

MOTOTRBO™ REPEATER XPR™ 8380

PROFESSIONAL DIGITAL TWO-WAY RADIO SYSTEM



MOTOTRBO™ Repeater Basic Service & Installation Manual

JULY 2017

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68009404001-DB

Notice

Foreword

This manual covers all models of the XPR™ 8380 Repeater, unless otherwise specified. It includes all the information necessary to maintain peak product performance and maximum working time, using levels 1 and 2 maintenance procedures. This level of service goes down to the board replacement level and is typical of some local service centers, Motorola Solutions Authorized Dealers, self-maintained customers, and distributors.



CAUTION: These servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

Product Safety and RF Exposure Compliance



CAUTION: Before using this product, read the operating instructions for safe usage contained in the Product Safety and RF Exposure booklet enclosed with your product.

CAUTION: This repeater is restricted to occupational use only to satisfy FCC RF energy exposure requirements. Before using this product, read the RF energy awareness information and operating instructions in the Product Safety and RF Exposure booklet enclosed with your product to ensure compliance with RF energy exposure limits.

For a list of Motorola Solutions-approved antennas, and other accessories, visit the following web site which lists approved accessories: <http://www.motorolasolutions.com/governmentandenterprise>

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Level 1 and 2 Maintenance

This manual covers Level 1 and 2 Maintenance:

Level 1 maintenance is the assessment and/or repair of fault in terms of faulty accessory or physical aspect of product; not including opening of the unit. Limited to replacement of antenna, battery, handset, external microphones, external knobs, all related frequency programming to customers' and in some cases alignment/tuning, by Customer Programming software (CPS).

Level 2 maintenance includes all Level I activities plus: Assessment that require opening the Subscriber Product and rectifying a fault by replacement of a board or module, or replacement of major mechanical parts (like Power Supply), followed by alignment/tuning to ensure the replacement of board/module/major mechanical parts are within Subscriber Product's specifications as per the service manual. It does not incorporate discrete component replacement.

Request for Assistance

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



NOTICE: For Level 2 maintenance, only Motorola Service Centers or Authorized Motorola Service Dealers can perform these functions. Any tampering by non-authorized Motorola Solutions Service Centers voids the warranty of your repeater. To find out more about Motorola Solutions Service Centers, please visit <http://www.motorola.com/governmentandenterprise>.

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Level 3 Maintenance

The Level 3 Maintenance can only be done at the Motorola Solutions Service Center/Depot since it can deeply affect the performance of the repeater.

To find out more about Motorola Solutions Service Center, please visit <http://www.motorola.com/governmentandenterprise>.

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Environmental Information

The environmental information pertains to the restrictions of hazardous substances and proper disposal of electronic equipment and its guidelines.

Material Content

This is to declare that Motorola Solutions products comply with the EU Directive 2011/65/EU (Restriction of Hazardous Substance or RoHS-2) and India RoHS, including applicable exemptions, with respect to the following substances:

- Lead (Pb) < 0.1% by weight (1000 ppm)
- Mercury (Hg) < 0.1% by weight (1000 ppm)
- Cadmium (Cd) < 0.01% by weight (100 ppm)
- Hexavalent Chromium (Cr6+) < 0.1% by weight (1000 ppm)
- Polybrominated Biphenyls (PBB) < 0.1% by weight (1000 ppm)
- Polybrominated Diphenyl Ethers (PBDE) < 0.1% by weight (1000 ppm)



NOTICE:

- The Motorola Solutions MOTOTRBO system and its subsystems have been created in compliance with the environmental goals of the European Union's Restriction of Hazardous Substances (RoHS 2) Directive 2011/65/EU and the Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU as well as Motorola Solutions corporate goals to minimize environmental impact of its products.
- This Motorola Solutions policy is reflected throughout the entire design, procurement, assembly, and packaging process.
- In support of these efforts to provide environmentally-responsible products, please comply with the information in the following sections regarding product disposal for systems being replaced.

Disposal of your Electronic and Electric Equipment

Do not dispose of electronic and electric equipment or electronic and electric accessories with your household waste.

In some countries or regions, collection systems have been set up to handle waste of electrical and electronic equipment.

In European Union countries, contact your local equipment supplier representative or service center for information about the waste collection system in your country.

Disposal Guidelines



■ The European Union's WEEE directive symbol on a Motorola Solutions product indicates that the product should not be disposed of with household waste.

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Document History

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

68009404001-A	Initial Release.	Jan. 2010
68009404001-B	Changed Repeater and Connector board service kit numbers from PMLN5269_S and PMLN5270_S to PMLN5643_S and PMLN5644_S respectively. Corrected Front Panel Assembly part number and item number labeling for Cable, RF Tx and Cable RF Rx in Table 5-3 Repeater Exploded View Parts List. Added antenna HAF4035_ and corrected description of HAF4021_ to 7.5 dB in Accessories chapter.	Feb. 2010
68009404001-C	Added 800/900 MHz band information.	Apr. 2010
68009404001-DA	Added Auto Test and Tune	Dec. 2016
68009404001-DB	Changed Motorola to Motorola Solutions	June 2017

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Notations Used in This Manual

Throughout the text in this publication, you will notice the use of note and caution notations. These notations are used to emphasize that safety hazards exist, and due care must be taken and observed.



NOTICE: An operational procedure, practice, or condition that is essential to emphasize.



CAUTION: CAUTION indicates a potentially hazardous situation which, if not avoided, might result in equipment damage.

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Notice

Limited Commercial Warranty

This limited commercial warranty describes the conditions under, and period during, which the repeater is repaired, replaced, and what is not covered.

I. What This Warranty Covers And For How Long

MOTOROLA SOLUTIONS INC. ("MOTOROLA") warrants the MOTOROLA manufactured Communication Products listed below ("Product") against defects in material and workmanship under normal use and service for a period of time from the date of purchase as scheduled:

Repeater	Two (2) Years
Product Accessories	One (1) Year

Motorola, at its option, will at no charge either repair the Product (with new or reconditioned parts), replace it (with a new or reconditioned Product), or refund the purchase price of the Product during the warranty period provided it is returned in accordance with the terms of this warranty. Replaced parts or boards are warranted for the balance of the original applicable warranty period. All replaced parts of Product shall become the property of MOTOROLA.

This express limited warranty is extended by MOTOROLA to the original end user purchaser only and is not assignable or transferable to any other party. This is the complete warranty for the Product manufactured by MOTOROLA. MOTOROLA assumes no obligations or liability for additions or modifications to this warranty unless made in writing and signed by an officer of MOTOROLA. Unless made in a separate agreement between MOTOROLA and the original end user purchaser, MOTOROLA does not warrant the installation, maintenance or service of the Product.

MOTOROLA cannot be responsible in any way for any ancillary equipment not furnished by MOTOROLA which is attached to or used in connection with the Product, or for operation of the Product with any ancillary equipment, and all such equipment is expressly excluded from this warranty. Because each system which may use the Product is unique, MOTOROLA disclaims liability for range, coverage, or operation of the system as a whole under this warranty.

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SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION OR EXCLUSIONS MAY NOT APPLY.

This warranty gives specific legal rights, and there may be other rights which may vary from state to state

IV. How To Get Warranty Service

You must provide proof of purchase (bearing the date of purchase and Product item serial number) in order to receive warranty service and, also, deliver or send the Product item, transportation and insurance prepaid, to an authorized warranty service location. Warranty service will be provided by Motorola 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 contact Motorola at 1-888-567-7347 US/Canada..

V. What This Warranty Does Not Cover

Defects or damage resulting from use of the Product in other than its normal and customary manner.

Defects or damage from misuse, accident, water, or neglect.

Defects or damage from improper testing, operation, maintenance, installation, alteration, modification, or adjustment.

Breakage or damage to antennas unless caused directly by defects in material workmanship.

A Product subjected to unauthorized Product modifications, disassemblies or repairs (including, without limitation, the addition to the Product of non-Motorola supplied equipment) which adversely affect performance of the Product or interfere with Motorola's normal warranty inspection and testing of the Product to verify any warranty claim.

Product which has had the serial number removed or made illegible.

Freight costs to the repair depot.

A Product which, due to illegal or unauthorized alteration of the software/firmware in the Product, does not function in accordance with MOTOROLA's published specifications or the FCC type acceptance labeling in effect for the Product at the time the Product was initially distributed from MOTOROLA.

Scratches or other cosmetic damage to Product surfaces that does not affect the operation of the Product.

Normal and customary wear and tear.

VI. Patent And Software Provisions

MOTOROLA will defend, at its own expense, any suit brought against the end user purchaser to the extent that it is based on a claim that the Product or parts infringe a United States patent, and MOTOROLA will pay those costs and damages finally awarded against the end user purchaser in any such suit which are attributable to any such claim, but such defense and payments are conditioned on the following:

- that MOTOROLA will be notified promptly in writing by such purchaser of any notice of such claim;
- that MOTOROLA will have sole control of the defense of such suit and all negotiations for its settlement or compromise; and
- should the Product or parts become, or in MOTOROLA's opinion be likely to become, the subject of a claim of infringement of a United States patent, that such purchaser will permit MOTOROLA, at its option and expense, either to procure for such purchaser the right to continue using the Product or parts or to replace or modify the same so that it becomes noninfringing or to grant such purchaser a credit for the Product or parts as depreciated and accept its return. The depreciation will be an equal amount per year over the lifetime of the Product or parts as established by MOTOROLA.

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VII. Governing Law

This Warranty is governed by the laws of the State of Illinois, USA.

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Chapter 1

MOTOTRBO Repeater Introduction

1.1 MOTOTRBO Repeater Description

The XPR 8380 repeater is available in the following frequency ranges and power levels.

Table 1: Frequency Ranges and Power Levels

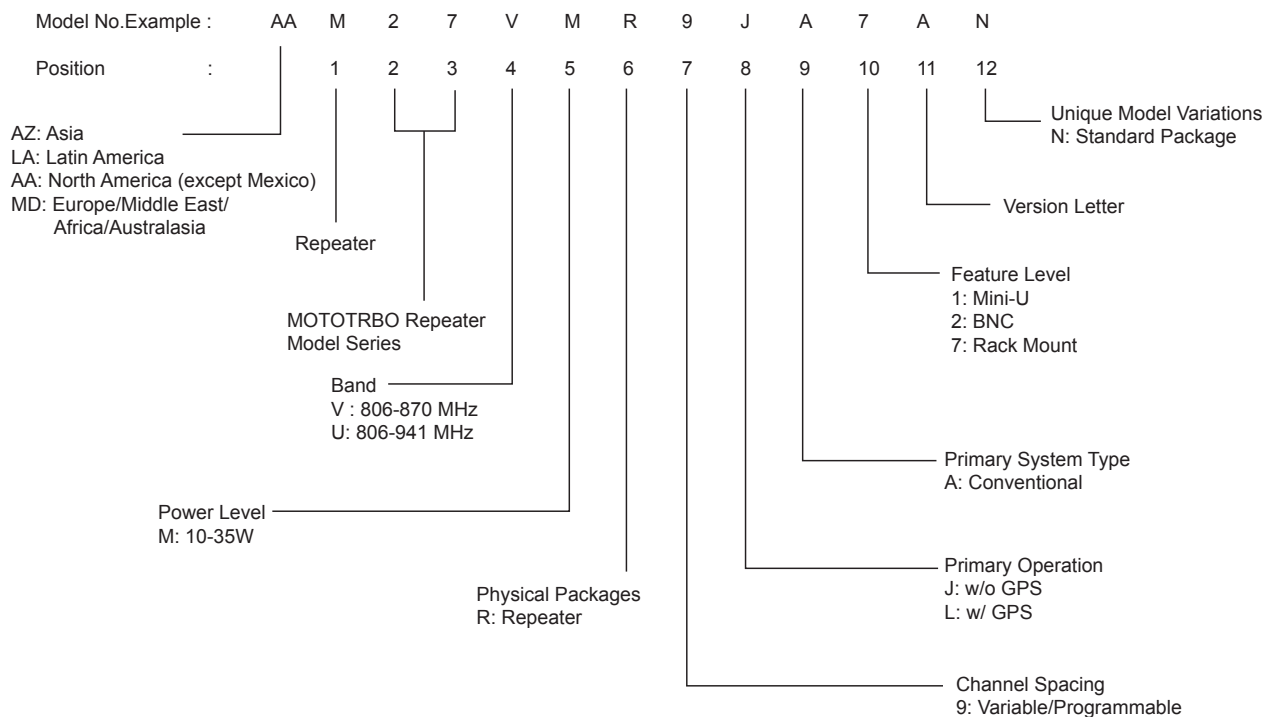
Frequency Band	Bandwidth	Power Level
800	806–870 MHz	10–35 Watts
800/900	806–941 MHz	10–35 Watts

This repeater is among the most sophisticated two-way repeaters available. It has a robust design for users who need high performance, quality, and reliability in their daily communications. This architecture provides the capability of supporting a multitude of legacy and advanced features resulting in a more cost-effective two-way repeater communications solution.

1.2 MOTOTRBO Repeater Model Numbering Scheme

The MOTOTRBO™ Repeater model numbering scheme identifies the repeater model and the various options available.

Figure 1: Repeater Model Numbering Scheme



1.3

800 MHz MOTOTRBO Repeater (806–870 MHz) Model Chart

806–870 MHz, 10–35W		
Model	Description	
AAM27VMR9JA7AN	806–870 MHz, 10–35 W, MOTOTRBO Repeater	
	Item	Description
X	PMUF1472_	XPR 8380 800 MHz 10–35W, Repeater
X	PMLN5644_S	Connector Board Assembly
X	PMLN5643_S	Repeater Indicator Board
X	PMTF4001_S*	Repeater Service Kit
X	PMPN4001_	Power Supply
X	3087791G01	120V Line Cord
X	6816814H01	XPR 8380 Installation Guide
X	6881095C99	Product Safety and RF Exposure Booklet

* = Repeater Service Kit refers to Transmitter/Receiver Brick.

X = Item Included

_ = the latest version kit. When ordering a kit, refer to your specific kit for the suffix number.

1.4

800/900 MHz MOTOTRBO Repeater (806–941 MHz) Model Chart

806–941 MHz, 10–35W		
Model	Description	
AAM27UMR9JA7AN	806–941 MHz, 10–35 W, MOTOTRBO Repeater	
	Item	Description
X	PMUF1491_	XPR 8380 800/900 MHz 10–35W, Repeater
X	PMLN5579_S	Connector Board Assembly
X	PMLN5643_S	Repeater Indicator Board
X	PMTF4001_S*	Repeater Service Kit
X	PMPN4001_	Power Supply
X	PMBN4076_	Packaging Kit
X	3087791G01	120V Line Cord
X	6816814H01	XPR 8380 Installation Guide

Table continued...

806–941 MHz, 10–35W		
Model		Description
X	6881095C99	Product Safety and RF Exposure Booklet

* = Repeater Service Kit refers to Transmitter/Receiver Brick.

X = Item Included

_ = the latest version kit. When ordering a kit, refer to your specific kit for the suffix number.

1.5

Specifications

General		
Specification	800 MHz	800/900 MHz
Channel Capacity	1	1
Technical RF Output		
806–870 MHz	10–35 W	10–35 W
896–941 MHz	–	10–30 W
Frequency	806–870 MHz	806–941 MHz
Dimensions (HxWxL)	5.22" x 19" x 11.67" (132.6 mm x 482.6 mm x 296.5 mm)	
Weight	31 lbs (14 kg)	
Voltage Requirements	100–240 V AC 47–63 Hz (13.6 V DC)	
Current Drain:	1.0 A (100 V AC)	
Standby	0.5 A (240 V AC)	
	1.0 A (typical)(13.4 V DC)	
Transmit: Low Power	3.0 A (100 V AC)	
	1.5 A (240 V AC)	
	10 A (typical)(13.4 V DC)	
Transmit: High Power	4.0 A (100 V AC)	
	1.8 A (240 V AC)	
	12 A (typical)(13.4 V DC)	
Operating Temperature Range	-30°C to +60°C	
Max Duty Cycle	100%	
FCC Description	10–35 W: ABZ99FT5029	10–35 W: ABZ99FT6001
IC Description	10–35 W: 109AB-99FT5029	10–35 W: 109AB-99FT6001

Receiver		
Specification	800 MHz	800/900 MHz
Frequency	806–825 MHz	806–825 MHz 896–902 MHz
Channel Spacing	12.5 kHz/25 kHz	12.5 kHz/25 kHz 12.5 kHz only for 900 MHz
Frequency Stability (-30°C to +60°C)	±0.5 ppm	±0.1 ppm
Analog Sensitivity (12 dB SINAD)	0.22 µV (typical)	
Digital Sensitivity	5% BER: 0.3 µV 0.22 µV (typical)	
Intermodulation (TIA603C)	78 dB	
Adjacent Channel Selectivity: TIA603	65 dB @ 12.5 kHz 75 dB @ 25 kHz	
TIA603C	50 dB @ 12.5 kHz 75 dB @ 25 kHz	
Spurious Rejection (TIA603C)	75 dB	
Audio Distortion @ Rated Audio	3% typical	
Hum and Noise	-45 dB @ 12.5 kHz -45 dB @ 25 kHz	
Audio Response	TIA603C	
Conducted Spurious Emission:	-57 dBm	

Frequency	851–870 MHz	851–870 MHz 935–941 MHz
Channel Spacing	12.5 kHz/25 kHz	
Frequency Stability (-30°C to +60°C)	±0.5 ppm	±0.1 ppm
Power Output: 851–870 MHz 935–941 MHz	10–35 W –	10–35 W 10–30 W
Modulation Limiting	±2.5 kHz @ 12.5 kHz ±5.0 kHz @ 25 kHz	
Digital Modulation Fidelity (4FSK)	FSK Error 5% FSK Magnitude 1%	

Table continued...

FM Hum and Noise	-40 dB @ 12.5 kHz -45 dB @ 25 kHz
Conducted/Radiated Emission	-36 dBm < 1 GHz -30 dBm > 1 GHz
Adjacent Channel Power (TIA603C)	-50 dB @ 12.5 kHz -60 dB @ 25 kHz
Audio Response	TIA603C
Audio Distortion	3%
FM Modulation	12.5 kHz : 11K0F3E 25 kHz : 16K0F3E
4FSK Digital Modulation	12.5 kHz Data Only : 7K60FXD 12.5 kHz Data & Voice : 7K60FXE
Digital Vocoder Type	AMBE +2™
Digital Protocol	ETSI TS 102 361-1 ETSI TS 102 361-2 ETSI TS 102 361-3

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Chapter 2

MOTORTBO Test Equipment and Service Aids

2.1

Recommended Test Equipment

The list of equipment contained in the following table includes most of the standard test equipment required for servicing Motorola Solutions repeaters.

Table 2: Recommended Test Equipment

Equipment	Characteristic	Example	Application
Service Monitor	Can be used as a substitute for items marked with an asterisk (*)	Motorola R2670, 3920 or equivalent	Frequency/deviation meter and signal generator for wide-range troubleshooting and alignment
Digital RMS Multimeter*	100 μ V to 300 V 5 Hz to 1 MHz 10 Meg Ohm Impedance	Fluke 179 or equivalent (www.fluke.com)	AC/DC voltage and current measurements. Audio voltage measurements
RF Signal Generator*	100 MHz to 1 GHz -130 dBm to +10 dBm FM Modulation 0 kHz to 10 kHz	Agilent N5181A (www.agilent.com), Ramsey RSG1000B (www.ramseyelectronics.com), or equivalent	Receiver measurements
Oscilloscope*	2 Channels 50 MHz Bandwidth 5 mV/div to 20 V/div	Leader LS8050 (www.leaderusa.com), Tektronix TDS1001b (www.tektronix.com), or equivalent	Waveform measurements
Power Meter and Sensor*	5% Accuracy 100 MHz to 500 MHz 50 Watts	Bird 43 Thruline Watt Meter (www.bird-electronic.com) or equivalent	Transmitter power output measurements
RF Millivolt Meter	100 mV to 3 V RF 10 kHz to 1 GHz	Boonton 92EA (www.boonton.com) or equivalent	RF level measurements

2.2 Service Aids

The following table lists the service aids recommended when performing testing, tuning, and troubleshooting on the repeater.

While all of these items are available from Motorola Solutions, most are standard workshop equipment items, and any equivalent item capable of the same performance may be substituted for the item listed.

Table 3: Service Aids

Motorola Part Number	Description	Application
RLN4460_	Test Set	Enables connection to audio/accessory jack. Allows switching for radio testing.
RVN5115_	Customer Programming Software (CPS) on CD-ROM	Allows a technician to program, tune, and troubleshoot repeaters.
PMKN4010_	Mobile & Repeater Rear Programming Cable	Connects the rear connector to a USB port for programming and data applications.
PMKN4016_	Mobile & Repeater Rear Accessory Programming and Test Cable	Connects the rear connector to a USB port for programming, data applications, testing and alignment.
PMKN4018_	Mobile & Repeater Rear Accessory Connector Universal Cable	Connects the rear connector to accessory devices such as desk sets. Cable contains all 26 wires and is unterminated at the user end.

2.3 Programming Cables

The following cables are used to perform programming and testing on the repeater.

Figure 2: Mobile & Repeater Rear Programming Cable PMKN4010_

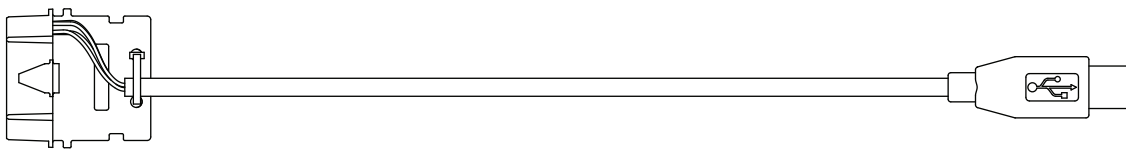


Figure 3: Mobile & Repeater Rear Accessory Programming and Test Cable PMKN4016_

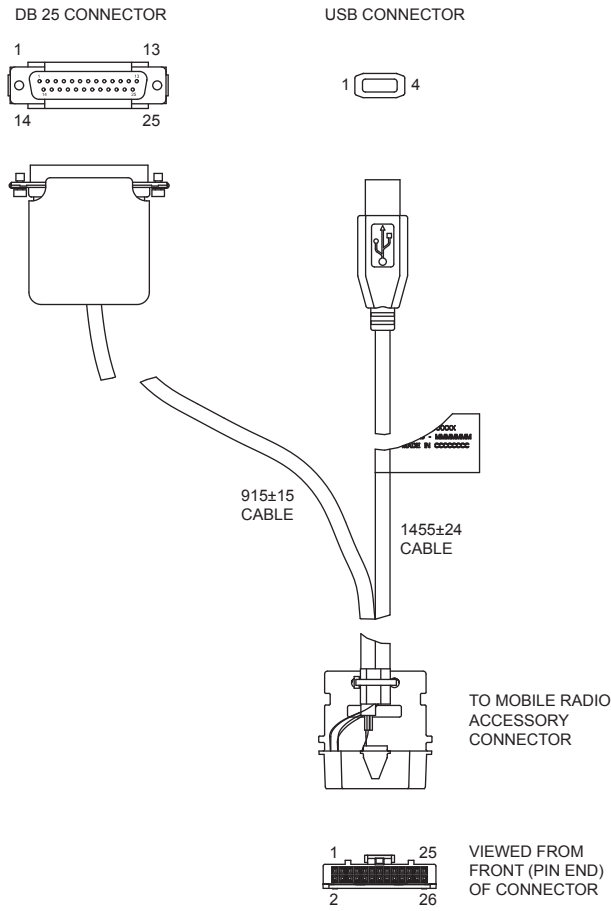


TABLE 2-3: WIRE DIAGRAM

26 PIN ACCESSORY PORT CONNECTOR		USB	DB25P
PIN NO.	DESCRIPTION		
3	VCC (5v)	1	
2	DATA -	2	
1	DATA +	3	
4	GND	4	
	DRAIN WIRE AND BRAID	SHELL	
9	SPEAKER -		7
11	EXT MIC		17
17	DIGI IN 1 (EXT PTT)		20
16	GND		16
10	SPEAKER +		1

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Chapter 3

MOTOTRBO Transceiver Performance Testing

3.1

Performance Testing Accuracy

The MOTOTRBO Repeater meets published specifications through their manufacturing process by utilizing high-accuracy laboratory-quality test equipment.

The recommended field service equipment approaches the accuracy of the manufacturing equipment with few exceptions. This accuracy must be maintained in compliance with the manufacturer's recommended calibration schedule.



NOTICE: Although repeaters function in digital and analog modes, all testing is done in analog mode.

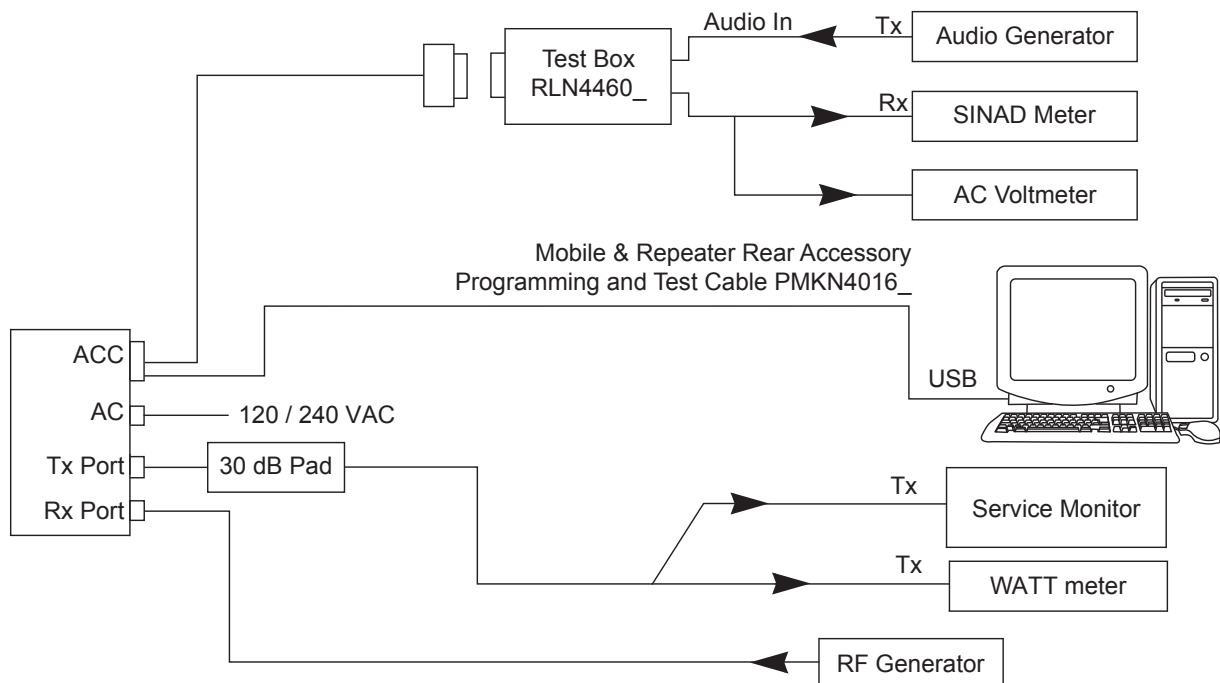
3.2

Transceiver Performance Testing Setup

To perform the testing procedures, the repeater must be connected to the PC and test equipment.

The equipment required for test procedures is connected as shown in the following diagram. Supply voltage is 120/240 VAC.

Figure 4: Repeater Testing Equipment Setup



Initial equipment control settings should be as indicated in [Table 4: Initial Equipment Control Settings on page 40](#). [Table 5: Receiver Performance Checks on page 40](#) lists Receiver Performance Checks information.

Table 4: Initial Equipment Control Settings

Service Monitor	Test Set
Monitor Mode: Power Monitor	Speaker set: A
RF Attenuation: -70	Speaker/load: Speaker
AM, CW, FM: FM	PTT: OFF
Oscilloscope Source: Mod Oscilloscope Horizontal: 10 mSec/Div Oscilloscope Vertical: 2.5 kHz/Div Oscilloscope Trigger: Auto Monitor Image: Hi Monitor Bandwidth: Narrow Monitor Squelch: middle setting Monitor Vol: 1/4 setting	

Table 5: Receiver Performance Checks

Test Name	Communications Analyzer	Radio	Test Set	Comment
Rated Audio	Mode: GEN Output level: 1.0 mV RF Mod: 1 kHz tone at 3 kHz deviation Monitor: DVM: AC Volts	Use tuner tool to program repeater to an appropriate test frequency with carrier squelch.	PTT to OFF (center), meter selector to Audio PA	Set volume to 7.75 Vrms via tuner tool.
Distortion	As above, except to distortion	As above	As above	Distortion <5.0 %
Sensitivity (SINAD)	As above, except SINAD, lower the RF level for 12 dB SINAD.	As above	PTT to OFF (center)	RF input to be <0.3 μ V
Noise Squelch Threshold (only radios with conventional system need to be tested)	RF level set to 1 mV RF	As above	PTT to OFF (center), meter selection to Audio PA, speaker/load to speaker	Set volume to 7.75 Vrms via tuner tool.
	As above, except change frequency to a conventional system. Raise RF level from zero until radio un-squelches.	out of TEST MODE; select a conventional system	As above	Unsquelch to occur at <0.25 μ V. Preferred SINAD = 9-10 dB

3.3

Auto Test and Tune Support Alignment Instrument

Auto Test and Tune Support is an automated alignment instrument for the repeater.

The Auto Test and Tune Support instrument allows you to perform Test and Tune procedures in the right method that saves time and helps to achieve higher efficiency. To accomplish the overall Test and Tune procedures, the repeater must be tested in two test suites: Analog mode and Digital mode. These procedures include Tuning and Testing in Analog mode and Testing in Digital Mode.



NOTICE: Contact Motorola Solutions Customer Support for more details on this instrument.

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Chapter 4

MOTOTRBO Repeater Programming and Tuning

4.1

Customer Programming Software Introduction

The MOTOTRBO Customer Programming Software (CPS) as well as the Tuner application are used to program the repeater and are designed for use on Windows Vista/XP operating system. These programs are available in one kit as listed in the following table. An Installation Guide is also included with the kit.



NOTICE: Refer to the appropriate program on-line help files for the programming procedures.

Table 6: Repeater Software Program Kits

Description	Kit Number
MOTOTRBO CPS, Tuner and AirTracer Applications CD	RVN5115_

4.2

Customer Programming Software Setup

Customer Programming Software (CPS) is used to program and tune the repeater.

The setup is shown in [Figure 5: Customer Programming Software Setup from Rear Accessory Connector on page 43](#).

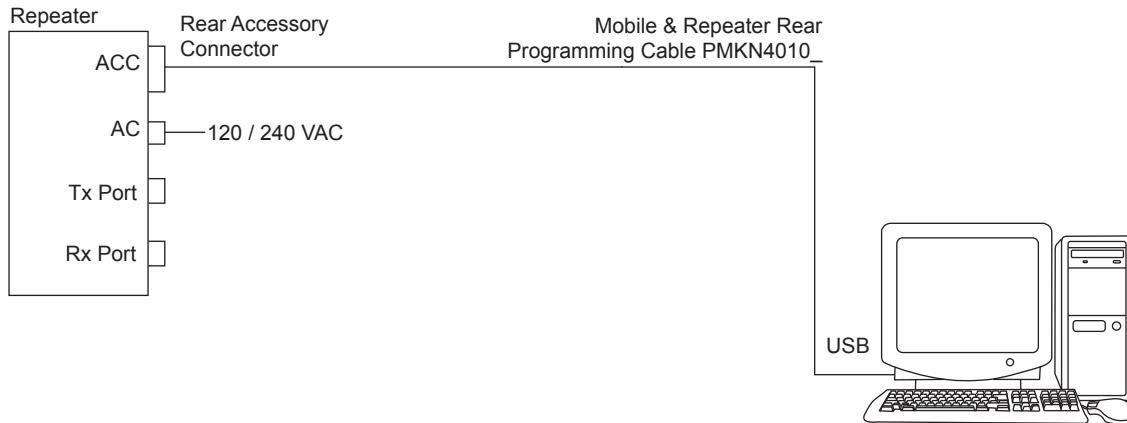


NOTICE: See the appropriate program on-line help files for the programming procedures.



CAUTION: Computer USB ports can be sensitive to Electronic Discharge. Do not touch exposed contacts on cable when connected to a computer.

Figure 5: Customer Programming Software Setup from Rear Accessory Connector



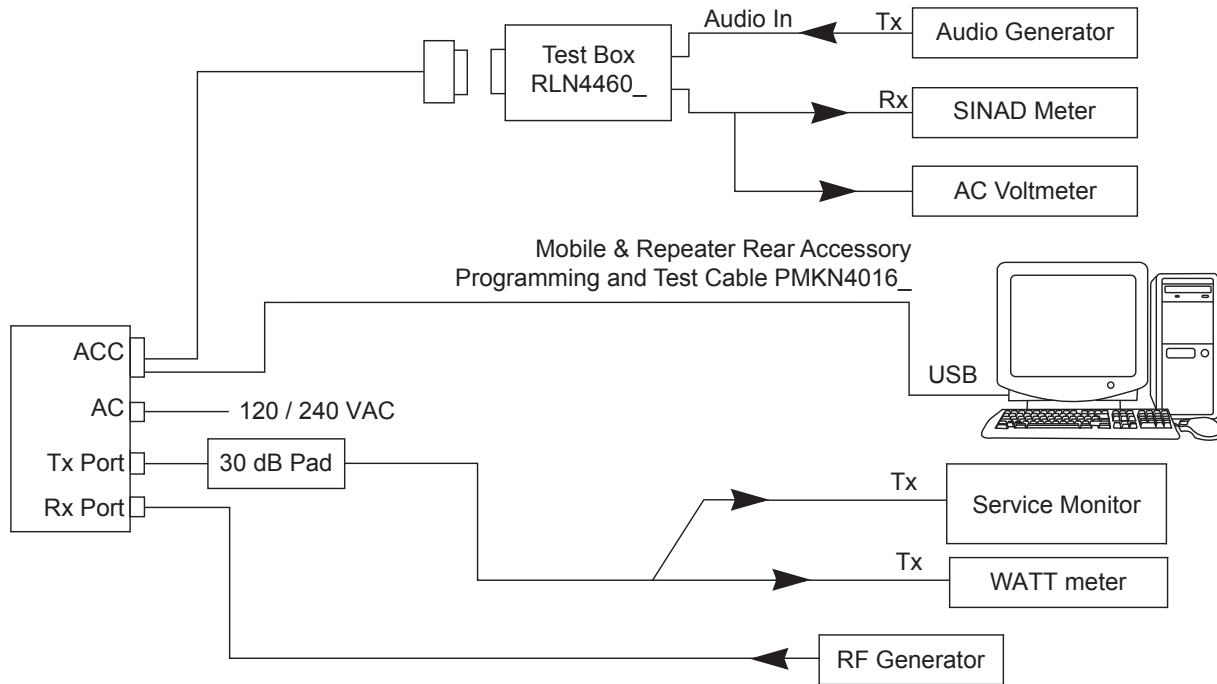
4.3

Repeater Tuning Setup

A personal computer (PC), Windows Vista/XP and a tuner program (which is available as part of the MOTOTRBO CPS kit) are required to tune the repeater.

To perform the tuning procedures, the repeater must be connected to the PC and test equipment setup as shown in the following figure.

Figure 6: Repeater Tuning Equipment Setup



4.4

Preparing and Configuring the Repeater

The repeater must be set-up with the proper connections to prepare for the alignment procedures.

Prerequisites:



NOTICE: Ensure that the repeater is configured for the analog mode of operation. If not, use the latest version of the Customer Programming Software (CPS) and program an analog channel as the first channel in the zone channel assignment screen. Save the codeplug as a precautionary measure.

Procedure:

- 1 Ensure the **On/Off** switch on the rear of the repeater is in the **Off** position.
- 2 Disconnect the AC power cable from the repeater.
- 3 Remove the five screws that hold the top cover onto the repeater chassis.
- 4 Remove the cover of the repeater.
- 5 Connect the MOTOTRBO Mobile/Repeater programming cable to the rear of the repeater.
- 6 Connect the AC power cable to the repeater.
- 7 Place the **On/Off** switch on the rear of the repeater, in the **On** position.

- 8 Ensure that the repeater goes through its normal power-up cycle and that the **Disable** LED is not illuminated.
- 9 Using the latest version of the Tuner, read the repeater tuning partition and save it as `Txtune<xxxx>`
where `<xxxx>` are the last four digits of the serial number of the repeater.
- 10 For transceiver alignment, connect a coaxial cable from the Tx output of the repeater to the communication analyzer RF I/O port. For receiver alignment, connect a coaxial cable from the Rx output of the repeater to the communication analyzer RF I/O port.

The communication analyzer is a suitable 50 ohm termination for the transmitter output, therefore no PA damage occurs while tuning the repeater as long as the repeater is NOT allowed to be left transmitting for extended periods of time.
- 11 Place the **On/Off** switch on the rear of the repeater, in the **Off** position.
- 12 Remove the repeater internal power supply cable from the rear of the Tx brick.
- 13 Connect an external 13.8 volt power supply to a MOTOTRBO mobile power cable. Set the current limit on the power supply to 15 amps (max current draw is 12 amps) and remove the fuse from the fuse block, on the cable.
- 14 Configure a Digital Volt Meter (DVM) for current measurements and connect the DVM to the fuse block on the power cable, which allows current to flow through the DVM and to the Tx brick.
- 15 Connect the external power cable to the rear of the Tx brick.
- 16 Turn on the Tx brick external power supply and place the **On/Off** switch on the rear of the repeater, in the **On** position at the exact same time.



NOTICE: The repeater requires that both the Tx and Rx bricks power up at approximately the same time. Ensure the repeater disabled LED is NOT on. If so, continue to power down and power up the repeater bricks. See [step 16](#) simultaneously until the repeater has a normal power-up sequence.

4.5

Measuring the Transmit Current

Procedure:

- 1 Measure and record the standby current draw of the transceiver. The standby current draw should be approximately 520 mA.
- 2 Using the latest version of the Tuner application, read the repeater tuning partition.
- 3 If the tuner indicates that the repeater is in the **Single Board** configuration, perform the following actions:
 - a Click **OK**.
 - b Turn the repeater **On/Off** switch to the **Off** position.
 - c Turn off the Tx brick external power supply and then turn on both power supplies simultaneously.



IMPORTANT: The drain bias current level referenced in [Aligning the Power Amplifier Bias on page 46](#) is the baseline level.

4.6

Tuning the Transmit Reference Oscillator Alignment

The reference oscillator of the repeater provides accurate signaling for GNSS satellites.

This alignment procedure should be done as maintenance schedules and regulations require.

Prerequisites:



NOTICE: Connect the radio antenna port to an attenuation pad, if necessary, before connecting the repeater to a communications analyzer to ensure that the maximum input power is not exceeded on the communications analyzer input port.

Procedure:

- 1 Launch the Tuner application.
- 2 Under the **TX** menu in the tree view, select **Ref Oscillator**.
- 3 Switch the communications analyzer to the Monitor mode.
- 4 Configure the communication analyzer for the current operating frequency that is displayed in the Ref. Oscillator screen of the tuner.
- 5 To key up the repeater, click **PTT**.
- 6 If necessary, adjust the softpot value until the error frequency read on the communications analyzer is as close to zero hertz as possible. Check the performance requirements, from the reference frequency as shown:

800 Repeater +/-400 Hz

800/900 Repeater +/-80 Hz



NOTICE:

If the Reference Oscillator adjustment cannot be made due to no power output from the repeater, perform [Aligning the Power Amplifier Bias on page 46](#) first, and then perform the Reference Oscillator adjustment.

- 7 To de-key the repeater, click **PTT**.
- 8 Click **Write** to write the updated softpot value.

4.7

Aligning the Power Amplifier Bias

Aligning the drain bias current in the RF power amplifier (PA) device is required after replacing or servicing the RF board. The PA Bias should always be checked before the power is aligned on a new board, serviced board, or when swapping the Tx and Rx bricks or boards.

Procedure:

- 1 Take the standby current value that was read in [Measuring the Transmit Current on page 45](#) test and add the following device bias current (800: 350 mA) to calculate the target PA bias current.
Example: (520 mA + 700 mA = 1220 mA)
- 2 Launch the Tuner application.
- 3 Under the **TX** menu in the tree view, select **PA Bias 1**.
- 4 In the softpot value area, enter the lowest working softpot value to avoid damaging the PA.
- 5 The lowest working softpot value should be below the values shown in the following table:

RF Band	Working Softpot Value
800/900	695 (Both PAs)

- 6 Click **Write** to write the updated softpot value.
- 7 To key up the repeater, click **PTT Toggle**.



NOTICE: A menu box appears indicating the power softpots in the repeater are reset once the repeater is keyed up.

- 8 Click **Write** to restore the power softpots, as specified in the next step. Click **OK**.
- 9 Adjust the working softpot value until the target PA bias current is achieved.
(This value was calculated in step 4).
- 10 To de-key the radio, click **PTT Toggle**.
- 11 Click **Write** to save the tuned softpot value into the repeater codeplug.

4.8

Tuning the Power Levels

Perform the Transmit Low Power, Attenuated Low and High Power Tuning on the repeater to adjust signal loss.

Prerequisites:



NOTICE: The steps for Attenuated Low Power tuning are only applicable to the low power models. Attenuated Low Power is the measurement of the output power with an internal attenuator turned on. It is required to achieve accurate power output at power less than 5.0 W.

Procedure:

- 1 Launch the Tuner Application.
- 2 Begin with the first column and the first box (that is, the first frequency point from the top), by clicking the box.
- 3 As you perform the power alignment, enter each frequency into the analyzer or put the analyzer in the scan mode and ensure that the analyzer is programmed to scan the frequency band of the repeater being aligned.
- 4 To key up the repeater at the corresponding frequency point, click **PTT Toggle**.
- 5 Monitor the power level.
- 6 To de-key the repeater, click **PTT Toggle**
- 7 Enter the power measurement into the appropriate box on the Tuner screen.
- 8 Repeat the previous steps for the remaining frequencies ensuring to align each box in all rows and columns.
- 9 Click **Write** to save the tuned power values into the repeater codeplug.

The following chart shows the range of expected values when tuning the power alignments.

Band	Tuning Frequency	Power Point 1	Power Point 2	Power Point 3	Power Point 4
		Power Tuning Range	Power Tuning Range	Power Tuning Range	Power Tuning Range
800 10–35 W	F1–F4	9.0–11.0 W	14.0–16.0 W	18.5–21.5 W	37.0–40.0 W
900 10–30 W	F5–F8	9.0–11.0 W	14.0–16.0 W	18.5–21.5 W	31.5–34.5 W

4.9

Adjusting the Modulation Balance

Tune the deviation level across a specific frequency band.

Procedure:

- 1 Launch the Tuner application.
- 2 From the **PTT Tone** drop down list, select **Low Tone**.
- 3 Click the uppermost box (that is, the lowest frequency point from the top).
- 4 Enter the frequency into the Communication Analyzer.
- 5 To key up the repeater, click **PTT Toggle**.
- 6 Observe the FM deviation in avg rms (kHz) on the analyzer.
The avg rms of the FM deviation value should be approximately 3.0 kHz. Denote this value.
- 7 To de-key the repeater, click **PTT Toggle**.
- 8 From the **PTT Tone** drop down list, select **High Tone**.
- 9 Key up the radio and observe the High Tone FM deviation (kHz) in avg rms.
- 10 To match the reading of the Low Tone that was recorded in a previous step, adjust the High Tone FM deviation (kHz) in avg rms.
- 11 De-key the radio.
- 12 Repeat this procedure for the remaining frequencies.
- 13 Click **Write** to save the tuned softpot values into the radio codeplug.

4.10

Preparing and Configuring the Repeater for Receiver Alignment

The repeater must be set-up with the proper connections to prepare for the receiver alignment procedures.

Prerequisites:



NOTICE: Ensure the repeater is configured for the analog mode of operation. If not, use the latest version of the CPS and program an analog channel as the first channel in the zone channel assignment screen.

Procedure:

Follow the setup procedures from [Preparing and Configuring the Repeater on page 44](#) with the exception to connect a coaxial cable from the Rx output of the repeater to the communications analyzer RF I/O port.

4.11

Tuning the Receiver Reference Oscillator

The reference oscillator of the repeater provides accurate signaling for GNSS satellites.

This alignment procedure should be done as maintenance schedules and regulations require.

Procedure:

- 1 Launch the Tuner application.
- 2 Under the **RX** menu in the tree view, click **Ref Oscillator**.

- 3 Configure the communications analyzer to output a RF signal level of -50 dBm, without modulation (silent carrier), on the current operating frequency to be tuned.
- 4 Click **Auto Tune**. The Softpot values are automatically tuned.
- 5 To save the tuned softpot value into the repeater codeplug, click **Write**.

4.12

Adjusting the Front End Filter

MOTOTRBO Receivers have an adjustable Pre-Selector Filter Frequency Response. The purpose of this filtering is to provide attenuation of any “Out-of-Band” signals that may get picked-up by the receiver and cause unnecessary interference. The Tuner is used to align the frequency response of the Front End Filter appropriately. This procedure is the manual way of tuning.

Prerequisites:



NOTICE: The softpot ranges from the table below provide guidance for the best performance trade-off between optimum receiver sensitivity and maximum out-of-band attenuation. Typically, the softpot values that control this adjustment monotonically increase with frequency. Motorola Solutions recommends that you keep the adjusted softpot value within this range for normal operational use.

The Internal and External audio options can be used for radio testing purposes. For example, to test the radio receive sensitivity at a particular frequency point, the user can set the frequency and control the audio output either to internal or external.

Procedure:

- 1 Launch the Tuner application.
- 2 Under **RX** in the tree view, click **Front End Filter**.
- 3 On the tuner screen, the audio should be selected as **Mute** for the Front End Filter tuning.
- 4 Configure the Communications Analyzer to output a RF signal level of -70 dBm, without modulation (silent carrier), on the current operating frequency to be tuned.
- 5 Click the upper most box (that is. the first frequency point from the top) in the tuner.
- 6 Adjust the working softpot value down and then up, until an RSSI (dBm) value has been determined to be as close as possible to the -70dbm signal the communications analyzer is outputting.
- 7 Once the highest value (dbm level), has been determined, find the range of this value and then program the softpot for the middle of that range.
- 8 Repeat these steps for the remaining frequencies.
- 9 To save the tuned softpot values into the repeater codeplug, click **Write**.

4.13

Tuning the Rated Volume

Adjusting the rated volume allows the radio to output at the optimal volume output allowed for the repeater.

Procedure:

- 1 Launch the Tuner application.
- 2 Under **RX** in the tree view, click **Rated Volume**.
- 3 Connect the MOTOTRBO programming cable to the Test Input port of the RLN4460B test box.

- 4 Connect the AC/DC Meter port at the Test Box to the Communications Analyzer's Audio Input port.
- 5 Configure the Communications Analyzer to output a RF signal level of -50 dBm, with a 1 kHz tone modulation at 3.0 kHz, on the current operating frequency to be tuned.
- 6 On the Test Box Load Selector, select **MX**.
- 7 On the Test Box Meter Out, select **RX**.
- 8 On the Test Box, switch the **SPKR/LOAD** toggle to **Load**.
- 9 Adjust the working softpot value until audio output of approximately 7.75 V is obtained.
- 10 To save the tuned softpot value into the repeater codeplug, click **Write**.

4.14

Tuning the Front End Gain and Attenuation Control

This alignment sets a reference value allowing Gain and Attenuation Control circuitry to auto adjust a weak or distorted signal entering the receiver front-end RF amplifier to provide a better quality signal.

Procedure:

- 1 Launch the Tuner application
- 2 Under **RX** in the tree view, click **Front End Gain Adjustment**.
- 3 Configure the Communications Analyzer to output an RF signal level of -80 dBm, without modulation (silent carrier), on the current operating frequency to be tuned.
- 4 To begin tuning, click **Auto Tune**.
Once the auto tune has finished, the softpot values are saved into the radio codeplug.
- 5 Close the **Tuner** screen for the repeater being aligned.
- 6 Place the AC power switch to the **Off** position (tuning off the repeater) then place the AC power switch to the **ON** position and ensure that the repeater goes through a normal power-up cycle.
- 7 Read the repeater with the tuner again.
- 8 To ensure that the Front End Gain and Attenuation Control tuning has been performed correctly, in the tree view under **RX**, select **Front End Filter**. On the tuner screen, the audio should be selected as **Mute** for the Front End Filter tuning. Click the up/down arrow (once) on any one of the manual slider bars. Configure the Communications Analyzer to output an RF signal level of -80 dBm, without modulation (silent carrier) on the carrier frequency of the slider bar that was selected, the displayed RSSI level on the tuner screen should read within +/-2 dB of -80 dBm.

4.15

Repeater Reassembly

Once programming and tuning of the repeater has been performed, the tuning equipment must be removed and the repeater reassembled and placed into working mode.

Procedure:

- 1 Place the **On/Off** switch on the rear of the repeater, in the **Off** position.
- 2 Remove the AC power cord from the repeater.
- 3 Remove the mobile power cable from the Tx brick and attach the internal power supply cable for the Tx brick to the Tx brick.
- 4 Attach the cover of the repeater.

- 5 Screw the top cover back onto the repeater using the five screws that hold the top cover onto the repeater chassis.



NOTICE: Please see [Disassembly/Reassembly Procedures on page 53](#).

- 6 Disconnect the MOTOTRBO mobile/repeater programming cable to the rear of the repeater.

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Chapter 5

Disassembly/Reassembly Procedures

Repairing and replacing parts in the repeater requires the repeater to be disassembled and then reassembled.

- Preventive maintenance (inspection and cleaning).
- Safe handling of CMOS and LDMOS devices.
- Repair procedures and techniques.
- Disassembly and reassembly of the repeater.
- Disassembly and reassembly of the Transmit and Receive radios.

5.1

Preventive Maintenance

Periodic visual inspection and cleaning is recommended.

Inspection

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

Cleaning Procedures

The following procedures describe the recommended cleaning agents and the methods to be used when cleaning the external and internal surfaces of the repeater. External surfaces include the top cover and repeater enclosure.

Periodically clean smudges and grime from exterior enclosure. Use a soft, non-abrasive cloth moistened in a mild soap and water solution. Rinse the surface using a second cloth moistened in clean water, and clean any dirt or debris from the fan grill and louvers on the front side.



NOTICE: Internal surfaces should be cleaned only when the repeater is disassembled for service or repair.

The only recommended agent for cleaning the external repeater surfaces is a 0.5% solution of a mild dishwashing detergent in water. The only factory recommended liquid for cleaning the printed circuit boards and their components is isopropyl alcohol (100% by volume).

Cleaning Internal Circuit Boards and Components

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



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

5.2

Safe Handling of CMOS and LDMOS Devices

Complementary Metal Oxide Semiconductor (CMOS) and Laterally Diffused Metal Oxide Semiconductor (LDMOS) devices are used in this family of repeaters, and are susceptible to damage by electrostatic or high voltage charges. Damage can be latent, resulting in failures occurring weeks or months later. Therefore, special precautions must be taken to prevent device damage during disassembly, troubleshooting, and repair.

Handling precautions are mandatory for CMOS/LDMOS circuits and are especially important in low humidity conditions.

DO NOT attempt to disassemble the repeater without first referring to the following CAUTION statement.



CAUTION: This repeater contains static-sensitive devices. Do not open the repeater unless you are properly grounded. Take the following precautions when working on this unit:

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

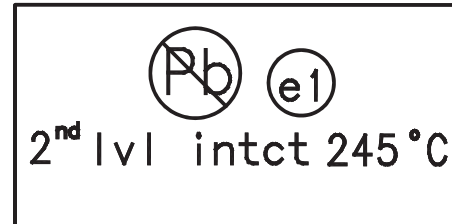
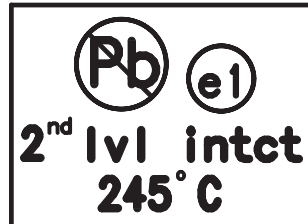
5.3

Repair Procedures and Techniques – General

Repairing repeaters requires special precautions. To guard against personal injury and/or damage to the equipment, follow the information in this section.



NOTICE: Environmentally Preferred Products (EPP) (refer to the marking on the printed circuit boards – examples shown below) were developed and assembled using environmentally preferred components and solder assembly techniques to comply with the European Union's Restriction of Hazardous Substances (ROHS 2) Directive 2011/65/EU and Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU. To maintain product compliance and reliability, use only the Motorola Solutions specified parts in this manual.



Any rework or repair on Environmentally Preferred Products must be done using the appropriate lead-free solder wire and lead-free solder paste as shown in the following tables.

Table 7: Lead Free Solder Wire Part Number List

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

Table 8: Lead Free Solder Paste Part Number List

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

Parts Replacement and Substitution

When damaged parts are replaced, identical parts should be used. If the identical replacement part is not locally available, check the parts list for the proper Motorola Solutions part number and order the part. Refer to the nearest Motorola Solutions Radio Products and Solutions Organization listed in [Appendix A : Replacement Parts Ordering on page 95](#) of this manual.

Rigid Circuit Boards

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

When soldering near a connector:

- Avoid accidentally getting solder in the connector.
- Be careful not to form solder bridges between the connector pins.
- Examine your work closely for shorts due to solder bridges.

5.4

Repeater Disassembly and Reassembly – General

The following tools are required for disassembling the repeater:

- Small Flat Blade Screwdriver
- TORX™ T30 Driver Bit
- TORX™ T25 Driver Bit
- TORX™ T20 Driver Bit
- TORX™ T15 Driver Bit
- TORX™ T10 Driver Bit
- 7 mm Magnetic Socket Driver (extension of >150 mm)
- 16 mm Deep Well Socket Driver
- 19 mm Deep Well Socket Driver

If a unit requires more complete testing or service than is customarily performed at the basic level, please send repeater to a Motorola Solutions Service Center listed in [Appendix B : Motorola Solutions Service Centers on page 97](#).

The following disassembly procedures should be performed only if necessary.

5.5

Repeater Disassembly - Detailed

Disassembling the repeater consists of removing the Transmit radio, Receive radio, Repeater Indicator Board, connector board assembly and other miscellaneous parts.

The following are items to take into consideration before disassembling the repeater.

- Power cord and all external cables must be disconnected before opening up the repeater.
- Take the proper grounding precautions as stated in [Safe Handling of CMOS and LDMOS Devices](#).
- When disassembling the repeater, retain all screws for reuse.

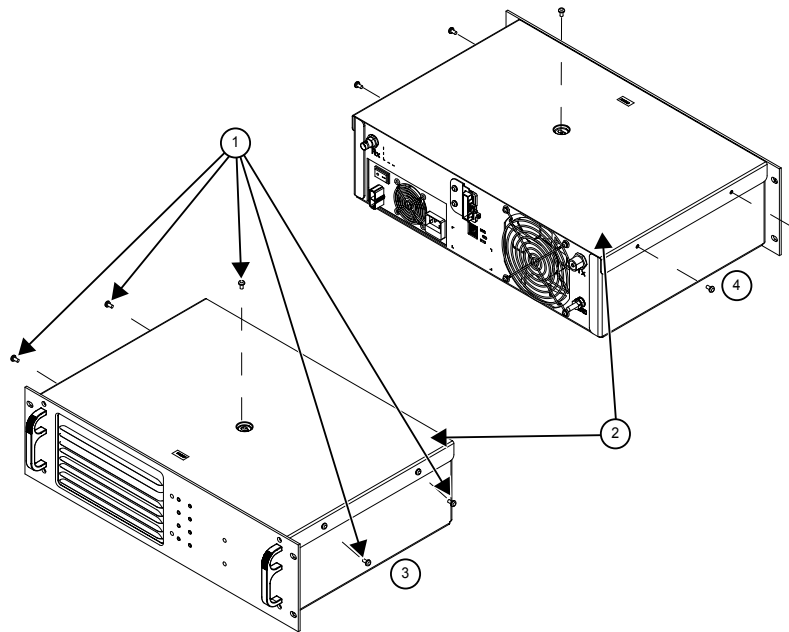
5.5.1

Removing the Cover

Remove the cover to either replace it or to disassemble the repeater further.

Procedure:

Remove the five screws that retain the cover to the housing using a T20 TORX driver. See the following figure.

Figure 7: Removing the Top Cover of Repeater Housing

Number	Description
1	Screws
2	Top Cover
3	Front View of Repeater
4	Back View of Repeater

5.5.2

Removing the Repeater Indicator Board

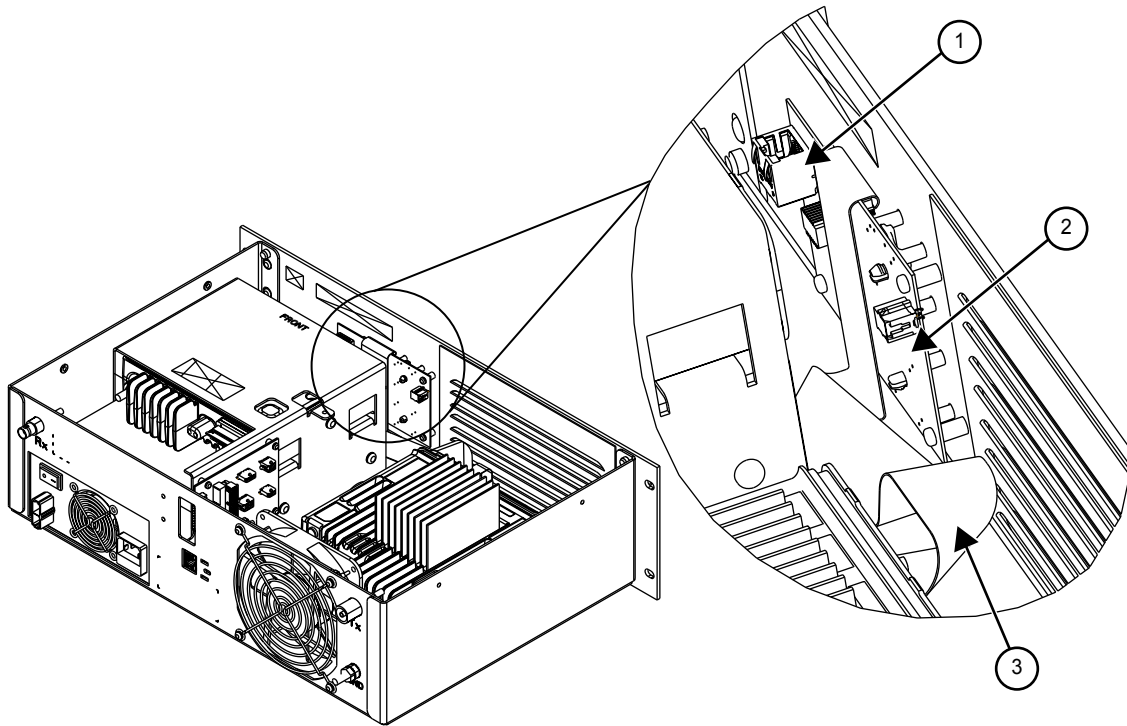
Remove the indicator board to either replace it or to disassemble the repeater further.

Procedure:

- 1 Disconnect the blue Ethernet cable from the Ethernet connector on the Repeater Indicator Board.
- 2 Disconnect the flex cable from the 30-position connector on the Repeater Indicator Board, noting orientation of cable which is identified with a solid black line.

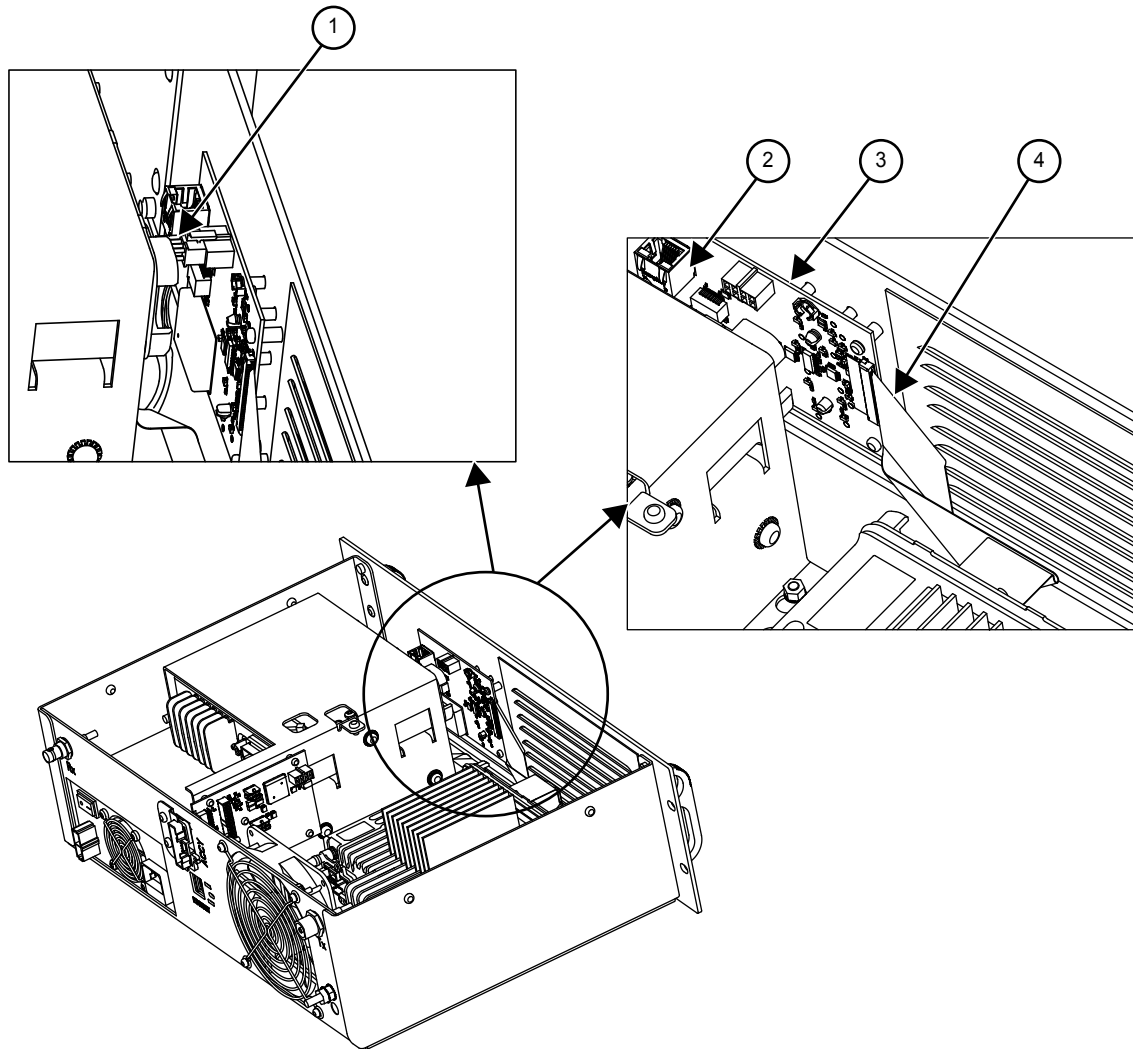
This is important for reassembly.

Figure 8: Disconnecting Ethernet Cable and Flex Cable



Number	Description
1	Ethernet Connector
2	Repeater, LED, and USB Converter Board
3	Flex Cable

- 3 For PMLN5643_, remove the ribbon cable from the 8-pin connector as well.

Figure 9: Disconnecting Ethernet Cable, Flex Cable and Ribbon Cable

Number	Description
1	8-Pin Ribbon Cable
2	Ethernet Connector
3	Repeater Indicator Board
4	Flex Cable

- 4 Detach the front panel by removing the four M6 screws located on the front face of panel using a T30 TORX driver.
- 5 Place the front panel on a flat surface with the Repeater Indicator Board facing up.
- 6 Detach the Repeater Indicator Board from the front panel by removing the four M3 screws using a T10 TORX driver.
- 7 Hold the Repeater Indicator Board on its outer edge with your finger tips, squeeze together the catch of each clip and slightly press them through the board to remove the light guide.
- 8 Store Repeater Indicator Board in an anti-static bag when it is not being serviced.

5.5.3

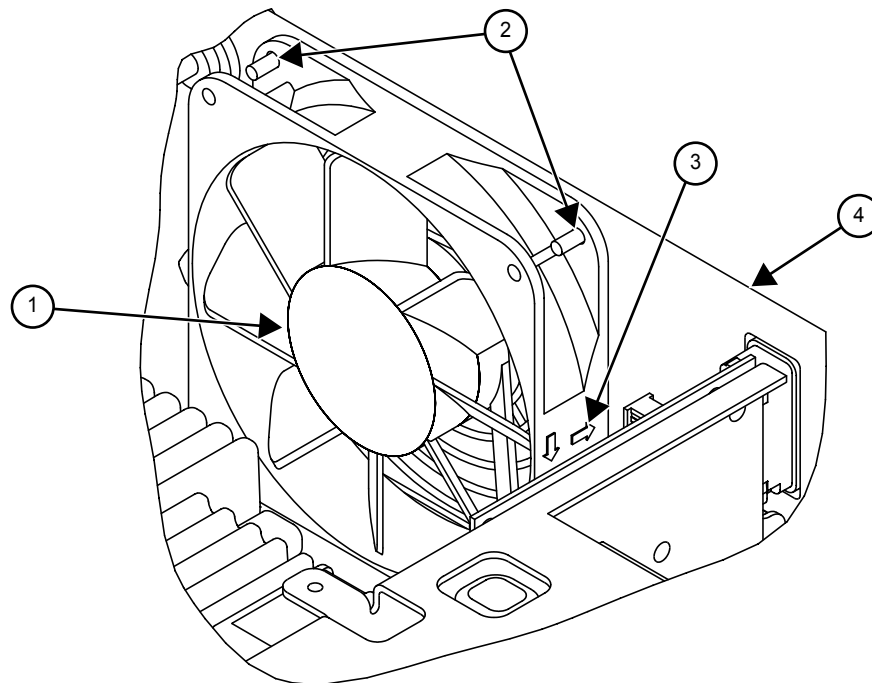
Removing the Fan

Remove the fan to either replace it or to disassemble the repeater further.

Procedure:

- 1 Unplug the fan cable from the mating connector on the connector board assembly.
- 2 Detach the fan assembly by removing the four screws that secure the fan grill and fan assembly to the back of the enclosure using a T15 TORX driver.
- 3 Carefully remove fan, noting position of arrow which identifies direction of air flow. This is important for reassembly.

Figure 10: Fan Orientation



Number	Description
1	Fan
2	Screws
3	Position of arrow
4	Back of Enclosure

5.5.4

Removing the Transmit Radio

Remove the transmit radio to either replace it or to disassemble the repeater further in order to replace the transceiver board.

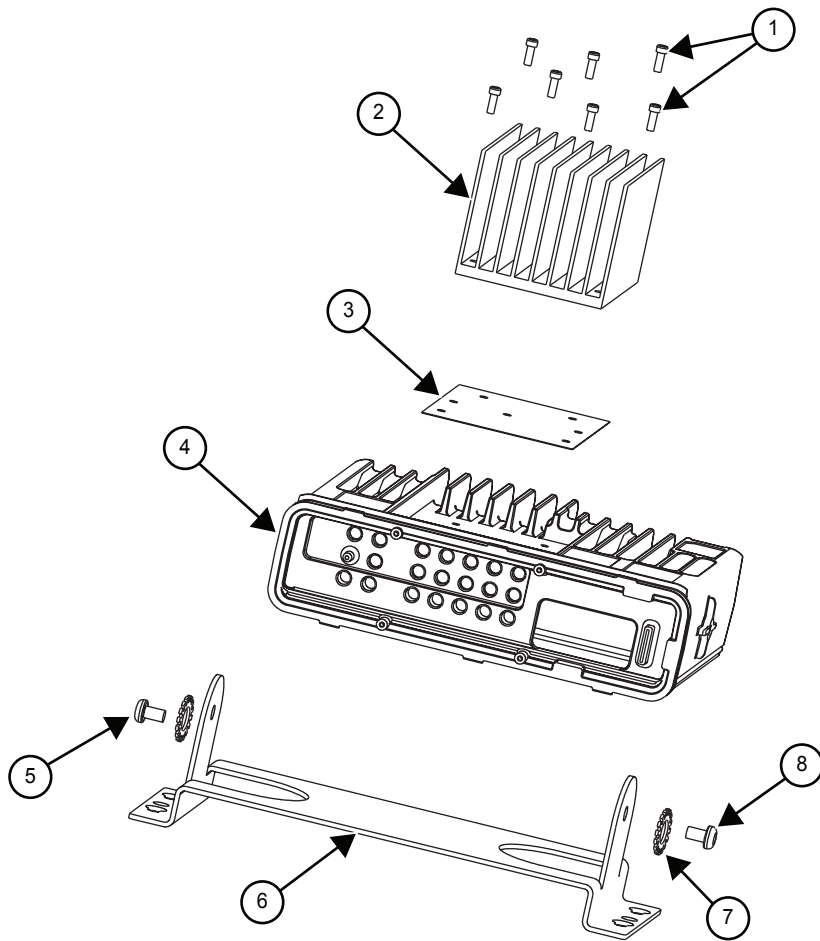
Prerequisites: Refer to [Figure 11: Tx Radio Disassembly on page 62](#).

Procedure:

- 1 Disconnect the flex cable from the 30-position connector on the Transmit radio, noting the orientation of the cable which is identified with a solid red line. This is important for reassembly.

- 2** Remove the flex cable (with double sided adhesive tape) from the power supply.
- 3** Make sure that the double sided adhesive tape material is completely removed from the power supply.
- 4** Disconnect the SSI flex cable from the connector on the Transmit radio, noting the orientation of the cable which is identified with a solid black line.
This is important for reassembly.
- 5** Loosen the four M4 lock nuts that secure the Transmit radio assembly with a 7 mm socket driver.
- 6** Slide the Transmit radio assembly slightly forward before lifting it out of the enclosure.
- 7** Disconnect the power cable from the Transmit radio.
- 8** Disconnect the antenna cable from the Transmit radio.
- 9** Disconnect the accessory connector from the Transmit radio.
- 10** Lift the Transmit radio assembly out of the enclosure and place on a flat surface.
- 11** Loosen and remove the two M5 screws and washers that secure the Transmit radio to the bracket using a T25 TORX driver.

Figure 11: Tx Radio Disassembly



Number	Description
1	M3 Screws (7)
2	Heatsink
3	Thermal Pad
4	Transmit Radio
5	M5 Screw (1)
6	Transmit Bracket
7	Washer
8	M5 Screw (1)

5.5.4.1

Removing the Thermal Pad and Heatsink

Remove the heatsink to disassemble the repeater further. Remove the thermal pad, as a new pad is needed for reassembly.

Prerequisites: Refer to [Figure 11: Tx Radio Disassembly on page 62](#).

Procedure:

- 1 Remove all of the seven screws which secure the heatsink to the Transmit radio using a T10 TORX driver.
- 2 Remove the heatsink from the Transmit radio.
- 3 Peel off and discard the thermal pad.
- 4 Replace all worn parts.

5.5.5

Removing the Receive Radio, Power Supply and Connector Board Assembly

Prerequisites: Refer to [Figure 12: Receive Radio Removal on page 64](#).

Procedure:


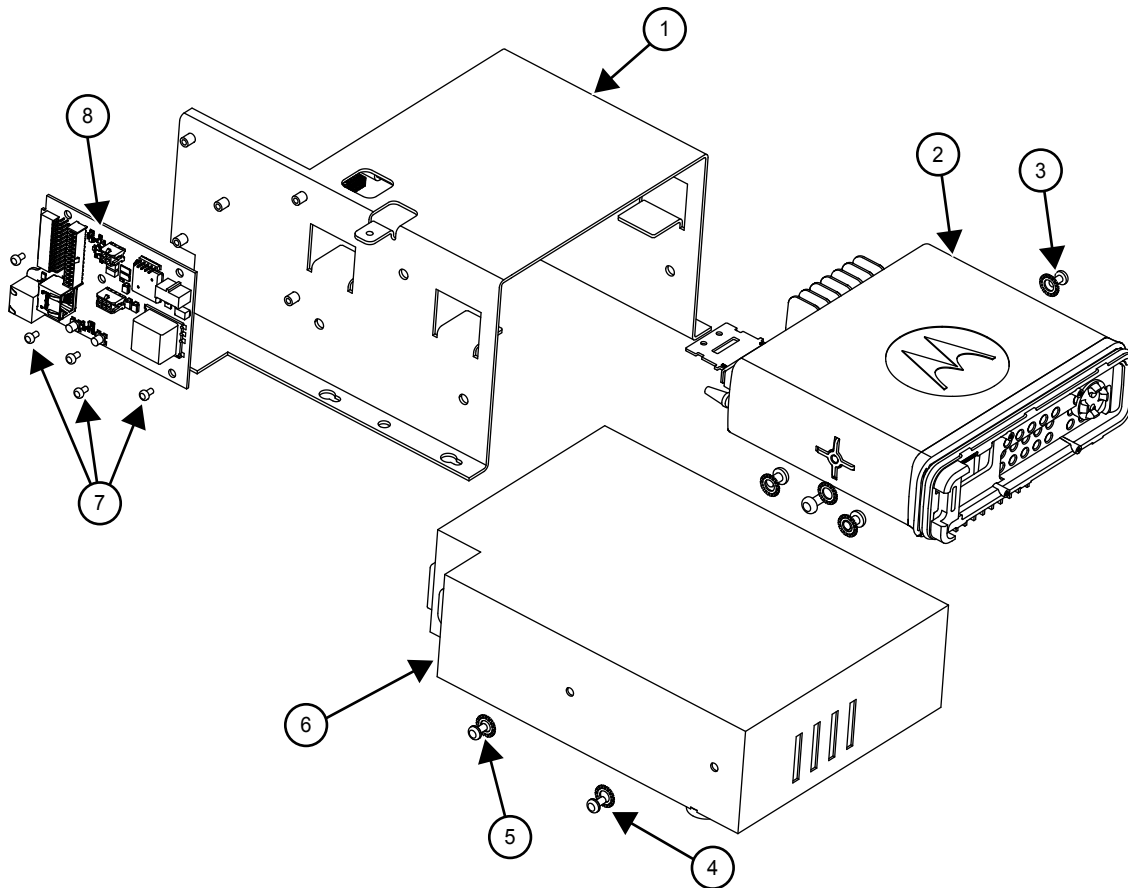
- 1 Disconnect the SSI flex cable from the connector on the Receive radio, noting the orientation of the cable which is identified with a dotted line.
This is important for reassembly.
- 2 Disconnect the antenna cable from the Receive radio.
- 3 Disconnect the power cable from the Receive radio.
- 4 Remove the two screws securing the retainer clip using a T20 TORX™ driver.
- 5 Remove accessory connector from the back side of repeater by inserting a flat blade screwdriver into the slot located on the top of the connector.
- 6 Disconnect all of the cables from their mating connectors located on the connector board assembly.
- 7 Loosen the five M4 lock nuts that secure the Receive radio assembly using a 7 mm socket driver.
 **NOTICE:** The two lock nuts at the side on base require a magnetic lock nut driver with extension of greater than 150 mm.
- 8 Slide the Receive radio assembly slightly forward before lifting it out of the enclosure.
- 9 Take precaution not to damage the power supply or the connector board assembly and place assembly on a flat surface.

Figure 12: Receive Radio Removal



Number	Description
1	Receive Bracket
2	Receive Radio
3	M5 Screw
4	M5 Screw
5	Washer
6	Power Supply
7	M3 Screws (5)
8	Connector Board Assembly (800/900 PCB assy shown)

5.5.5.1

Removing the Receive Radio

Remove the receive radio to either replace it or to disassemble the repeater further in order to replace the receiver board.

Procedure:

- 1 With assembly on a flat surface, loosen and remove the two M5 screws and washers that secure the Receive radio to the bracket using a T25 TORX driver.

- 2 Slide the Receive radio out of the bracket.

5.5.5.2

Removing the Connector Board Assembly

Remove the connector board assembly to replace it.

Procedure:

- 1 With assembly on a flat surface, detach the connector board assembly from Receive radio assembly by removing the five M3 screws using a T10 TORX driver.
- 2 Store connector board assembly in anti-static bag when it is not being serviced.

5.5.5.3

Removing the Power Supply

Remove the power supply to replace it.

Procedure:

- 1 With assembly on a flat surface, loosen and remove the four M5 screws and washers that secure the power supply to the bracket using a T25 TORX driver.
- 2 Slide the power supply out from the bracket.
- 3 Disconnect the Y-split cable from the power supply before sending to the manufacturer.



NOTICE: The Power Supply should be serviced by the manufacturer.

5.5.6

Removing the Transceiver and Receiver Boards

Remove the transceiver or receiver board to replace them.

Procedure:

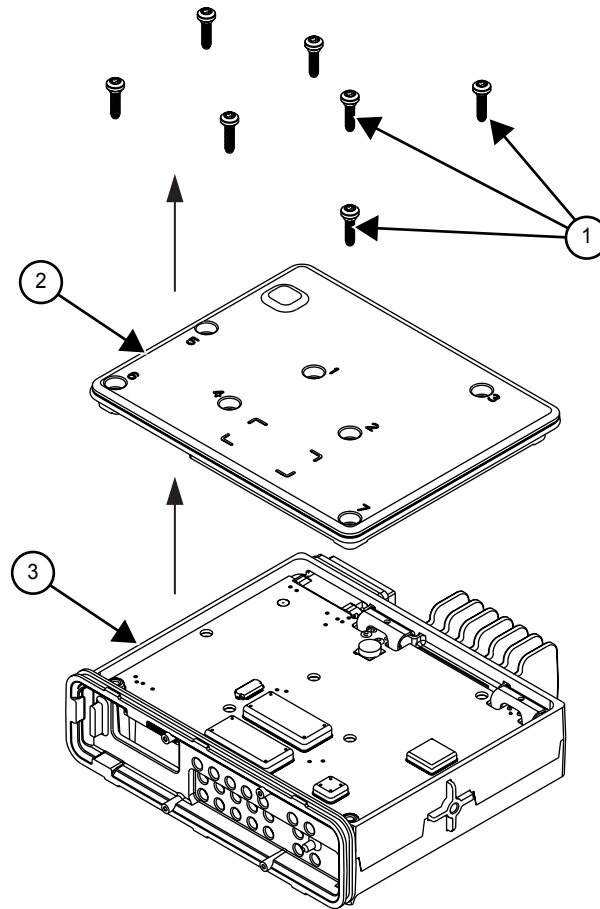
- 1 Remove the seven screws from the die cast cover using the T20 TORX™ driver.



NOTICE: Do not remove the O-rings from the screws.

- 2 Lift the die cast cover from the chassis.

Figure 13: Die Cast Cover Removal.

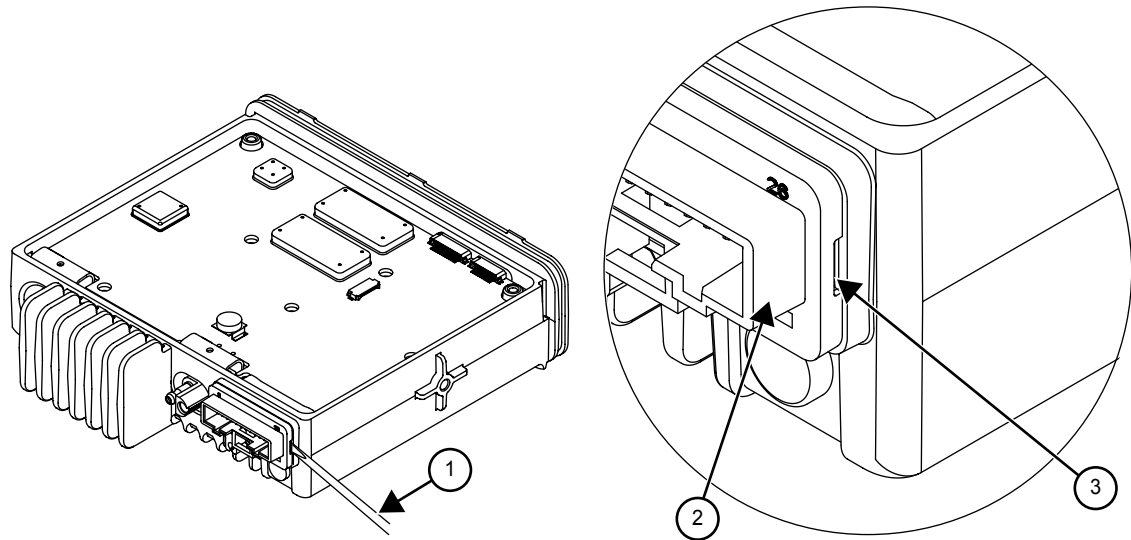


Number	Description
1	Screws (7)
2	Die Cast Cover
3	Radio Chassis

- 3 Remove the rear accessory connector from the radio assembly by inserting a flat-blade screwdriver into the slot on the side of the connector as shown in [Figure 14: Rear Accessory Connector Removal on page 67](#).



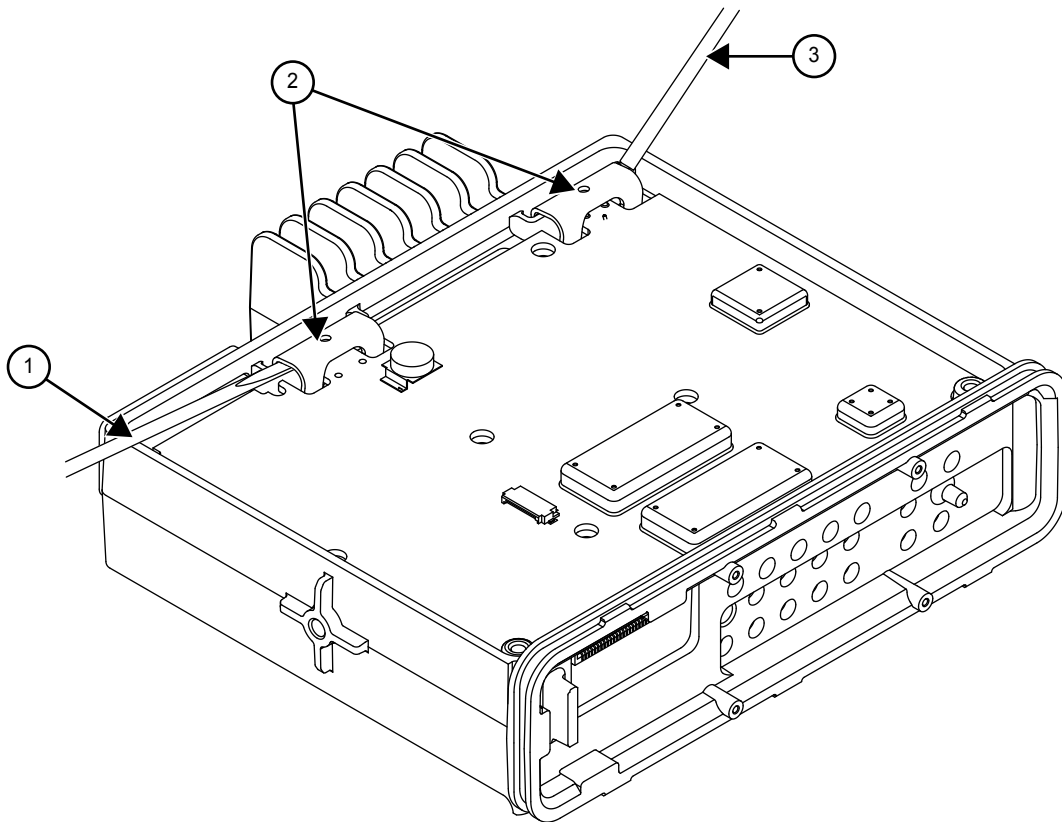
CAUTION: The rear accessory connector should never be removed when the cover is still assembled to the radio.

Figure 14: Rear Accessory Connector Removal

Number	Description
1	Flat-bladed Screwdriver
2	Rear Accessory Connector
3	Slot

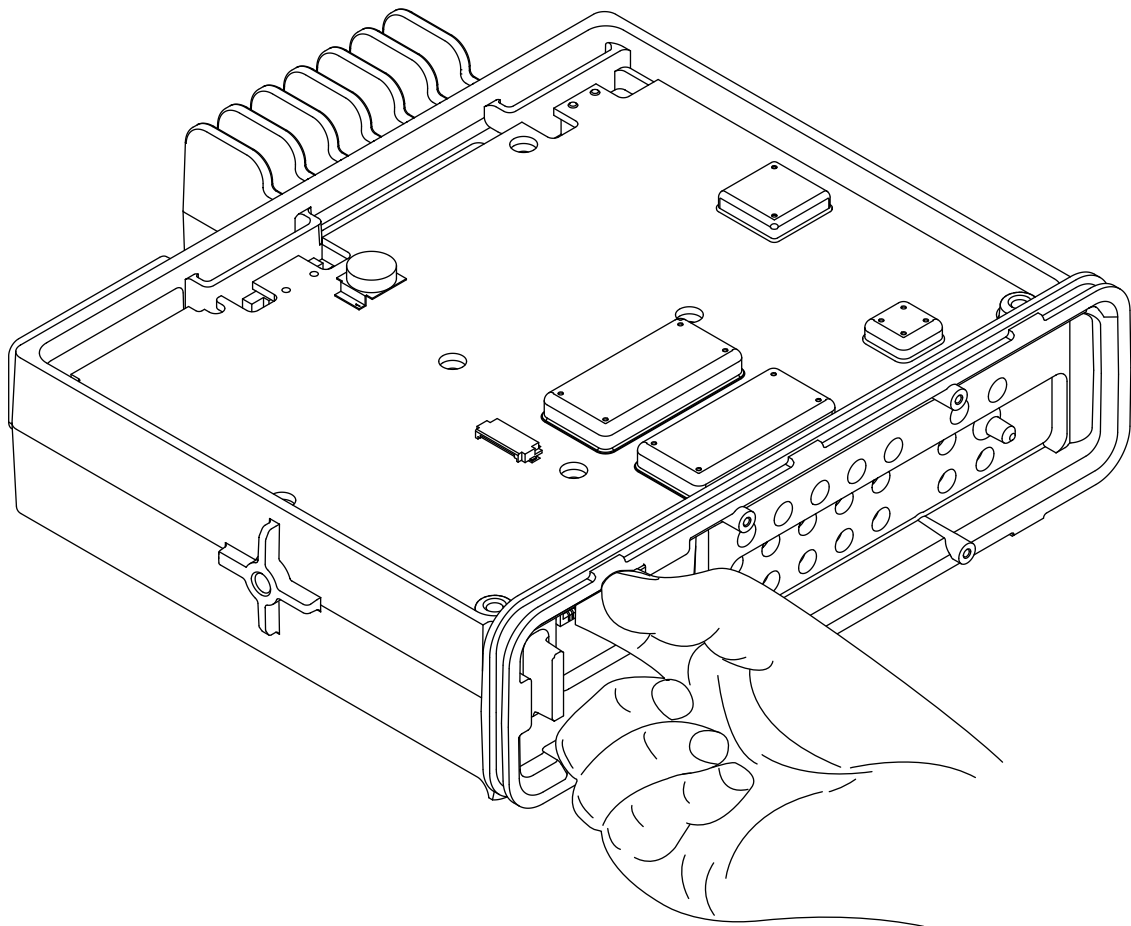
- 4 Remove the RF/DC retention clips by gently prying them out with a flat-blade screwdriver as shown in the following figure.

Figure 15: RF/DC Retention Clips Removal



Number	Description
1	Flat-bladed Screwdriver
2	RF/DC Retention Clips
3	Flat-bladed Screwdriver

- 5 Remove the transceiver board by sliding a finger into the opening provided at the front of the radio and gently press up on the 30-pin connector, lifting up the front of the board, as shown in [Figure 16: Transceiver Board Removal on page 69](#).

Figure 16: Transceiver Board Removal

- 6 Slide the transceiver board towards the front of the radio to allow the RF/DC connectors to clear the chassis.

Handle the transceiver board by the edges only and store it in an antistatic bag.



CAUTION: The thermal pads can act as an adhesive and cause stress to critical components on the transceiver board if the transceiver board is lifted too quickly.



NOTICE: If the RF/DC connector gaskets remain in the chassis, remove them and place them back on the connectors.

5.6

Reassembling the Transmit and Receive Radio – Detailed

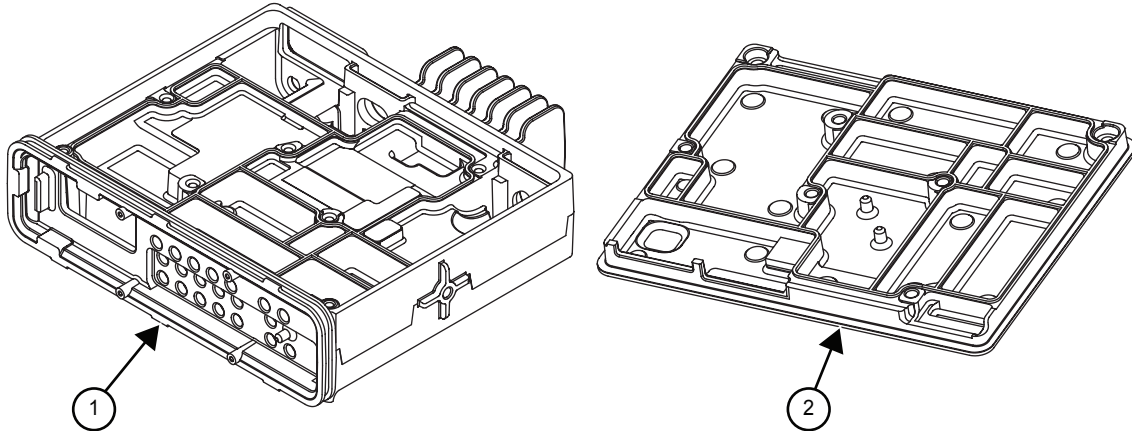
The following reassembly procedures are applicable to both the Transmit and Receive radios.

Procedure:

- 1 Prior to reassembling the radio, inspect all seals and sealing surfaces for damage (nicks, cuts, etc.) or debris.
See the exploded view and bill of materials for the correct part numbers and replace parts, as necessary.
- 2 Reseat all new seals on their respective parts.

- For both the die cast cover and the chassis, thoroughly inspect the shield gasketing for damage and verify all thermal pads are in place and free from damage and debris. See [Figure 17: Thermal Pads and Shield Gasketing on Chassis and Die Cast Cover on page 70](#) to replace damaged pads.

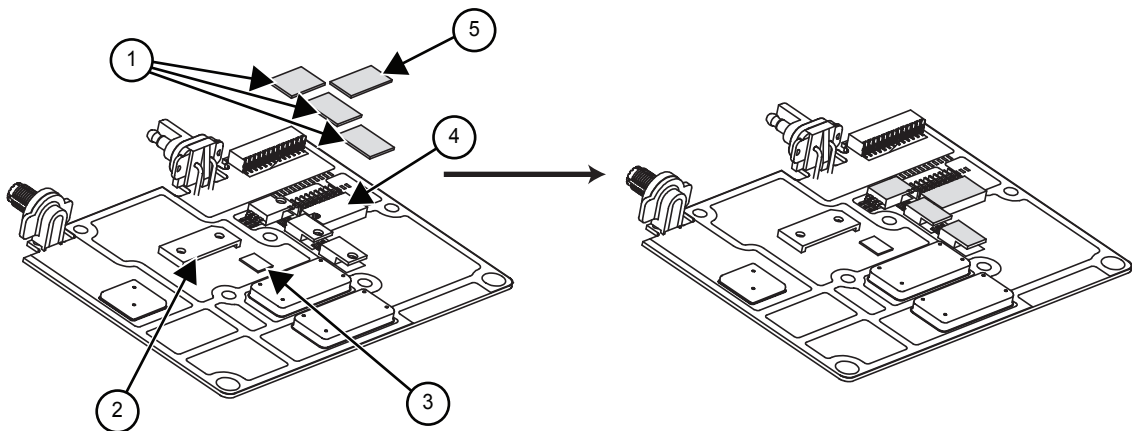
Figure 17: Thermal Pads and Shield Gasketing on Chassis and Die Cast Cover



Number	Description
1	Chassis with Thermal Pads and Shield Gasketing
2	Die Cast Cover with Thermal Pads and Shield Gasketing

- Thoroughly inspect the transceiver board and verify all thermal pads are in place and free from damage. See [Replacing the Transistor Thermal and Pads on page 77](#) to replace damaged pads.

Figure 18: Transceiver Board with Thermal Pads



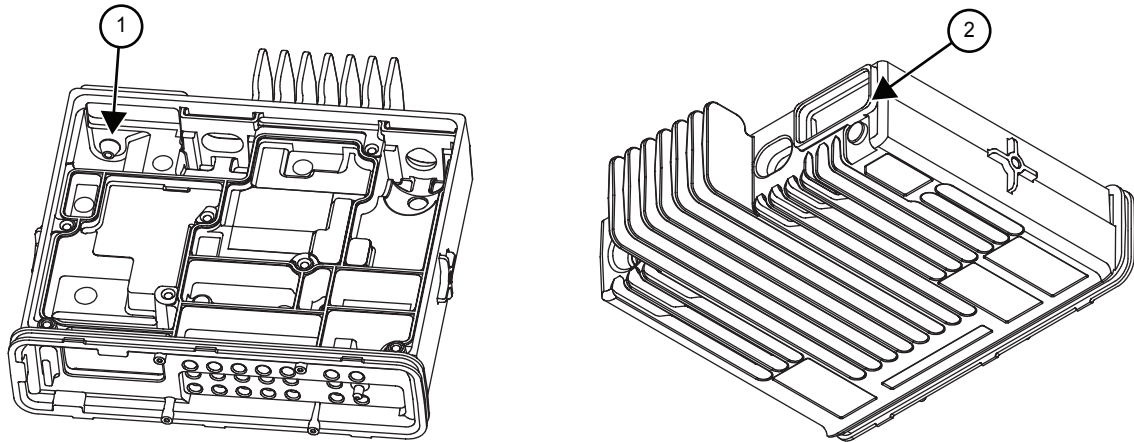
Number	Description
1	Transistor Thermal Pads (75012018001)
2	Apply Thermal Grease (1180113S01)
3	Driver Pad (7515577H01)
4	Audio PA Component

Table continued...

Number	Description
5	PA Thermal Pad (75012015001)

- 5 Push the GPS plug into the chassis opening until it is fully seated.

Figure 19: Replacing GPS Plug



Number	Description
1	GPS Plug
2	GPS Plug

5.6.1

Replacing the Transceiver Board and Receiver Boards

Install the replacement transceiver or receiver boards.

Procedure:

- 1 Insert the transceiver board into the chassis by tilting the transceiver board (approximately 30 degrees) and sliding it into place, taking care to line up the RF and DC connectors with the openings in the back of the chassis.

Ensure that the transceiver board alignment holes are positioned over the chassis alignment bosses and then push the board down to fully seat.

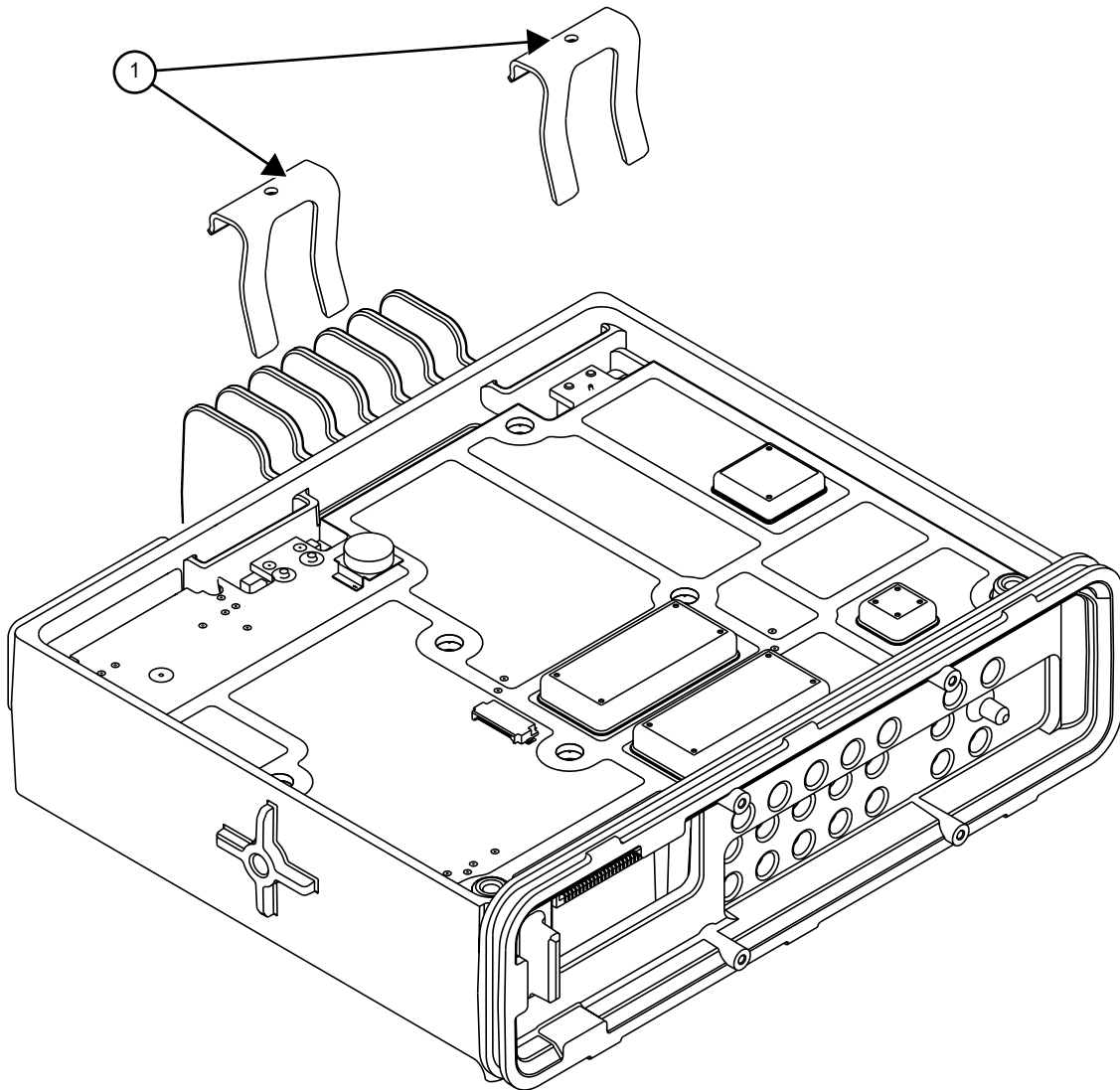
Number	Description
1	Locating Bosses



CAUTION: Do not leave the transceiver board in the chassis for extended periods of time without the RF/DC retention clips, or damage to the board connectors may occur.

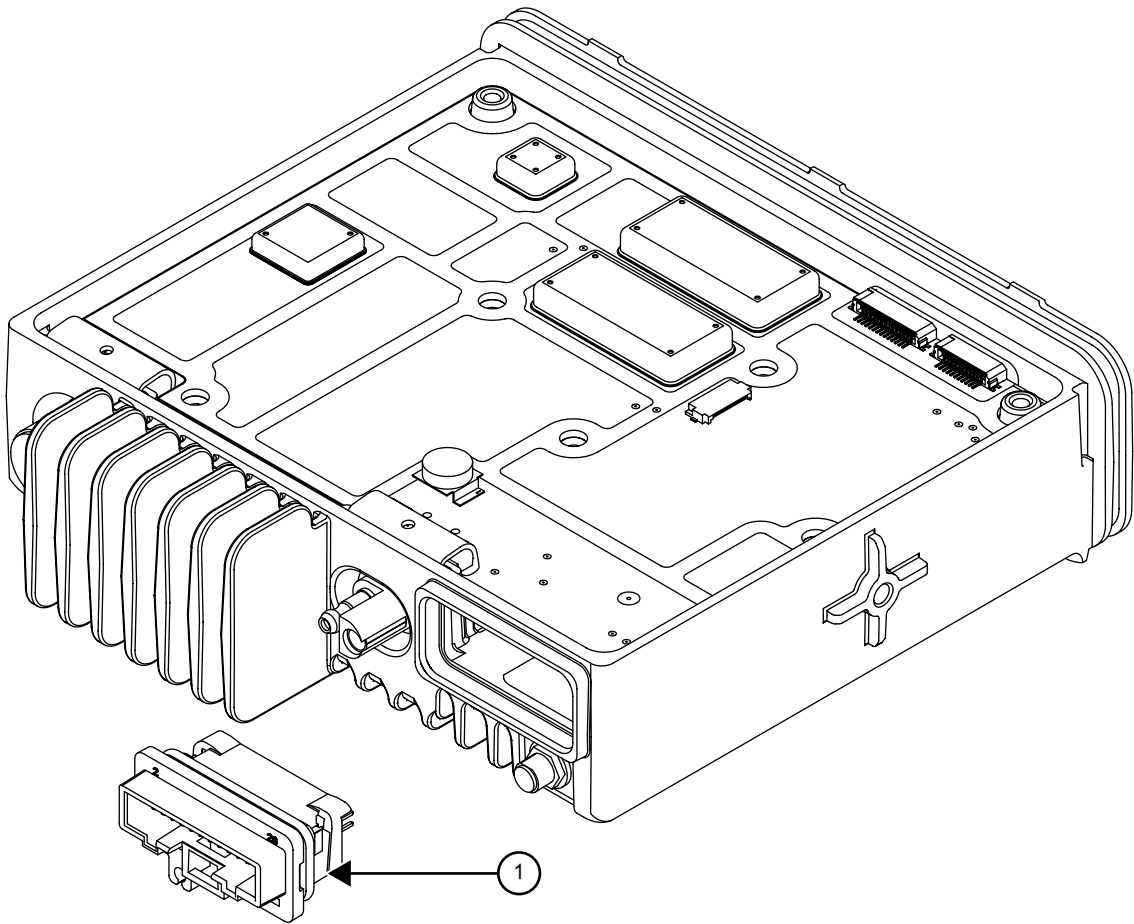
- 2 Insert the RF/DC retention clips and fully seat them. The DC clip should be inserted first to properly locate the transceiver board.

Figure 20: Inserting RF/DC Retention Clips



Number	Description
1	RF/DC Retention Clips

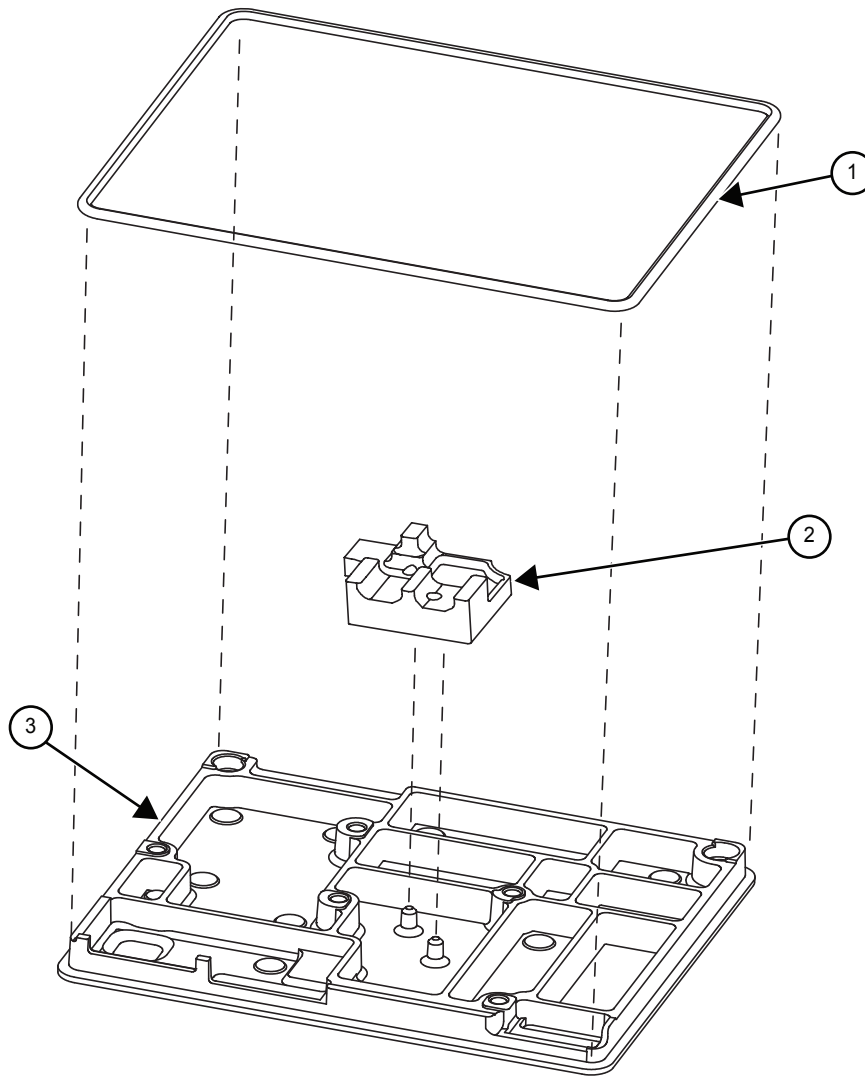
- 3** Insert the rear accessory connector into the radio assembly and press into place until the connector is flushed with the chassis.

Figure 21: Inserting Rear Accessory Connector

Number	Description
1	Rear Accessory Connector

- 4 Fit the O-ring onto the die cast cover securely.

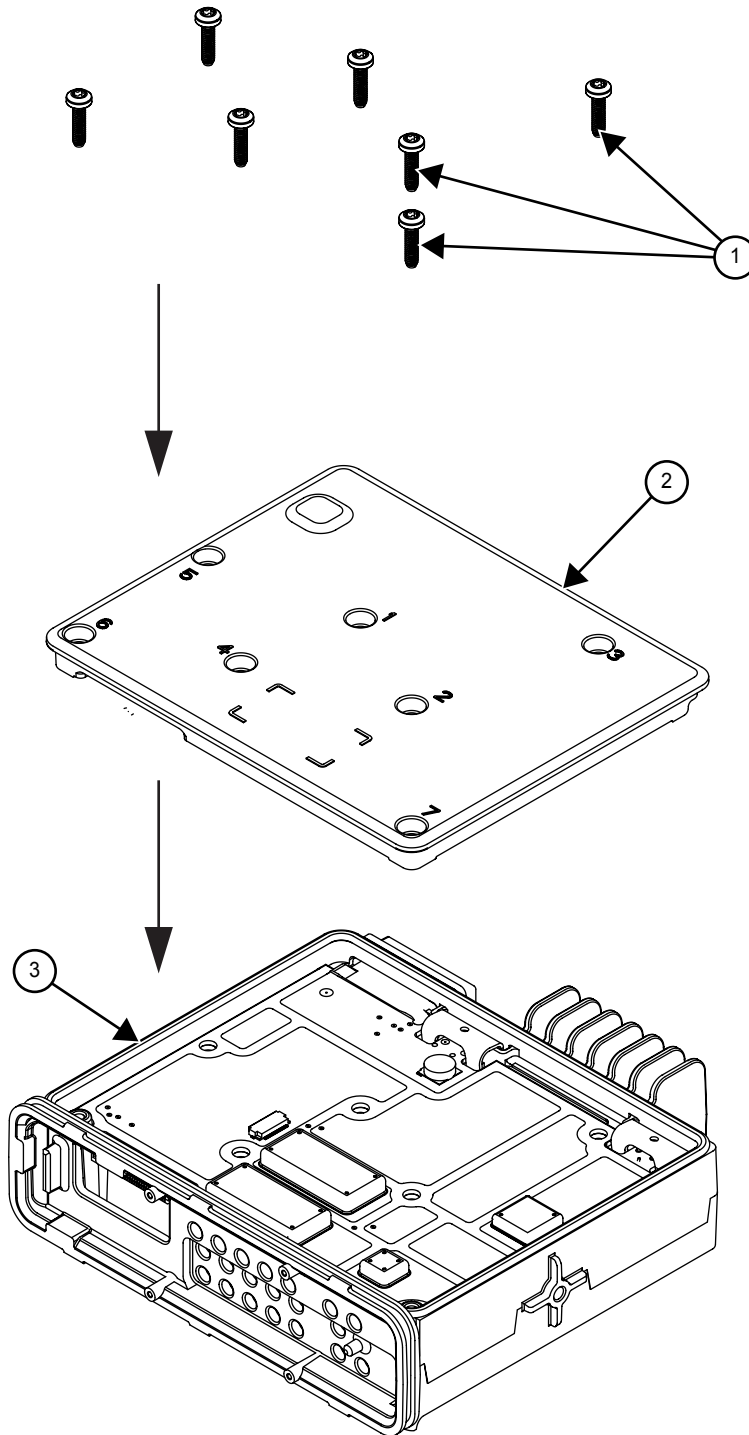
Figure 22: Assembling of PA Pad and O-ring



Number	Description
1	O-ring
2	PA Pad
3	Die Cast Cover

- 5 Place the die cast cover onto the chassis orienting the die cast cover so that screw holes 6 and 7 align with the bosses on the chassis.

Figure 23: Assembling Die Cast Cover onto Chassis

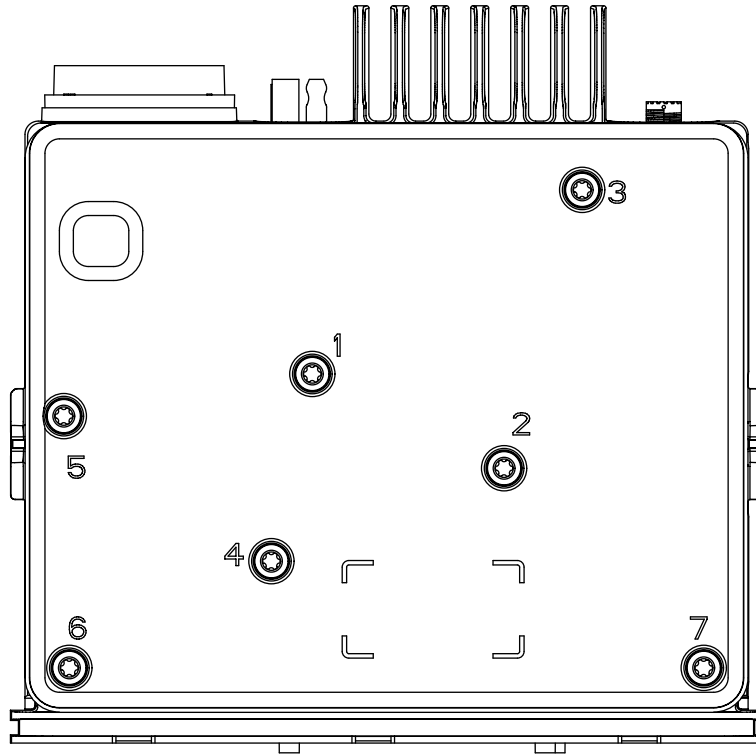


Number	Description
1	Screws (7)
2	Die Cast Cover
3	Radio Chassis

6 Using a T20 TORX™ driver, tighten the seven screws between 2.94 N-m (26 lbs-in) in order.

- 7 Repeat tightening the seven screws in the order shown otherwise the first three screws will likely be loose.

Figure 24: Screw Sequence to Tighten Die Cast Cover



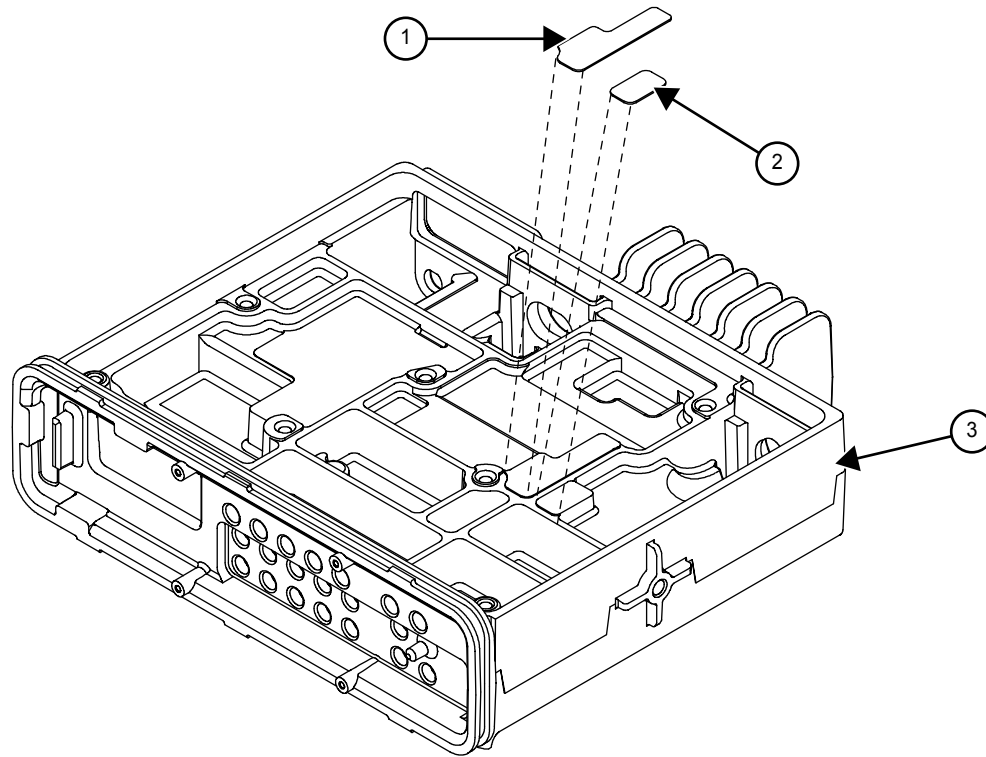
5.6.1.1

Replacing the Harmonic Filter Thermal Pad

While replacing the transceiver board, the harmonic filter thermal pad must be replaced on the chassis.

Procedure:

- 1 Use a plastic flat-edge tool to lift the pad from the chassis surface. Discard the old pad.
- 2 Use a soft cloth to remove any remaining residue. Alcohol can also be used, if necessary. Care should be taken to minimize any cleaning-agent contact with the surrounding shield gasket.
- 3 Once the surface is clean and dry, remove the new pad from the shipping liner, and place it white side down on the chassis as shown in [Figure 25: Replacing Thermal Pads on page 77](#).

Figure 25: Replacing Thermal Pads

Number	Description
1	Harmonic Filter Pad (75012017001)
2	Harmonic Filter Pad (75012016001)
3	Radio Chassis

5.6.1.2

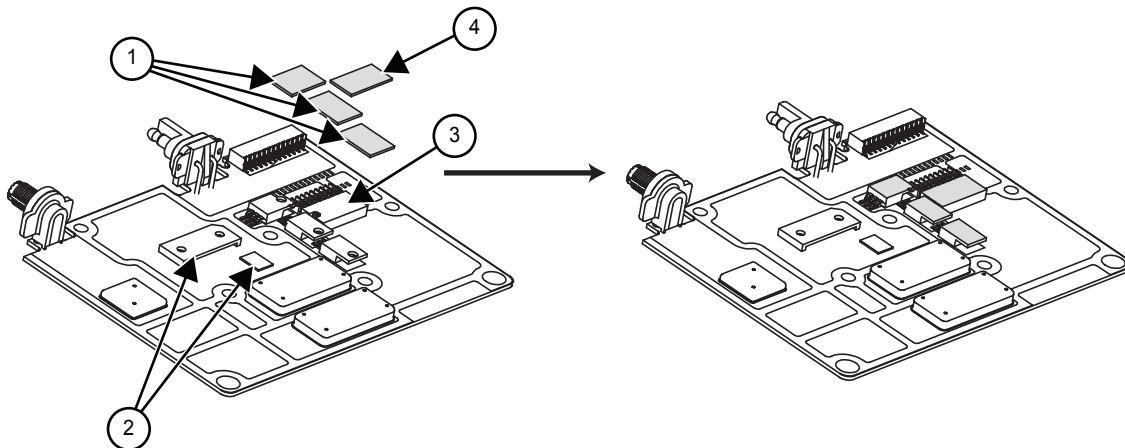
Replacing the Transistor Thermal and Pads

While replacing the transceiver board, the transistor thermal pad and PA thermal pad must be replaced on the transceiver board.

Procedure:

- 1 Use a plastic flat-edge tool to lift each pad from the transceiver board. Discard the old pads.
- 2 Use a soft cloth to remove any remaining residue. Alcohol can also be used, if necessary.
- 3 Once the surface is clean and dry, remove each new pad from the shipping liner, and place in the proper location on top of each transistor component and the audio PA.

Figure 26: Placing Thermal Pads on PA and Transistor Components



Number	Description
1	Transistor Thermal Pads (75012018001)
2	Apply Thermal Grease (1180113S01) on Final Heat Spreader and Driver Heat Sink
3	Audio PA Component
4	PA Thermal Pad (75012015001)

5.6.2

Replacing the Power Supply

Replace the power supply to reassemble the repeater when a transceiver or receiver board was replaced or when the power supply was replaced.

Procedure:

- 1 Visually inspect the repeater enclosure to ensure that no metal shavings or debris are found before replacing the power supply. See [Figure 1](#).
- 2 Align the two mounting holes on each side of the bracket with the mounting holes on the power supply.
- 3 Secure the power supply and the bracket with the four M5 screws and washers.
- 4 Tighten the four M5 screws to 3.0 N-m.
- 5 Firmly connect the single connection end of Y-split cable to power cable of power supply.

5.6.3

Replacing the Receive Radio

Install the receive radio to reassemble the repeater after replacing the receive radio or replacing the receiver board.

Procedure:

- 1 Insert the Receive radio into the top half of the bracket.
- 2 Align the mounting hole on each side of the receive chassis to the mounting holes on the bracket.
- 3 Secure the Receive radio and the bracket with the two M5 screws and washers.

- 4 Tighten the two M5 screws to 3.0 N-m.

5.6.4

Replacing the Connector Board Assembly

Install the connector board assembly to reassemble the repeater after replacing the receive radio.

Procedure:

- 1 Align the five mounting holes on the connector board assembly to the five standoffs on the receive bracket.
- 2 Secure the connector board assembly with the five M3 screws.
- 3 Tighten the five M3 screws to 1.0 N-m.

5.6.5

Replacing the Receive Bracket Assembly to the Enclosure

Replace the receive bracket assembly to reassemble the repeater after replacing the receive radio or replacing the receiver board.

Procedure:

- 1 Visually inspect the repeater enclosure to ensure that no metal shavings or debris are found before replacing the power supply. See [Figure 1](#).
- 2 Align and mount the receive bracket assembly onto the five stud screws in the enclosure.
- 3 Ensure that the dimple locator (bump) on the enclosure is nested within the hole on the receive bracket before installing and tightening the lock nuts.
- 4 Tighten the five lock nuts to 2.0 N-m.



NOTICE: The two lock nuts at the side on base require a magnetic lock nut driver with extension of greater than 150 mm.

- 5 Connect the antenna cable to the Receive radio.
- 6 Insert the BNC connector of the antenna cable through the back panel of the enclosure and secure it using a lock washer and nut.
- 7 Tighten the nut to 2.3 N-m using a 16 mm deep well socket driver.
- 8 Firmly connect one of the connectors from the dual end of Y-split cable to the Receive radio.



NOTICE: All cables (except the antenna cable), are routed at the bottom rear receive bracket.

- 9 Insert the accessory connector through the opening of the enclosure onto the edge of the connector board assembly.
- 10 Make sure that the accessory connector is inserted onto the connector board assembly and that the back-end surface of the accessory connector is flushed firmly against the back panel of enclosure.
- 11 Mount the retainer clip and secure it with the two M4 screws.
- 12 Tighten the screws to 2.0 N-m.
- 13 Insert the solder terminal end of the SSI cable into the 11-position connector at the front face of Receive radio. A dashed black line is visible from the top view.

5.6.6

Replacing the Transmit Radio Thermal Pad and Heatsink

Install the transmit radio to reassemble the repeater after replacing the transmit radio or replacing the transceiver board.

Procedure:

- 1 Make sure that mating surfaces of Heatsink and Transmit radio are cleaned and free from any debris. See [Figure 11: Tx Radio Disassembly on page 62](#).
- 2 Align the holes on the thermal pad to the screw holes in the Transmit radio and place the thermal pad onto the Transmit radio.
- 3 Align the holes on the heatsink to the screw holes in the Transmit radio and place the heatsink onto the thermal pad.
- 4 Secure, but do not tighten the seven screws previously removed.
- 5 When all seven screws are secured, tighten to 1.0 N-m. See [Figure 8](#).

5.6.7

Replacing the Transmit Bracket Assembly to the Enclosure

Replace the transmit bracket assembly to reassemble the repeater after replacing the transmit radio or replacing the transceiver board.

Procedure:


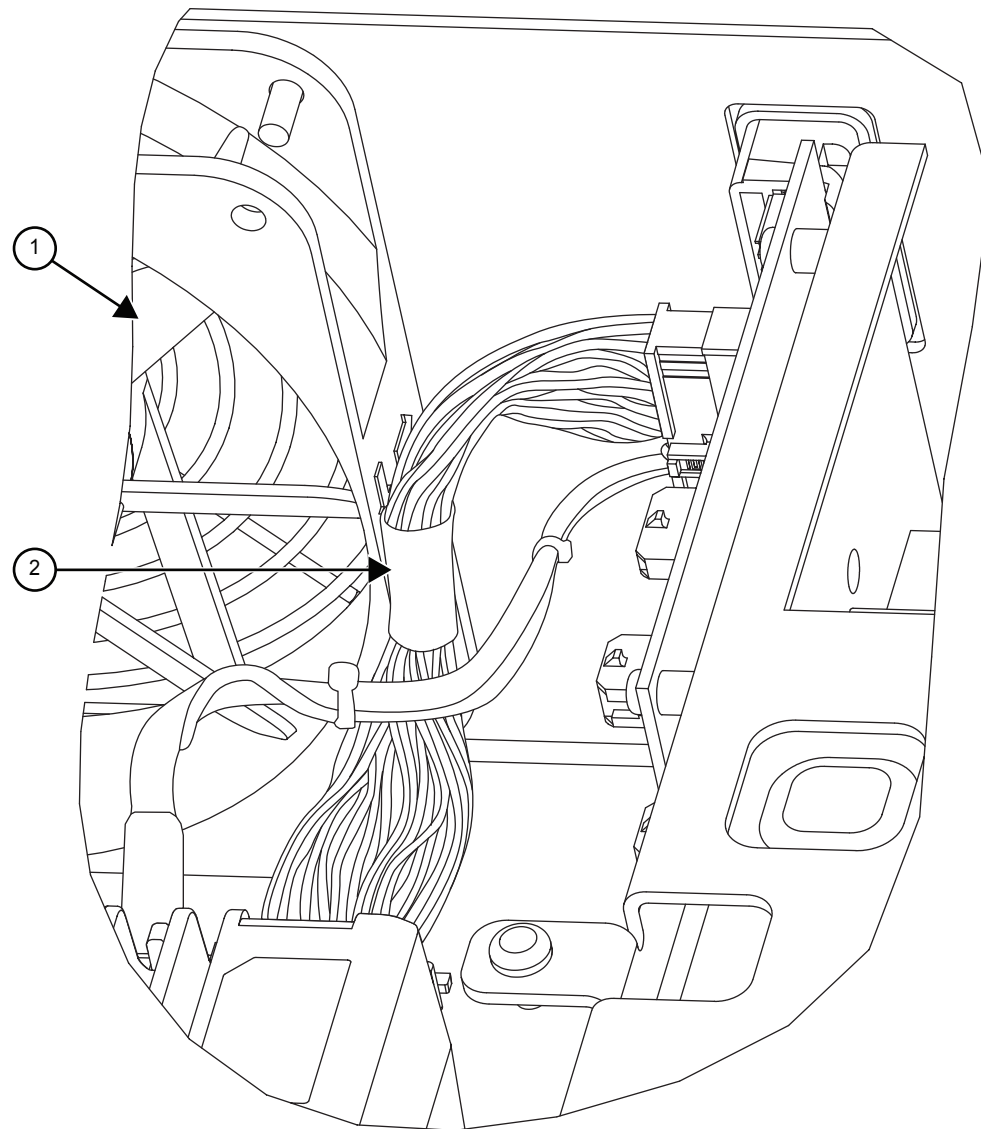
- 1 Position the Transmit radio onto the transmit bracket so that the label "FRONT" on bracket is facing the front face of radio. (See [Figure 11: Tx Radio Disassembly on page 62](#))
- 2 Align the mounting holes on the Transmit radio and the transmit bracket on both sides.
- 3 Attach and secure the M5 screws and washers on each side of the bracket.
- 4 Tighten the screws to 3.0 N-m, making sure that the Transmit radio remains horizontal.
- 5 Align and mount the transmit bracket assembly onto the four stud screws in the enclosure.
- 6 Ensure that the dimple locator (bump) on the enclosure is nested within the hole on the transmit bracket before installing and tightening the lock nuts.
- 7 Secure the four lock nuts (two on each side) onto the stud screws.
- 8 Tighten the four lock nuts to 2.0 N-m.
- 9 Connect the antenna cable to the Transmit radio.
- 10 Insert the N-Type connector of the antenna cable through the back panel of the enclosure and secure it using a lock washer and nut.
- 11 Tighten the nut to 2.3 N-m using a 19 mm deep well socket driver.
- 12 Firmly connect one of the connectors from the dual end of Y-split cable to the Transmit radio.
- 13 Connect the black colored end of accessory cable connector to rear of Transmit radio making sure that the locking connector tab is facing up.
- 14 Connect the white-colored end of the accessory cable connector to the connector board assembly making sure that the locking connector tab is facing toward the front of repeater.
 **NOTICE:** Make sure that the accessory connectors at both ends are locked in place. A clicking sound can be heard from the locking tab.
- 15 Position the accessory cable harness against the side of fan body. See [Figure 27: Accessory Cable Harness Assembly on page 81](#).

Figure 27: Accessory Cable Harness Assembly

Number	Description
1	Fan
2	Accessory Cable Harness

16 Insert the solder terminal end of the SSI flex cable (positioned bottom side of PCB) into the 11-position connector in the Transmit radio. A solid black line is visible from the top view.

17 Insert the solder terminal end of the flex cable (positioned top side of PCB) into the 30-position connector in the Transmit radio. A solid red line is visible from the top view.

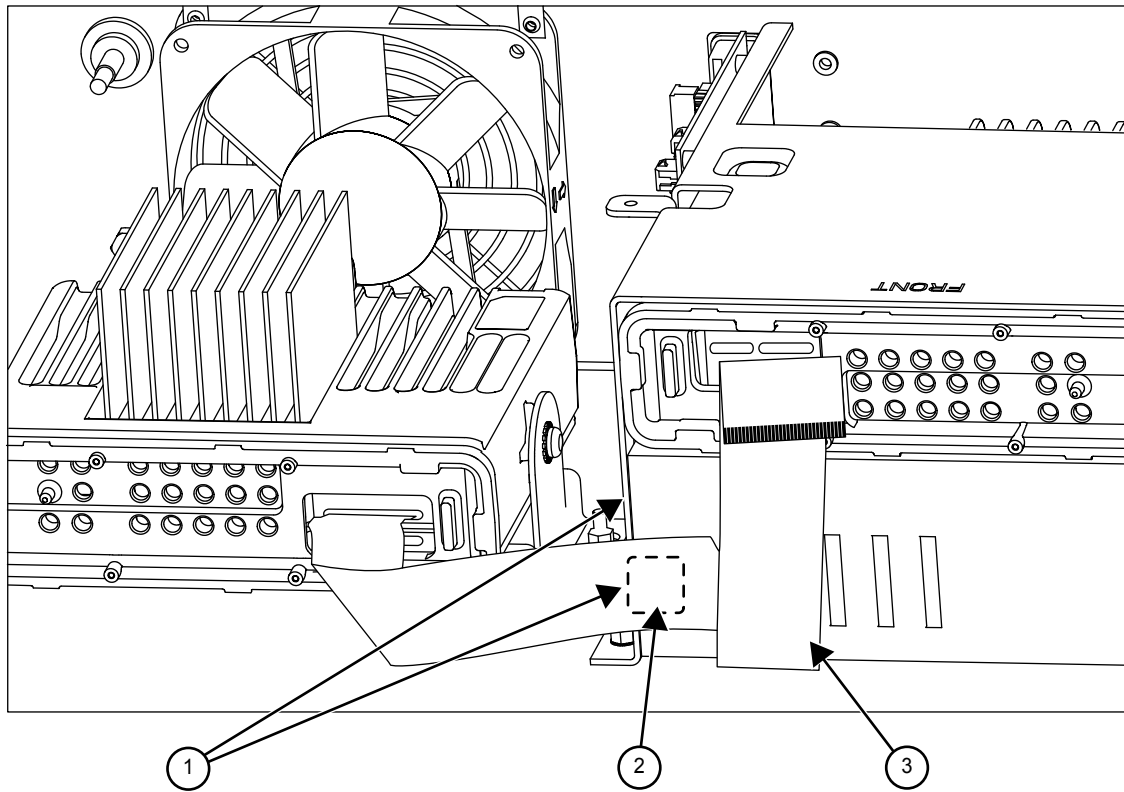
18 On the flex cable, peel the paper on the back of the adhesive tape.

19 Make sure that the surface on the power supply is free of grease and debris where the flex cable adhesive tape is applied.

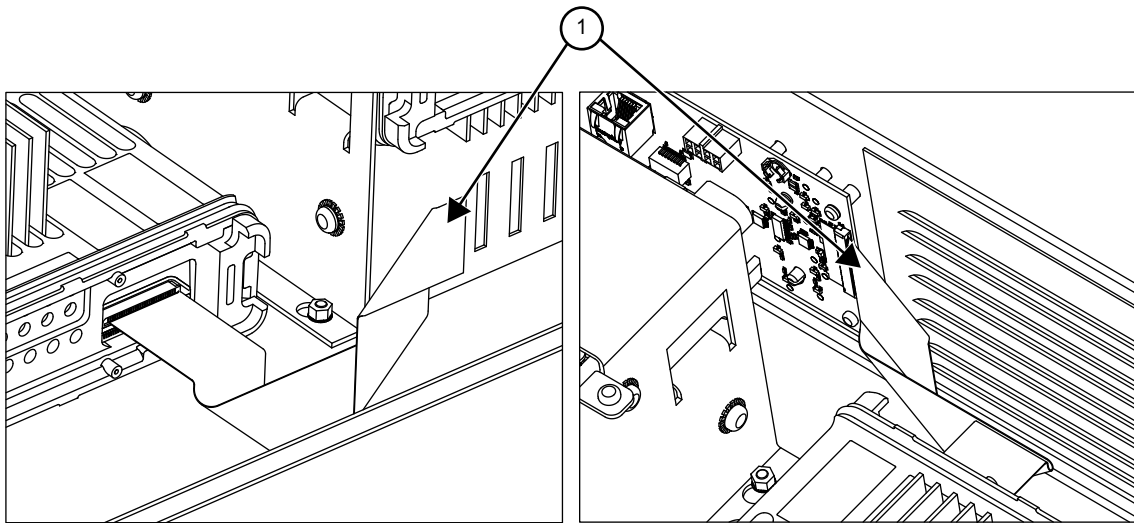
20 Apply the adhesive tape so that the vertical left edge of the adhesive tape aligns with the left vertical edge of the power supply as shown in [Figure 28: Mounting the Adhesive Tape Flex](#)

[Cable to Power Supply on page 82](#). Notice that the bottom edge of the flat cable is touching or almost touching the bottom of the enclosure.

Figure 28: Mounting the Adhesive Tape Flex Cable to Power Supply



Number	Description
1	Tape edge is located near edge of power supply
2	Adhesive tape location on the other side of cable
3	This edge touching or almost touching the bottom of the enclosure

Figure 29: Flex Cable Assembly

Number	Description
1	Flex Cable

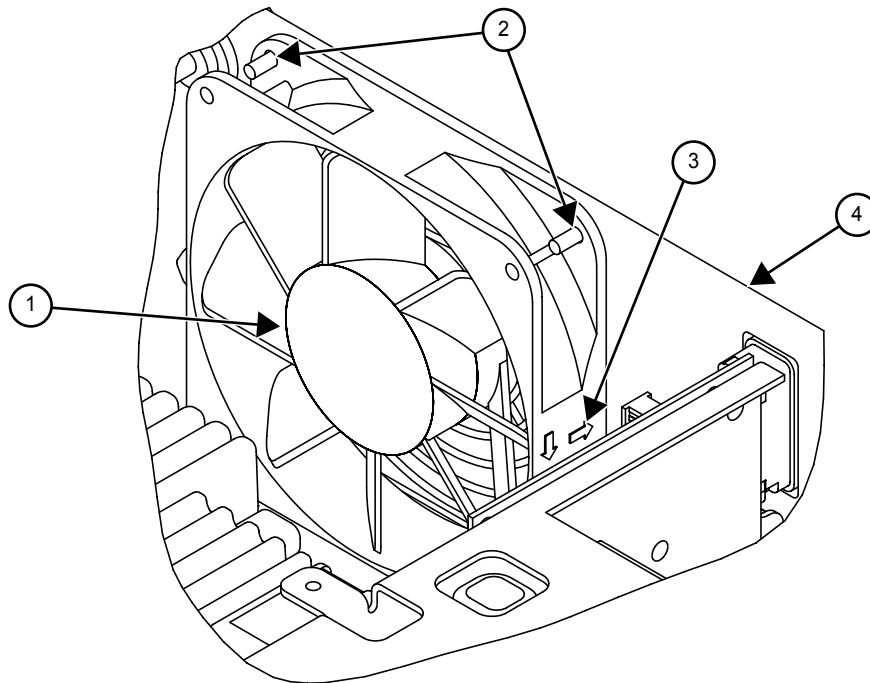
5.6.8**Replacing the Fan**

Install the fan to reassemble the repeater after replacing the fan or replacing other parts of the repeater.

Procedure:

- 1 Position the fan in the enclosure with the arrow pointing outward and the wires on the fan at the bottom right corner of the fan.

Figure 30: Fan Orientation



Number	Description
1	Fan
2	Screws
3	Position of arrow
4	Back of enclosure

- 2 Position the fan grill outside of the enclosure aligning with the screw holes.
- 3 Install the four 3.5 mm screws through the fan grill and the rear panel of the enclosure.
- 4 Secure the fan and tighten the four screws to 1.6 N-m and into the threaded insert.
- 5 Plug the fan cable plug into the 4-position fan connector on the connector board assembly.



NOTICE: Dress and tie wrap the blue Ethernet cable and the fan cables.

5.6.9

Replacing the Repeater Indicator Board

Install the repeater indicator board to reassemble the repeater after replacing the fan or replacing other parts of the repeater.

Prerequisites: See [Removing the Repeater Indicator Board on page 57](#).

Procedure:

- 1 Holding the Repeater Indicator Board by the outer edge, insert the clips of light guide into mounting holes, making sure the light guide snaps into place.
- 2 Align the four mounting holes on the Repeater Indicator Board onto the four standoffs on the front panel.
- 3 Install and secure the four M3 screws.

- 4 Tighten the four M3 screws to 1.0 N-m.
- 5 Use the four M6 screws to secure the front panel onto the enclosure. Tighten the screws to 3.7 N-m.
- 6 Connect the blue Ethernet cable from the Connector board onto the Ethernet connector on the Repeater Indicator Board.
- 7 Insert the flex cable onto the 30-position connector on the Repeater Indicator Board.
The solder terminal end of the flex cable faces towards the front panel. A solid black line is visible from the top view.

5.6.10

Replacing the Cover

Install the cover to reassemble the repeater after replacing other parts of the repeater.

Procedure:

- 1 Place the cover on the housing.
- 2 Secure the two M4 screws on each side of the cover and one at the top. Tighten the screws to 2.0 N-m.

5.7

Repeater Exploded Mechanical Views and Parts Lists

Figure 31: Repeater Assembly Exploded View

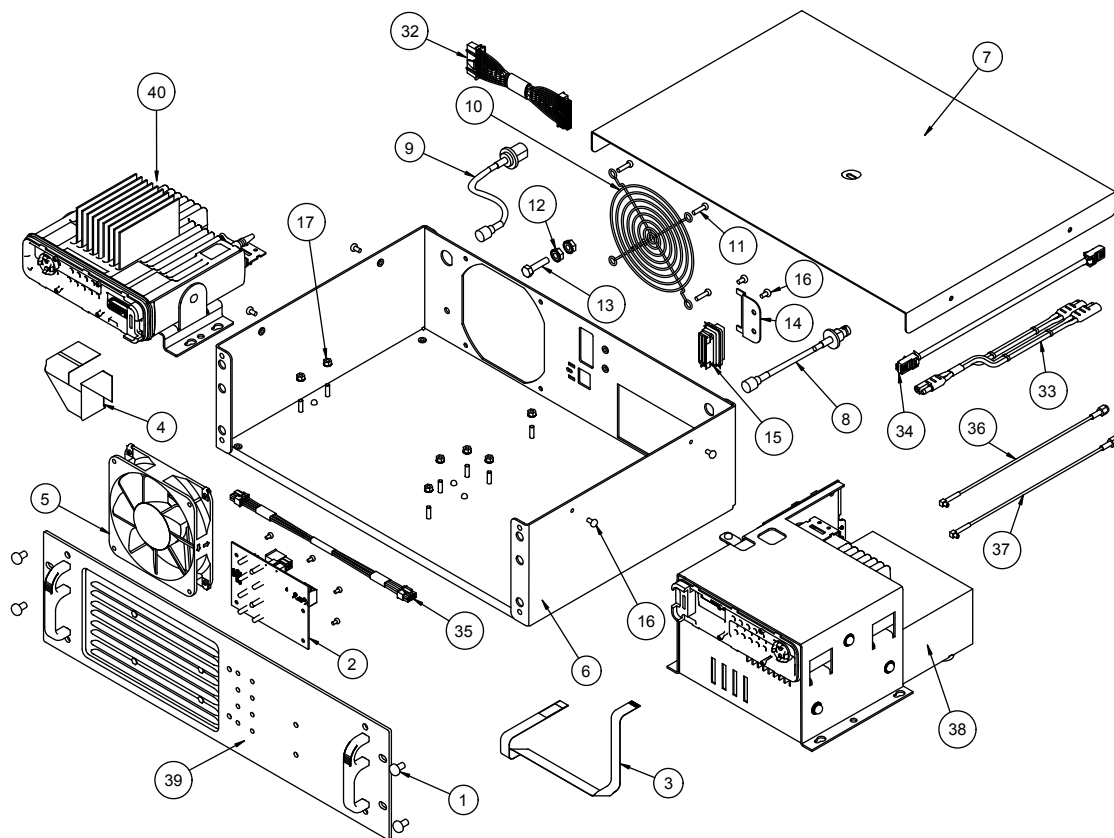


Figure 32: Receive Bracket and Radio Assembly Exploded View

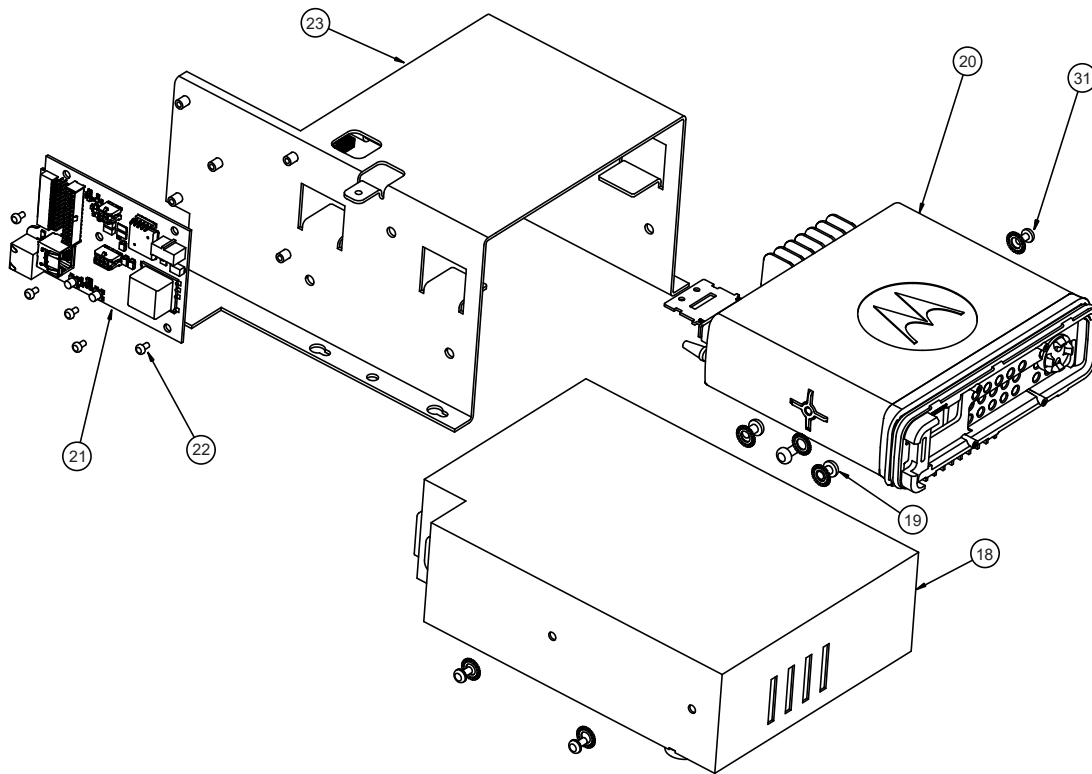


Figure 33: Transmit Bracket and Radio Assembly Exploded View

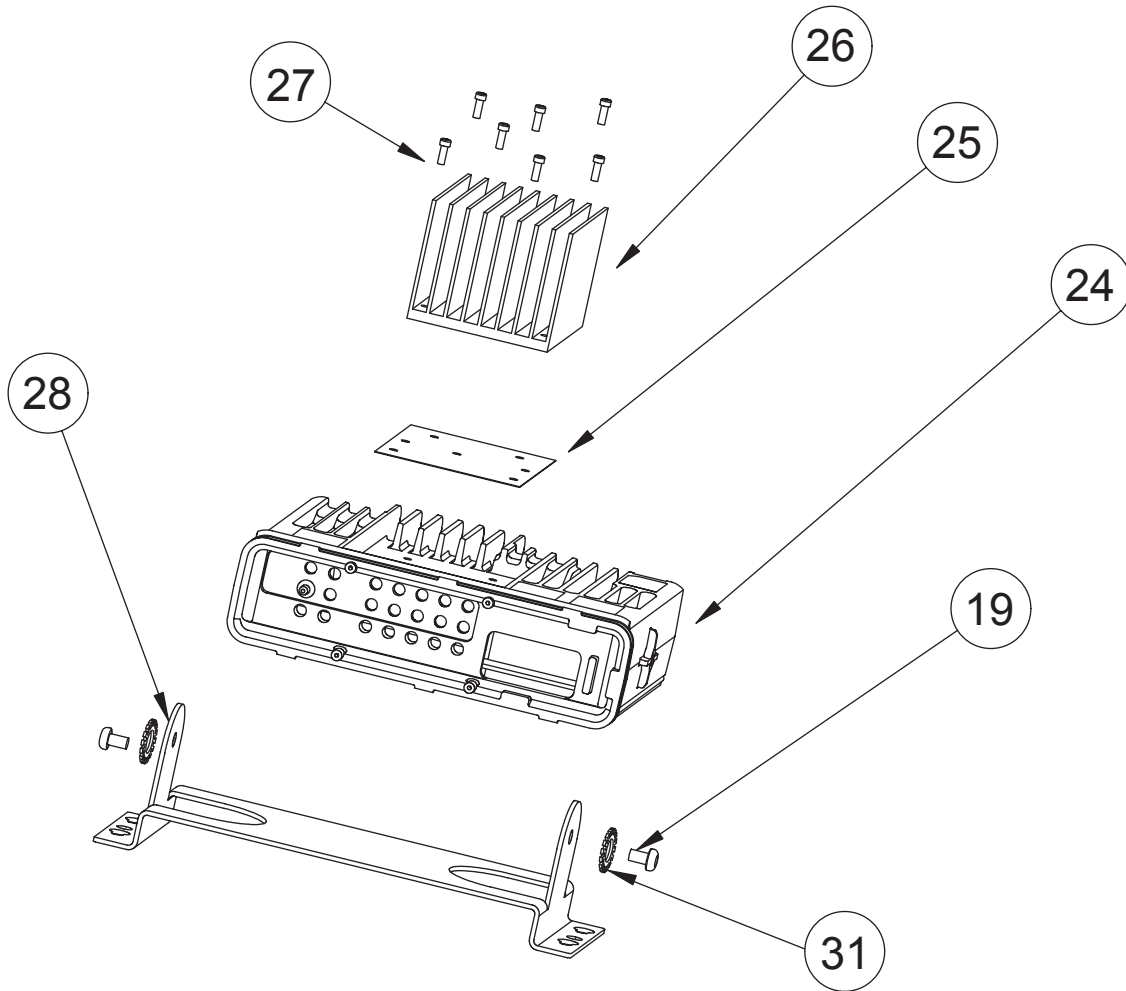


Figure 34: Front Panel Complete Assembly Exploded View

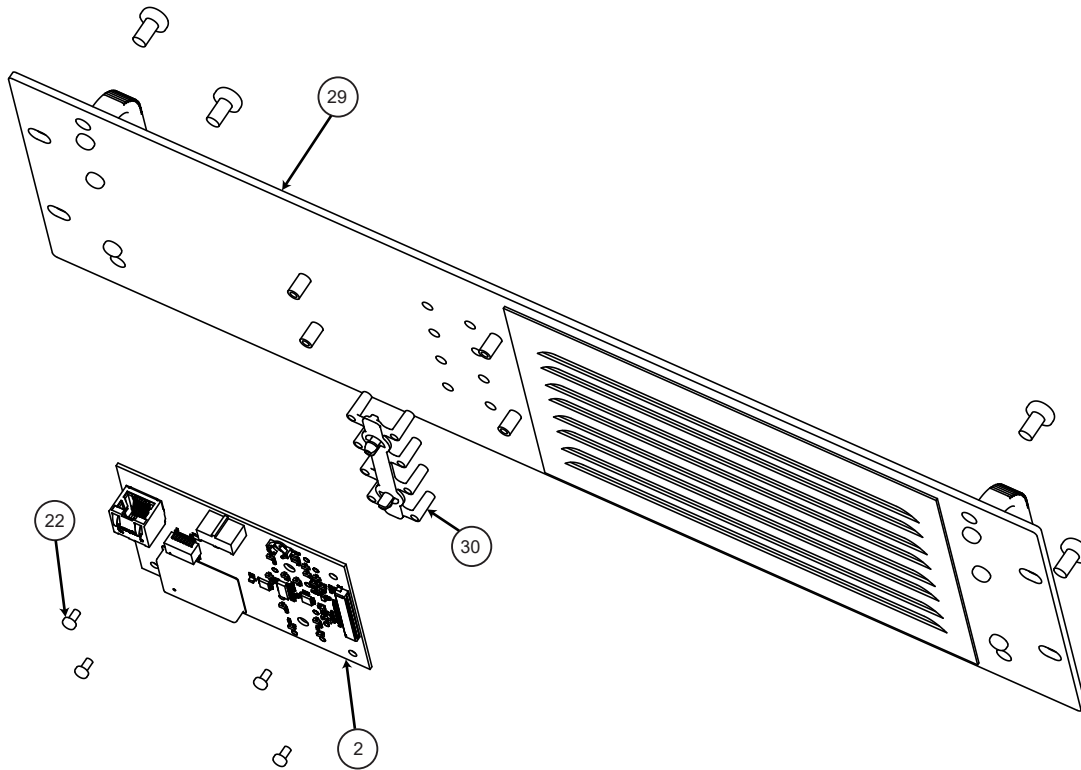


Table 9: Repeater Exploded View Parts List

Item No.	Description	Part Number
1	Screw, TT6x1.0x10, Starpan, EM6219 (black)	0312016A54
2	Repeater Indicator Board	PMLN5643_
3	Cable, Flex SSI	3015639H01
4	Cable, Flex 30-Position	3015634H02
5	Fan Assembly	5915618H01
6	Enclosure Assembly	1515837H01
7	Top Cover	1515655H01
8	Cable, RF Rx, W/BNC	3015574H01
9	Cable, RF Tx, W/N-Type	3015573H01
10	Fan Grill	1383852R01
11	Screw, TT3.5x0.6x16, Star SLT Pan	0371805M01
12	M6 Ground Nut	0285854Y01
13	M6 Ground Screw	0310909A95
14	Accessory Retainer Clip	4216361H01

Table continued...

Item No.	Description	Part Number
15	Rear Accessory Connector	0178042A01
16	Screw, M4x0.7x13.0, Starpan STLZNC	0310909E63
17	Lock Nut M4	0285854Y02
18	Power Supply	PMPN4001_
19	Screw, M5x0.8x8.0, Starpan STLZNC	0310909A74
20	Receive Radio Brick Assembly	See the following sections to identify proper Repeater XCVR Service Kit: <ul style="list-style-type: none"> • 800 MHz MOTOTRBO Repeater (806–870 MHz) Model Chart on page 30 • 800/900 MHz MOTOTRBO Repeater (806–941 MHz) Model Chart on page 30
21	Connector Board Assembly (800 MHz)	PMLN5644_
22	Screw, M3x0.5x5, Starpan STLZNC	0310909A30
23	RX Bracket Assembly	0715656H01
24	Transmit Radio Brick Assembly	See the following sections to identify proper Repeater XCVR Service Kit: <ul style="list-style-type: none"> • 800 MHz MOTOTRBO Repeater (806–870 MHz) Model Chart on page 30 • 800/900 MHz MOTOTRBO Repeater (806–941 MHz) Model Chart on page 30
25	Thermal Pad	7515633H01
26	Heatsink	2615620H01
27	Screw, M3x0.5x10, Starpan STLZNC	0310909A33
28	Tx Bracket	0715654H01
29	Front Panel Assembly only (handles not included)	6415658H06
30	Light Guide	6116326H01
31	Washer	0400002647
32	Cable Assembly, Tx to Connector Board	3015570H01
33	Cable, Power, Y-Split	3085859M01

Table continued...

Item No.	Description	Part Number
34	Cable, Ethernet	3015575H01
35	Cable, DC	30009303001
36	Cable, RF	30009305001
37	Cable, RF	30009305001
38	Receive Bracket & Radio assembly. See Figure 32: Receive Bracket and Radio Assembly Exploded View on page 86 for breakdown.	
39	Front Panel complete assembly. See Figure 34: Front Panel Complete Assembly Exploded View on page 88 for breakdown.	
40	Transmit Bracket & Radio assembly. See Figure 33: Transmit Bracket and Radio Assembly Exploded View on page 87 for breakdown.	

5.8 Torque Chart

The following table lists the various nuts and screws by part number and description, followed by the torque values in different units of measure. Torque all screws to the recommended value when assembling the repeater.

Table 10: Torque Specifications for Nuts and Screws

Part Number	Description	Driver/ Socket	Torque		
			N-m	lbs-in	kg-cm
0285854Y01	Grounding Nut, M6	10 mm dip socket	2.0	17.70	20.4
0285854Y02	Lock Nut, M4 x 0.8, ext tooth	7 mm socket	2.0	17.70	20.4
0310909A30	Screw, M3.0 x 0.5 x 5 mm	T10 Torx	1.0	8.9	10.2
0310909A33	Screw, M3 x 0.5 x 10 mm	T10 Torx	1.0	8.9	10.2
0310909A74	Screw, M5 x 0.8 x 8 mm	T25 Torx	3.0	26.6	30.6
0371805M01	Screws, M3.5 x 0.5 x 16 mm	T15 Torx	1.6	14.2	16.3
0310909A95	Grounding Screw, M6 x 1 x 25	T30 Torx	2.0	17.7	20.4
0312016A54	Screws, TT6 x 1.0 x 10 mm Star Thread Rolling Screw	T30 Torx	3.7	32.7	37.7
0310909E63	Screw, M4 x 0.7 x 7 mm, Slotted Star	T20 Torx	2.0	17.7	20.4
3015574H01	BNC Type connector	16 mm deep well socket	2.3	20.4	23.5
3015573H01	N Type connector	19 mm deep well socket	2.3	20.4	23.5

Chapter 6

Basic Troubleshooting

This chapter contains error codes and board replacement procedures. If the repeater does not pass all the performance checks in [MOTOTRBO Transceiver Performance Testing on page 39](#), then send the repeater to a Motorola Service Center listed in [Appendix B : Motorola Solutions Service Centers](#).



NOTICE: To access the various connector pins, use the housing eliminator/test fixture along with the diagrams found in this section of the manual. (See Section, [Service Aids on page 36](#), for the appropriate Motorola service aids and tools part numbers.)

6.1

High Power RF Precaution

The repeater might transmit while the technician believes the radio is in receive mode under the following conditions: radio failure, digital affiliation, a defective PTT button, or other unintentional activations.

To avoid possible equipment damage, when performing both transmit and receive tests, a suitable attenuator rated at 100 W or more should always be used with test equipment connected to the RF connector. The only exception to this is when the equipment's input power rating is higher than the maximum output power of the repeater.

6.2

Replacement of Service Kits

Once a problem has been isolated to a specific board, install the appropriate service kit.

If the service kit is replaced, it does not necessarily need to be retuned if it has been factory tuned. It should be checked for performance before being placed into service. The Bias DAC needs to be set for the appropriate final device bias current prior to keying up the repeater. If the bias is not properly set it may be possible to cause damage to the transmitter

See the Model Charts, for the service kit to order at Motorola Radio Products and Solutions Organization at 1-800-422-4210. See <https://businessonline.motorolasolutions.com> for further information.



CAUTION: The Tuner Tool only allows the serial number of a blank board to be entered once. Be very attentive during this procedure.

6.3

LED Indicator Descriptions

This table provides the Status and Functional Descriptions of each LED on the repeater. The LEDs indicate the activity and health of the repeater.

Table 11: LED Indicator Descriptions

LED	Status	Description
Power	Solid GREEN	Repeater powered by AC
	Solid RED	Repeater powered by back-up battery
	Off	Repeater powered off

Table continued...

LED	Status	Description
Repeater Disable	Solid RED	Repeater function disabled
	Blinking RED	Repeater in self test mode
	Off	Repeater in normal operational mode
Digital	Solid BLUE	Repeater in Digital mode
Analog	Solid YELLOW	Repeater in Analog mode
TX-A	Solid GREEN	Repeater transmitting (Analog)
	Solid GREEN	Repeater transmitting on Slot A (Digital)
RX-A	Solid YELLOW	Repeater receiving (Analog)
	Solid YELLOW	Repeater receiving on Slot A (Digital)
TX-B	Solid GREEN	Repeater transmitting on Slot B (Digital)
RX-B	Solid YELLOW	Repeater receiving on Slot B (Digital)

6.4

Ethernet LED Indicator Descriptions

This table provides the Status and Activity of the LEDs for the Ethernet connections on the repeater.

Table 12: Ethernet LED Indicator Descriptions

LED	Status	Description
Yellow	Solid YELLOW	Link valid
	Blinking YELLOW	Tx/Rx activity
Green	Solid GREEN	100 Mbits speed
	Off	10 Mbits speed

Chapter 7

Accessories

Motorola provides the following approved accessories to improve the productivity of your repeater.

For a list of Motorola-approved accessories, visit the following web site:
<http://www.motorola.com/governmentandenterprise>.

Antennas

- 806–869 MHz, 7.5 dBD Gain Antenna, (DSTRBO800ANTSC420)
- 896–941 MHz, 7.5 dBD Gain Antenna, (DSTRBO900ANTSC420)

Cables

- [Mobile & Repeater Rear Programming Cable](#), (PMKN4010_)
- [Mobile & Repeater Rear Accessory Programming and Test Cable](#), (PMKN4016_)
- [Mobile & Repeater Rear Accessory Connector Universal Cable](#), (PMKN4018_)
- Battery Back-up Cable, (RKN4152_)

Miscellaneous Accessories

- Wall Mount Kit for MOTOTRBO Repeater (PMLE4476_)
- Rack Mount for 1 Duplexer and 1 Preselector (PMLE4548_)
- Tower Mounting Hardware for RRX4038 (RRX4032_)
- RF Surge Suppressor (RRX4038_)
- 810–960 MHz, Circulator (HFF4003_)
- 806–941 MHz, Duplexer (DSTRBO350WDUPLXR)
- 806–960 MHz, Preselector (DSTRBO650WPRESSEL)

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Appendix A : Replacement Parts Ordering

Some replacement parts, spare parts, and/or product information can be ordered directly.

Basic Ordering Information

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Motorola Online

Motorola Online users can access our online catalog at

<https://businessonline.motorolasolutions.com>

To register for online access, please call 1-800-422-4210 (for U.S. and Canada Service Centers only). International customers can obtain assistance at <https://businessonline.motorolasolutions.com>

Mail Orders

Mail orders are only accepted by the US Federal Government Markets Division (USFGMD).

Motorola

7031 Columbia Gateway Drive

3rd Floor - Order Processing

Columbia, MD 21046

U.S.A.

Telephone Orders

Radio Products and Solutions Organization ¹

(United States and Canada)

7:00 AM to 7:00 PM (Central Standard Time)

Monday through Friday (Chicago, U.S.A.)

1-800-422-4210

1-847-538-8023 (United States and Canada)

U.S. Federal Government Markets Division (USFGMD)

1-877-873-4668

8:30 AM to 5:00 PM (Eastern Standard Time)

Fax Orders

Radio Products and Solutions Organization ¹

(United States and Canada)

¹ The Radio Products and Solutions Organization (RPSO) was formerly known as the Radio Products Services Division (RPSD) and/or the Accessories and Aftermarket Division (AAD).

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Appendix A : Replacement Parts Ordering

1-800-622-6210
1-847-576-3023 (United States and Canada)
USFGMD
(Federal Government Orders)
1-800-526-8641 (For Parts and Equipment Purchase Orders)

Parts Identification

Radio Products and Solutions Organization ¹
(United States and Canada)
1-800-422-4210

Product Customer Service

Radio Products and Solutions Organization (United States and Canada)
1-800-927-2744

Appendix B : Motorola Solutions Service Centers

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 the repeater to a Motorola Solutions Service Center as listed or to the nearest Authorized Service Center.

Servicing Information

Type of Centers	Address	Contact Number
Motorola Service Center	1220 Don Haskins Drive Suite A El Paso, TX 79936	Tel: 915-872-8200
Motorola Federal Technical Center	10105 Senate Drive Lanham, MD 20706	Tel: 1-800-969-6680 Fax: 1-800-784-4133
Canadian Technical Logistics Center	181 Whitehall Drive Markham, Ontario, L3R 9T1	Toll Free: 800-543-3222

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