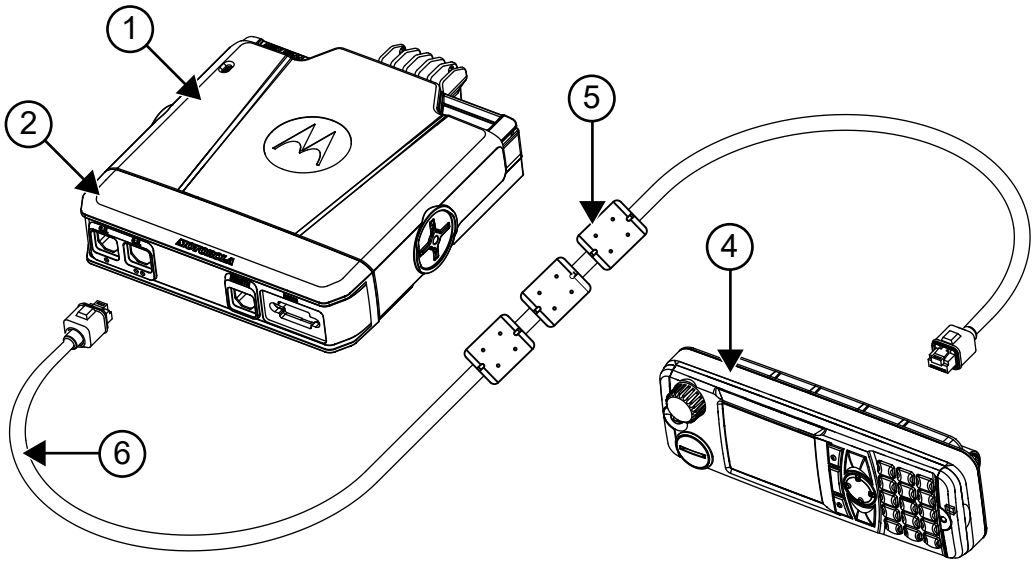


Figure 11: Remote Mount Installation with TSCH

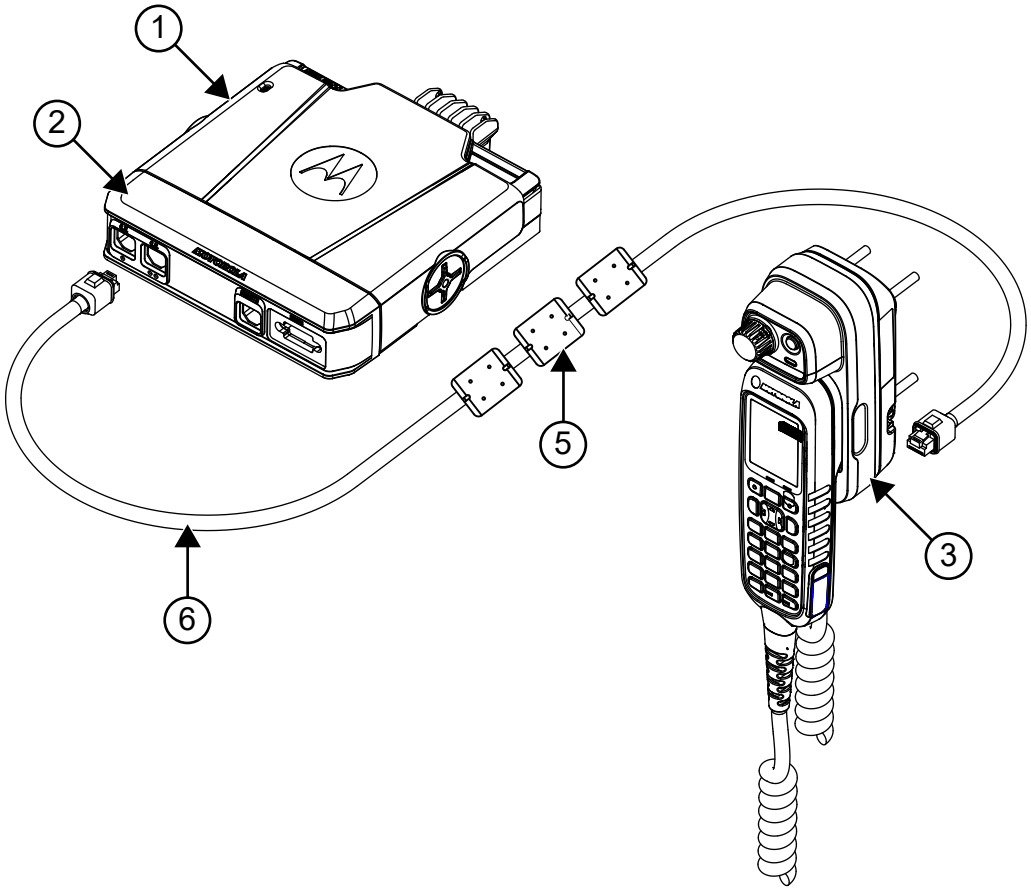


Figure 12: Dual Control Head with Two RECH (IP54 or IP67)

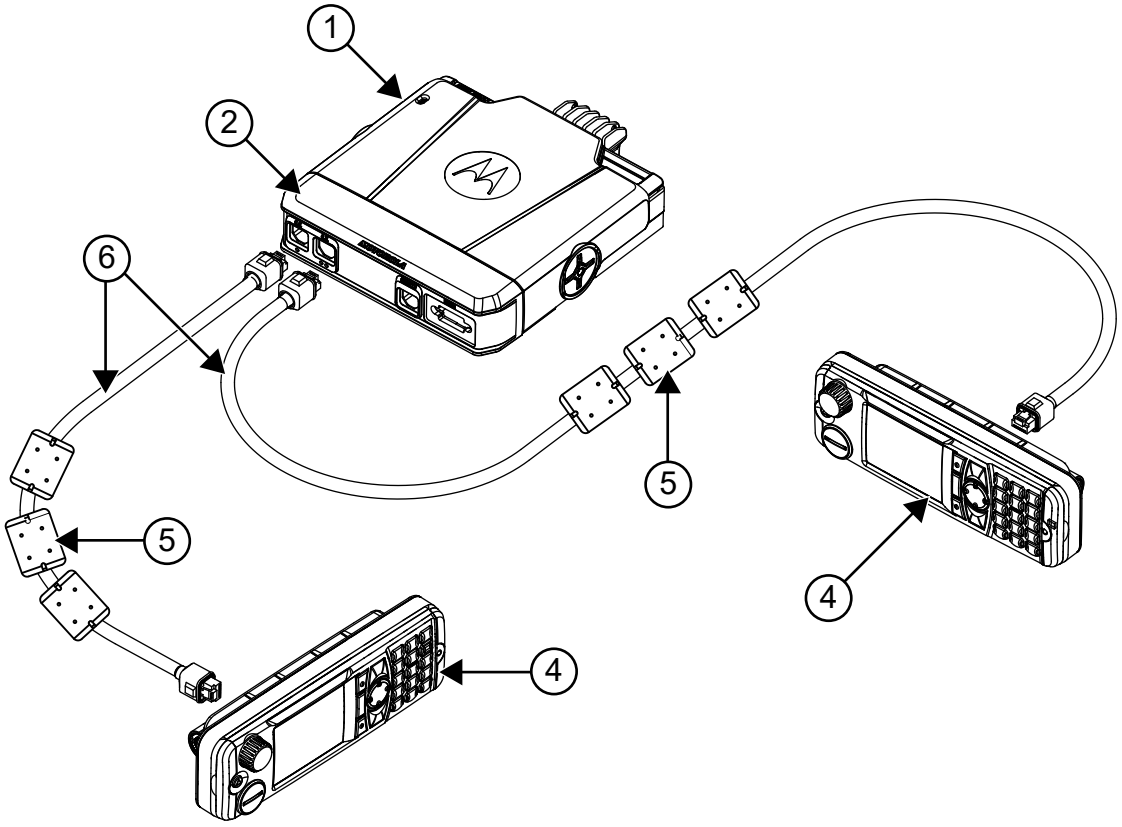


Figure 13: Dual Control Head with Two TSCH

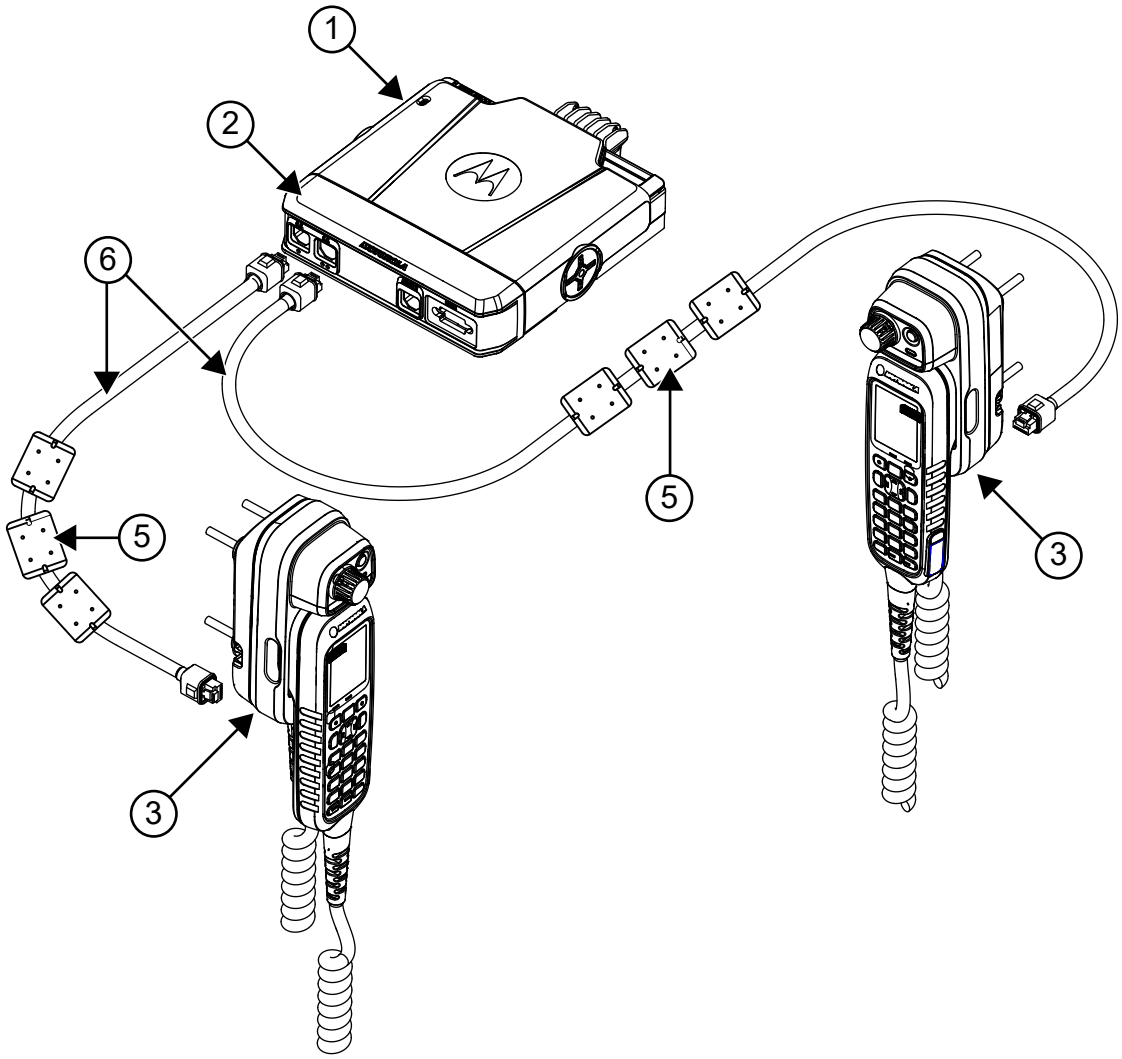


Figure 14: Dual Control Head with a Combination of IP54 or IP67 RECH, and TSCH

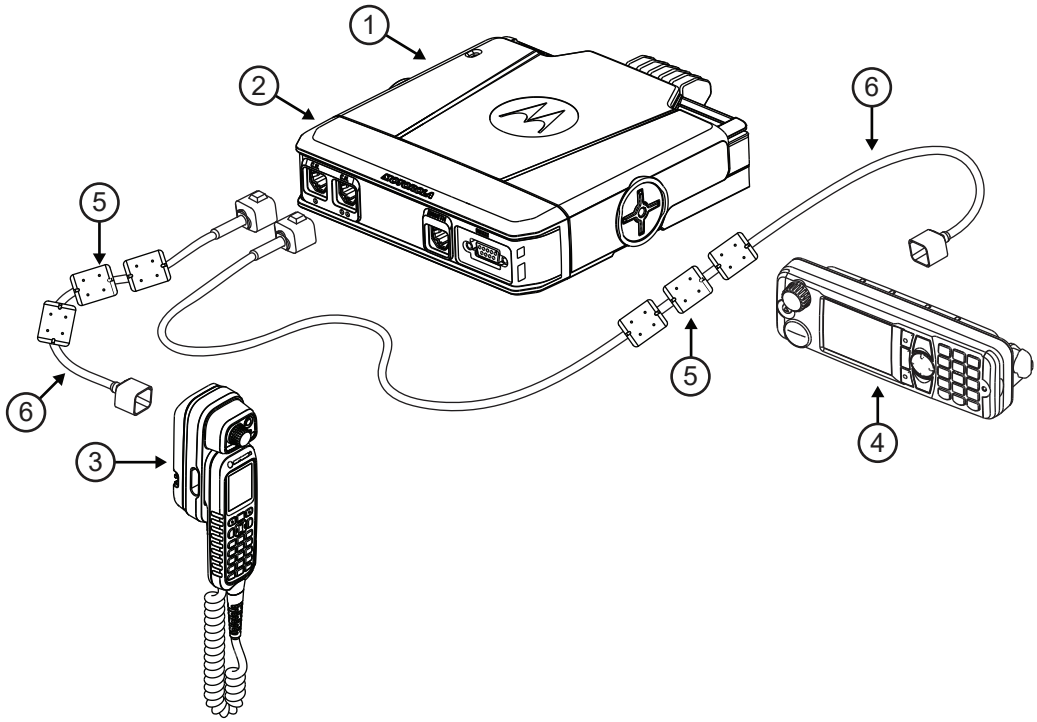


Figure 15: Multi-Radio Control Installation with IP54 or IP67 RECH

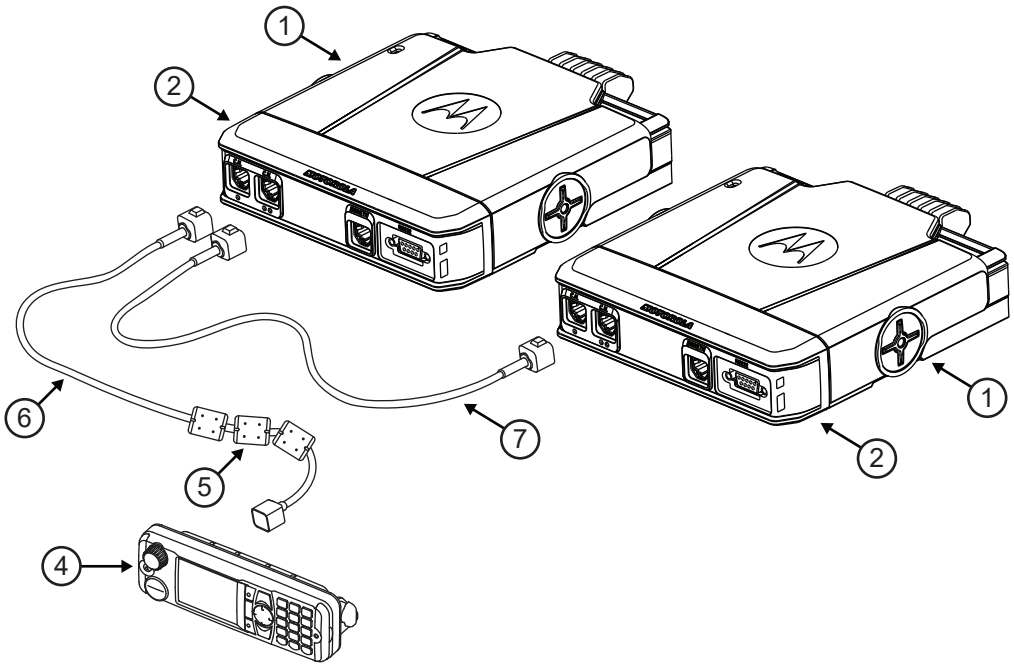
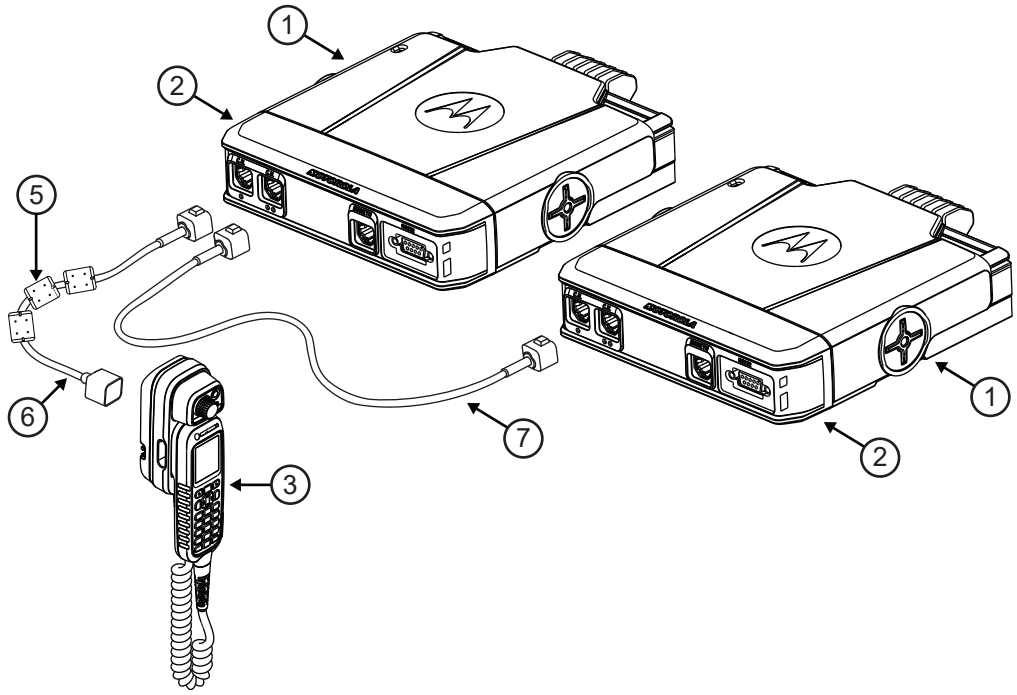


Figure 16: Multi-Radio Control Installation with TSCH



IMPORTANT: If you enter a message on one control head, all buttons except the Emergency button is disabled on the other control head. You can turn off your radio using the Power Off button of the inactive control head.

NOTE: For Multi-Radio Control installations, the Emergency Hot Mic and Ambience Listening functions require a Visor Microphone to connect to the rear of each radio.

Table 39: Configurations – Graphics Description

Annotation	Description
1	Transceiver
2	Dual Remote Expansion Head – PMLN8597_
3	Telephone Style Control Head (TSCH)
4	Remote Ethernet Control Head (RECH) – IP54 or IP67
5	Ferrite Clamps – 91012044001
6	Remote RJ50 Ethernet Cable or IP67 RECH RJ50 Ethernet Cable
7	Mobile to Mobile Ethernet Cable, 3 m – PMKN4177_

3.3.1

Ethernet Cables

WARNING: Dual Remote Expansion Head (DREH) is only compatible with Ethernet Remote Heads. Do not combine Ethernet Control Head with non-Ethernet Control Head. Also, ensure use of proper Ethernet cables to connect the DREH with Telephone Style Control Head (TSCH), Remote Ethernet Control Head (RECH) or to another DREH. If not connected properly, the transceiver can be damaged.

Table 40: Ethernet Cables

Item	Part Number
RJ50 Ethernet Cable, 3 m (IP67 RECH)	PMKN4320_
RJ50 Ethernet Cable, 5 m (IP67 RECH)	PMKN4321_
RJ50 Ethernet Cable, 7 m (IP67 RECH)	PMKN4322_
RJ50 Ethernet Cable, 10 m (IP67 RECH)	PMKN4323_
RJ50 Ethernet Cable, 15 m (IP67 RECH)	PMKN4324_
RJ50 Ethernet Cable, 40 m (IP67 RECH)	PMKN4325_
Remote Ethernet Cable, 3 m	PMKN4141_
Remote Ethernet Cable, 0.5 m	PMKN4280_
Remote Ethernet Cable, 5 m	PMKN4140_
Remote Ethernet Cable, 7 m	PMKN4139_
Remote Ethernet Cable, 10 m	PMKN4138_
Remote Ethernet Cable, 12 m	PMKN4136_
Remote Ethernet Cable, 15 m	PMKN4146_
Remote Ethernet Cable, 40 m	PMKN4135_
TETRA Mobile to Mobile Ethernet Cable, 0.5 m	PMKN4176_
TETRA Mobile to Mobile Ethernet Cable, 3 m	PMKN4177_
TETRA Mobile to Mobile Ethernet Cable, 7 m	PMKN4178_

Figure 17: RJ50 Ethernet Cable for IP67 RECH (PMKN4320_, PMKN4321_, PMKN4322_, PMKN4323_, PMKN4324_, and PMKN4325_)

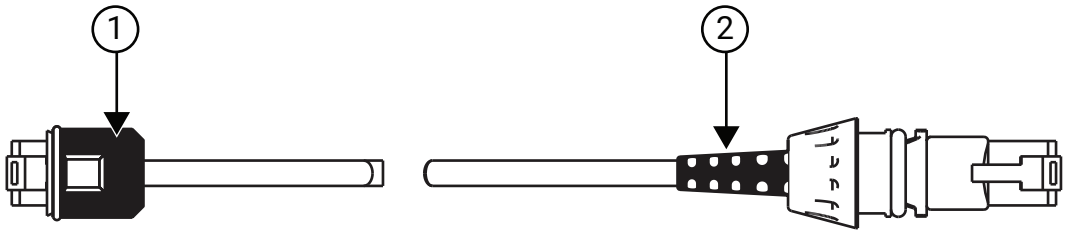


Table 41: Associated Components

Number	Description
1	Dust Cap Rubber (blue color)
2	Strain Relieve (blue color)

Figure 18: Remote Ethernet Cable (PMKN4280_, PMKN4141_, PMKN4140_, PMKN4139_, PMKN4138_, PMKN4136_, and PMKN4146_)

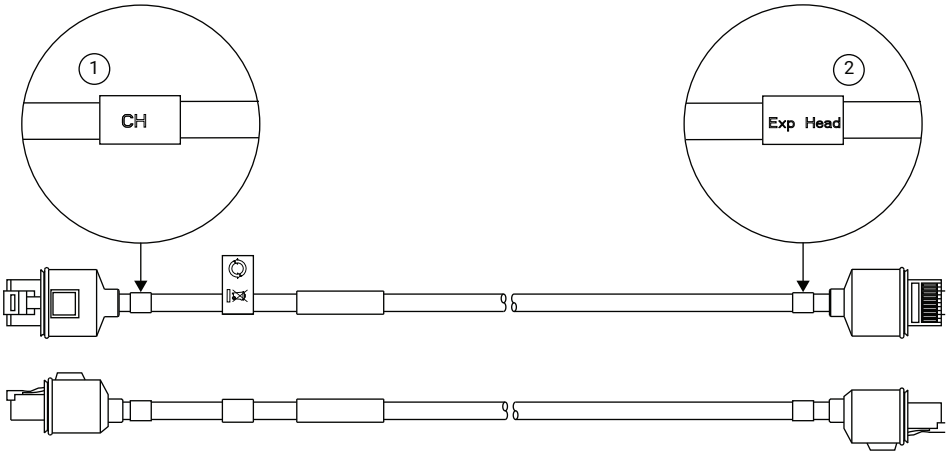


Figure 19: Remote Ethernet Cable, 40 m (PMKN4135_)

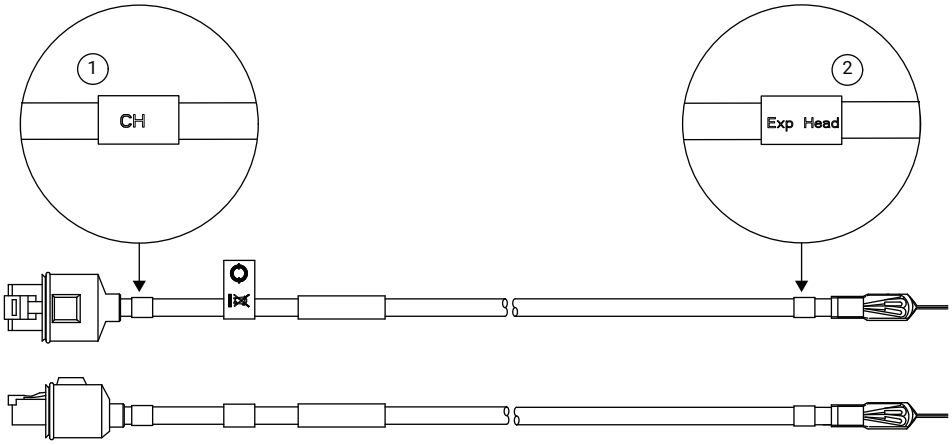


Table 42: Associated Components

Annotation	Description
1	Exp Head mark
2	CH mark **NOTE:** Requires three (3) Ferrite Clamps, Part Number 91012044001. Manually install all Ethernet cables. Install clamps on the CH end of the cable with two turns of wire around each clamp.

Figure 20: Remote Ethernet Cable (PMKN4176_, PMKN4177_, and PMKN4178_)

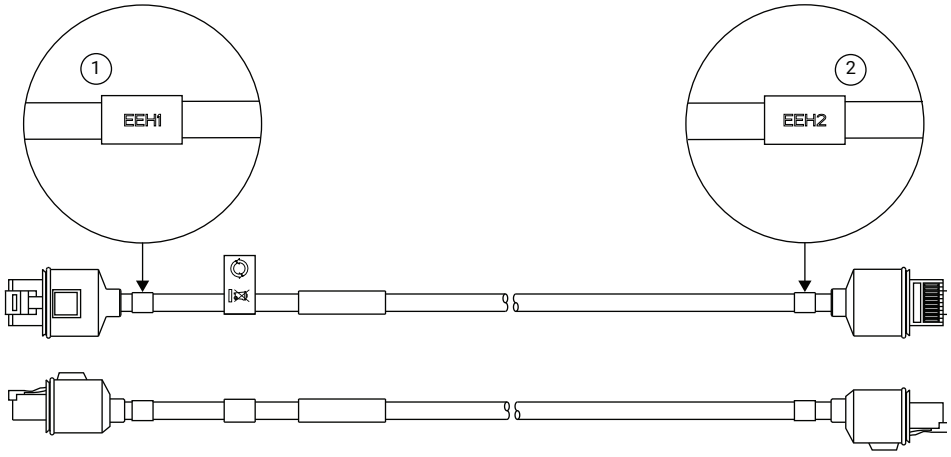


Table 43: Associated Components

Annotation	Description
1	Ethernet Expansion Head (EEH1) mark
2	Ethernet Expansion Head (EEH2) mark

NOTE: For PMKN4135_, the open-end wire at the "CH" end shall be terminated with the in-box RJ50 plug based on the Ethernet Cable Pin Diagram. After routing the transceiver to the Control Head, use a 10P10C Crimping Tool to crimp the RJ50 plug to the open end of the cable.

WARNING: Use the 'Exp Head', 'EEH1', 'EEH2', and 'CH' marks to ensure that the Ethernet Cables are correctly connected.

3.3.2
Installing the IP67 Ethernet Cable

Procedure:

1. Before inserting the cable to the RJ50 socket, rotate and align the lock cap.

   Ensure the two markings on the lock cap face up, aligning with the RJ50 contact plane.
2. Connect the 10-pin RJ50 connector to the RJ50 socket of the IP67 Remote Ethernet Control Head (RECH).

   Ensure that the pin contact faces up. Push in until the lock cap flushes with the IP67 RECH back housing.
3. Turn the lock cap in a clockwise direction to secure the cap to the back housing.
4. Connect the other side of the RJ50 connector to the RJ50 socket on the remote expansion head.

Figure 21: Connecting the RJ50 Connector to the IP67 RECH

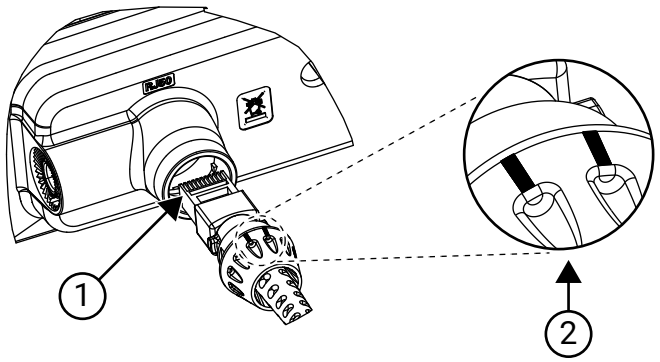


Table 44: Associated Components

Number	Item	Description
1	Pin Contact	Ensure that pin contact faces upwards.
2	Seal Lock Cap	Seal lock cap marking must always face upwards.

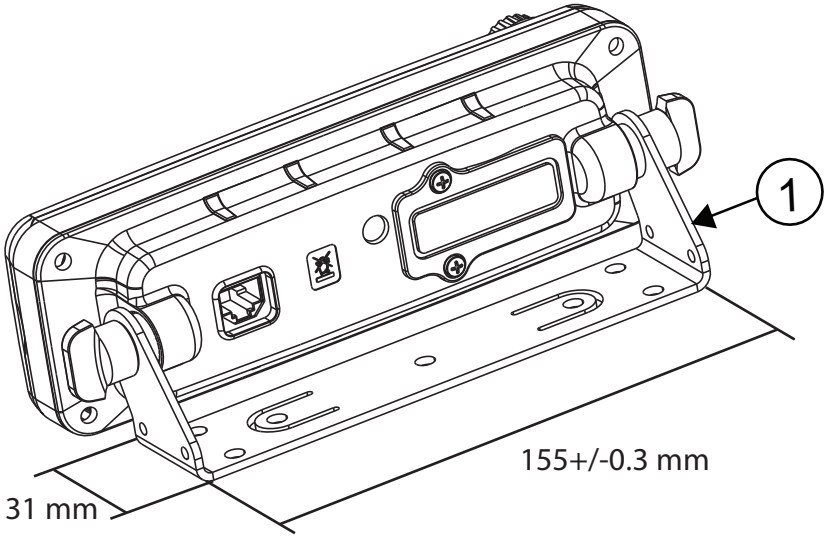
3.3.3

Installing the Remote Ethernet Control Head (RECH) onto the Remote Mount Trunnion

Procedure:

1. Slide the IP54 or IP67 RECH onto the mounting trunnion until it snaps into place.
2. Tighten the screws at both sides of the trunnion. After a few turns, tilt the control head for an optimum view of the display. Then, complete the tightening of the screws.

Figure 22: IP54 or IP67 RECH Installation with Remote Mount Trunnion



Number	Description
1	Remote Mount Trunnion Kit (PMLN4912_)

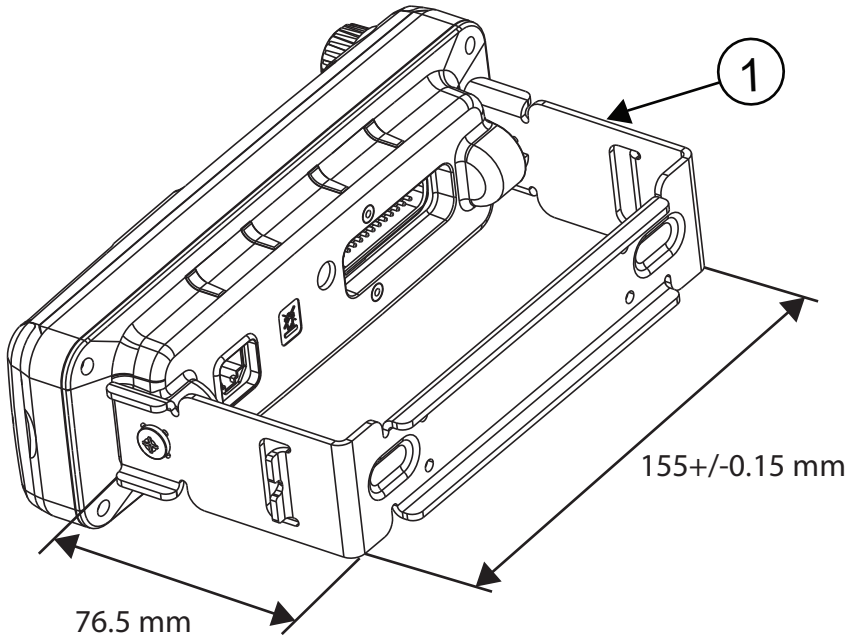
3.3.4

Installing the Remote Ethernet Control Head (RECH) in a DIN Mount Bracket

Procedure:

1. Slide the IP54 or IP67 RECH onto the DIN Mount Bracket until it snaps into place.
2. Tighten the screws at both sides of the DIN Mount Bracket.

Figure 23: IP54 or IP67 RECH Installation with DIN Mount Bracket



Number	Description
1	DIN Mount Bracket Kit (PMLN5093_)

3.3.5

Inserting the IP54 or IP67 Remote Ethernet Control Head with the DIN Mount Bracket into the DIN Frame

Procedure:

1. Insert the mounting frame into the DIN Mount Bracket, and retain it by bending back the relevant fixing tabs.

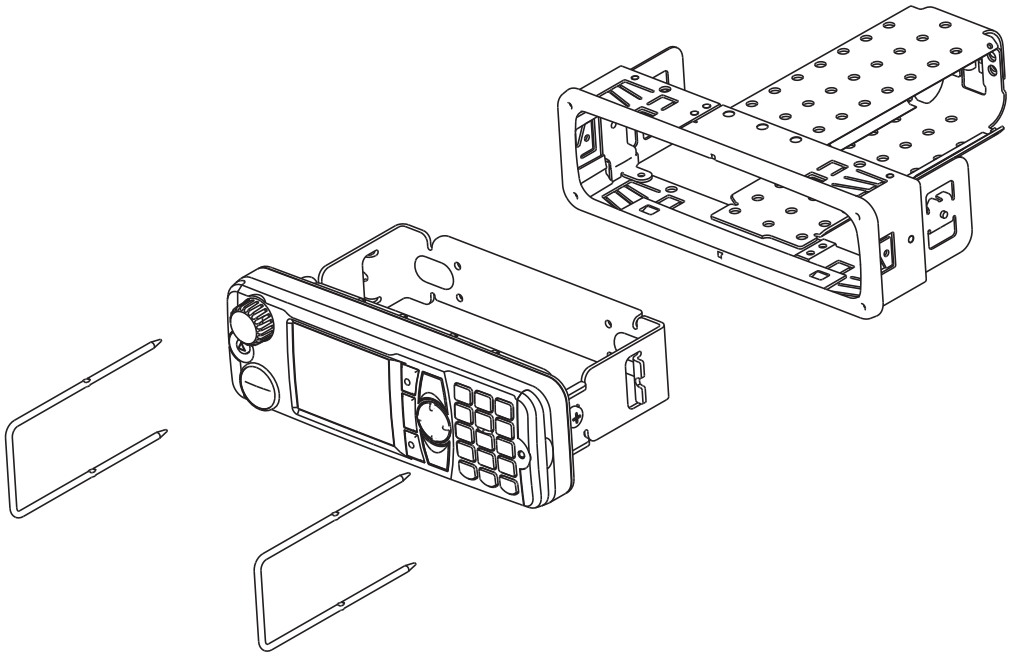
2. If necessary, use all six tabs to secure the frame.

   NOTE:
   The tabs are easily bent back by twisting a large flat-bladed screwdriver into the slot behind the tabs.

   For a more secure installation, secure the top and rear of the frame with screws.

   Use the demount tool as an aid for both mounting and demounting.

Figure 24: IP54 or IP67 RECH Installation with DIN Mount Bracket into the DIN Frame



3.3.6
Accessories Expansion Cable

The Accessories Expansion Cable allows your radio to have extra accessories using the Mobile Microphone Port (MMP).

Figure 25: Accessories Expansion Cable with the Mobile Microphone Port (MMP)

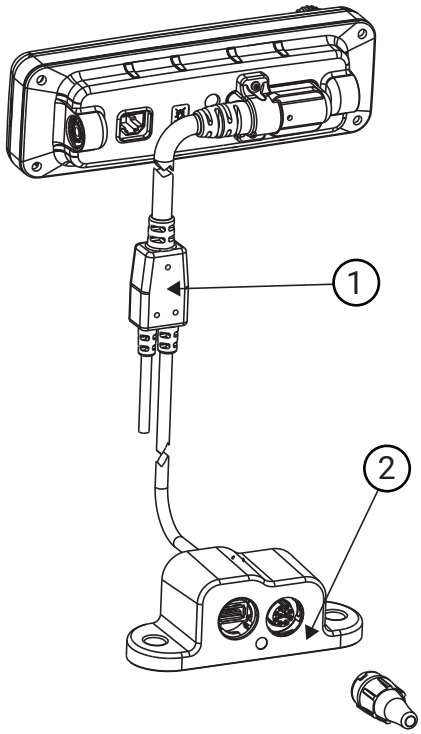


Figure 26: Accessories Expansion Cable with the Mobile Microphone Port (MMP)

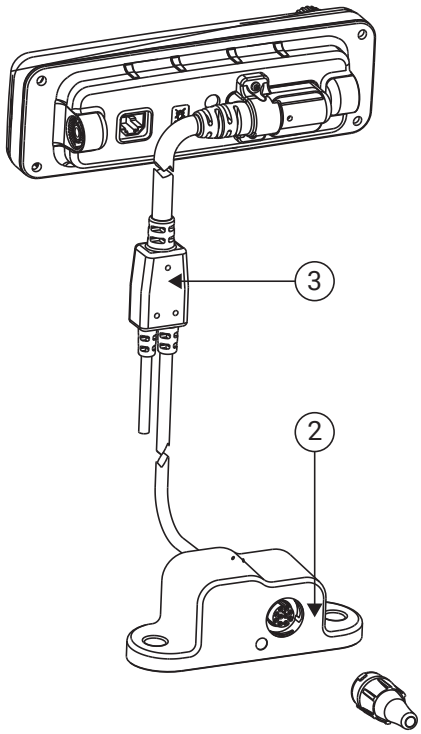


Table 45: Associated Components

Number	Description
1	Accessories Expansion Cable PMKN4029_/PMKN4056_ (IP54 RECH)

Number	Description
2	Mobile Microphone Port (MMP)
3	Accessories Expansion Cable PMKN4429_/PMKN4456_ (IP67 RECH)

3.3.7
Installing the Accessories Expansion Cable

The following steps are applicable to both IP54 Remote Ethernet Control Head (RECH) and IP67 RECH.

Procedure:

1. Plug in the Accessories Expansion Cable to the DB25 Port of the RECH.
2. To secure the Accessories Expansion Cable in place, tighten the screws at the DB25 connector.
3. Mount the Mobile Microphone Port (MMP) or USB port module to a surface. To fix the module securely, tighten the two screws on both sides of the module.

   NOTE: For more information on the connector pin functions of the Accessories Expansion Cable and the Mobile Microphone Port (MMP) or USB Port Module, see Accessories Expansion Cable on page 112.

3.3.8
Extra Accessories for the IP54 or IP67 Remote Ethernet Control Head, and Telephone Style Control Head

The Accessories Expansion Y-Cable (PMKN4133_ for IP54 Remote Ethernet Control Head (RECH), or PMKN4333_ for IP67 RECH) allows you to connect extra accessories.

Figure 27: Accessories Expansion RECH Y-Cable

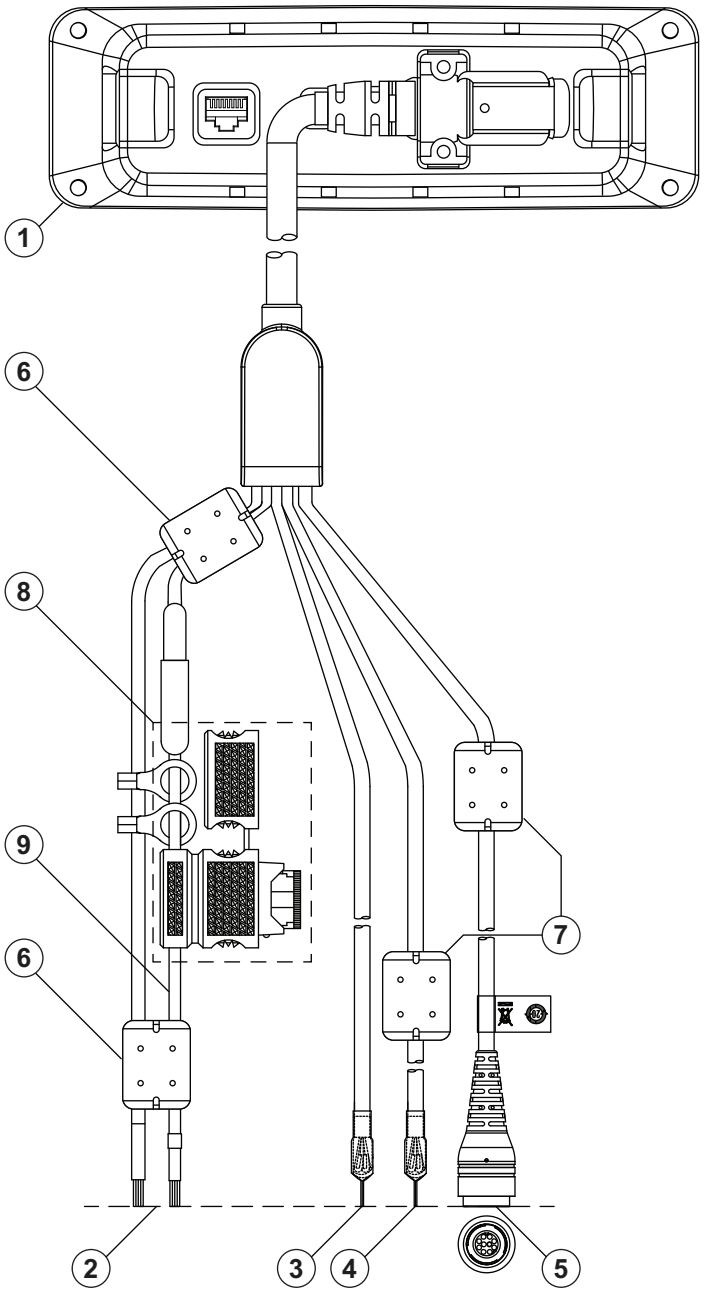


Table 46: Associated Components

Number	Item	Description
1	Remote Ethernet Control Head with the cable connected by the DB25 Connector	-
2	Ground Wire and External Power Wire, Input supply 12 V/24 V: 2 A	The connections correspond to P4 and P5, as detailed in Remote Ethernet Control Head Y-Cable (Accessories Expansion Cable) on page 117, which provides the Pin Diagram of Cable

Number	Item	Description
		PMKN4133. P4 is the 12/24 V positive DC supply input and P5 is Ground. This supply is for the Audio Power Amplifier and is required to connect a Loudspeaker to the RECH. This is the only Power connection that allows 12 V or 24 V operation, all other Power supplies must be 12 V.
3	Speaker Wires	The connections correspond to P6 detailed in Remote Ethernet Control Head Y-Cable (Accessories Expansion Cable) on page 117 and correspond to the Loudspeaker output of the RECH. The Audio Amplifier that supplies this output requires an independent DC Supply. Refer to Number 2. The use of connector kit PMLN6487_ allows a plug-and-play installation of the associated Loudspeakers such as RSN4002_.
4	Free-end Wires	When used during installation, heat-shrink wrap unused wires to prevent shorting. These connections correspond to P3, as detailed in Remote Ethernet Control Head Y-Cable (Accessories Expansion Cable) on page 117. These connections provide multiple functions including Hands Free Microphone (HF1 and HF2). These two inputs are individually screened and include a common drain-Ground, PTT1 and PTT2, Power On, Rear Audio, and the available GPIO lines. The use of the IIMPRES Visor Microphone RMN5054_, also requires the One Wire bus connection provided on this cable.
5	Rear GCAI Connector	The connections correspond to P2 detailed in Remote Ethernet Control Head Y-Cable (Accessories Expansion Cable) on page 117 and this connector is the 10 -Pin Rear GCAI Accessory connector that enables compatible Accessories such as the RMN5107_ Fist Microphone to be connected to the rear of the Control Head.
6	Ferrite Clamp (91012044002)	Manual installation is required. Clamps are installed with 2-turns of wire around the clamp.
7	Ferrite Clamp (91012044003)	Manual installation is required. Clamps are installed with 2-turns of wire around the clamp.
8	Fuse of 2 A (6580283E03)	-
9	Label for Y-cable power rating	-

NOTE:
See Connectors and PIN Assignment on page 91 for wiring and pin out information.

Manual installation is required. Clamps are fixed with 2-turns of wire.

The Accessories Expansion (Telephone Style Control Head) TSCH Y-Cable (PMKN4134_) allows you to connect extra accessories.

Figure 28: Accessories Expansion TSCH Y-Cable

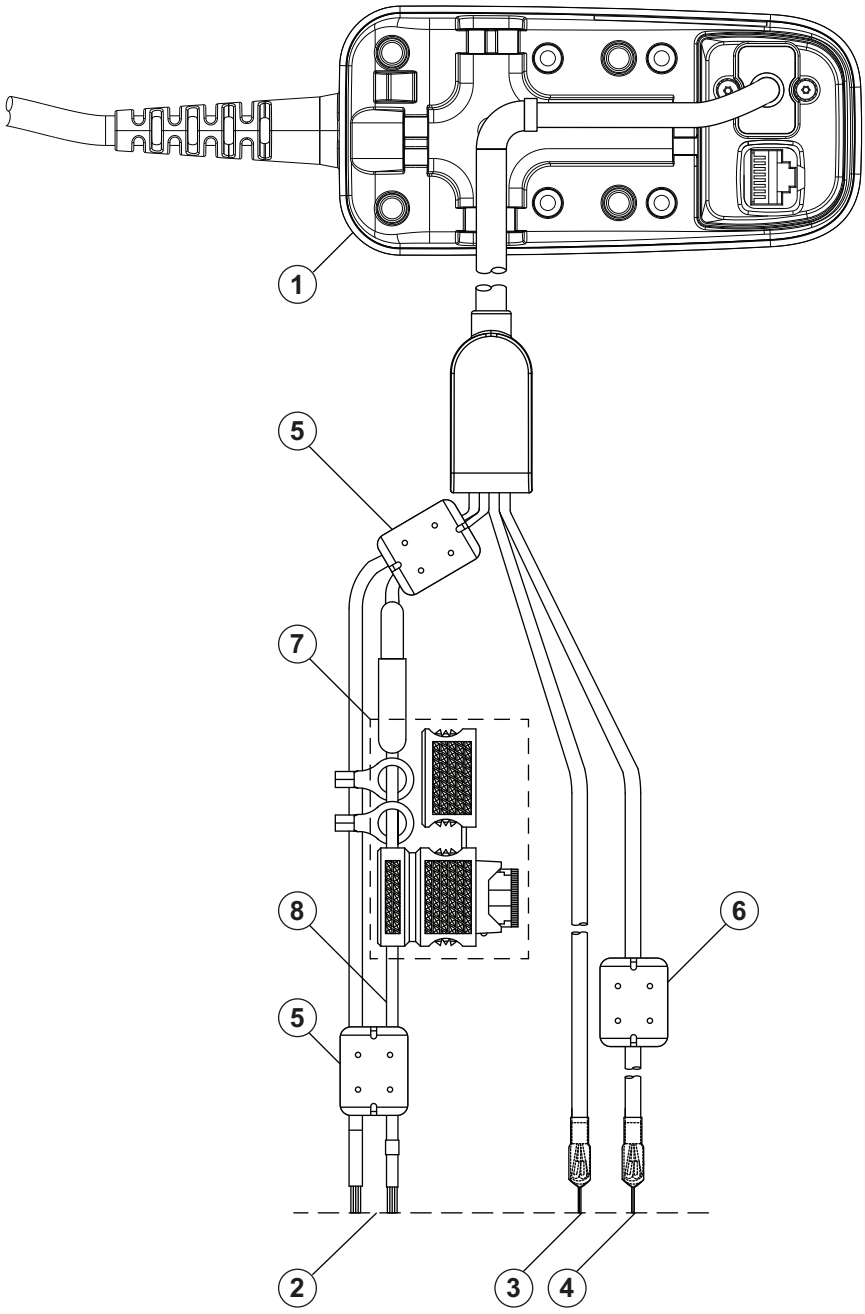


Table 47: Associated Components

Number	Item	Description
1	Telephone Style Control Head	-

Number	Item	Description
2	Ground Wire and External Power Wire, Input supply 12 V/24 V: 2 A	The connections correspond to P3 and P4, detailed in Telephone Style Control Head Y-Cable (Accessories Expansion Cable) on page 118, which provides the Pin Diagram of PMKN4134_. P3 is the 12 V or 24 V positive DC supply input and P4 is the Ground. This supply is for the Audio Power Amplifier and is required to connect a Loudspeaker is to the TSCH. Note that this is the only Power connection allowing 12 V or 24 V operation. All other Power supplies must be 12 V.
3	Speaker Wires	The connections correspond to P5 detailed in Telephone Style Control Head Y-Cable (Accessories Expansion Cable) on page 118 and correspond to the Loudspeaker output of the TSCH. The Audio Amplifier, which supplies this output, requires an independent DC Supply. Refer to Number 2. The use of connector kit PMLN6487_ allows a plug-and-play installation of the associated Loudspeakers such as RSN4002_.
4	Free-end Wires	When used during installation, heat-shrink wrap unused wires to prevent shorting. These connections correspond to P2, as detailed in Telephone Style Control Head Y-Cable (Accessories Expansion Cable) on page 118. These connections provide multiple functions including Hands Free Microphone PTT1 and PTT2, and Emergency. The use of IMPRES Visor Microphone RMN5054_ also requires the One Wire bus connection provided on this cable.
5	Ferrite Clamp (91012044002)	Manual installation is required. Clamps are installed with 2-turns of wire around the clamp.
6	Ferrite Clamp (91012044003)	Manual installation is required. Clamps are installed with 2-turns of wire around the clamp. For easier installation on Free-end wires, remove the insulation jacket.
7	Fuse of 2 A (CP000122A01)	-
8	Label for Y-cable power rating	-

NOTE: Do not overtorque the TSCH Y-cable screw. Recommended screw torque is 2.0+/-0.1 lb-in.

3.3.9

Telephone Style Control Head

The Ethernet Style Handset can be installed both horizontally and vertically. When installing the telephone style control head, consider the wide viewing angle of the color display and the best direction to disengage the handset from the cradle.

Figure 29: Telephone Style Control Head (TSCH) Cradle

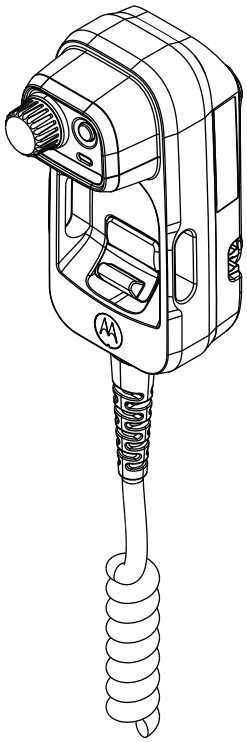
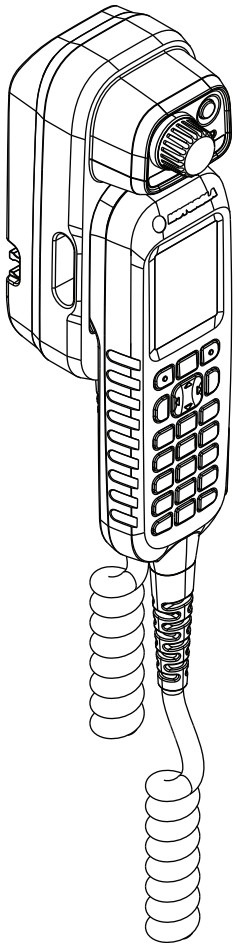
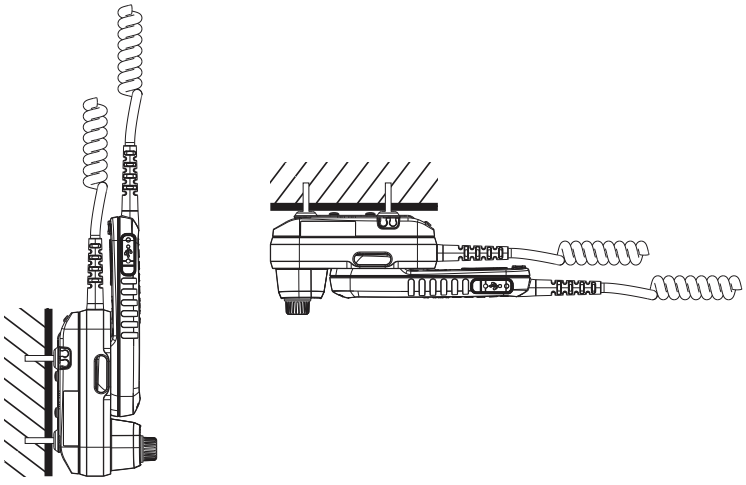


Figure 30: Telephone Style Control Head Handset and Cradle



IMPORTANT: Do not install the TSCH in the following ways.

Figure 31: Telephone Style Control Head Unsupported Installation



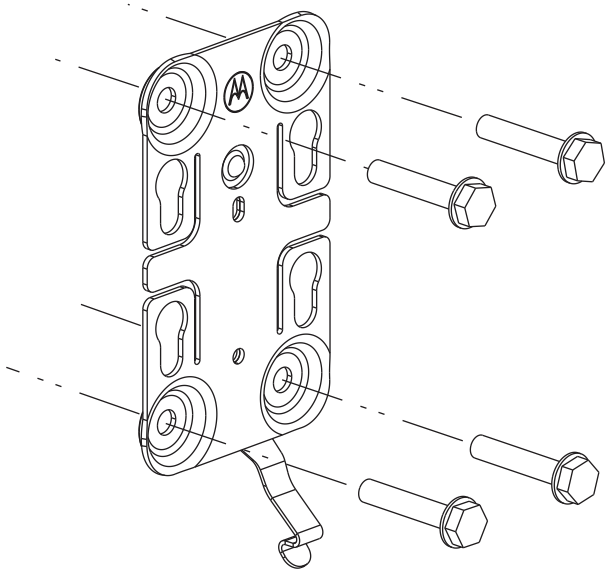
3.3.9.1

Mounting TSCH Cradle onto Slim Bracket

Procedure:

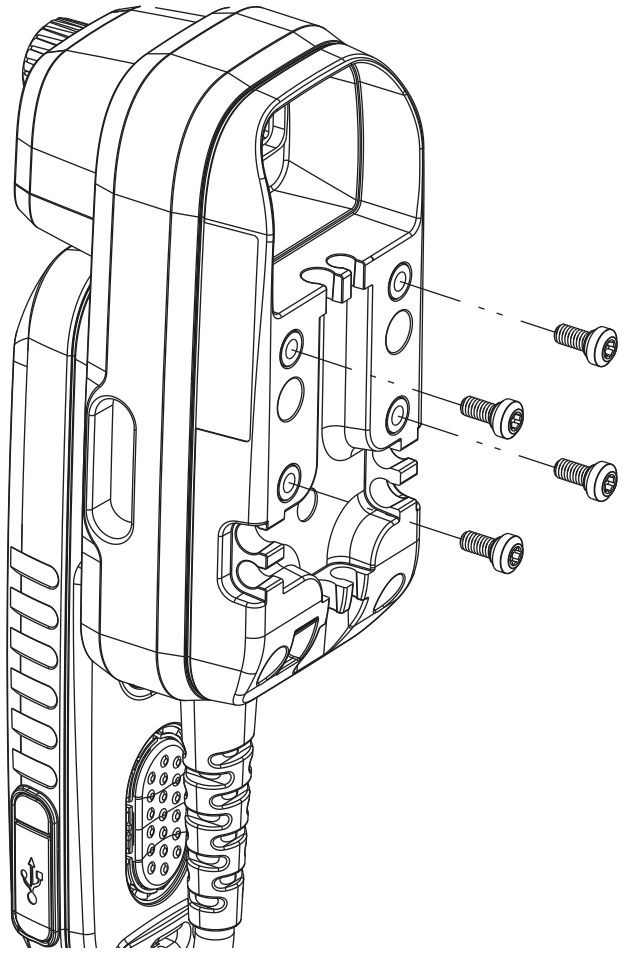
1. Place the bracket on the intended location. Tighten the four screws (0312002B14) to the screw holes.

   Figure 32: Slim Bracket



2. Align the four screws (03012069001) to the Telephone Style Control Head (TSCH) cradle. Tighten the screws with a 5 lbf in. (0.5649 Nm) screw torque.

Figure 33: TSCH Cradle Rear View



3. Screw the four screws to the keyholes on the bracket. Slot the TSCH cradle onto the Slim Bracket.

Figure 34: TSCH Cradle Rear View with Slim Bracket

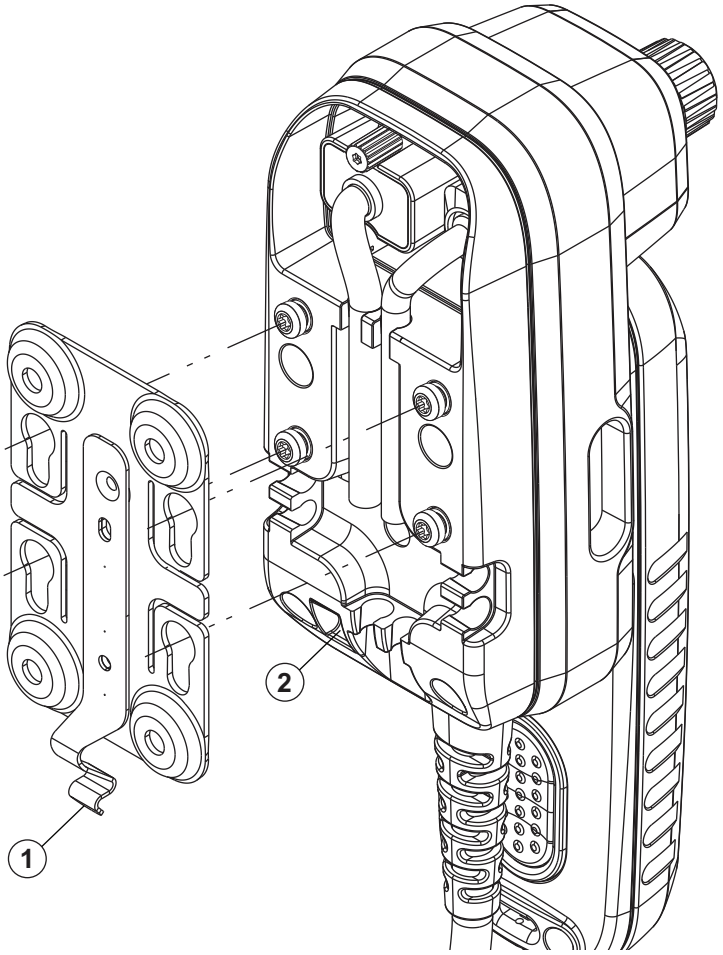
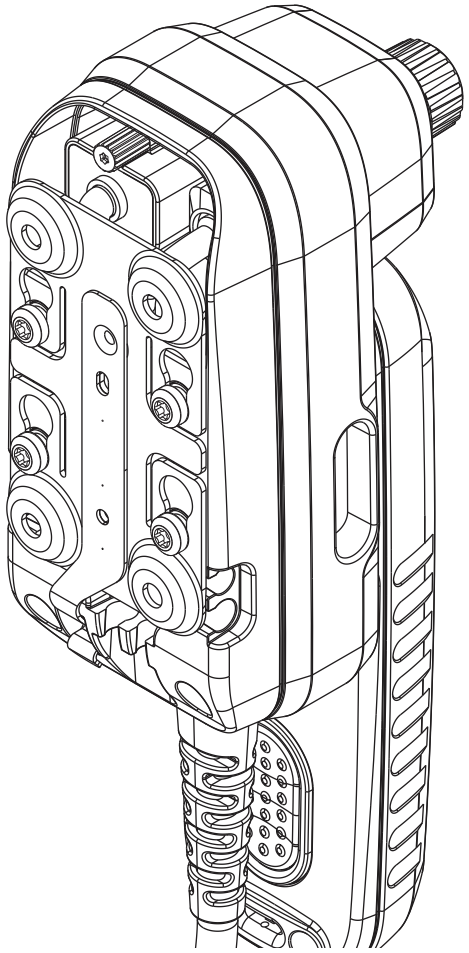


Table 48: Associated Components

Label	Description
1	Bracket Hook
2	TSCH Cradle Locking Slot

4. Pull down the TSCH cradle until the Bracket Hook is fully engaged to the TSCH Cradle Locking Slot.

Figure 35: TSCH Cradle Rear View with Attached Slim Bracket



3.4

Databox Expansion Head Installation

This section describes the installation of the Databox Expansion Head for your radio. Ensure that the battery terminals are removed or the transceiver is turned off during the whole installation.

3.4.1

Databox Expansion Head Radio without Control Head

The Databox Expansion Head can be used without a control head.

This configuration allows the use of your radio without any control head, allowing your radio to be turned on using the ignition switch.

The packet data or Short Data Service (SDS) using AT commands are available from the 9-pin subD connector (PEI), and from the Accessory Connector through the USB cable at the same time.

The Remote Push-to-Talk (PTT) can be connected using the 26-pin rear connector. Only one talkgroup is available, and that talkgroup is the first item on the configuration tool list.

3.4.2
Data Box Radio

This configuration allows you to control the Transceiver Box without Control Head through the Peripheral Equipment Interface (PEI). For example, a personal computer, laptop, console, and so forth. You can either use AT Commands that is recommended, or the TNP1 protocol from a Control Terminal.

In this configuration, the Control Terminal is a substitute for the Control Head. The Data Terminal is connected to the 9-pin socket of the Databox Expansion Head using the RS232 cable, or to the 26-pin accessory connector using the USB cable.

Figure 36: Data Box Radio Interface

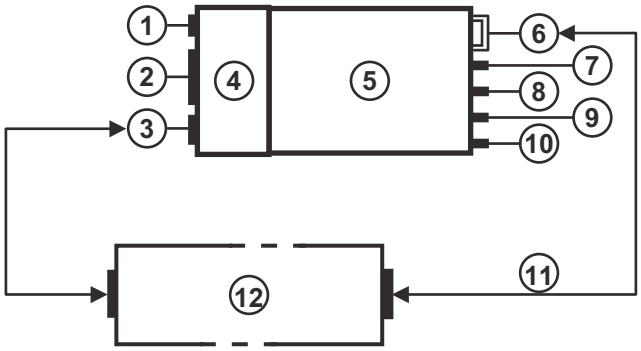


Table 49: Associated Components

Number	Description
1	Ethernet Connector (RJ50)
2	25-pin subD Connector (female)
3	9-pin subD Connector (female)
4	Databox Expansion Head
5	Terminal Transceiver Box
6	Accessory Connector (26-pin)
7	Power Connector
8	SMA Wi-Fi or Bluetooth Connector
9	SMA GNSS Connector
10	BNC RF Antenna Connector
11	USB Cable
12	Data Terminal (can be connected either from the front or the back of the Terminal Transceiver Box)

3.4.3
Databox Expansion Head with Third-Party Control Head

In this configuration, your radio supports two Control and Data Terminals in parallel. Both support AT Commands for Control and Data. See *AT Commands Programmer`s Guide*).

The Peripheral Equipment Interface (PEI) is used to transfer data between the Mobile Terminal and External Terminal. The PEI interface is available on both RS232 and USB physical layers depending on your radio configuration. In the Dash/Desk mount, or remote mount with no Expansion Head, your radio provides the

PEI using either 5-wire RS232, or USB at 26-pin Accessory Connector. When Expansion Head is connected, your radio supports PEI through both 9-pin SubD (RS232) at Expansion Head, and 26-pin Accessory Connector (USB).

The Databox Expansion Head can be used with a virtual head on a Personal Computer (PC) or a third-party control head.

This configuration allows the controlling of the Transceiver Box with a Control Terminal such as a PC, laptop, or console. In this configuration, the Control Terminal is a substitute for the Control Head.

Figure 37: Configuration with Two Control and Data Terminals

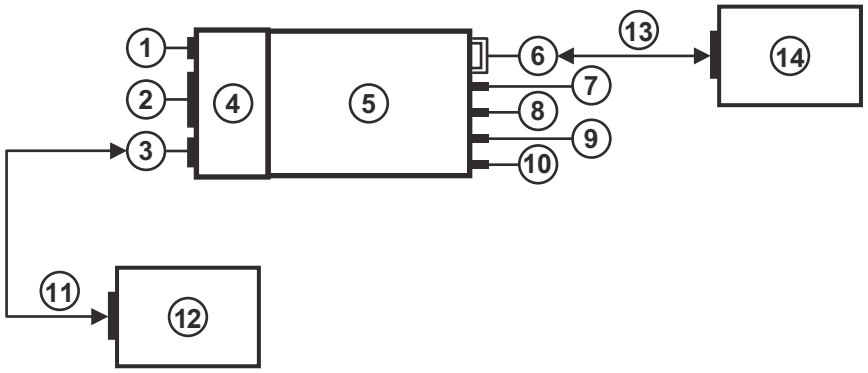


Table 50: Associated Components

Number	Description
1	Ethernet Connector (RJ50)
2	Connector (female) 25-pin SubD
3	9-pin subD Connector (female), 8-Wire RS232 PEI Interface
4	Databox Expansion Head
5	Terminal Transceiver Box
6	Accessory Connector (26-pin)/USB 2.0
7	Power Connector
8	SMA Wi-Fi or Bluetooth Connector
9	SMA GNSS Connector
10	BNC RF Antenna Connector
11	RS232 PEI Connection
12	Control and Data Terminal using RS232
13	USB 2.0 Cable for PEI and Programming
14	Control and Data Terminal using USB 2.0

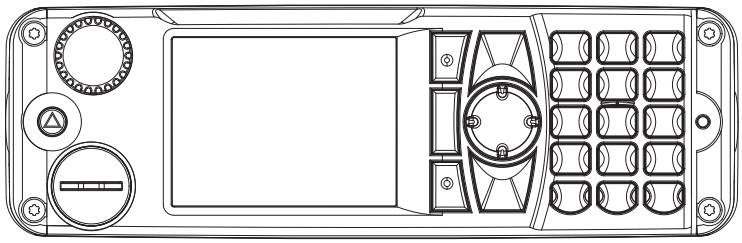
3.5
MXM600 with IP67 Remote Control Head

Motorola Solutions provides standard IP67 installation kits for a range of applications such as motorcycle, boat, and fire truck water pump area.

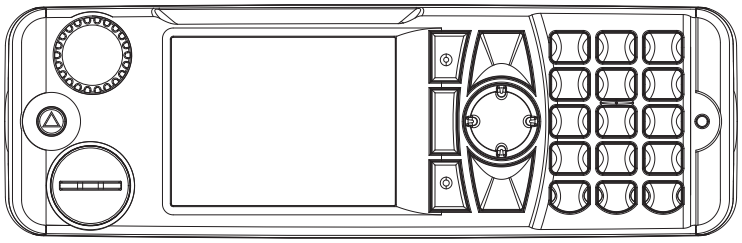
The keypad labeling of the control head varies according to the specific customer or country requirements. See Table 12: Control Heads on page 22.

MXM600 is compatible with two types of Remote Control Heads:

Figure 38: Comparison of RECH Types



IP67 RECH



IP54 RECH

Table 51: Compatibility of IP67 Control Heads

Control Head	Description
IP67 RECH	Compatible with all MXM600 Single Remote Expansion Head (SREH), Dual Remote Expansion Head (DREH), and Databox Expansion Head (DEH). Only use Ethernet IP67 remote cable. See Mechanical Parts List for IP67 Remote Mount Installation on page 75.
TELCO IP67 Control Head (Legacy)	Only compatible with PMLN4904_. Only use TELCO cables. See Mechanical Parts List for IP67 Remote Mount Installation on page 75.

Figure 39: Differentiation Between TELCO IP67 Control Head and IP67 RECH

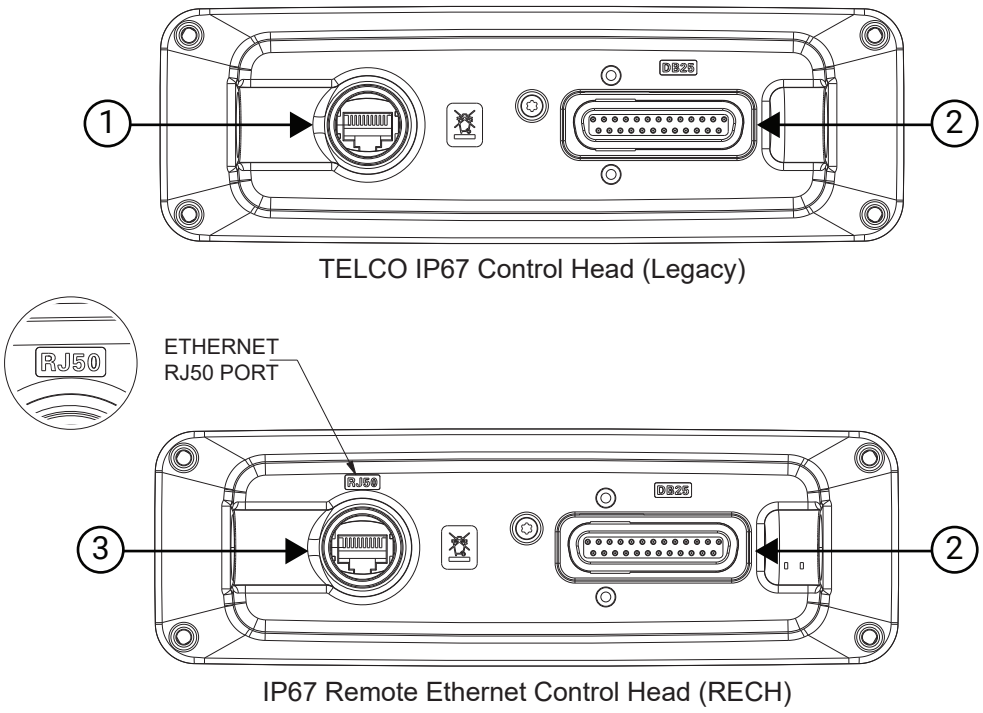


Table 52: Associated Components

Number	Description
1	10-Pin TELCO Connector
2	25-Pin DB25 Connector
3	Ethernet RJ50 Connector

3.5.1

Installing IP67 Remote Ethernet Control Head in a Motorcycle

NOTE:
Only persons who are competent and able to ensure that the complete installation fulfills regulatory requirements, such as ElectroMagnetic Compatibility (EMC) are allowed to plan the installation.

Ensure that the distance from the antenna location on the transceiver enclosure is at least 30 cm or 1 ft to the motorcycle operator in compliance with RF Energy Safety standards. To ensure that human exposure to radio frequency electromagnetic exposure is within the guidelines referenced in this document, transmit only when bystanders are at least 90 cm or 3 ft from the motorcycle.

Prerequisites:
Ensure that the transceiver box is turned off during installation.

Before you drill a hole or run a wire, inspect the vehicle. Determine the method and location that you intend to mount the antenna, radio, and accessories. Plan wire and cable runs to provide maximum protection from pinching, crushing, and overheating.

The following list of considerations should, as a minimum, be checked during installation planning:

Figure 40: Motorcycle Installation

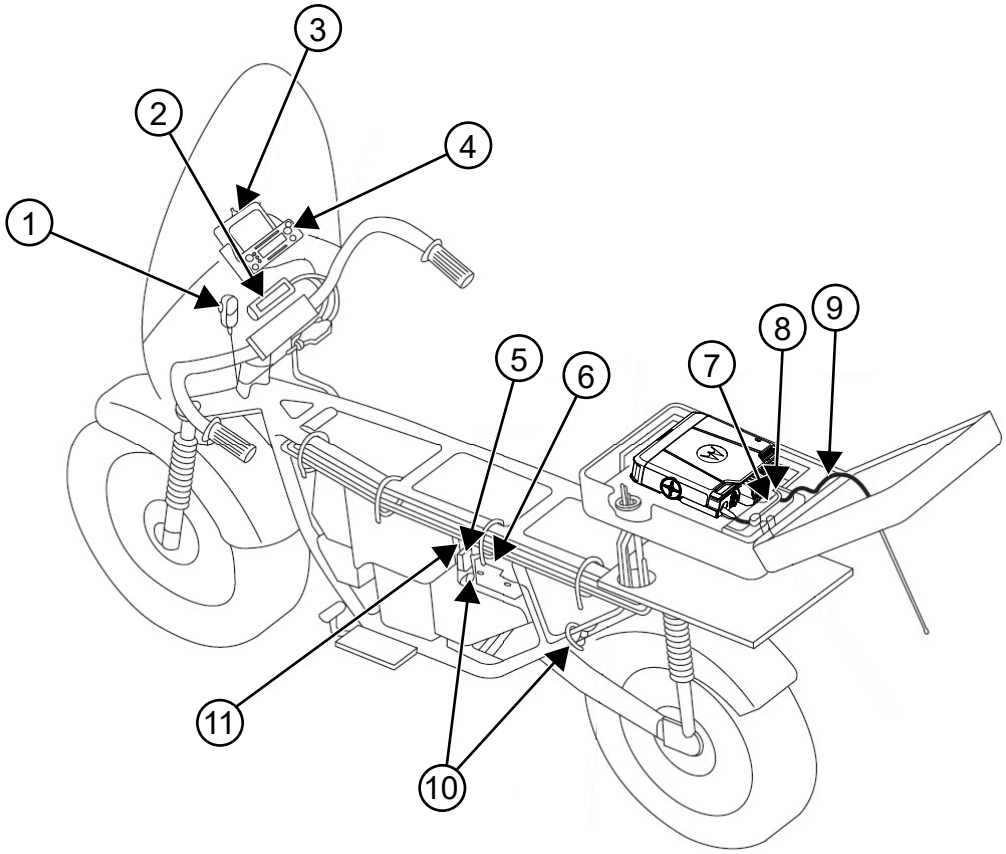


Table 53: Motorcycle Installation Description

Number	Description
1	Microphone
2	Control Head Cable
3	Speaker
4	Control Head
5	Fuse Block
6	Battery
7	Power Cable
8	Accessory Cable
9	Antenna

Number	Description
10	Chassis Ground
11	Ignition Cable

Procedure:

1. Place the transceiver in the box at the back of the motorcycle.
2. Mount the IP67 Remote Ethernet Control Head (RECH) horizontally at a position that enables the driver to view the controls and operate them easily.
3. Ensure that the IP67 RECH is close enough to the vehicle operator to permit easy access to operating controls.
4. Mount the IP67 RECH directly on the chassis or handle part.
5. Ensure that the units mounted in the motorcycle box are protected from dirt and moisture.
6. Verify that sufficient space is available around the units to allow air flow and removal.
7. Verify that the cable from the IP67 RECH on the handlebars to the radio unit is long enough to allow sufficient space for turning the handles.
8. Route the antenna in the shortest way to minimize power loss over the cable.
9. Check that the mounting surfaces are able to support the weight of the units.

   NOTE: If a combined TETRA/GNSS/Bluetooth/Wi-Fi antenna is used, the antenna housing carries the GNSS/Bluetooth/Wi-Fi transmitter and receiver. Ensure not to cover the antenna housing with metal or other radio wave absorbing materials.
10. Slide the IP67 RECH onto the mounting trunnion until it locks into place.
11. Tighten the screws at both sides of the trunnion. After a few turns, tilt the IP67 RECH for an optimum view of the display. Then, complete the tightening of the screws.
12. Mount the motorcycle trunnion in an upward movement or downward movement.

    The movement is limited to a 77° angle.

Figure 41: Upward Movement

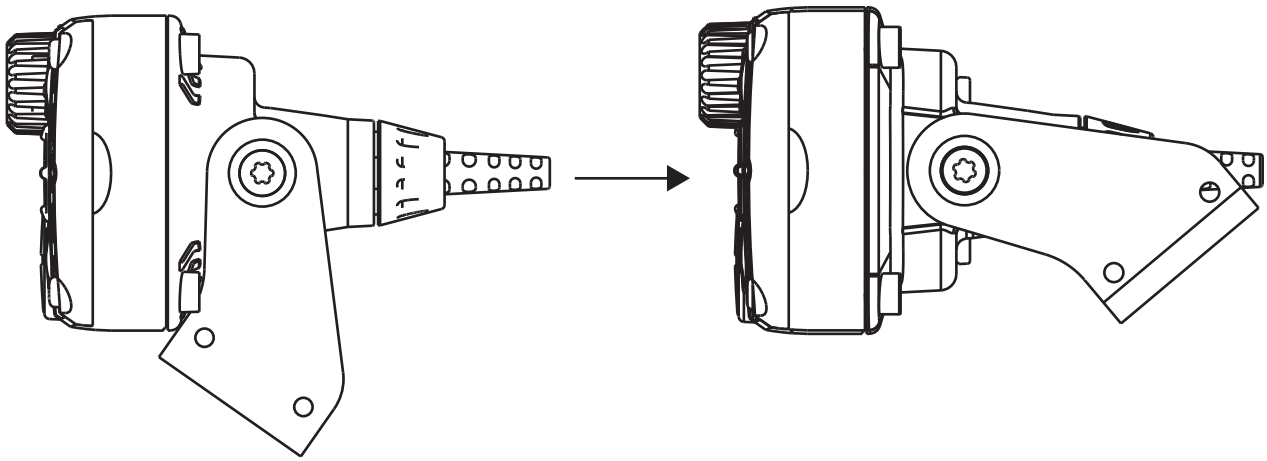
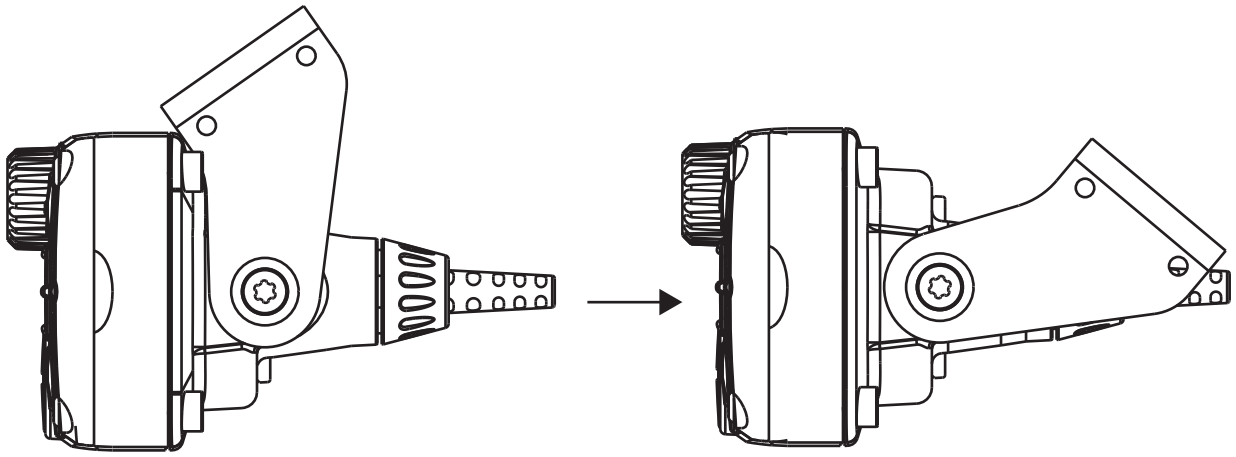


Figure 42: Downward Movement



3.5.2

Mechanical Parts List for IP67 Remote Mount Installation

Figure 43: IP67 Remote Ethernet Control Head (RECH) Mounted in a Trunnion

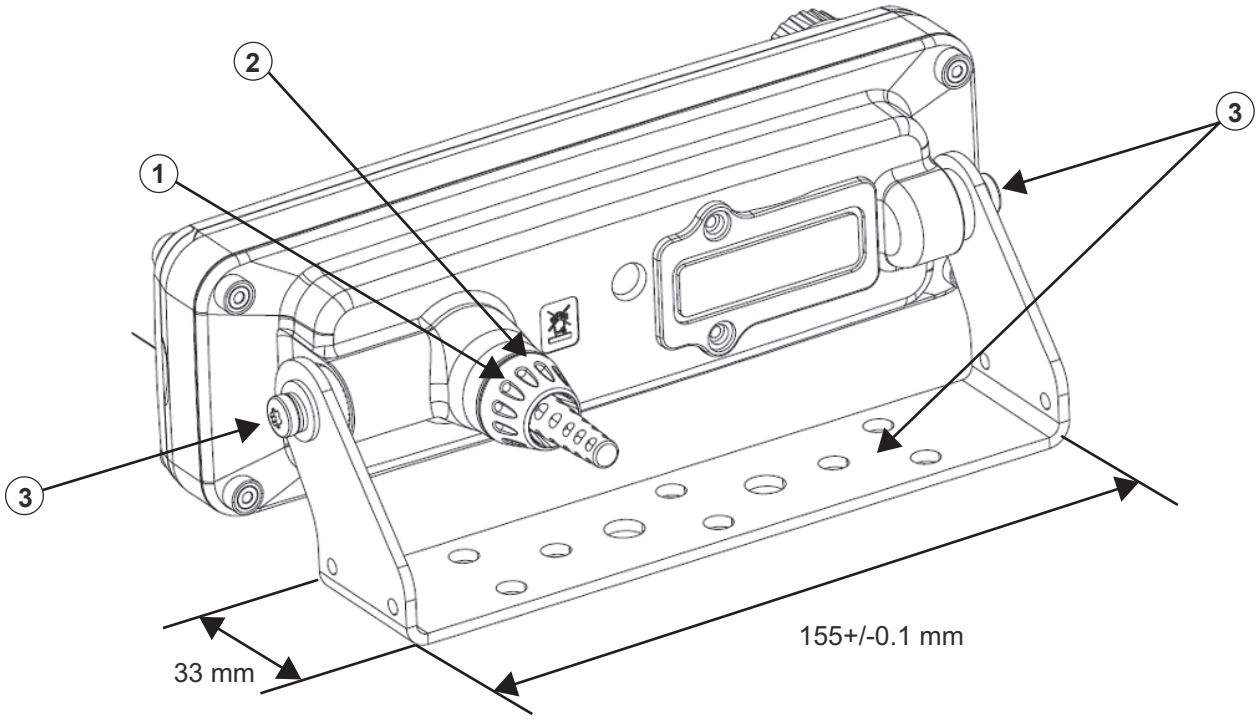


Table 54: Mechanical Parts List for Installation

Item	Description	Part Number
1	IP67 RECH Ethernet Cable	PMKN4320_ (3 m) **NOTE:** Recommended for Motorcycle Mount.
		PMKN4321_ (5 m)
		PMKN4322_ (7 m)
		PMKN4323_ (10 m)
		PMKN4324_ (15 m)
		PMKN4325_ (40 m)
2	Motorcycle Remote Control Head (TELCO) Cable	PMKN4030_
3	IP67 RECH Trunnion Kit	PMLN5092_

3.5.3
Extra Connectivity to the IP67 Remote Ethernet Control Head

For information on adding extra connectivity using the Accessories Expansion Cable and the Mobile Microphone Port (MMP). See Installing the Accessories Expansion Cable on page 58.

3.6
Junction Box Installation

The data junction box (GMLN7825_) assists easy installation for dash and remote mount configurations.

The junction box allows you to add a laptop to the remote configuration. The junction box allows connections of a visor microphone, various accessories, or fist microphone.

WARNING: The junction box (GMLN7825_) is only compatible with MXM600.

NOTE: Only trained personnel can install the mobile terminal. All installations must take place in accordance with the requirements of the vehicle and antenna manufacturer or supplier.

Figure 44: Junction Box Installation (Rear)

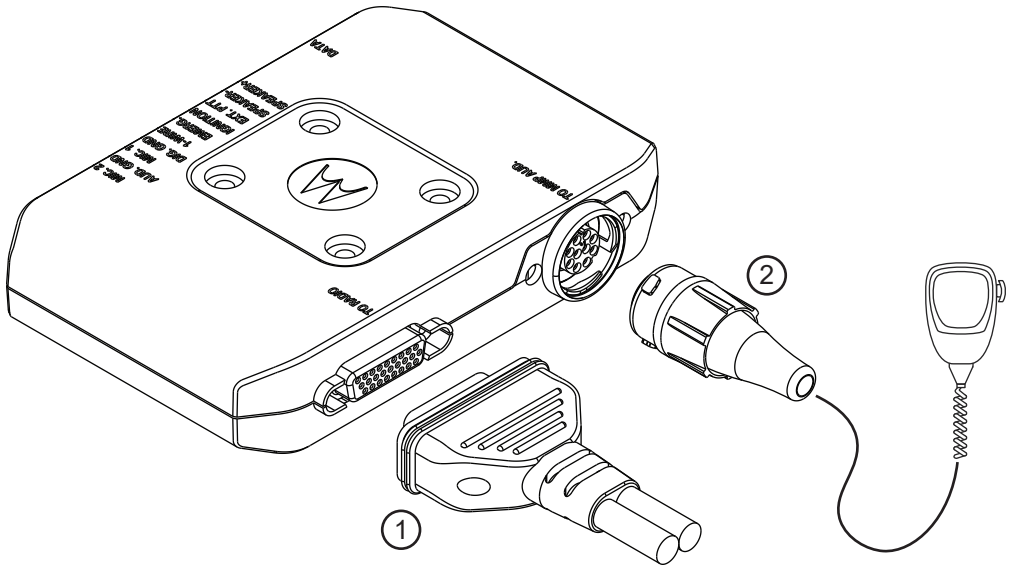


Figure 45: Junction Box Installation (Front)

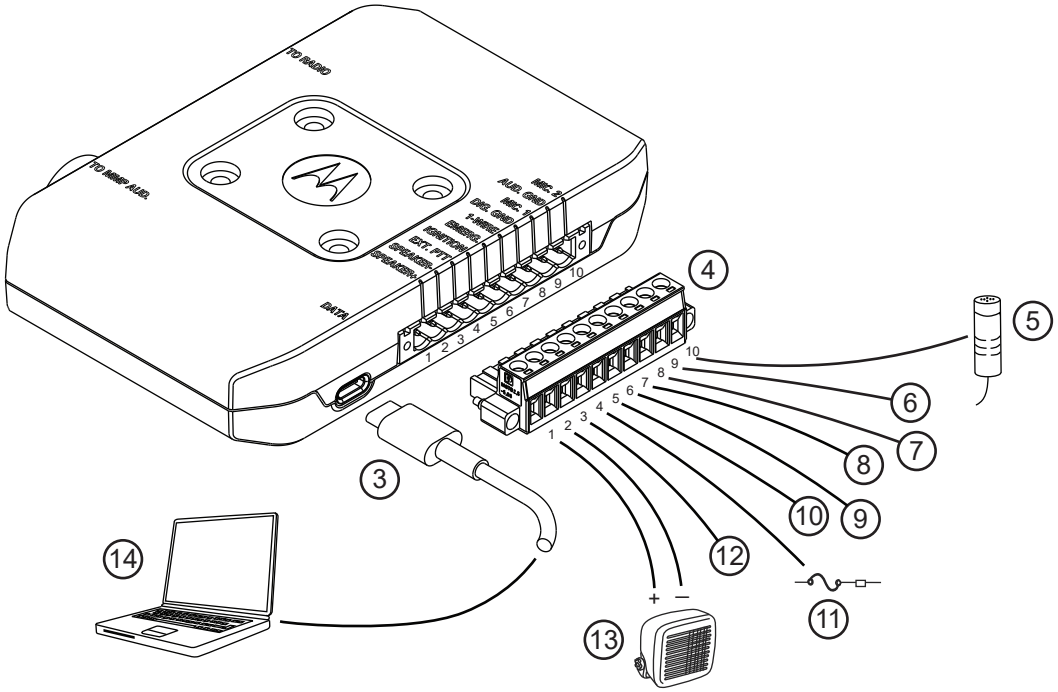


Table 55: Junction Box Installation Description

Number	Description
1	Connecting cable between junction box and mobile (MXM600) terminal (Accessory plug on rear side of the transceiver)
2	GCAI connector for Mobile Microphone Port (MMP) audio accessories
3	USB-C for programming and data (PEI)
4	Accessory plug
5	Mic +2 (smart noise canceling visor mic)
6	Mic GND
7	Mic +1
8	GND
9	1-Wire
10	Emergency cable
11	Ignition sense cable
12	External PTT
13	Speaker
14	Laptop

NOTE: The junction box PCB is not repairable. Order a new junction box as necessary.

3.6.1
Installing the Junction Box

The junction box can be installed horizontally or vertically. The junction box has no connector sealing and is designed for use in locations that are not exposed to dust and water.

Procedure:

1. Secure the data junction box using the four screws supplied with the kit.
2. Connect the connection cable PMKN4302_ (5 m in length), PMKN4301_ (4 m in length), or PMKN4300_ (2 m in length) from the junction box to the accessory connector on the rear side of the transceiver.

   The cable used is for installation purposes only, and must be ordered separately.
3. Fasten the cable with the plug screws.

3.6.2
Connecting Accessories to the Junction Box

Procedure:

1. Connect all accessories to the junction box.
2. Connect the cable from the mobile terminal to the junction box.
3. Connect the programming cable to the junction box, if required.

3.6.3

Connectors on the Junction Box

Figure 46: Connectors on the Junction Box – Rear Panel

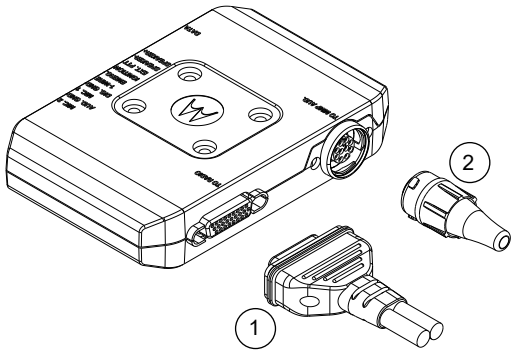


Table 56: Associated Components

No.	Part/Kit Number	Description
1	PMKN4302_ (length 5 m)	Connecting cable from Junction Box to MXM600 (rear side 26-pin accessory connector) for installation purpose only
	PMKN4301_ (length 4 m)	
	PMKN4300_ (length 2 m)	
2	–	GCAI connector for Mobile Microphone Port (MMP) audio accessories

Figure 47: Connectors on the Junction Box - Front Panel

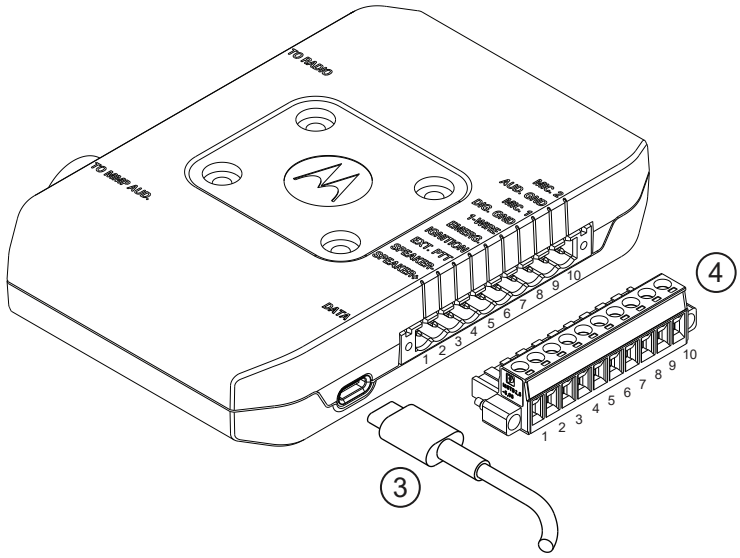


Table 57: Associated Components

No.	Part/Kit Number	Description
3	USB-C	For programming and data (PEI)
4	pin 1	Speaker +
	pin 2	Speaker -
	pin 3	External PTT
	pin 4	Ignition Sense
	pin 5	Emergency
	pin 6	1-Wire
	pin 7	Digital Ground
	pin 8	MIC_1
	pin 9	Audio Ground
	pin 10	MIC_2

CAUTION: PIN 4: To short the ignition to the ground, use an adapter between your radio and the accessory connector. Interference can cause your radio to hang.

3.6.4

Connection Plan for the Junction Box Accessory Plug

Figure 48: Connection Plan for the Speaker

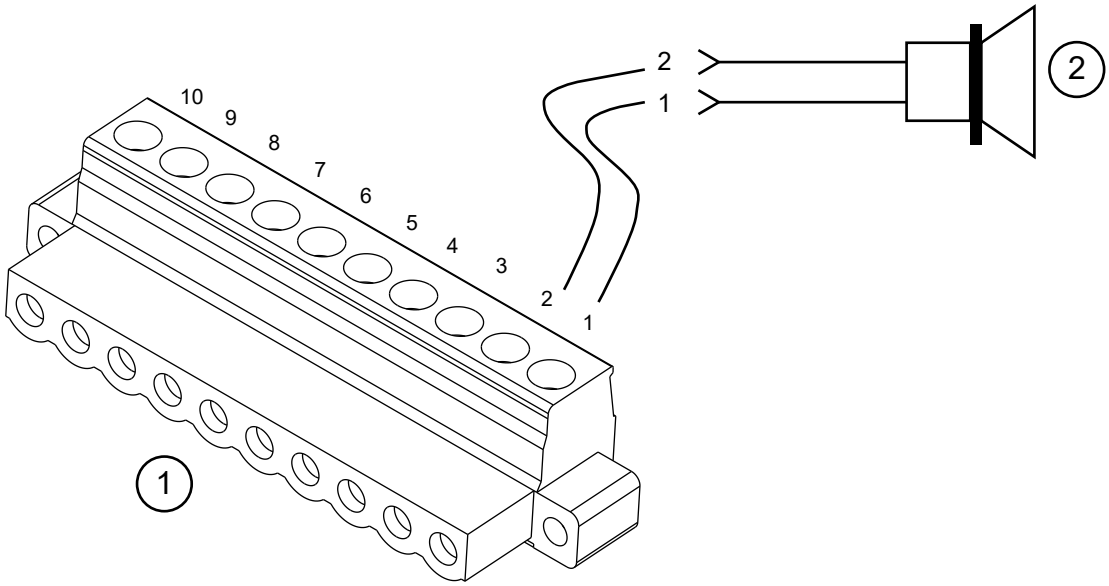


Table 58: Associated Components

Number	Description
1	Junction Box 10 Pin Accessory Plug
2	Speaker

Figure 49: Connection Plan for the Emergency Switch

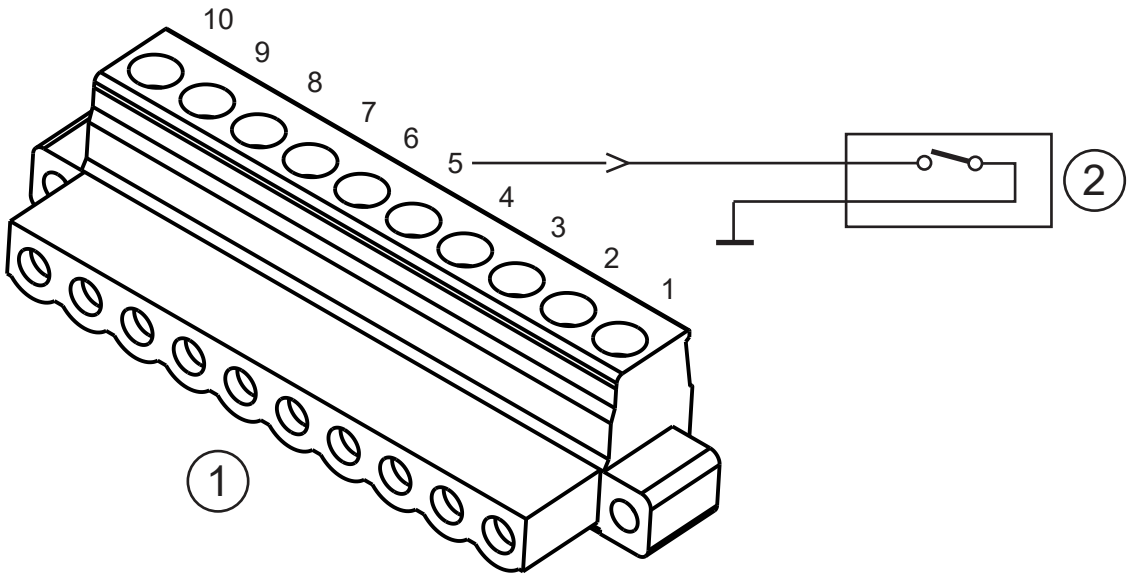


Table 59: Associated Components

Number	Description
1	Junction Box 10 Pin Accessory Plug
2	Emergency Switch

Figure 50: Connection Plan for the Ignition Sense Cable

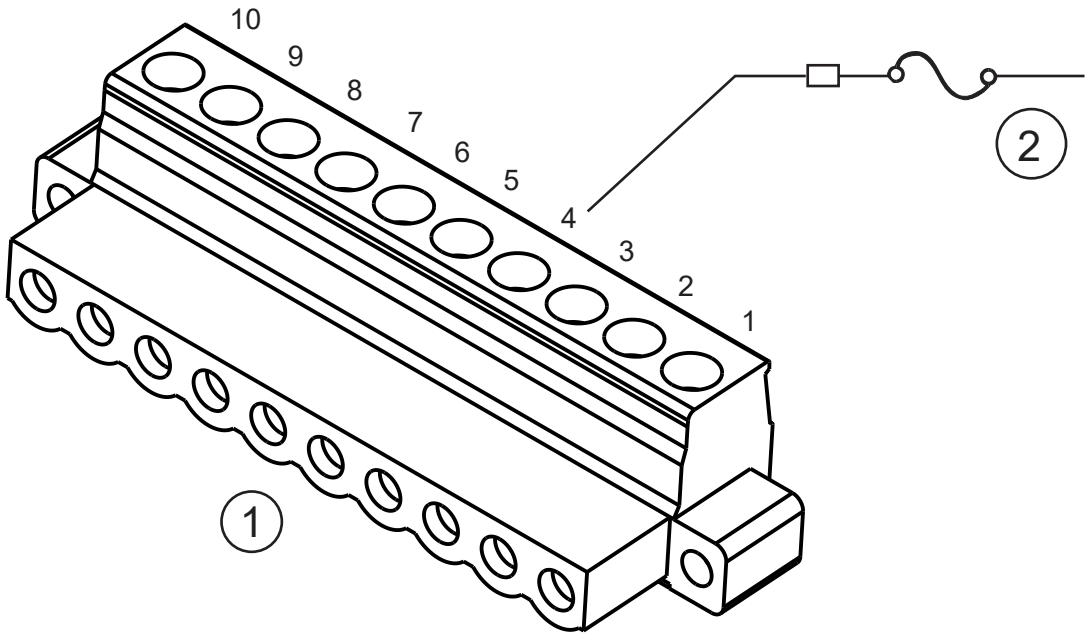


Table 60: Associated Components

Number	Description
1	Junction Box 10 Pin Accessory Plug
2	To Ignition Switch, Ignition Switch Cable, Switched Battery Voltage

Figure 51: Connection Plan for External Push-To-Talk (PTT)

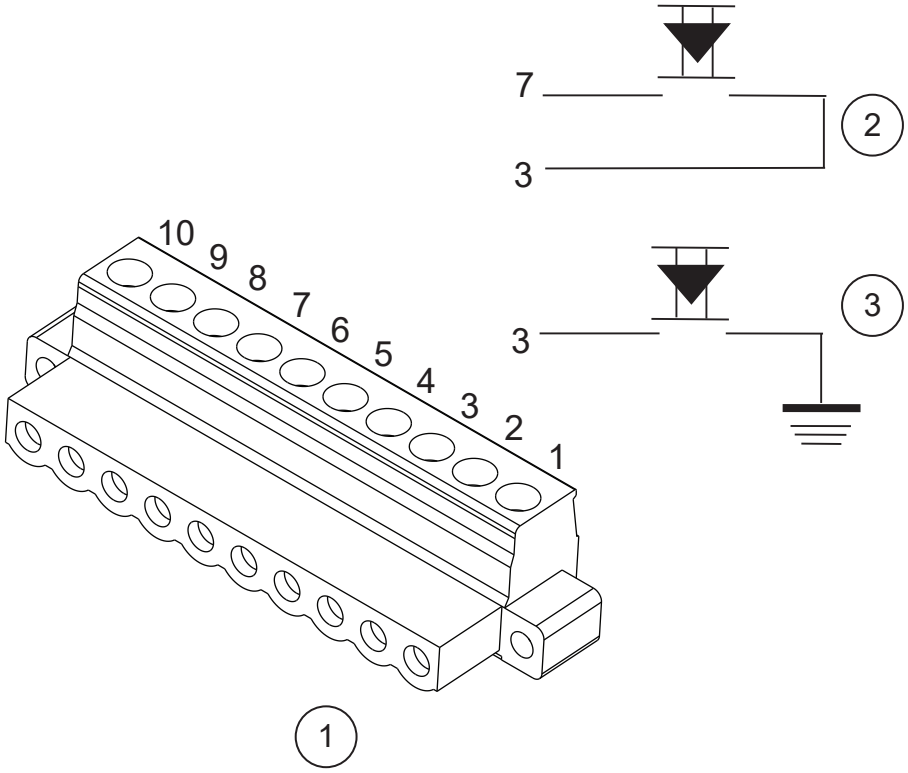


Table 61: Associated Components

Number	Description
1	Junction Box 10 Pin Accessory Plug
2	External PTT Version A
3	External PTT Version B

3.6.5
Installing the Ignition Sense Cable

Procedure:

1. Connect the stripped lead of the fuse holder cable only to an ignition switched terminal of the fuse block.

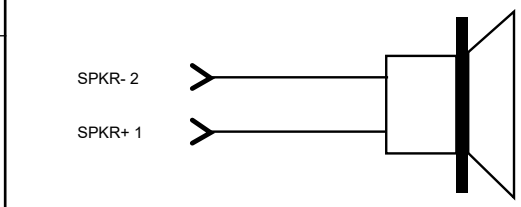
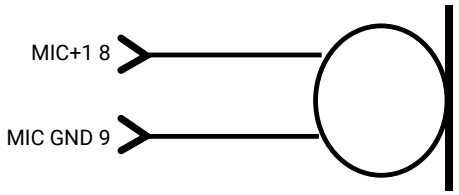
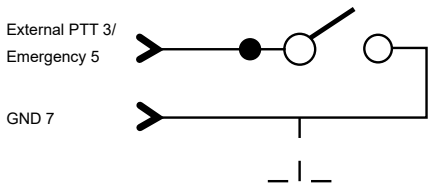
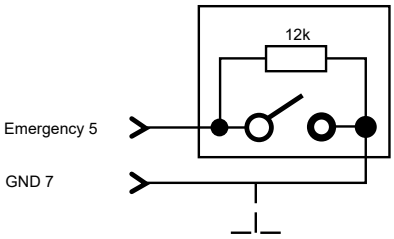
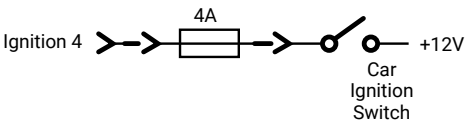
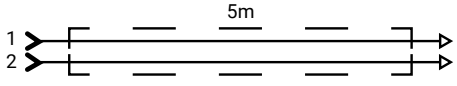
   Use the supplied terminal or any other suitable terminal.
2. Mount the fuse holder using the mounting hole, and dress wires as required.
3. Cut the thin cable to the required length, crimp the supplied red lead to the stripped lead of the thin cable, and connect it to the blue terminal of the fuse holder cable.
4. Connect the other end of the ignition sense thin cable to pin 4 of the junction box terminal.

5. Insert the provided fuse into the fuse holder and close the cover.

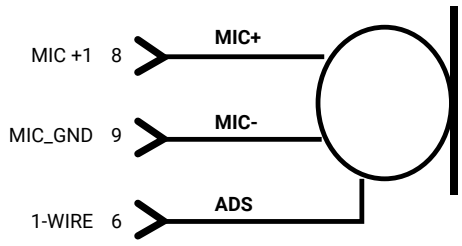
CAUTION: PIN 4: Ground the ignition line if it is not in used. Interference can cause your radio to hang.

3.6.6
Connection Plan for Accessory Plug

Table 62: Connection Plan for Accessory Connector Kit

Part Number	Description	Cable Connectivity
RSN4002 _	Speaker 13 W	
RSN4003_	Speaker 7.5 W	
PMMN4087_	Visor-mounted micro-phone	
RLN5926_[1]	Push button for Push-to-Talk (PTT)	
RLN4858_ [1]	Goose neck PTT	
RLN4836_	Tri-state emergency foot switch and cable	
PMKN4120_	Ignition sense cable	
PMKN4119_	Speaker extension cable	

[1] You can use this accessory for the Push-To-Talk (PTT) or Emergency function.

Part Number	Description	Cable Connectivity
RMN5054_	Smart-visor microphone	

3.7

Installing the Trunnion

The trunnion allows the terminal to be mounted to various surfaces. The trunnion must be securely fixed to the vehicle chassis.

The MXM600 is compatible with the following trunnions:

- GLN7317 High Profile
- GLN7324 Low Profile
- RLN4779 Key Lock Bracket
- PMLN8620_ MXM600 Standard Trunnion Kit

The PMLN8620_ is an enhanced trunnion kit that comes with screw hole alignment features. It allows the mobile radio prealigned to the enhanced trunnion screw holes, and uses guide rings on the trunnion to guide the wing screws tighten to the mobile radio.

Procedure:

1. Ensure that the surface can support the weight of the terminal.

   NOTE: Although the trunnion can be mounted to a plastic dashboard, you are recommended to locate the mounting screws to penetrate the supporting metal frame of the dashboard.

2. Ground your radio housing to the nearest vehicle chassis ground point. To ground your radio housing, perform one of the following:
   - Remove the paint from the part of the trunnion that touches your radio and vehicle chassis.
   - Connect a short cable with ring lugs on both ends to the chassis under the wing screw.

Figure 52: Terminal into Low or High Profile Trunnion (GLN7324_ / GLN7317_)

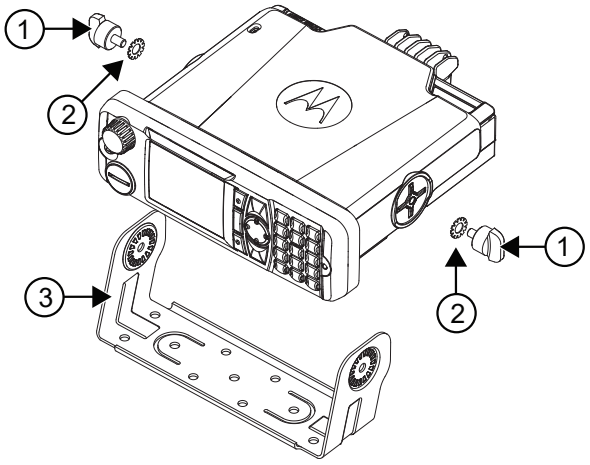


Figure 53: Terminal into Enhanced Trunnion Kit (PMLN8620_)

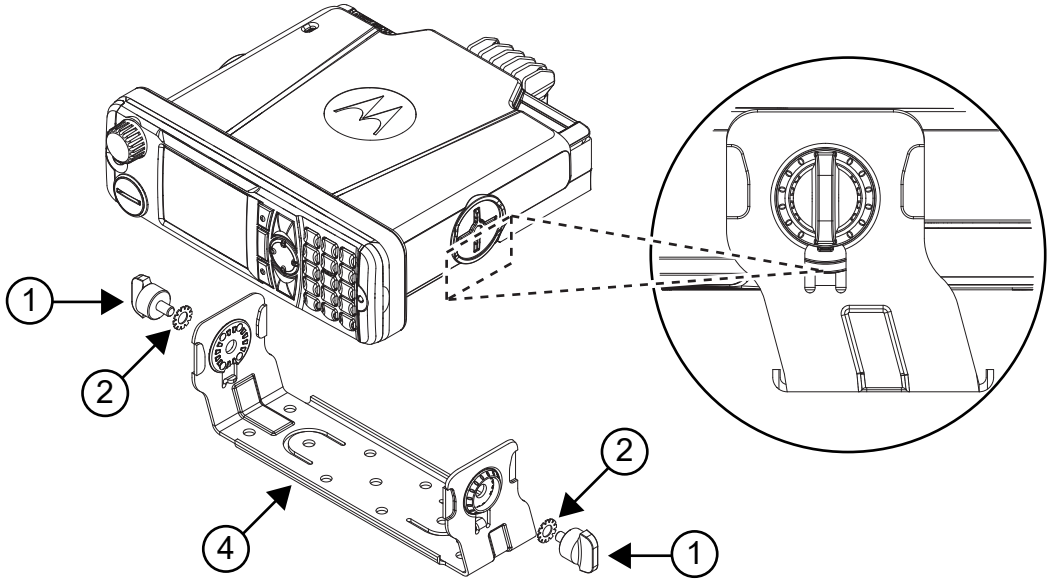
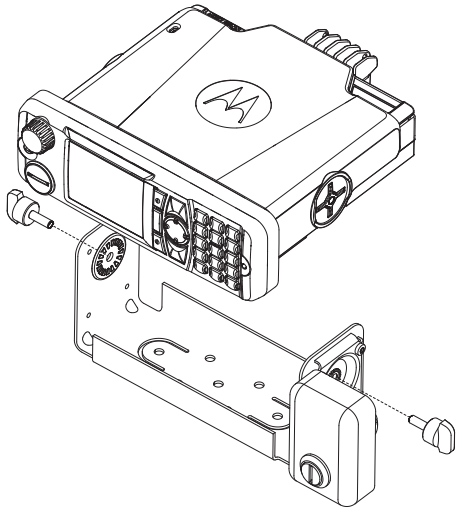


Table 63: Associated Components

Number	Part Number	Description
1	0302637Y01	Wing screws included in the Trunnion Mount Kit.
2	0400002647	Washer 2x
3	GLN7324_, GLN7317_	Trunnion
4	PMLN8620_	Enhanced Trunnion

Figure 54: Terminal into Key Locked Mount Trunnion (RLN4779_)



3. Select the transmission hump, or open underneath portion of the dash to mount your terminal.

   When mounting the trunnion on the transmission hump, be careful that the transmission housing is not affected.

4. To mark the hole positions on the mounting surface, use the trunnion mounting bracket as a template.

   Use the innermost three holes for a curved mounting surface, such as the transmission hump, and the three outermost holes for a flat surface such as under the dash.

5. To drill a hole at each location, center-punch the spots you marked and use a 4 mm (5/32 in.) bit for drilling.

6. To secure the trunnion mounting bracket to the mounting surface, use the three self-tapping screws provided.

7. Slide the terminal into the trunnion. Secure the terminal with the two wing screws provided.

   NOTE: The keypad labeling of the control head varies according to the specific customer or country requirements.

8. Ground your radio housing to the nearest vehicle chassis ground point. To ground your radio housing, perform one of the following:

   - Remove the paint from the part of the trunnion that touches your radio and vehicle chassis.
   - Connect a short cable with ring lugs on both ends to the chassis under the wing screw.

Figure 55: Top of Dash Mount

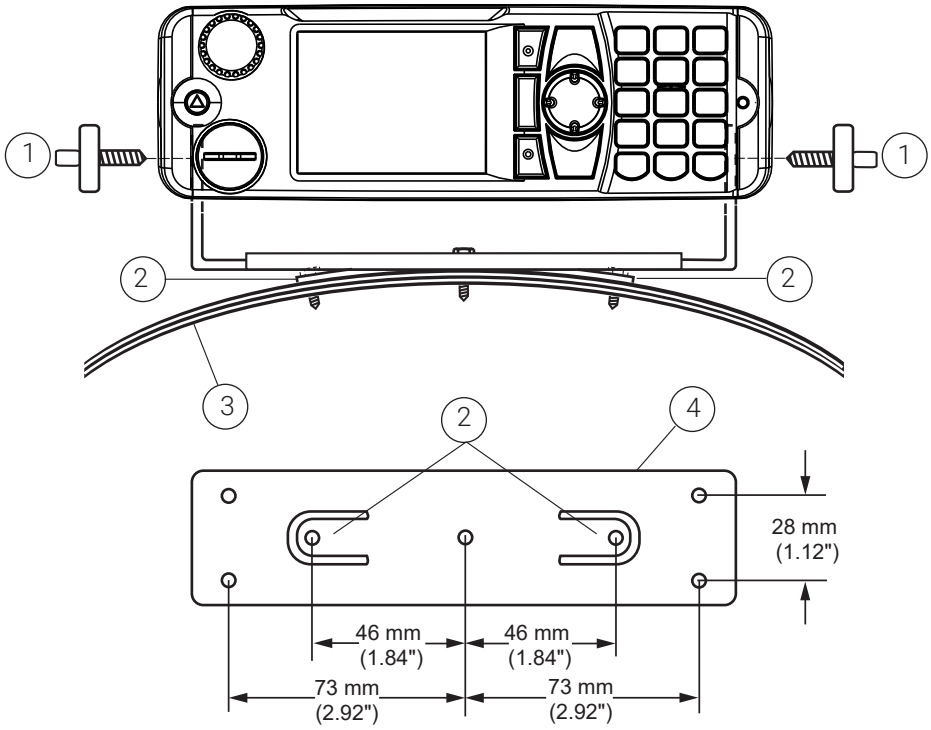


Table 64: Associated Components

Number	Description
1	Wing screw
2	Tab
3	Mounting surface
4	Trunnion mounting bracket

The compatible trunnion kit comes complete with the following:

- 0771061L01 – GLN7317_Bracket, Standard Trunnion, or
- 0771061L02 – GLN7317_Bracket, Low Trunnion, or
- BR000490A01 – PMLN8620_ Bracket, Enhanced Trunnion
- 0302637Y01 – Wing Screw M5x7.9 mm, quantity 2
- 0400002647 – Lock Washer, quantity 2
- 0312002B14 – Self-drill Steel 10-16x1, quantity 4

Figure 56: Below Dash Mounting

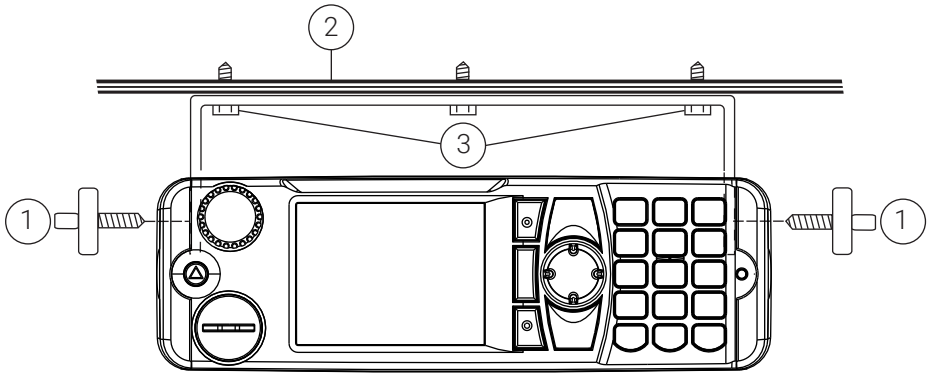


Table 65: Associated Components

Number	Description
1	Wing screw
2	Mounting surface
3	Sheet metal screws

Chapter 4

Connectors and PIN Assignment

This section describes the connectors and pin assignments available for your radio.

4.1 Transceiver Front – Pin Functions

Figure 57: Transceiver Front View - Dash/Desk Control Head and Expansion Head Interface

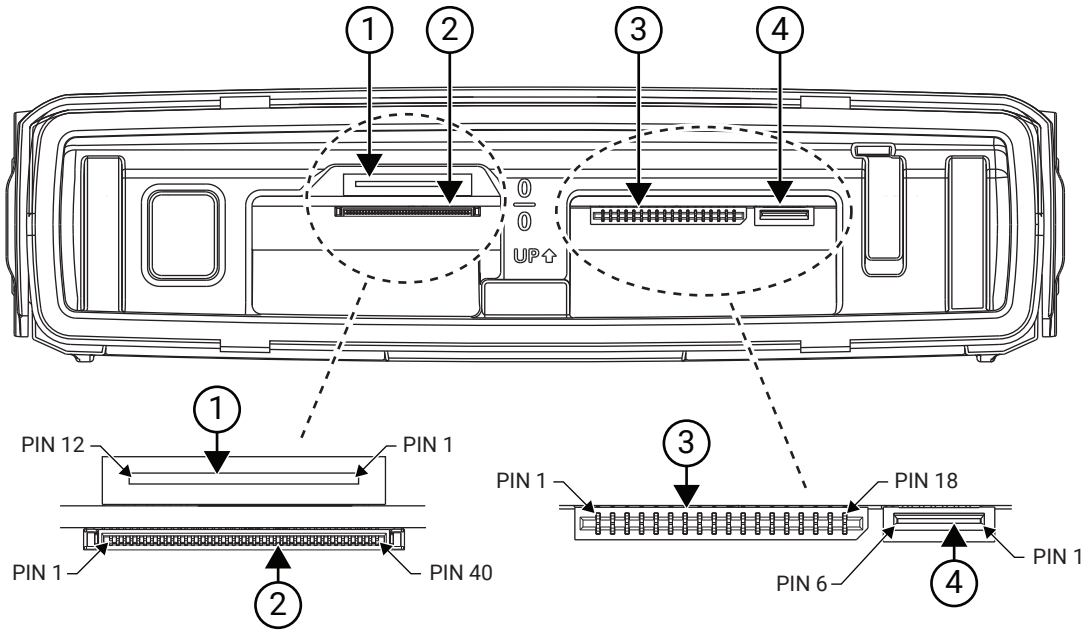


Table 66: Transceiver Front View

Number	Description
1	12-Pins FPC CONN 0916162H02
2	40-Pins ZIF CONN CN002046A01
3	18-Pins FPC CONN CN002031A03
4	6-Pins FPC CONN CN002104A01

Table 67: Transceiver Pin Assignment of the Enhanced Control Head Interface (12-Pins)

Pin	Function	Description
1	SCI_TX	Serial Communication Interface TXD
2	TBD	Not-Connected – SPEAKER+ line in transceiver
3	TBD	Not-Connected – SPEAKER- line in transceiver

Pin	Function	Description
4	GND	Ground
5	EXTERNAL-PTT	External PTT
6	5VD	+ 5 V regulated
7	HANDSET_AUDIO	Handset audio
8	BUS +	Either SBEP or Serial Communication Interface
9	INT_MIC	Microphone input – impedance of 560 Ω
10	FLT_A +	Filtered A+
11	ON_OFF_CONTROL_SV	Terminal On/Off Control shared with Enhanced Control Head request
12	GND	Ground

Table 68: Transceiver Pin Assignment of the Expansion Board Connector (40-Pins)

Pin	Function	Description
1	GND	Ground
2	EXPH_GPIO1	New GPIO reserved.
3	SPIB_CLK	Part of the QSPIB
4	GND	Ground
5	FLT_A+	Continuous battery voltage for sense via 22 Ω
6	RESET_OUT	Reset, it is an output to reset the device.
7	ON_OFF_BR	On/Off functionalities. Connected to dual core processor at 1.8 V level
8	ON_OFF_CONTROL_5V	Terminal On/Off Control shared with Enhanced Control Head Request
9	3V3_DIG	3.3 V Sense Output (max 10 mA)
10	EXP_REQ	Request Line from 4Wire / UART
11	SPIB_CS_UART	Part of the QSPIB (chip select) for 4wire RS232 UART
12	SPIB_CS_NEW	For future use; 1.8 V logic level
13	SPIB_MISO	Part of the QSPIB
14	I2C_SDA	I2C Data; 1.8 V logic levels
15	SPIB_MOSI	Part of the QSPIB
16	IRQ-40-pin	Interrupt for external device for future use; 1.8 V logic levels.
17	CH_ON_OFF_OUT2	I/O for on/off functional support for multiple control-head; 1.8 V logic levels
18	GND	Ground
19	INT_MIC	Microphone Input - impedance of 560 Ω
20	GND	Ground
21	EXPANSION_PTT	Expansion PTT

Pin	Function	Description
22	I2C_SCL	I2C Clock; 1.8 V logic levels
23	CH_ON_OFF_OUT3	I/O for On/Off Control in multiple control heads. 1.8 V logic level.
24	CH_ON_OFF_IN2	I/O for on/off functional support for multiple control-head; 1.8 V logic levels
25	CH_ON_OFF_IN3	I/O for on/off functional support for multiple control-head; 1.8 V logic levels
26	EXPH_ID2	Reserve pin for Expansion ID in future
27	TERMINAL ON/OFF (IGNITION)	I2C Clock; 1.8 V logic levels
28	GND	Ground
29	RS232_DCD	Data Carrier Detect
30	RS232_TX	Tx Data
31	RS232_DSR	Data Set Ready
32	RS232_RTS	Request to Send
33	RS232_DTR	Data Terminal Ready
34	RS232_CTS	Clear to Send
35	RS232_RX	Rx Data
36	RS232_RI	Ring Indicator
37	OPTION_DET - EXPH_ID	Input pin to read the Expansion Head ID.
38	9V3	Regulated 9V3 (max 10 mA)
39	5VD	Same 5 V regulator as the 12-pin connector (100 mA); for future use.
40	HANDSET_AUDIO	Handset Audio to earpiece

Table 69: Transceiver Pin Assignment of the Ethernet Connector (18-Pins)

Pin	Function	Description
1	GND	Ground
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	Ethernet RXM	RX-
6	Ethernet RXP	RX+
7	FLT_A +	Filtered A+
8	FLT_A +	Filtered A+
9	FLT_A +	Filtered A+
10	FLT_A +	Filtered A+
11	FLT_A +	Filtered A+

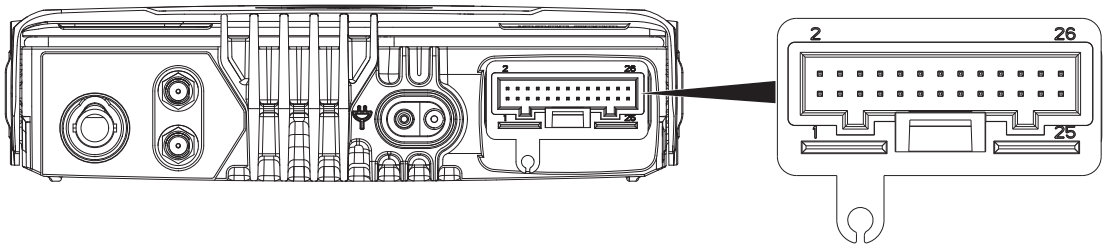
Pin	Function	Description
12	FLT_A +	Filtered A+
13	Ethernet TXM	TX-
14	Ethernet TXP	TX+
15	ON_OFF_BR	On/Off functionality for future use. Connected to Dual Core Processor I/O at 1.8 V level.
16	ON_OFF_CH	On/Off functionality. Same as in 12-pin ON_OFF_CONTROL_SV.
17	GND	Ground
18	GND	Ground

Table 70: Transceiver Pin Assignment of the Enhanced Control Head Interface (6-Pins)

Pin	Function	Description
1	REEH_5V	5 V regulator (100 mA), enable SW_B+ in DEH.
2	REEH_1.8V	1.8 V Regulator for future use.
3	GND	Ground
4	REEH_CH_ON_OFF_OUT2_1V8	Output pin to turn Control Head On/Off. 1.8 V logic level.
5	REEH_ID2	Reserve pin for Expansion ID in future
6	REEH_EXPH_ID	Input pin to read the Expansion Head ID.

4.2 Transceiver Rear Side

Figure 58: Location of Accessory Connector – Rear Side



CAUTION: The accessory connections shown are not compatible to some other models of Motorola Solutions radios. Check MXM600 Accessories-to-Model Chart on page 19 for the appropriate accessory or technical manual for further information. Ensure that the accessory connector is correctly positioned.

Table 71: 26-Pin Accessory Connector

Pin	Function	Description
1	UART0_TXD / USBx_D+	USB1.1 – Default Host

Pin	Function	Description
2	UART0_RXD / USBx_D–	RS232 or UART0 – Alternative Setting **NOTE:** • The default connection is USB1.1 when the Expansion Head is connected. • UART0 is configured on the DB9 interface on the Expansion Head if it is configured in the CPS. • The DB9 radio monitor interface can detect cable connection based on the pin voltage level of RX and DTR lines. • When the Expansion Head is not connected and your radio is with or without BSI software, the connection is configurable to UART0 in CPS codeplug.
3	UART0_RTS / USBx_VBUS	
4	GND_USBx	
5	1-WIRE	1-Wire standard port (pulled through 2K2 to 5 V inside U600_B), Data for RMN5054_ Microphone
6	KEYFAIL / FLASH	Key load (pulled through 10 K to 5 V) Flash input (>10 V triggers Flash mode)
7	SWB +	A+ voltage (limited to 14 V) with 1 A current limitation
8	GND_MAIN	Main and power ground
9	SPEAKER –	Loudspeaker (PA) negative output **WARNING:** Do not ground! See Table 100: Normal Load Conditions on page 134 (for MXM600) for Rated Audio Power. Do not attach audio accessories single-ended between the speaker out (+ or –) and ground on the rear connector because the mobile radio has a Class D amplifier. If it is required to connect a single-ended accessory to the speaker out, then convert the balanced speaker output from your radio to single-ended using a transformer or an electrical circuit.
10	SPEAKER +	Loudspeaker (PA) positive output **WARNING:** Do not ground! See Table 100: Normal Load Conditions on page 134 (for MXM600) for Rated Audio Power. Do not attach audio accessories single-ended between the speaker out (+ or –) and ground on the rear connector because the mobile radio has a Class D amplifier. If it is required to connect a single-ended accessory to the speaker out, then convert the balanced speaker output from your radio to single-ended using a transformer or an electrical circuit.
11	TX_AUDIO	TX audio input (Line In, 26-pin rear connector J400, used for audio recording)

Pin	Function	Description
12	GND_ANA	Main audio ground
13	MIC1 / EXT_MIC	External microphone input (EXT_MIC) or first microphone (MIC1) for noise canceling dual microphone input Nominal sensitivity: 80 mV RMS, Bias voltage: 9.3 V or 2.1 V (Selected accessory dependant)
14	RX_AUDIO	RX audio output (Line Out, 26-pin rear connector J400, used for audio playback) **NOTE:** Voice recorder feature is only applicable for software release MR15.1 and above.
15	MIC2	Microphone input (MIC2) Nominal sensitivity: 80 mVrms, Bias voltage: 9.3 V or 2.1 V (selected accessory dependant)
16	GND_MIC	Ground (for MIC)
17	EXTERNAL_PTT	PTT input (pulled through 4K7 to 5 V)
18	UART0_DTR / USBy_ID	RS232 or UART1/UART0 DTR/2nd USB2.0 (OTG) ID
19	HOOK_PA_EN	HOOK_PA_EN input or configurable GPIO1 (5 V)
20	UART0_TXD / USBy_TX	RS232 or UART0 TXD/2nd USB2.0 (OTG) D+
21	UART0_RTS / USBy_VBUS	RS232 or UART0 RTS/2nd USB2.0 (OTG) VBUS – 100 mA
22	UART0_RXD / USBy_RX	RS232 or UART0 RXD/2nd USB2.0 (OTG) D-
23	EMERGENCY	Emergency Input (Pulled through 24K9 to A+) – Pull low to power on
24	UART_CTS	RS232 or UART1/UART0 CTS input
25	IGNITION	Ignition input (through series 15 K) – Pull > 10.8 V to power on
26	EXTERNAL ALARM	External Alarm output (Pulled through 4K7 to A+) or configurable GPIO2 (12 V) (open drain). **NOTE:** External Alarm works only when the ignition is off.

NOTE:

- When Expansion Head is connected, the connection is USB2.0.
- When Expansion Head is not connected and UART0 is configured on pins 1–4 in CPS codeplug, the connection is USB2.0.
- If UART0 is not configured on pins 1–4 in CPS codeplug, USB2.0/UART0 is automatically switched depending on which accessory is detected.

CAUTION: Pin 25: If the ignition line is not used, it must be grounded for example connected to pin 8. Interference can cause your radio to hang.

NOTE: Pins 13 and 15 cannot be used or configured at the same time.

4.3

Accessory Connection Plan

CAUTION: The accessory connections shown are not compatible to some other models of Motorola Solutions radios. Check MXM600 Accessories-to-Model Chart on page 19 for the appropriate accessory or technical manual for further information. Ensure that the accessory connector is correctly positioned.

Figure 59: Accessory Connector

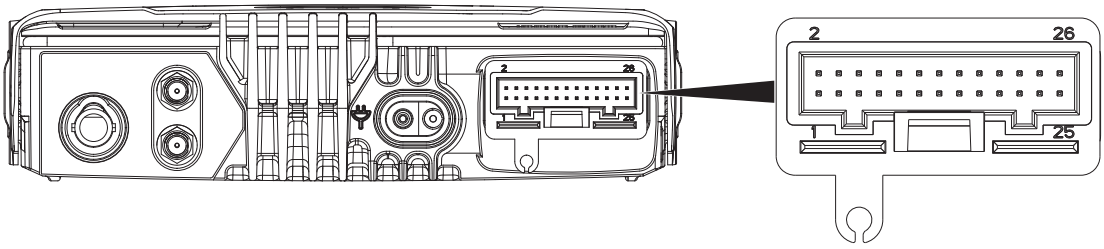


Figure 60: 26-Pin Accessory Connector (PMLN8541_)

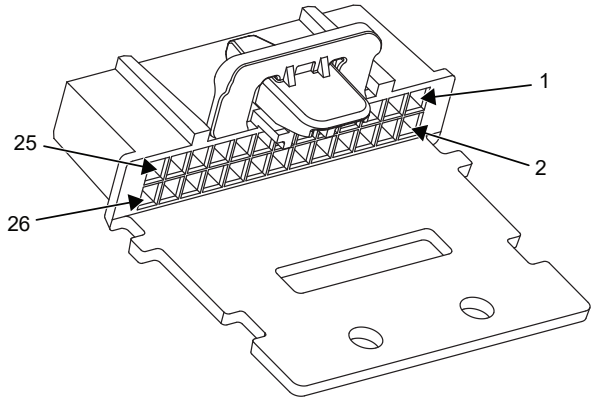
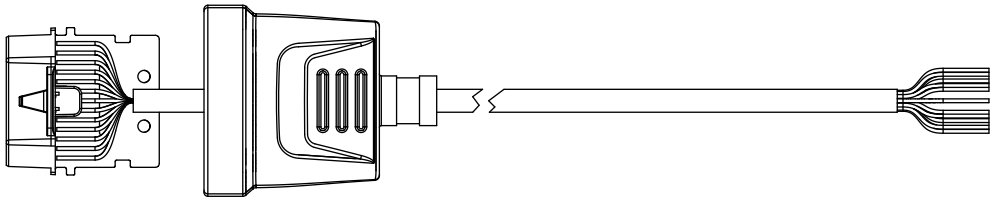


Table 72: PMLN5072_ Accessory Connector Kit Items

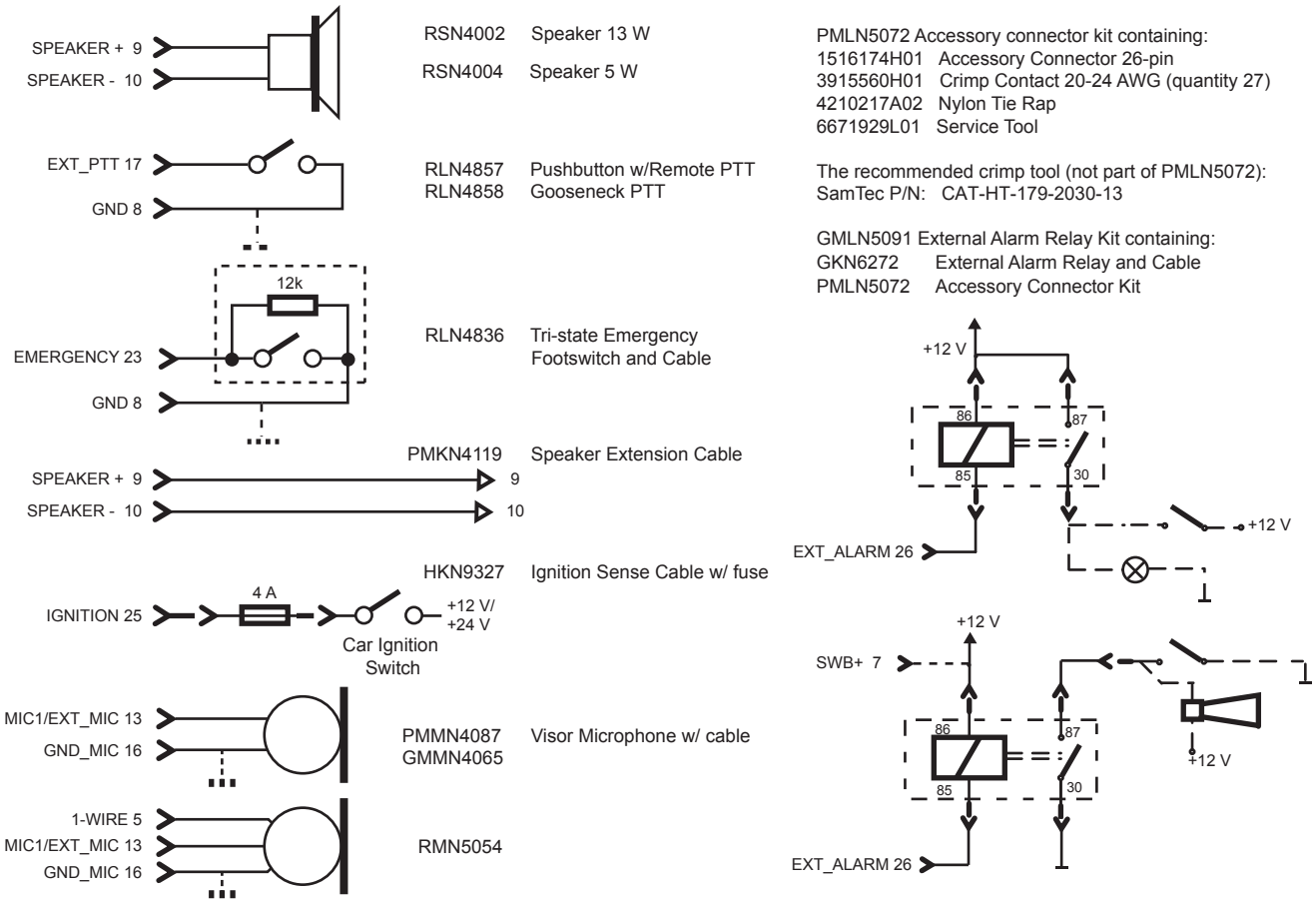
Item	Part Number
Accessory Connector 26-pin	1516174H01
Crimp Contact 20–24 AWG (27 units)	3915560H01
Nylon Tie Rap	4210217A02
Service Tool	6671929L01

Figure 61: 26-Pin Rear Connector with Pre-Crimped, Open-Ended Cable (PMKN4303_)



PMKN4303_ is a cable assembly with the 26-pin connector (CN002065A01) that comes with fully crimped contacts and wires.

Figure 62: Connecting Diagrams



CAUTION: HKN9327_ Ignition Sense Cable: If the ignition line is not used, it needs to be grounded. Interference can cause radio to hang.

4.4

Connecting Accessories to 26-Pin Connector

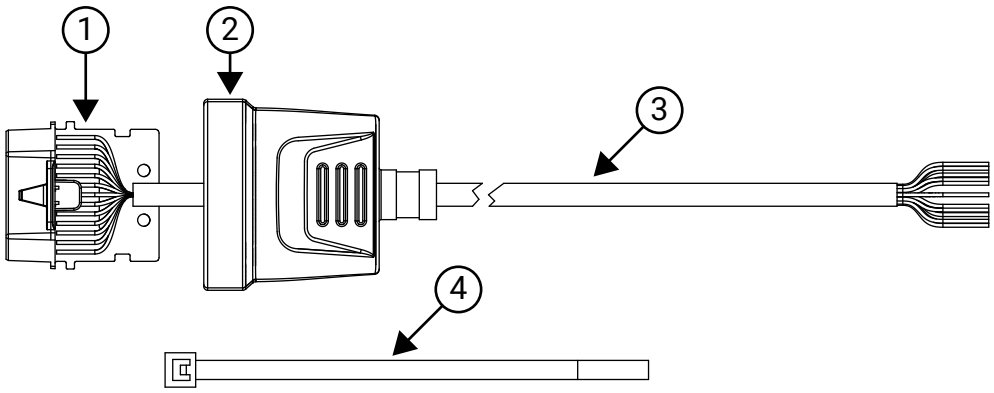
IMPORTANT: Refer to MXM600 Accessories-to-Model Chart on page 19 for accessories or technical manual for more information. Ensure the correct position of the accessory connector.

4.4.1

Cabled 26-Pin Connector

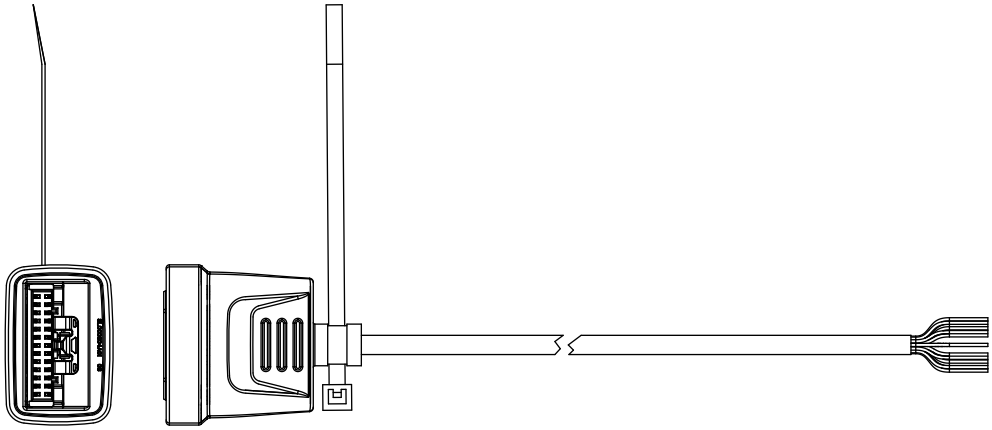
The Cabled 26-Pin Connector, PMKN4303_ is crimped and terminated to the 26-Pin Accessory Connector, with open-ended wires. The cable enables the installer to directly connect necessary accessories to the open-ended side of the cable without crimping process, unlike PMLN8541_.

Figure 63: 26-Pin Rear Connector with Pre-Crimped, Open-Ended Cable and Dust Cover



Number	Description
1	26-Pin Accessory Connector
2	Dust Cover
3	Pre-crimp wires, open-ended
4	Cable tie

Figure 64: Dust Cover Installation



NOTE: The cable tie must be fully tightened to achieve IP54 compliance.

4.4.2

Performing Re-crimp Procedure Using Rear Accessories Connector

To use accessories such as RLN4858_ and GKN6272_ with the rear connector of your radio, follow the re-crimp procedure using the crimp pins provided with PMLN8541_ connector kit. These accessories do not require to be re-crimped when used with the Data Junction Box GMLN7825_.

Procedure:

1. Cut and remove nickel-plated pins from the wire.
2. Strip the insulation from the end of the wires (2 mm to 4 mm).
3. Place the new gold plated crimp pin (from the PMLN8541_ kit) on the gauge slot on the crimp tool.
4. Insert the wire into the wire slot of the crimp pin.
5. Apply pressure to the crimp tool handle until the wire is crimped by the pin.

   NOTE: The recommended crimp tool is SamTec P/N: CAT-HT-179-2030-13. The tool is not part of PMLN8541_.

4.5

Connectors and Pin Assignment of Expansion Heads

CAUTION: Do **not** connect a TELCO remote cable to the Ethernet RJ50 port.

Figure 65: Single Remote Expansion Head – Front View and Connector Location

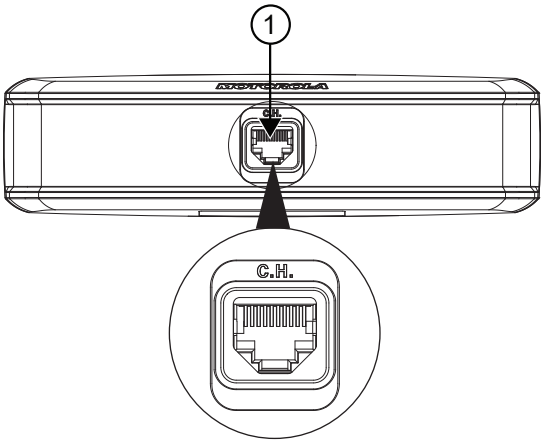


Table 73: Associated Components

Number	Description
1	10-pin RJ50 Ethernet Connector, Front View **NOTE:** This is a connector to the Control Head and not to a microphone.

Figure 66: Dual Remote Expansion Head – Front View and Connector Location

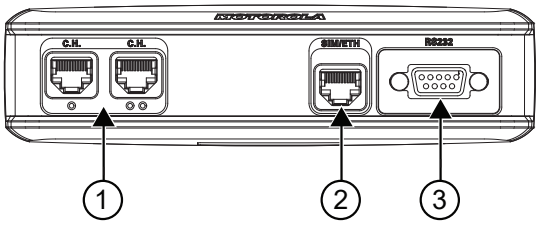


Table 74: Associated Components

Number	Description
1	Two RJ50 Ethernet Connectors. (Connectors to the Control Heads or Dual Remote Expansion Head.) **CAUTION:** Dual Remote Expansion Heads are only compatible with Ethernet Remote Heads. Do **not** mix Ethernet Control Heads with non-Ethernet Control Heads.
2	RJ50 Connector (Connects to TETRA SIM card reader or RJ-45 Ethernet)
3	9-Pin subD Connector

NOTE: Use an appropriate RJ50 Ethernet cable to connect Control Heads or Dual Remote Expansion Head. Do **not** use TELCO cables.

Figure 67: Databox Expansion Head – Front View and Connector Location

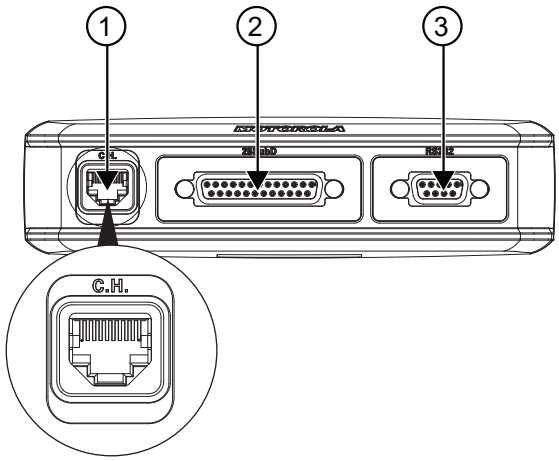


Table 75: Associated Components

Number	Description
1	10-pin RJ50 Ethernet Connector, Front View, **NOTE:** This is a connector to the Control Head and not to a microphone.
2	25-pin subD Connector
3	9-pin subD Connector

4.5.1

10-Pin RJ50 Connector for Control Head

Single Remote Expansion Head (SREH):

You can use the 10-pin RJ50 Ethernet connector to connect a remote mount control head, option of an IP54 Remote Ethernet Control Head, IP67 Remote Ethernet Control Head, or Telephone Style Control Head (TSCH).

CAUTION: Do not connect any other accessories such as a microphone. This action can result in hardware failure or malfunction.

Dual Remote Expansion Head (DREH):

You can use two 10-pin RJ50 connectors for port-1 and port-2 of the DREH in the same way as described in Single Remote Expansion Head (SREH).

Databox Expansion Head (DEH):

You can use the 10-pin RJ50 connector of the DEH in the same way as described in Single Remote Expansion Head (SREH).

Table 76: 10–Pin RJ50 Ethernet Connector Pins

PIN	Function	Description
1	FLT_A+ (12 V)	This is the voltage supply for SREH, DREH, and DEH from a power supply or battery
2	TX+ Ethernet	Ethernet transmit positive line, TX+
3	TX- Ethernet	Ethernet transmit negative line, TX–
4	RX+ Ethernet	Ethernet receive positive line, RX+
5	GND	Main board GND
6	GND	Main board GND
7	RX- Ethernet	Ethernet receive negative line, RX–
8	CH_ON_OFF_OUT1_5 V	ON/OFF control line Transceiver to Control Head
9	CH_ON_OFF_IN1_5V	ON/OFF control line from Control Head to Transceiver
10	FLT_A+ (12 V)	This is the voltage supply for SREH, DREH, and DEH from a power supply or battery

4.5.2

25-Pin SubD Connector

Databox Expansion Head:

Turn your radio on or off using the Ignition Sense Cable PMKN4120_. Connect the PMKN4120_ cable to Pin 10 on the rear side Accessory Connector.

Table 77: 25-Pin SubD Connector Pins

PIN	Function	Description
1	GND	Ground
2	RS232_SCI_TX	Transceive data (RS232 line with RS232 level)
3	RS232_SCI_RX	Receive data (RS232 line with RS232 level)
4	RS232_RTS	Request to Send (RS232 line with RS232 level)
5	RS232_CTS	Clear to Send (RS232 line with RS232 level)
6	FLT_A+	Filtered unswitched UB+/200 mA
7	Signal_GND	Ground for RS232
8	Not Connected	NC
9	Not Connected	NC
10	Not Connected	NC
11	Not Connected	NC
12	SW_B+	Switched B+/100 mA
13	Not Connected	NC
14	ON_OFF_CONTROL / FLASH_MODE	• Switch into flash mode (connect Pin 14 with 6) • On/Off control for Standard Control Head
15	Not Connected	NC
16	INT_MIC	Microphone analog input of 80 mV RMS, 600 Ω impedance, 9 V
17	Not Connected	NC
18	Not Connected	NC
19	GROUND	Ground
20	IGNITION	Connecting this pin to the ignition line of the vehicle will automatically turn on your radio if the ignition of the vehicle is turned on
21	ON_OFF_GND	This is the On/Off control for the old Control Head “J” (MTM300 Control Head)
22	EXPANSION_PTT	Expansion PTT works together with INT_MIC
23	Not Connected	NC
24	HANDSET_AUDIO	Handset audio to earpiece impedance has to be > 200 Ω
25	Not Connected	NC

4.5.3
9-Pin SubD Connector

Dual Remote Expansion Head (DREH):

The pin assignment of this 9-pin subD connector follows the requirements of an RS232 standard interface with the RS232 voltage level. The cable used is a standardized serial interface cable that allows connecting a data device with an RS232 Interface such as a PC, laptop, console, and other devices. See Connecting Cables on page 111.

Databox Expansion Head (DEH)

You can use 9-pin subD connector of the DEH in the same way as described in Dual Remote Expansion Head (DREH).

Table 78: 9-Pin SubD Connector Pins

Pin	Function	Description	PC Direction
1	DCD	Data Carrier Detect	Input
2	RXD	Received Data Serial	Serial IN
3	TXD	Transmitted Data	Serial OUT
4	DTR	Data Terminal Ready	Output
5	GND	Ground Output	Output
6	DSR	Data Set Ready	Input
7	RTS	Request to Send	Output
8	CTS	Clear to Send	Input
9	RI	Ring Indicator	Input

4.5.4
10-Pin RJ50 Connector for SIM or Ethernet

Dual Remote Expansion Head (DREH):

You can use the third 10-pin RJ50 connector of DREH (marked as SIM/ETH) to connect to an external TETRA SIM card reader, or to connect to RJ45 Ethernet network (hardware-ready).

Table 79: Pin Assignment for the Third RJ50 Port (SIM/ETH)

Pin	Function	Description
1	RS232_RX	RS232 Receiver line
2	TX_P_P1	Ethernet transmit positive line, TX+
3	TX_N_P1	Ethernet transmit negative line, TX-
4	RX_P_P1	Ethernet receive positive line, RX+
5	RS232_RTS	RS232 Request to Send line
6	GND	Main board GND
7	RX_N_P1	Ethernet receive negative line, RX-
8	RS232_TX	RS232 Transmitter line
9	RS232_CTS	RS232 Clear to Send line
10	FLT_A+ (12 V)	This item is the voltage supply for EEH from the power supply or battery.

4.6

Connector and Pin Assignment of the Dash/Desk Control Head

Figure 68: Mobile Microphone Port (MMP) Connector of the Dash/Desk Control Head

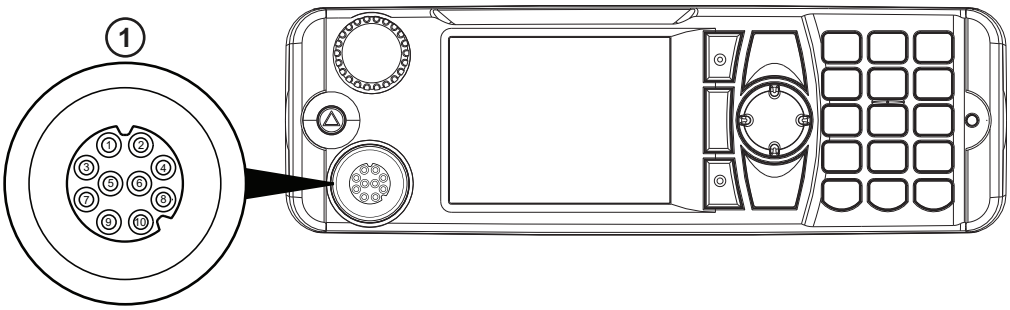


Table 80: Associated Components

Number	Description
1	View of the MMP Connector for the Dash/Desk Control Head

NOTE: The keypad labeling of the control head varies according to the specific customer or country requirements.

Table 81: MPP Connector of the Dash/Desk Control Head Functions

Mobile Microphone Port (MPP) Pin		Default Functions	Alternative Functions	USB Functions	RS232 Functions
1	1-WIRE	1-WIRE	1-WIRE	1-WIRE	1-WIRE
2	GPIO_3	PTT	GP Input or Output	GP Input or Output	RS-232-RTS
3	SPEAKER	SPEAKER	SPEAKER	SPEAKER	SPEAKER
4	GPIO_2	GPIO_2 INPUT	GP Input or Output	DATA -	RS-232-RXD
5	GND	GND	GND	GND	GND
6	OPT 5 V	HIGH Impedance	OPT 5 V	VBUS	OPT 5 V
7	MIC +	MIC +	MIC +	MIC +	MIC +
8	GPIO_1	GPIO_1 INPUT	GP Input or Output	DATA +	RS-232-TXD
9	GPIO_4	HOOK	GP Input or Output	GP Input or Output	RS-232-CTS
10	GPIO_0	GPIO_0 INPUT	GP Input or Output, PWR ON	GP Input or Output, PWR ON	GP Input or Output, PWR ON

NOTE: The connector enters one of the five modes automatically based on the automatic detection of the connected accessory.

4.7

Connector and Pin Assignment of IP54 or IP67 Remote Ethernet Control Head

Figure 69: View of the IP54 or IP67 Remote Ethernet Control Head (RECH) with Mobile Microphone Port (MMP) Connector

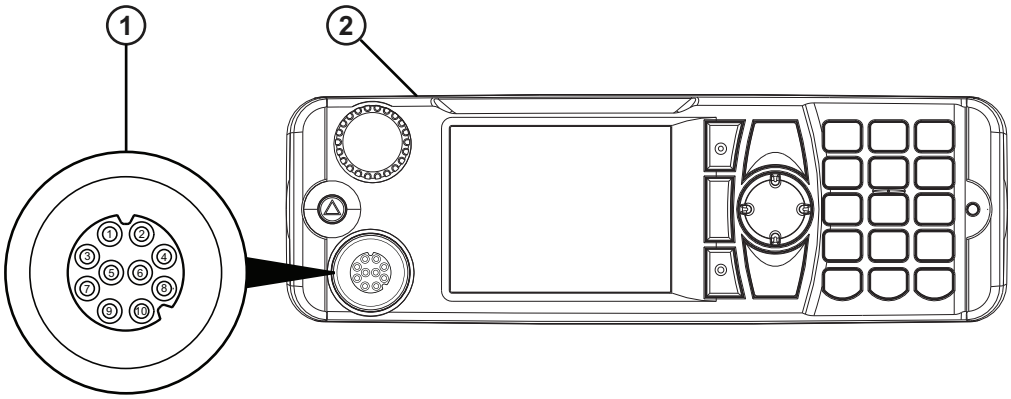


Table 82: Associated Components

Number	Description
1	View of the MMP Connector for the IP54 or IP67 RECH
2	IP54 or IP67 RECH

Table 83: MMP Connector of the IP54 or IP67 RECH Functions

Mobile Microphone Port (MPP) Pin		Default Functions	Alternative Functions	USB Functions	RS232 Functions
1	1-WIRE	1-WIRE	1-WIRE	1-WIRE	1-WIRE
2	GPIO_3	PTT	GP Input or Output	GP Input or Output	RS-232-RTS
3	SPEAKER	SPEAKER	SPEAKER	SPEAKER	SPEAKER
4	GPIO_2	GPIO_2 INPUT	GP Input or Output	DATA -	RS-232-RXD
5	GND	GND	GND	GND	GND
6	OPT 5 V	HIGH Impedance	OPT 5 V	VBUS	OPT 5 V
7	MIC +	MIC +	MIC +	MIC +	MIC +
8	GPIO_1	GPIO_1 INPUT	GP Input or Output	DATA +	RS-232-TXD
9	GPIO_4	HOOK	GP Input or Output	GP Input or Output	RS-232-CTS

Mobile Microphone Port (MPP) Pin		Default Functions	Alternative Functions	USB Functions	RS232 Functions
10	GPIO_0	GPIO_0 INPUT	GP Input or Output, PWR ON	GP Input or Output, PWR ON	GP Input or Output, PWR ON

NOTE: The connector enters one of the five modes automatically based on the automatic detection of the connected accessory.

Figure 70: IP54 RECH – Rear Connectors

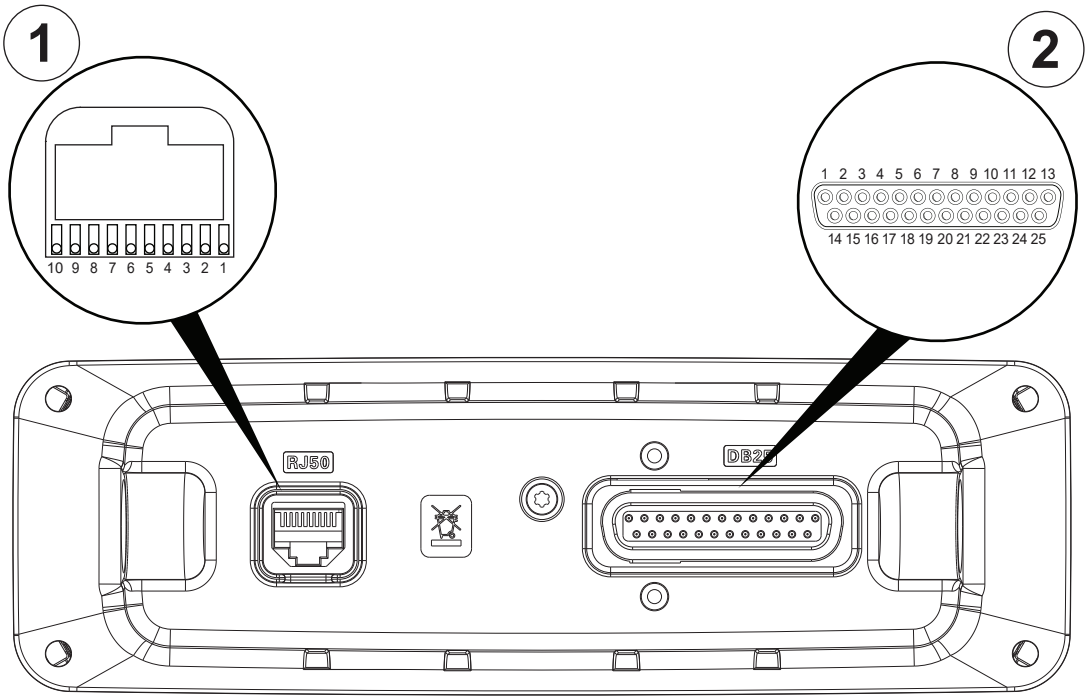


Figure 71: IP67 RECH – Rear Connectors

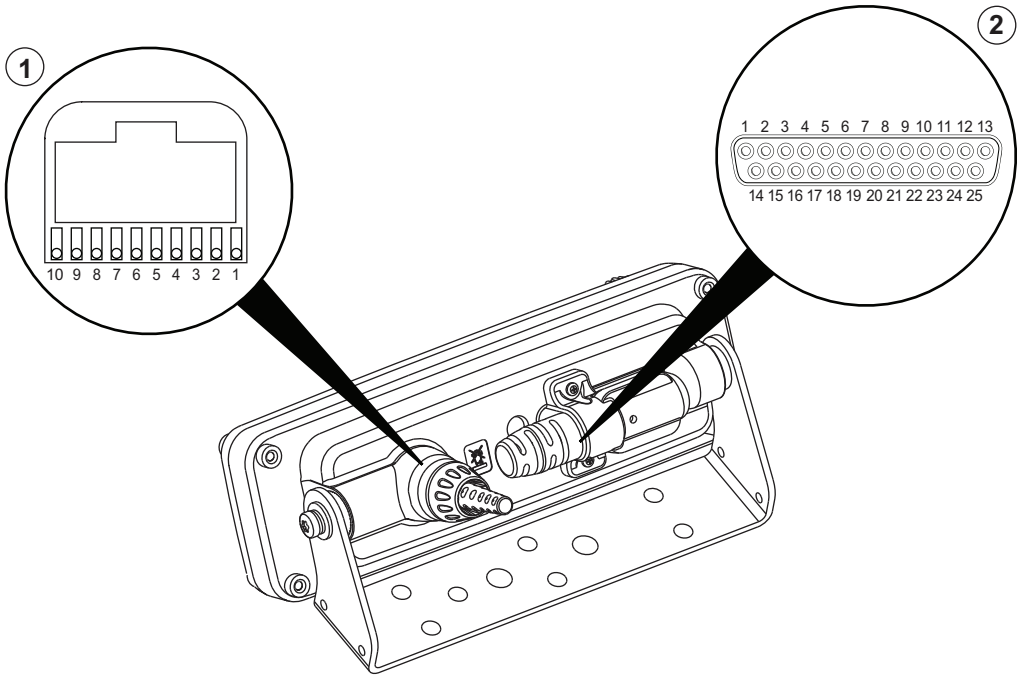


Table 84: Associated Components

Number	Description
1	10-Pin Ethernet RJ50 Connector
2	25-Pin Back Connector

Table 85: 10-Pin Ethernet Connector

Pin	Function	Description
1	FLT_A+ (12 V)	This is the voltage supply for the Control Head from power supply or battery
2	TX+ Ethernet	Ethernet transmit positive line, TX+
3	TX– Ethernet	Ethernet transmit negative line, TX-
4	RX+ Ethernet	Ethernet receive positive line, RX+
5	GND	Main board GND
6	GND	Main board GND
7	RX- Ethernet	Ethernet receive negative line, RX-
8	CH_ON_OFF_OUT1_5V	ON/OFF control line from Transceiver to Control Head
9	CH_ON_OFF_IN1_5V	ON/OFF control line from Control Head to Transceiver
10	FLT_A+ (12 V)	The voltage supply for the Control Head from power supply or battery

Table 86: 25-Pin Back Connector

Pin	Function	Description
1	GPIO_9	Output: Active for duration of call (car radio mute)
2	GPIO_6	External PTT for MIC_HF1, Ethernet Control Head GPIO6
3	GPIO_8	Control Head GPIO2 (CPS configurable)
4	GPIO_3	GCAI PIN 2 GPIO
5	VBUS_1B	+5 V Supply, Connected to Pin 6 of Mobile Microphone Port
6	REAR_D -	Rear handset D+ line
7	REAR_D +	Rear handset D- line
8	GPIO_0	GCAI Pin 10 GPIO
9	EXT_PWR_12V	External power supply, 12 V or 24 V for External Speaker
10	1_Wire	1-wire® bidirectional serial bus, Connected to GCAI Pin 1 of Mobile Microphone Port
11	MIC_HF1_GND	Ground for external microphone MIC_HF_1
12	MIC_HF1	External microphone input (MIC_HF1), Nominal sensitivity: 80 mV rms, Bias voltage: 9.3 V or 2.1 V (Selected accessory dependant)
13	GND	GND Common Ground
14	GPIO_5	Control Head GPIO1 (CPS configured/enabled)
15	GPIO_7	4 Level Analog Input, 33 k to 5.0 V PU
16	1_WIRE	1-wire® bidirectional serial bus, Dedicated to power up detection of IMPRES Visor Mic (input MIC_HF1)
17	REAR_AUDIO	Handset VOL controlled audio output, Min RL = 150 Ω unbalanced, Connected to GCAI Pin 3 Mobile Microphone Port Connector
18	GND	GND, Connected to GCAI Pin 5 Mobile Microphone Port
19	MIC_MMP_REAR	Rear microphone input MIC_MMP_REAR, Input 80 mV rms, Bias voltage 7.7 V, Connected to GCAI Pin 7 Mobile Microphone Port
20	GPIO_4	GPIO, Hook Input, Connected to GCAI Pin 9 Mobile Microphone Port.
21	SPK +	Speaker positive line **:** Do not ground!

Pin	Function	Description
22	SPK –	Speaker negative line **:** Do not ground!
23	MIC_HF2_GND	Ground for external MIC_HF2
24	MIC_HF2	Second external microphone input MIC_HF2, Nominal sensitivity 80 mV rms, CPS selectable bias voltage 7.7 V or 2 V
25	RM_ON	Turn on Control Head through accessories

4.8 Connecting Cables

This section describes the connecting cables used in your radio.

4.8.1 IP67 Remote Ethernet Control Head (RECH) Cable

IP67 RECH is available in six different lengths to support a different range of applications, including Motorcycle Mount.

For more information, see Table 10: Cables on page 20.

Figure 72: IP67 RECH Ethernet Cable

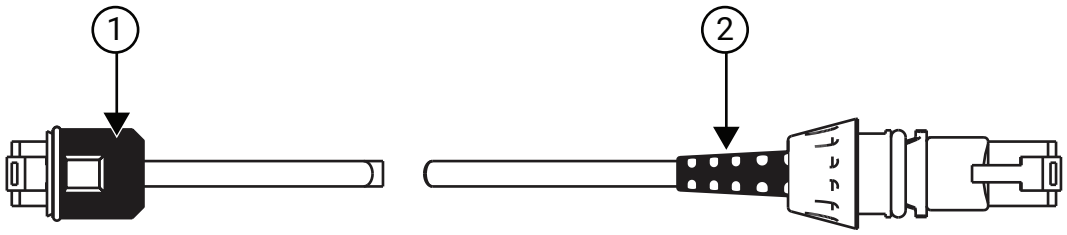


Table 87: IP67 RECH Ethernet Cable Description

Number	Description
1	Dust Cap Rubber (blue color)
2	Strain Relieve (blue color)

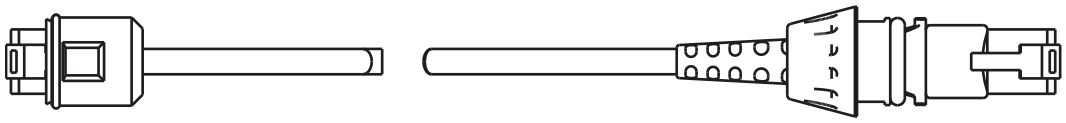
CAUTION: Compatible with IP67 RECH only. Do **not** mix the IP67 RECH Ethernet Cable with the Motorcycle Remote Control Head TELCO Cable.

4.8.2
Motorcycle Mount TELCO Cable

IP67 TELCO Control Head Cable (to connect IP67 TELCO Control Head to Serial Expansion Head PMLN4904_ only). Part Number: PMKN4030_, Length: 2.3 m (7.55 ft).

For more information, see Mechanical Parts List for IP67 Remote Mount Installation on page 75

Figure 73: Motorcycle Remote Control Head (TELCO) Cable



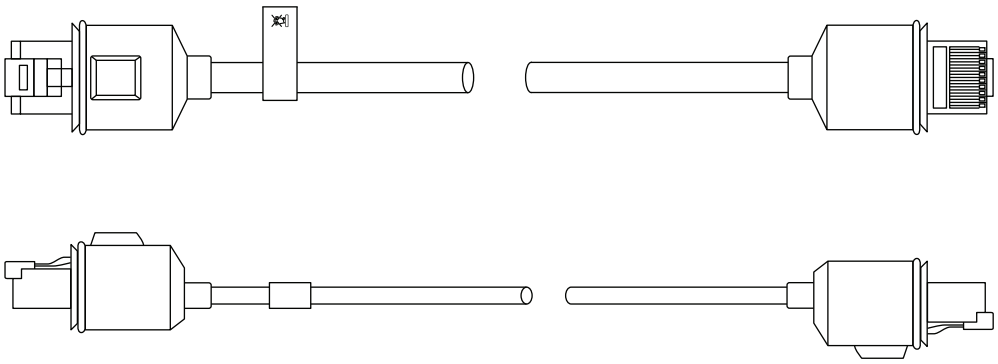
4.8.3
Remote Mount Ethernet Cables

Remote Mount Ethernet Cables are compatible with:

- IP54 or IP67 Remote Ethernet Control Head (RECH)
- Telephone Style Control Head (TSCH)
- Single Remote Expansion Head (SREH)
- Dual Remote Expansion Head (DREH)
- Databox Expansion Head (DEH)

For more information, see Ethernet Cables on page 51.

Figure 74: Remote Mount Ethernet Cables



4.8.4
Accessories Expansion Cable

The Accessories Expansion Cable is used to connect the IP54 or IP67 Remote Ethernet Control Head (RECH) to accessories.

The Part Numbers are as follows:

- IP54 RECH Accessories Expansion Cable – PMKN4029_ or PMKN4056_.
- IP67 RECH Accessories Expansion Cable – PMKN4429_ or PMKN4456_.

Figure 75: Accessories Expansion Cable, PMKN4029_ or PMKN4056_

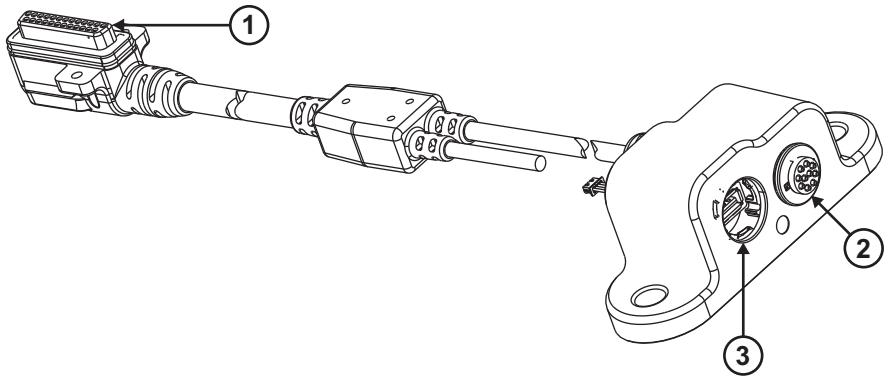


Figure 76: Accessories Expansion Cable, PMKN4429_ or PMKN4456_

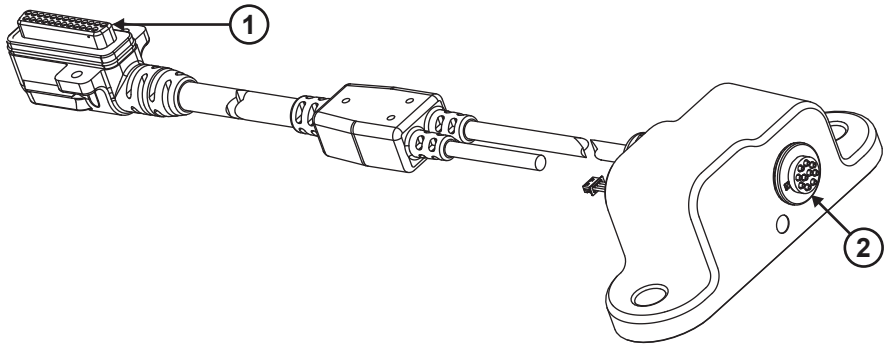


Table 88: Associated Components

Annotation	Description
1	DB25 Connector
2	Mobile Microphone Port
3	USB Connector

Table 89: Accessories Expansion Cable — Connections

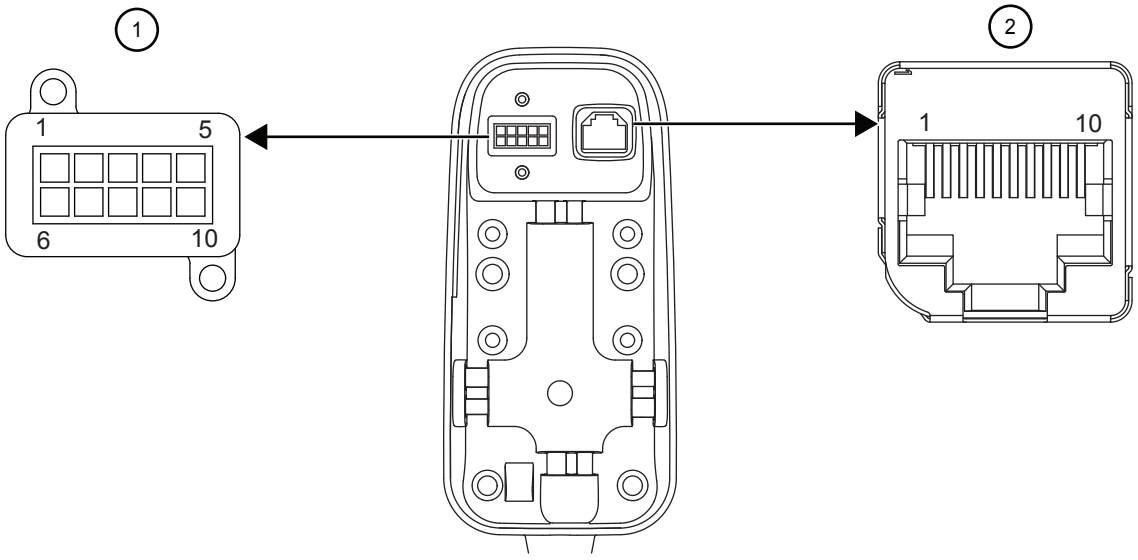
USB A JACK	Signal	subD 25 Pos
1	VBUS	9
2	D-	22
3	D+	21
4	Ground	18
Mobile Microphone Port (MMP)		
1	1_WIRE	16
2	GPIO_3 / OTG-ID / RTSc (PTT)	4
3	Speaker to Headset	17
4	GPIO_2 / D- / RxDc	6
5	GND (Ground)	N/A

6	Opt_5V / VBUS	5
7	Mic+	19
8	GPIO_1 / D+ / TxDc	7
9	GPIO_4 / CTSc / Keyfail (HOOK)	20
10	GPIO_0 / Pwr On	8
Customized Wire Color		
BROWN / BLACK	GPIO_9	1
ORANGE / BLACK	GPIO_6	2
YELLOW / BLACK	GPIO_8	3
LIGHT BLUE	GPIO_2	6
TURQUOISE	GPIO_1	7
GREEN / BLACK	TX	10
BLUE / BLACK	RX	11
GRAY / BLACK	MIC_2	12
BLUE	Ground	13
PINK / BLACK	GPIO_5	14
BLACK / WHITE	GPI_7	15
USB A JACK	**Signal**	**subD 25 Pos**
BROWN / WHITE	RTS	23
RED / WHITE	CTS	24
ORANGE / WHITE	Power On	25
RED / BLACK	Headset	17
YELLOW / WHITE	Ground	N/A

4.8.5

Connector and Pin Assignment for Cradle (Telephone Style Control Head)

Figure 77: View of the Telephone Style Control Head Cradle (TSCH)



There are two connectors at the back of the TSCH Cradle:

- 10-PIN Audio Connector
- RJ50 Connector

See the following tables for the Pin assignments of the 10-PIN Audio Connector and the RJ50 Connector.

Table 90: Pin Assignment of the 10-Pin Audio Connector – TSCH

PIN	Function	Description
1	EXT_PWR_12	This is the external voltage supply (12 V or 24 V) from power supply or battery for external speaker
2	PTT2	CPS configurable GPIO
3	PTT1	External PTT (for HF MIC 2)
4	EMERGENCY_FT_SW	Emergency signal line from external MIC
5	EXT_MIC	External MIC input line
6	GND	Main board GND
7	SPKR+	Output to External Speaker
8	SPKR-	Output to External Speaker
9	1-WIRE	1-Wire® bidirectional serial bus for accessories ID identification
10	Analog Ground	Analog Ground

Table 91: Pin Assignment of the 10-Pin RJ50 Connector – Telephone Style Control Head

PIN	Function	Description
1	FLT_A+ (12 V)	This is the voltage supply for the Control Head from power supply or battery. The maximum current is 300 mA
2	ETH_TX_POS	Ethernet transmit positive line, TX+
3	ETH_TX_NEG	Ethernet transmit negative line, TX-
4	ETH_RX_POS	Ethernet receive positive line, RX+
5	GND	Main board GND
6	GND	Main board GND
7	ETH_RX_NEG	Ethernet receive negative line, RX-
8	CH_ON_OFF_OUT1_5V	ON/OFF control line from Transceiver to Control Head
9	CH_ON_OFF_IN1_5V	ON/OFF control line from Control Head to Transceiver
10	FLT_A+ (12 V)	This is the voltage supply for the Control Head from power supply or battery. The maximum current is 300 mA

4.8.6
Ethernet Cables

Figure 78: Mobile to Control Head Ethernet Cable Pin Diagram

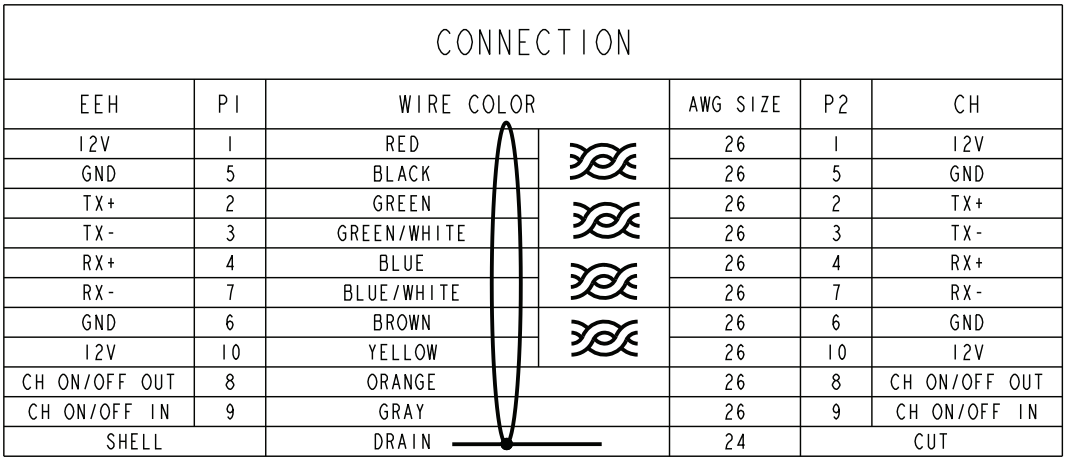


Figure 79: Mobile to Mobile Ethernet Cable Pin Diagram

CONNECTION					
BRICK 1	P1	COLOR		P2	BRICK 2
TX+	2	GREEN		4	RX+
TX-	3	GREEN / WHITE		7	RX-
RX+	4	BLUE		2	TX+
RX-	7	BLUE / WHITE		3	TX-
GND	5	BLACK		5	GND
GND	6	BROWN		6	GND
CH ON OFF OUT	8	ORANGE		9	CH ON OFF IN
CH ON OFF IN	9	GRAY		8	CH ON OFF OUT
SHIELD		DRAIN			SHIELD

4.8.7

Remote Ethernet Control Head Y-Cable (Accessories Expansion Cable)

Cable Part Number: PMKN4333_ (5A)

Figure 80: RECH Y-Cable Pin Diagram

CONNECTION									
P1	SIGNAL NAME	WIRE COLOR(CABLE 1)	SR MOLD	WIRE COLOR	P2	P3	P4	P5	P6
16	1_WIRE	BLACK 28#		CABLE 1/BLACK 28#	1				
4	GPIO_3/PTT(GCAI)	YELLOW 28#		CABLE 1/YELLOW 28#	2				
17	REAR_AUDIO	GREEN 28#		CABLE 1/GREEN 28#	3				
5	VBUS_1B	WHITE 26#		CABLE 1/WHITE 26#	6				
18	MC_MMP_REAR GND	DRAIN 26#		CABLE 1/DRAIN 26#	5				
19	MIC_MMP_REAR	WHITE 28#		CABLE 1/WHITE 28#	7				
6	REAR_D−	BROWN 28#		CABLE 1/BROWN 28#	4				
7	REAR_D+	ORANGE 28#		CABLE 1/ORANGE 28#	8				
20	GPIO_4	BLUE 28#		CABLE 1/BLUE 28#	9				
–	GPIO_0	GRAY 28#		CABLE 1/GRAY 28#	10				
1	GPIO_9	BROWN/BLACK 28#		CABLE 2/BROWN 28#		OPEN			
–	GPIO_6/PTT1	ORANGE/BLACK 28#		CABLE 2/ORANGE 28#		OPEN			
3	GPIO_8/PTT2	YELLOW/BLACK 28#		CABLE 2/YELLOW 28#		OPEN			
10	1_WIRE	GREEN/BLACK 28#		CABLE 2/GREEN 28#		OPEN			
11	MIC_HF1_GND(ANALOG_GND_2)	PINK 28#		CABLE 2/PINK 28#		OPEN			
12	MIC_HF1	PURPLE 28#		CABLE 2/PURPLE 28#		OPEN			
13	GND	DRAIN*3 26#		CABLE 2/DRAIN*3 26#		OPEN			
14	GPIO_5	BLUE/BLACK 28#		CABLE 2/BLUE 28#		OPEN			
15	GPI_7	GRAY/BLACK 28#		CABLE 2/GRAY 28#		OPEN			
17	REAR_AUDIO	PINK/BLACK 28#		CABLE 2/RED 28#		OPEN			
23	MIC_HF2_GND(ANALOG_GND_1)	LIGHT BLUE 28#		CABLE 2/LIGHT BLUE 28#		OPEN			
24	MIC_HF2	LIGHT GREEN 28#		CABLE 2/LIGHT GREEN 28#		OPEN			
21	SPKR+	BROWN 20#		CABLE 4/BROWN 20#					OPEN
22	SPKR−	ORANGE 20#		CABLE 4/ORANGE 20#					OPEN
25	PWR_ON	TAN 28#		CABLE 2/BLACK 28#		OPEN			
9	EXT_PWR_12/24V	RED 20#		CABLE 3/RED 20#+FUSE			OPEN		
18	GND	BLACK 20#		CABLE 3/BLACK 20#				OPEN	

4.8.8

Telephone Style Control Head Y-Cable (Accessories Expansion Cable)

Part Number: PMKN4134_

Figure 81: TSCH Y-Cable Pin Diagram

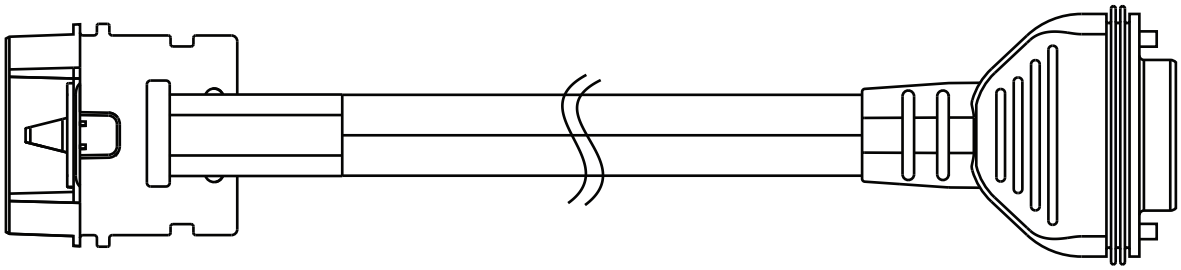
CONNECTION									
P1	SIGNAL NAME	WIRE COLOR(CABLE 1)	SR MOLD	WIRE COLOR		P2	P3	P4	P5
2	PTT2/GPI2	BLACK 28#		CABLE 2/BLACK 28#		OPEN			
3	PTT1/GPI1	GREEN 28#		CABLE 2/GREEN 28#		OPEN			
4	Emergency	BLUE 28#		CABLE 2/BLUE 28#		OPEN			
7	Speaker+	BROWN 20#			CABLE 3/BROWN 20#				OPEN
8	Speaker–	ORANGE 20#			CABLE 3/ORANGE 20#				OPEN
5	Microphone Input	RED 28#			CABLE 2/RED 28#	OPEN			
10	Analog Ground	WHITE 28#			CABLE 2/WHITE 28#	OPEN			
9	1–WIRE	YELLOW 28#			CABLE 2/YELLOW 28#	OPEN			
1	External Power 12/24V	RED 20#			CABLE 4/RED 20#+FUSE		OPEN		
6	Power Ground	BLACK+DRAIN 24#			CABLE 4/BLACK+DRAIN 24#	OPEN		OPEN	

4.8.9

Radio-to-Junction Box

- Part Number: PMKN4300_, Length: 2 m (6.57 ft)
- Part Number: PMKN4301_, Length: 4 m (13.13 ft)
- Part Number: PMKN4302_, Length: 5 m (16.40 ft)

Figure 82: Connecting Cable – Radio-to-Junction Box



TERMINAL ACCESSORY CONNECTOR
26-Pin AMP

JUNCTION BOX CONNECTOR
26-Pin subD

CONNECTION							
P1	SIGNAL	AWG	COLOR		SIGNAL	P2	CABLE
1	USB_HOST_D+	26#	GREEN	GREEN	USB1_DM_GPIO2	2	A
2	USB_HOST_D-	26#	WHITE	WHITE	USB1_DM_GPIO1	1	
3	USB_HOST_VBUS	26#	RED		USB1_VBUS	3	
4	GND (USB)	26#	DRAIN		GND_USB	12	
5	1 WIRE	26#	BLACK		1 WIRE	13	
14	RX_AUDIO	26#	BROWN		RX_AUDIO	7	
7	SWB+	20#	GRAY		SWB+	4	
9	SPEAKER-	20#	PURPLE	PURPLE	SPKR-	9	
10	SPEAKER+	20#	ORANGE	ORANGE	SPKR+	8	
11	TX_AUDIO	26#	TAN		TX_AUDIO	18	
12	ANALOG GROUND	26#	DRAIN		GND	16	
			PINK		NC	17	
13	MIC1/EXT_MIC	26#	BLUE		MIC1	6	
15	MIC2	26#	YELLOW		MIC2	15	
8	GND	20# + 20#	DRAIN x2		GND	5	
16	GND	26#	DRAIN		GND	14	B
17	EXTERNAL_PTT	26#	PINK		EXT_PTT	11	
18	SCI_DTR_USB_ID	26#	ORANGE		PTT_GPIO3	10	
19	HOOK_PA_EN	26#	YELLOW		HOOK_GPIO4	26	
21	RS232_RTS	26#	RED		USB0 VBUS	25	
20	SCI_TXD	26#	WHITE	WHITE	USB0_DP	24	
22	SCI_RXD	26#	GREEN	GREEN	USB0_DM	23	
23	EMERGENCY	26#	BLACK		EMERGENGY	22	
24	RS232_CTS	26#	BLUE		1 WIRE_MUX_SEL	21	
25	IGNITION	26#	PURPLE		IGNITION	20	
26	EXTERNAL ALARM	26#	GRAY		DETECT_GPIOO	19	

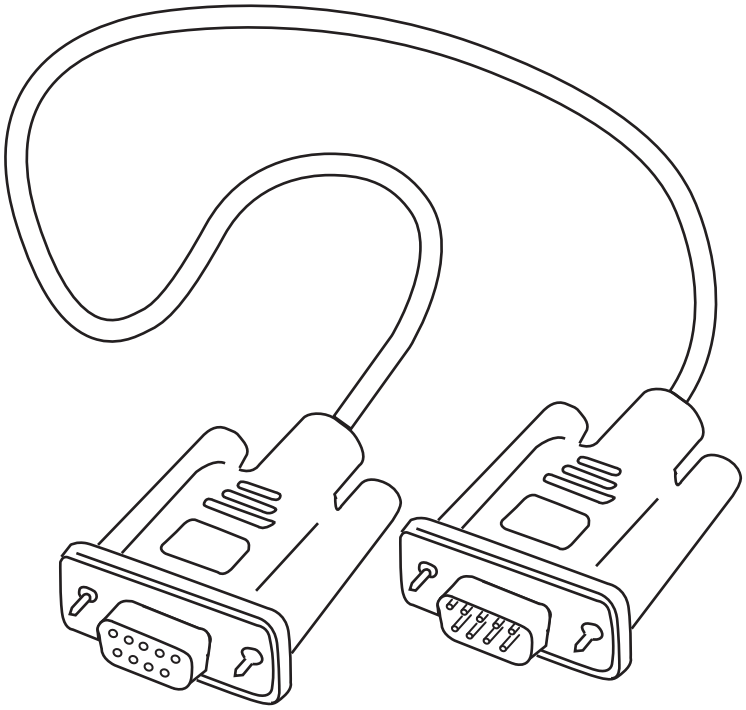
NOTE: The keypad labeling of the control head varies according to the specific customer or country concerns.

4.8.10

Databox Expansion Head Radio-to-Data Device

This is a standardized RS232 cable (not provided by Motorola Solutions). To connect this cable with the data device, use the 9-pin socket on the front side of the Databox Expansion Head Radio.

Figure 83: Standardized RS232 Cable



NOTE: The Databox Expansion Head has a protection grade of IP54. To maintain IP54 sealing when connecting an RS232 data cable, use an IP54 specified cable such as ROLINE AT-Modem cable ST-BU 1.8 m order no. 11.01.4518.

4.8.11

Databox Expansion Head Radio-to-Fist Microphone

Operation

Connect the crimped wires of the cable into the Accessory Connector (delivered with speaker RSN4002) and then plugged into the connector on the rear side of your radio. The other end has a connector that fits into the fist microphone housing.

Making Connections

First connect the exposed four wires to the Accessory Connector as shown in Power Cabling Routing to the Engine Compartment and then plug the connector block into the accessory socket on the rear side of your radio. The connector block plugs into the accessory connector (the four outside pins do not connect).

4.8.11.1

Removing the Existing Coiled Cord Cable

Procedure:

1. Rotate the locking collar at the base of the microphone in a counterclockwise direction until it stops.
2. Pull out the cord and away from the base of the microphone.
3. Install the new coiled cord GMKN4072_ in a reverse order of removal.

   Part Number: GMKN4072_, Length: 65 cm (2.2 ft)

Figure 84: Pin Assignment of Cable from Accessory Connector to Microphone Housing

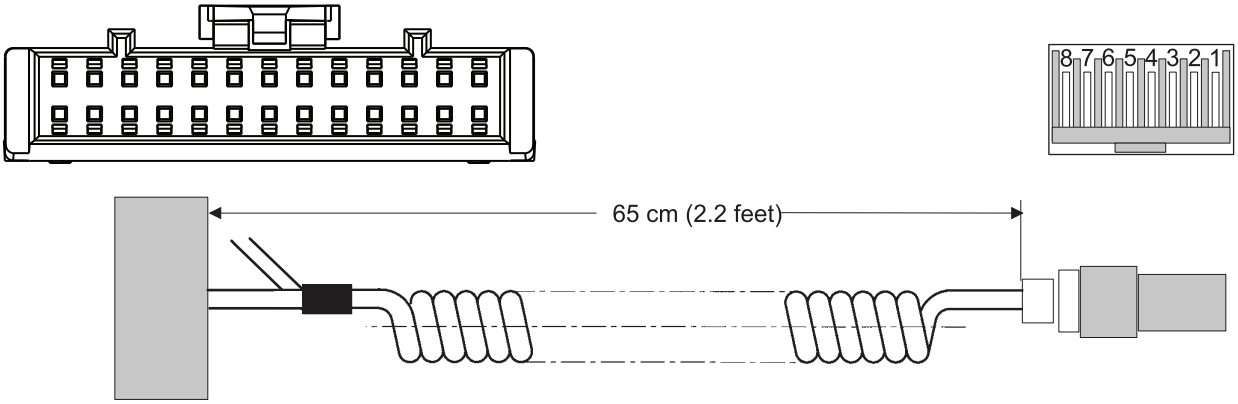


Table 92: Pin Assignment of Cable from Accessory Connector to Microphone Housing

To Accessory Connector (left)		To Microphone Housing (right)	
1	nc	1	nc
...	...	2	nc
11	nc	3	PTT (white)
12	GND (black)	4	EXT_MIC (blue)
13	EXT_MIC (blue)	5	GND (black)
14	nc	6	HOOK (red)
15	nc	7	nc
16	nc	8	nc
17	EXT_PTT (white)		
18	nc		
19	HOOK (red)		
20	nc		
...	...		
26	nc		

4.8.12

Cables to Provision AIE/E2E Keys

The following cables are used when provisioning your radio with encryption keys:

- PMKN4104_ – Active Data Cable to provision your radio with Air interface encryption keys.
- PMKN4108_ – Key Variable Load (KVL) cable to provision your radio with E2E keys.

The PMKN4104_ Active Data Cable provides a 5-wire RS232 interface such as RxD, TxD, CTS, RTS, DTR between a computer and a mobile radio. Connect the cable to the 26-pin Accessory Connector on the rear side of your radio, and into the 9-pin connector of a Data Device such as PC, laptop, console. The PMKN4104_ Active Data Cable is not repairable. Order a replacement cable as necessary: Length: 2.0 m (6.56 ft).

Figure 85: Active Data Cable PMKN4104_

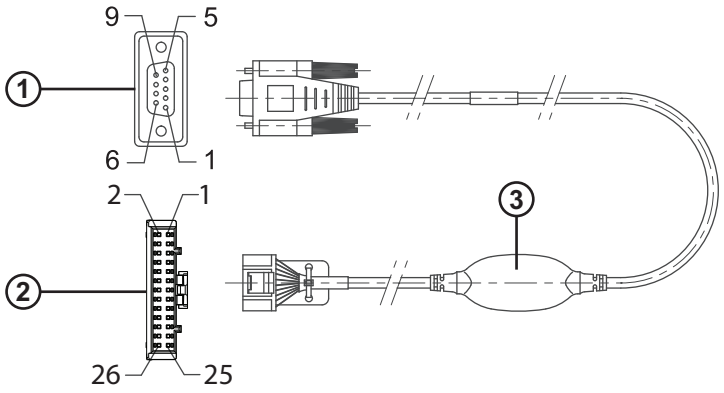


Table 93: Associated Components

Number	Description
1	To the computer
2	To Radio Accessory Connector
3	Radio Interface Box

Table 94: Pin Assignment - Active Data Cable PMKN4104_

26-Pin Connector	Function	Color
17	Ext PTT (+5 V)	Black
8	GND_MAIN	Yellow
7	SWB+	Brown
18	DTR	Red
24	CTS	White
21	RTS	Blue
20	TxD	Gray
22	RxD	Tan

Chapter 5

External Equipment Installation

This section describes the external equipment installation available for your radio.

5.1 Vehicle Antenna Installation

This section describes the installation of the vehicle antenna for your radio.

5.1.1 Mobile Radio Operation and EME Exposure

Transmit only when people outside the vehicle are at least the minimum recommended distance away from the vehicle body. The minimum recommended distance is 90 cm (3 ft). This separation ensures sufficient distance from a properly installed, externally mounted antenna. This assures optimal radio performance and human exposure to radio frequency electromagnetic energy is within the guidelines referenced in this manual.

5.1.2 Selecting an Antenna Site

When and where to use: To assure optimum performance and compliance with RF Energy Safety standards, these antenna installation guidelines and instructions are limited to metal-body vehicles with appropriate ground planes and take into account the potential exposure of back-seat passengers and bystanders outside the vehicle.

Procedure:

1. Install the vehicle antenna external to the vehicle and in accordance with:
   - The requirements of the antenna manufacturer or supplier
   - The requirements of the vehicle manufacturer
2. If you use the trunk lid, ensure that the trunk lid is grounded by connecting grounding straps between the trunk lid and the vehicle chassis.
3. Select an Antenna Site or Location on a Metal Body Vehicle.
   a. External installation – Check the requirements of the antenna supplier and install the vehicle antenna external to a metal body vehicle in accordance with those requirements.
   b. Roof top – For optimum performance and compliance with RF Energy Safety standards, mount the antenna in the center area of the roof.
   c. Trunk lid – On some vehicles with clearly defined, flat trunk lids, the antennas of some radio models can also be mounted on the center area of the trunk lid. For vehicles without clearly defined, flat trunk lids (such as hatchback autos, sports utility vehicles, and pick-up trucks), mount the antenna in the center area of the roof. The following restrictions apply when mounting the antenna on the trunk lid. Be sure that the distance from the antenna location on the trunk lid is at least 90 cm (36 inches) from the front surface of the rear seat-back to assure compliance with

RF Energy Safety standards. Ensure that the trunk lid is grounded by connecting grounding straps between the trunk lid and the vehicle chassis.

CAUTION: If these conditions cannot be satisfied, then mount the antenna on the roof top.

4. Ensure that the antenna cable can be easily routed to your radio. Route the antenna cable as far away as possible from any vehicle electronic control units and associated wiring.

   CAUTION: Ensure that your power cable is not placed with the antenna in parallel. Interference can cause your radio to hang.

5. Check the antenna location for any electrical interference according to vehicle manufacturer requirements.
6. The minimum distance between the antenna and your radio or accessories must be at least 91.5 cm (3 ft).
7. Ensure that the mobile radio antenna is installed at least 3 ft (0.9 meter) away from any other antenna on the vehicle.

   NOTE: Any two metal pieces rubbing against each other (such as seat springs, shift levers, trunk and hood lids, exhaust pipes) close to the antenna can cause severe receiver interference.

8. If a GPS or combined TETRA/GPS antenna is used, ensure that the antenna has a clear view to the sky and that the antenna base that carries the GPS/GNSS receiver is not covered with any metallic or radio frequency absorbing material.

5.1.3
Installing the Antenna

Procedure:

1. Mount the antenna according to the instructions provided with the antenna kit.
2. Run the coaxial cable to your radio mounting location. If necessary, cut off the excess cable and install the cable connector.
3. Connect the antenna cable connector to your radio antenna connector on the rear of your radio.

Figure 86: Connections to the Rear Side of Your Radio

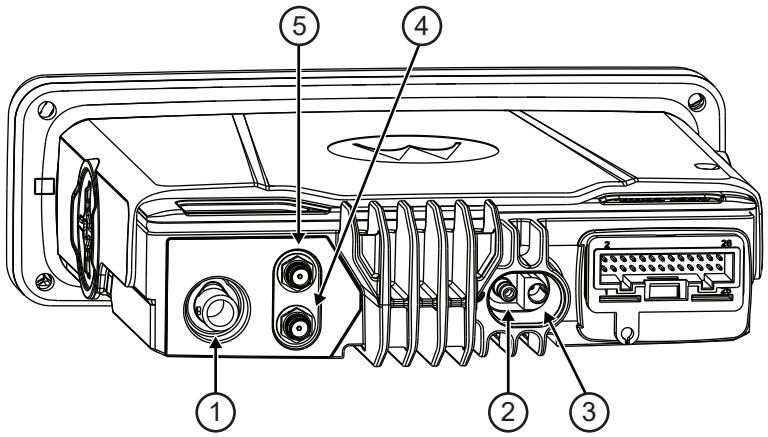


Table 95: Associated Components

Number	Description
1	Antenna BNC Connector
2	Battery +
3	Battery –
4	SMA GNSS Connector
5	SMA Wi-Fi or Bluetooth Connector

5.1.4
Completing Radio Installation

Procedure:

1. Mount the microphone clip to a convenient spot near your radio.
2. Plug the power cable into your radio power connector.

NOTE:
Motorola Solutions supplies a wide range of antennas and associated coaxial cables correctly terminated for use with the mobile radio. However should the need arise to carry out reinstallation or repair of a cable or connector then suitable information on selection and installation of replacement connectors and cables can be found on most recognized connector and cable manufacturers, for example Radiall, Huber and Suhner, Samtec.

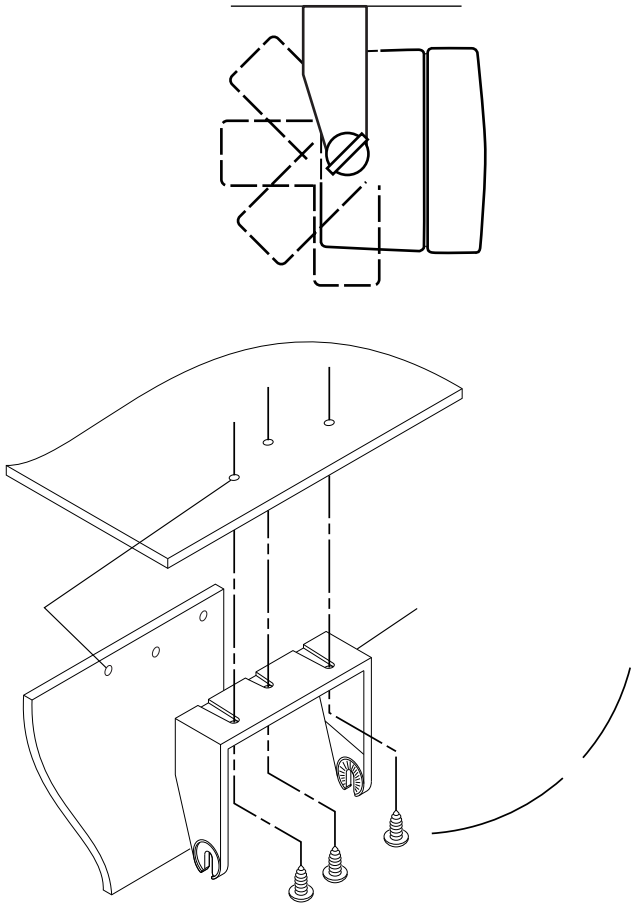
The BNC Connector should be typically of the crimped variety, likewise the SMA, or FME Connector used for GPS should also be of the crimped variety. Coaxial cable should be screened and low loss, see the individual specification sheets for the antennas to find details of specific cable types and or connectors. Additionally see the TETRA Interface Specification for the mobile radios for further information.

5.2
Installing External Speaker

Procedure:

1. Remove the speaker from the trunnion bracket by loosening the two wing screws.
2. Choose a place to mount the speaker. When mounting the trunnion on the transmission hump, be careful that the transmission housing is not affected.
3. Use the trunnion bracket as a template to mark the positions of the mounting holes.
4. Center-punch the spots you marked and drill a 4 mm (5/32 in.) diameter hole at each location.

Figure 87: External Speaker Trunnion Bracket



FL0830253-O

5. Mount the trunnion bracket with the screws supplied.
6. Insert the speaker into the trunnion bracket and tighten the two wing screws.
7. Insert the external speaker accessory plug into the accessory connector of your radio.

Appendix A

Service Information

Technical & Repair Support (for Contracted Customers Only)

If you would like to contact the Motorola Solutions Customer Care team, use the appropriate contact details below. Please be prepared to provide your contract number, product serial numbers, and detailed issue description for a faster response and a resolution. If the support request is Technical Support related, the request will be handled by the Technical Support Operations (TSO) team. This team of highly skilled professionals provides Technical Support to help resolve technical issues and quickly restore networks and systems. If you are unsure whether your current service agreement entitles you to benefit from this service, or if you would like more information about the Technical or Repair Support Services, contact your local customer support or account manager for further information.

Contact Details

Technical Requests: techsupport.emea@motorolasolutions.com

Repair Support: repair.emea@motorolasolutions.com

Contact Us: https://www.motorolasolutions.com/en_xu/support.html

Parts Identification and Ordering

If you need help with identifying non-referenced spare parts, direct a request to the Customer Care Organization of a local area Motorola Solutions representative. Orders for replacement parts, kits, and assemblies should be placed directly at the local distribution organization of Motorola Solutions.

However, you cannot order export-controlled products or spare parts such as TEA-related boards through an online shop or https://shop-business.motorolasolutions.com/. Send an order form with actual end-customer details by e-mail to your customer care team.

Appendix B

Service Information for APAC

This topic contains contact details to service centers in Asia and Pacific region.

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 Solutions Technical Support, be prepared to provide the product model number and the serial number.

Further Assistance from Motorola Solutions

You can also contact the Customer Help Desk through the website: http://www.motorolasolutions.com/en_xp/products. If a unit requires further complete testing, knowledge and/or details of component level troubleshooting or service than is customarily performed at the basic level, send your radio to a Motorola Solutions Service Center as listed in the following table:

Table 96: Service Information – Telephone Numbers and Addresses of the Asia and Pacific Motorola Solutions Centers

Country	Telephone Number	Address
Singapore	+65-6352-6383	**Motorola Solutions Singapore Pte. Ltd,** c/o Azure Engineering, 49 Jalan Pemimpin, #03-11 APS Industrial Building, Singapore 577203 Contact: Alvin Tan E-mail: alvin.tan@motorolasolutions.com Contact: Gan Saw See E-mail: gan.sawsee@motorolasolutions.com
Malaysia	+603-7809-0000	**Motorola Solutions Sdn. Bhd.** Level 14, Persoft Tower, No. 68, Pesiaran Tropicana, 47410 Petaling Jaya, Selangor Darul Ehsan, Malaysia Contact: Koh Tiong Eng E-mail: A21001@motorolasolutions.com
Indonesia	+62-21-3043-5239	**PT. Motorola Solutions Indonesia** 30th Floor, Gedung BRI II, Suite 3001, Jl. Jend. Sudirman Kav. 44-46, Jakarta 10210, Indonesia Contact: Eko Haryanto E-mail: Eko.Haryanto@motorolasolutions.com

Country	Telephone Number	Address
Thailand	Tel: +662-653-220 Fax: +668-254-5922	**Motorola Solutions (Thailand) Ltd.** 142 Two Pacific Place Suite 2201, 3220 Sukhumvit Road, Klongtoey, Bangkok 10110 Contact: Nitas Vatanasupapon E-mail: Nitas@motorolasolutions.com
India	+91-9844218850	**Motorola Solutions India Pvt. Ltd.** C/o Communication Test Design India Private Limited, #4, 5 Maruthi Industrial Estate, Rajapalya, Hoodi Village, Bangalore - 560048, India Contact: K. Umamaheswari E-mail: umamaheshwari@motorolasolutions.com
China	+86-10-8473-5128	**Motorola Solutions (China) Co. Ltd.** No. 1 Wang Jing East Road, Chao Yang District, Beijing, 100102, P.R. China Contact: Sophy Wang E-mail: C18170@motorolasolutions.com
Hong Kong	852-2966-4823	**Motorola Solutions Asia Pacific Ltd.** Unit 1807-1812, 18/F, Two Harbourfront, 22 Tak Fung Street, Hunghom, Kowloon, Hong Kong Contact: Judy Leung E-mail: Judy.Leung@motorolasolutions.com
Philippines	Tel: +632 858-7500 Fax: +632 841-0681	**Motorola Communications Philippines, Inc.** Unit 2102, One Global Place Building, 5th Ave., Bonifacio Global City, Taguig, Philippines 1634. Contact: Arthur Nieves E-mail: Arthur.Nieves@motorolasolutions.com
Korea	+822-3497-3649	**Motorola Solutions Korea, Inc.** 9th Floor, Hibrand Building, 215, Yangjae-Dong, Seocho-Gu, Seoul, 137-924, Korea. Contact: KS Kwak E-mail: r45321@motorolasolutions.com
Taiwan	+886-2-8729 8000	**Motorola Solutions Taiwan, Ltd.** 8F, No. 9, Songgao Rd.,

Country	Telephone Number	Address
		Taipei 110, Taiwan (R.O.C.) Contact: Michael Chou E-mail: ftpe239@motorolasolutions.com
Australia	+613-9847-7725	**Motorola Solutions Australia Pty. Ltd.** 10 Wesley Court, Tally Ho Business Park, East Burwood Victoria 3151, Australia. E-mail: servicecentre.au@motorolasolutions.com

Piece Parts

Some replacement parts, spare parts, and/or product information can be ordered directly. If a complete Motorola Solutions part number is assigned to the part, it is available from Motorola Solutions Service Organization. If no part number is assigned, the part is not normally available from Motorola Solutions. If a list of parts is not included, that means that no user-serviceable parts are available for that kit or assembly.

Customer Programming Software has no capability to tune your radio. Tuning your radio can only be performed at the factory or at the appropriate Motorola Solutions Repair Center. Component replacement can affect your radio tuning and must only be performed by the appropriate Motorola Solutions Repair Center.

All orders for parts/information should include the complete Motorola Solutions identification number. All part orders should be directed to your local Motorola Solutions Service Organization. See your latest price pages.

Parts Identification and Ordering

Request for help in identification of non-referenced spare parts should be directed to the Customer Care Organization of Motorola Solutions local area representation. Orders for replacement parts, kits, and assemblies should be placed directly on a Motorola Solutions local distribution organization.

Appendix C

Service Information for Americas

This topic contains contact details to service centers in Latin America and Caribbean region.

Technical Support

To request technical support, go to https://businessonline.motorolasolutions.com, **Contact Us**.

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

Warranty and Repairs

Table 97: Service Information – Telephone Numbers and Addresses of Latin America Radio Support Centers

Country	Telephone Number	Address
Colombia	571- 376-6990	Motorola Solutions de Colombia Service Centre Torre Banco Ganadero Carrera 7 No. 71-52 Torre B piso 13 Oficina 1301 Bogota
Mexico	5252576700	Motorola Solutions de México Service Centre Bosques de Alisos #125 Col. Bosques de las Lomas CP 05120 Mexico DF

Piece Parts

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

Table 98: Service Information – Telephone Numbers and Addresses of Latin America Motorola Solutions Centers

Country	Telephone Number	Address
Argentina	5411-4317-5300	Motorola Solutions Argentina Ave. del Libertador 1855 B1638BGE, Vicente Lopez Buenos Aires
Brasil	5511-3847-668	Motorola Solutions Ltda Av. Chedid Jafet

Country	Telephone Number	Address
		222 Bloco D Conjuntos 11,12,21,22 E 41 Condominio Millennium Office Park 04551-065- Vila Olimpia, Sao Paulo
Chile	562-338-9000	Motorola Solutions Chile S.A. Av. Nueva Tajamar 481 Edif. World Trade Center Of. 1702, Torre Norte Las Condes Santiago
Colombia	571-376-6990	Motorola Solutions Colombia LTDA. Carrera 7 #71-52 Torre A, Oficina 1301 Bogotá
Costa Rica	506-201-1480	Motorola Solutions de Costa Rica Parque Empresarial Plaza Roble Edificio El Portico, 1er Piso Centro de Negocios Internacional Guachepelin, Escazu San Jose
Ecuador	5932-264-1627	Motorola Solutions del Ecuador Autopist Gral. Rumiñahui, Puente 2 Conjunto Puerta del Sol Este-Ciudad Jardin Pasa E, Casa 65 Quito
Mexico	52-555-257-6700	Motorola Solutions de México, S.A. Calle Bosques de Alisos #125 Col. Bosques de Las Lomas 05120 México D.F.
Peru	511-211-0700	Motorola Solutions del Peru Ave. República de Panama 3535 Piso 11, San Isidro Lima 27
USA	954-723-8959	Motorola Solutions, Inc. Latin American Countries Region 789 International Parkway Sunrise, FL 33325
Venezuela	58212-901-4600	Motorola Solutions de Los Andes C.A. Ave. Francisco de Miranda Centro Lido, Torre A Piso 15, El Rosal Caracas, 1060

Appendix D

Warranty and Service Support

Motorola Solutions 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. Before shipping any terminal back to the appropriate Motorola Solutions warranty depot, contact Customer Resources or your Motorola Solutions dealer, distributor or reseller. All returns must be accompanied by a Warranty Claim Form, available from your Customer Service representative or through https://shop-business.motorolasolutions.com/ or your Motorola Solutions dealer, distributor, or reseller.

Warranty Period and Return Instructions

The terms and conditions of warranty are defined fully in the Motorola Solutions Customer, 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 before shipping the unit back to Motorola Solutions. This procedure is to ensure that the product has been correctly programmed or has not been subjected to damage outside the terms of the warranty.

Before shipping any terminal back to the appropriate Motorola Solutions warranty depot, contact Customer Resources (see the following pages). All returns must be accompanied by a Warranty Claim Form, available from your Customer Services representative. Products should be shipped back in the original packaging, or correctly packaged to ensure that no damage occurs in transit.

After Warranty Period

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

- Motorola Solutions 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.

How To Get Warranty Service

In order to receive warranty service, provide proof of purchase (bearing the date of purchase and Product item serial number) and, also, deliver or send the Product item, transportation and insurance prepaid, to an authorized warranty service location. Warranty service is provided by Motorola Solutions through one of its authorized warranty service locations. If you first contact the company which sold you the Product, it can facilitate your obtaining warranty service. You can also call Motorola Solutions at 1-888-567-7347 US/Canada.

Appendix E

Product Specific Information for Digital Terminals Type MTC953DE

This section gives the Service Personnel an overview about product-specific notes. It 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. Follow carefully all operating and safety instructions.

Table 99: Equipment Electrical Ratings

Parameter		Value
Rated Voltage		12 VDC
Rated Voltage Range		10.8 VDC to 15.6 VDC
Rated Current		MTC953DE (350–470 MHz): 5.5 A at 10 W RF power. Please be aware when planning the installation that there is a maximum current consumption of 10.5 A during PTT and even 100 mA (non-Ethernet)/ 90 mA (Ethernet) when terminal is switched off.
Transmitter Frequency Range		
	TMO	350–470 MHz
	DMO	350–470 MHz
Receiver Frequency Range		350–470 MHz

Table 100: Normal Load Conditions

Parameter	Value
Rated RF Power	10 W
Rated Audio Power	13 W @ 4 Ω, 15.6 W @ 4 Ω
Antenna Impedance	50 Ω
Operating Temp. Range	-30 °C to +60 °C
Operating Time	Continuous/Intermittent

NOTE: In general, the communication system determines terminal transmit and receive time (operating cycle time). On overload, respectively on extensive use beyond the system specifications at high ambient temperatures, the thermal control protects the terminal. The thermal control cuts down the RF output power, thus reducing the terminal coverage range.

Table 101: Fuse Identification

Parameter	Value	
Fuse for Power Cable PMKN4289_, PMKN4243_, or PMKN4275_	15 A (Motorola Solutions Part Number: 6580283E06)	**IMPORTANT:** In case of blown fuses during the installation, replace **only** with fuses of identical value. Never insert ones of different values.
Fuse for Ignition Sense Cable PMKN4120	4 A (Motorola Solutions Part Number: 6580283E02)	