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GMR Fantom™ 18/18x/24/24x Field Service Manual

⚠ WARNING

The GMR Fantom 18/18x/24/24x radar generates and transmits non-ionizing radiation. The radar must be turned off before approaching the scanner for service. Avoid looking directly at the scanner while it is transmitting, as the eyes are the most sensitive part of the body to electromagnetic radiation. Failure to properly turn off the radar may expose the service technician to harmful electromagnetic radiation that can result in personal injury or death.

The GMR Fantom 18/18x/24/24x radar contains high voltages. The scanner must be turned off before the covers are removed. While servicing the unit, be aware high voltages are present and take the necessary precautions. The high voltages in the scanner can take some time to decay. Failure to adhere to this warning can result in personal injury or death.

Repairing and performing maintenance on Garmin electronics is complex work that can result in serious personal injury or product damage if not done correctly.

NOTICE

Garmin is not responsible for, and does not warrant, the work that you or a non-authorized repair provider perform on your product.

Important Information Regarding Field Service of the GMR Fantom 18/18x/24/24x Radar

• Before you install or service the radar, ensure that the system software is up to date. For instructions on updating your Garmin chartplotter software, see your chartplotter owner's manual at support.garmin.com. Proceed with servicing the radar only if the software update does not resolve the issue.

• Record the serial number of your radar. You will need the serial number when you order replacement parts.

Contacting Garmin Product Support

Replacement parts are available only through Garmin Product Support.

• For dealer specific support, call 1-866-418-9438

• Go to support.garmin.com.

• In the USA, call (913) 397.8200 or (800) 800.1020.

• In the UK, call 0808 2380000.

• In Europe, call +44 (0) 870.8501241.

Getting Started

Tools Needed

• Screwdrivers
   ◦ #2 Phillips
   ◦ 5 mm hex
• Digital multimeter (volt/ohm meter)
• Compatible chartplotter
• 10 to 32 Vdc power supply
• High viscosity, electronics-compatible RTV compound

Radar Software Update

You must update the Garmin chartplotter software when you install this device. For instructions on updating the software, see your chartplotter owner's manual at support.garmin.com.

Before using this manual to troubleshoot a problem, ensure all Garmin devices on the boat are operating on the latest-released software version. Software updates may resolve the problem.

Troubleshooting

Errors on the GMR Fantom 18/18x/24/24x are reported on the chartplotter as an error message. When the radar reports an error, it may stop, go into standby mode, or continue operating, depending on the severity of the error. When an error is encountered, note the error message and perform the universal troubleshooting steps before proceeding with error-specific troubleshooting.

Universal Troubleshooting Steps

You must perform these troubleshooting steps prior to performing error-specific troubleshooting. You should perform these steps in order, and check to see if the error remains after performing each step. If the error remains after completing all of these steps, you can proceed to the topic for the error message you recieve to resolve the issue.

1 Update the radar and chartplotter software (page 1).
2 Examine the radar power cable and connections on the radar and on the battery or fuse block.
   - If the cable is damaged or a connection is corroded, replace the cable or clean the connection.
   - If the cable is good, and the connections are clean, test the radar with a known good power cable.
3 Examine the Garmin Marine Network cable and connections on the radar and the chartplotter or GMS™ 10.
   - If the cable is damaged, or a connection is corroded, replace the cable or clean the connection.
   - If the cable is good, and the connections are clean, test the radar with a known good Garmin Marine Network cable.

Radar Satus LED

A status LED is located on the product label and can help troubleshoot installation problems.

Status LED Color and Activity	Radar Status
Solid red	The radar is getting ready for use. This should only stay red briefly before changing to flashing green.
Flashing green	The radar is operating properly.
Flashing orange	The radar software is being updated.
Flashing red	The radar has encountered an error. Check a connected chartplotter to see if an error message is shown.

Error Codes and Messages

Major warning and severe error codes for the GMR Fantom 18/18x/24/24x radar are displayed on the chartplotter screen. These codes and messages are a good place to start when troubleshooting the radar.

To troubleshoot an error code from the radar, you can locate the code below and follow the troubleshooting steps as directed.

1003 - Hardware FPGA Program Fault

1 Perform the universal troubleshooting steps (page 2).

2 If the problem persists, replace the electronics box (page 9).

1004 - Input Voltage Low

1 Perform the universal troubleshooting steps (page 2).

2 Using a multimeter, check the input voltage level, and make sure it meets the specification for the radar.
NOTE: The voltage specification for the GMR Fantom 18/18x/24/24x is from 10 to 32 Vdc.

3 If the input voltage is in spec, examine the internal power cable for damage, and replace it if needed (page 11).

4 If the problem persists, replace the electronics box (page 9).
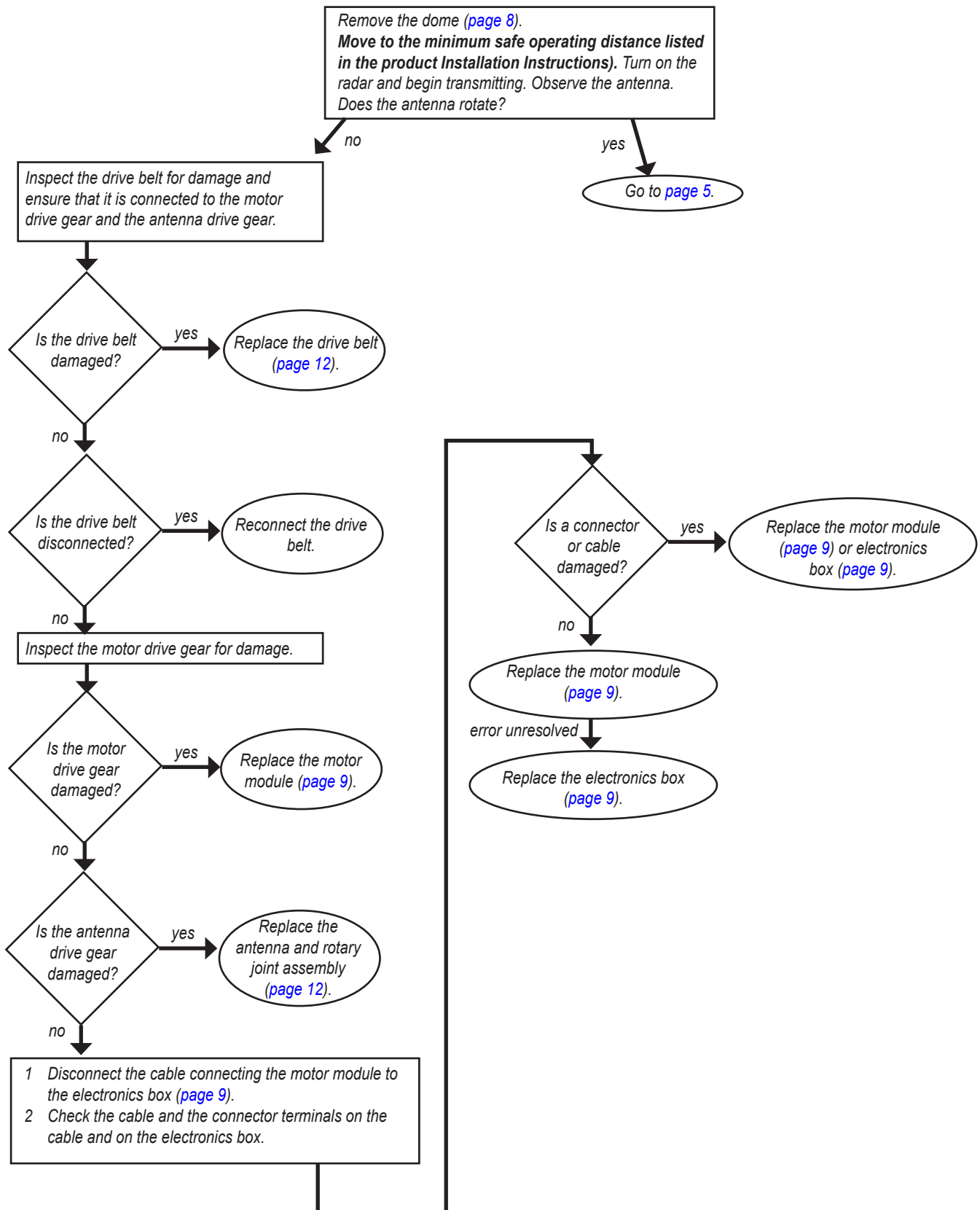
1005 - Input Voltage High

1 Perform the universal troubleshooting steps (page 2).

2 Using a multimeter, check the input voltage level, and make sure it meets the specification for the radar.
NOTE: The voltage specification for the GMR Fantom 18/18x/24/24x is from 10 to 32 Vdc.

3 If the input voltage is in spec, examine the internal power cable for damage, and replace it if needed (page 11).

4 If the problem persists, replace the electronics box (page 9).

1013 - High System Temperature

1 Perform the universal troubleshooting steps (page 2).

2 Check the temperature in the installed location, and make sure it meets the specification for the radar.
NOTE: The temperature specification for the GMR Fantom 18/18x/24/24x is from -15 to 70°C (from 5 to 158°F).

3 If the temperature range in the installed location is within spec, replace the the electronics box (page 9).

1019 - Spin Up Time Out, Speed Did Not Reach Specified RPMs
1025 - Transmit Speed Lost, Could Not Maintain Rotation Speed

1 Perform the universal troubleshooting steps (page 2).

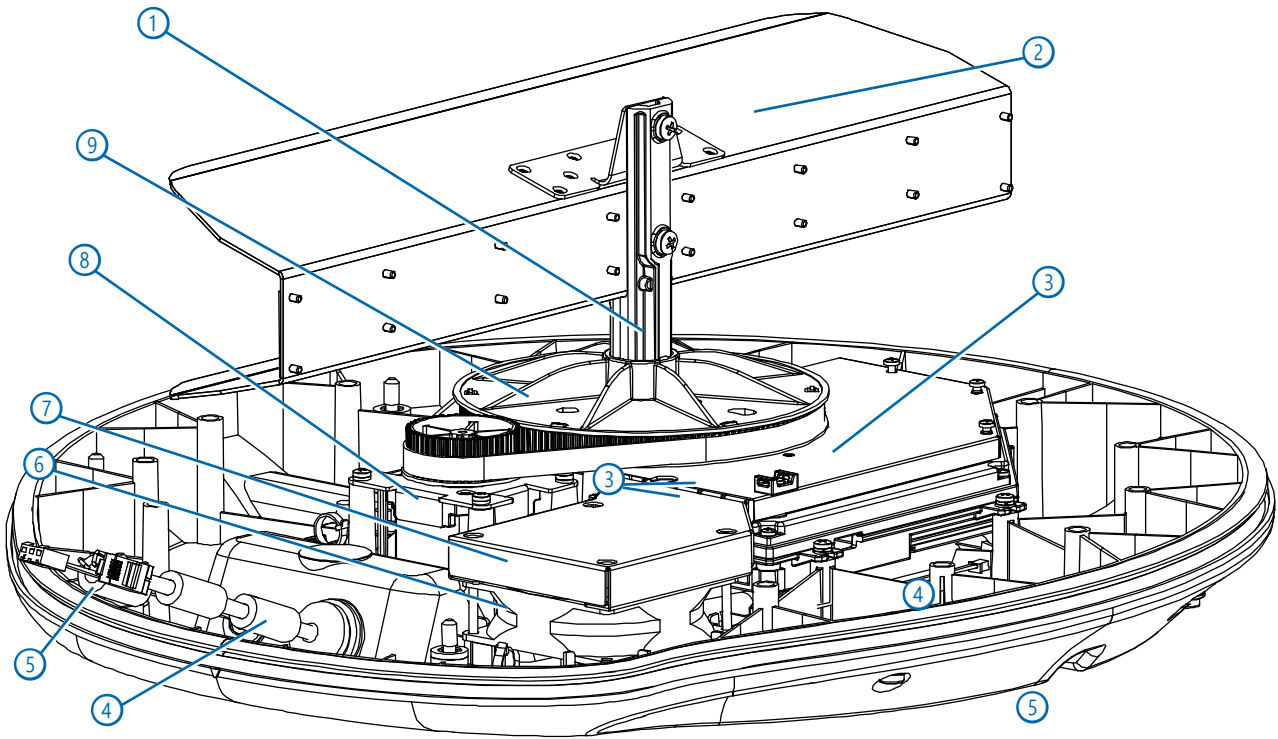**2** If the problem persists, use this flow chart for further troubleshooting.

Remove the dome (page 8).
Move to the minimum safe operating distance listed in the product Installation Instructions). *Turn on the radar and begin transmitting. Observe the antenna. Does the antenna rotate?*

— *no* → *Inspect the drive belt for damage and ensure that it is connected to the motor drive gear and the antenna drive gear.*

— *yes* → *Go to page 5.*

Is the drive belt damaged?
— *yes* → *Replace the drive belt (page 12).*
— *no* ↓

Is the drive belt disconnected?
— *yes* → *Reconnect the drive belt.*
— *no* ↓

Inspect the motor drive gear for damage.

Is the motor drive gear damaged?
— *yes* → *Replace the motor module (page 9).*
— *no* ↓

Is the antenna drive gear damaged?
— *yes* → *Replace the antenna and rotary joint assembly (page 12).*
— *no* ↓

1 Disconnect the cable connecting the motor module to the electronics box (page 9).
2 Check the cable and the connector terminals on the cable and on the electronics box.

Is a connector or cable damaged?
— *yes* → *Replace the motor module (page 9) or electronics box (page 9).*
— *no* ↓

Replace the motor module (page 9).

— *error unresolved* ↓

Replace the electronics box (page 9).

Yes, the antenna rotates.

Examine the antenna rotary joint, checking the screws that fasten the rotary joint to the base.

Tighten or reinstall the screws. ← *yes* — Are the screws loose or missing?

no

1   Disconnect the cable connecting the motor module to the electronics box (*page 9*).
2   Check the cable and the connector terminals on the cable and on the electronics box.

Is a connector or cable damaged? — *yes* → Replace the motor module (*page 9*) or electronics box (*page 9*).

no

Use a ferrous instrument to verify that the hall-effect magnet ① is installed in the rotary joint drive gear.

Is the hall-effect magnet missing? — *yes* → Install a replacement magnet (215-00007-00) using super glue. Make sure the north pole of the magnet faces up.

no

Replace the motor module (*page 9*). → Is the error resolved?

no

Replace the antenna and rotary joint assembly (*page 8*).

Is the error resolved? — *no* → Replace the electronics box (*page 9*).

Failure With No Error Code

Symptom	Possible Cause	Determination
Radar does not appear on the chartplotter network list	Network connection	**1** Inspect the network cable from the radar for damage at both ends. If possible, check the cable for continuity. If damaged, repair or replace the cable. **2** If a GMS 10 is installed, watch the GMS 10 LEDs for activity. If there is no activity, check the network cable from the chartplotter to the GMS 10. Repair or replace the cable if needed (page 11). **3** Remove the dome (page 8) and make sure that the internal network cable is connected to electronics box (page 9). **4** Inspect internal network cable and connectors. Repair or replace the cable if needed (page 11).
	Power connection	**1** With the radar off, check the fuse in the system cable. If the fuse is blown, replace it with a 7.5 A slow-blow fuse. **2** Check the power cable and connectors. Repair, replace, or tighten the power cable if needed. **3** Remove the dome (page 8) and make sure that the internal power cable is connected to electronics box (page 9). **4** Inspect internal power cable and connectors. Repair or replace the cable if needed (page 11). **5** Using a multimeter, verify the voltage (10–32 Vdc) at the internal power cable, and check the cable continuity. If voltage is not present, repair or replace the internal power cable (page 11).
	Processor	Connect the radar to a known good chartplotter, and turn on the chartplotter. If the radar does not appear on the network list, replace the electronics box (page 9).
No radar picture and no errors displayed	Setup or configuration settings	Return the radar to factory default settings on the chartplotter.
	Antenna	Replace the antenna (page 8).
"Radar Service Lost" reported by chartplotter	Main supply voltage	If power wires have been extended, verify that the wire gauge is correct for the distance. The voltage drop may be too large. The appropriate guage of wire exensions for the GMR Fantom 18/24 is: • 2 m (6.5 ft) = 16 AWG (1.31 mm²) or larger • 4 m (13 ft.) = 14 AWG (2.08 mm²) or larger • 6 m (19 ft.) or longer = 12 AWG (3.31 mm²) or larger
	Power connection	**1** With the radar off, check the fuse in the system cable. If the fuse is blown, replace it with a 7.5 A slow-blow fuse. **2** Check the power cable and connectors. Repair, replace, or tighten the power cable if needed. **3** Remove the dome (page 8) and make sure that the internal power cable is connected to electronics box (page 9). **4** Inspect internal power cable and connectors. Repair or replace the cable if needed (page 11). **5** Using a multimeter, verify the voltage (10–32 Vdc) at the internal power cable, and check the cable continuity. If voltage is not present, repair or replace the internal power cable (page 11).
	Network connection	**1** Inspect the network cable from the radar for damage at both ends. If possible, check the cable for continuity. If damaged, repair or replace the cable. **2** If a GMS 10 is installed, watch the GMS 10 LEDs for activity. If there is no activity, check the network cable from the chartplotter to the GMS 10. Repair or replace the cable if needed. **3** Remove the dome (page 8) and make sure that the internal network cable is connected to electronics box (page 9). **4** Inspect internal network cable and connectors. Repair or replace the cable if needed (page 11).
	Processor	Connect the radar to a known good chartplotter, and turn on the chartplotter. If the radar does not appear on the network list, replace the electronics box (page 9).
Poor sensitivity and sensitivity differences between ranges	Setup or configuration settings	Return the radar to factory default settings on the chartplotter.
	Antenna	Replace the antenna (page 8).
	Processor	Replace the electronics box (page 9).

Major Component Locations

Item	Description
1	Antenna rotary joint (see Notes)
2	Antenna
3	Electronics box
4	Internal network cable
5	Internal power cable
6	Fan
7	Fan cover
8	Motor (see Notes)
9	Antenna drive gear

Notes

- Do not disconnect the antenna from the antenna rotary joint. To remove the antenna, remove the antenna/rotary joint/drive gear assembly by following the disassembly procedures on page 8.
- Black models have a cap on the motor.

Radar Disassembly

Removing the Dome

1   Loosen the 6 mm hex screws ① on the bottom of the radar.

   The GMR Fantom 18/18x has eight screws, and the GMR Fantom 24/24x has ten screws.
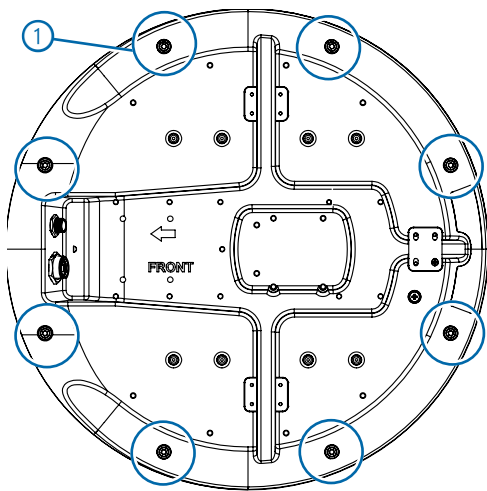
2   Pull directly up on the dome ② to remove it from the bottom of the radar.
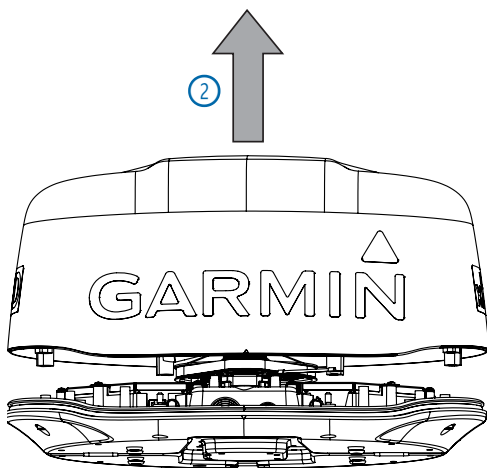
Reinstalling the Dome

1   After service is complete, ensure that all components are correctly reinstalled.

2   Turn on the radar in standby mode and ensure that no error appears on the chartplotter.

3   Turn off the radar.

4   Examine the rubber gasket on the radar housing.

   • If the gasket is damaged, replace it (*page 12*).

   • If the gasket is out of place, make sure it is installed correctly in the radar housing.

5   Align the marks on the dome and the radar housing ①, and place the dome on top of the radar housing.
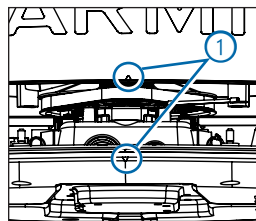
6   Tighten the 6 mm hex screws on the bottom of the radar.

   The screws stop turning when fully tightened. You cannot overtighten the screws.

Removing the Antenna

1   Remove the dome (page 8).

2   Locate the antenna mounting access hole ① on the rotary drive gear.
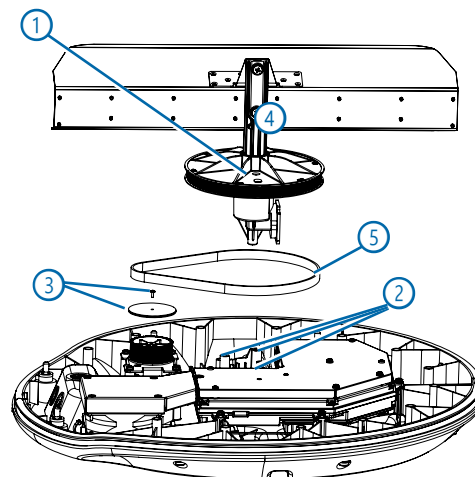
3   Rotate the antenna by hand to access the screws through the antenna mounting access hole, and remove the three #2 Phillips screws ② that connect the antenna to the radar housing.

4   Disconnect the cable from the connector on the antenna position sensor PCB, located under the rotary drive gear (page 10).

5   If you are servicing a black GMR Fantom 18x or 24x, remove the screw and cap from the motor ③.

6   Lift up on the antenna to remove the antenna assembly ④ and the antenna drive belt ⑤.

Reinstalling the Antenna

1   Place the antenna drive belt around the rotary drive gear.

2   Lower the antenna into the radar housing.

3   Connect the cable to the connector on the antenna position sensor PCB, located under the rotary drive gear (page 10).

4   Rotate the antenna by hand to access the antenna mounting locations, and secure the antenna to the radar housing using the three #2 Phillips screws you removed to remove the antenna.

   NOTE: The two silver screws secure the antenna to the radar housing. The single black screw secures the antenna to the electronics box.

5   Connect the antenna drive belt to the motor.

6   If you are servicing a black GMR Fantom 18x or 24x, replace the cap and screw on the motor.

Replacing the Fan

Even if the fan does not need to be replaced, you may need to remove the fan cover and fan to access other components or cable connections.

Removing the Fan Cover and Fan

1 Remove the dome (page 8).
2 Remove the antenna (page 8).
3 Disconnect the grounding cable from the motor to the electronics box ①.
4 Remove the fan cover ② by removing the four #2 Phillips screws ③ that connect it to the radar housing.
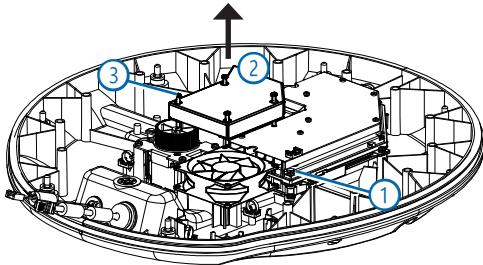
5 Disconnect the fan power cable from the electronics box (page 10).
6 Remove the zip tie securing the fan power cable to the radar housing.
7 Remove the fan.

Reinstalling the Fan

1 Place the fan into the radar housing.
2 Using a zip tie, secure the fan cable to the radar housing.
3 Connect the fan power cable to the electronics box (page 10).
4 Reinstall the fan cover.
5 Reconnect the grounding cable.
6 Reinstall the antenna (page 8).
7 Reinstall the dome (page 8).

Replacing the Motor

Black GMR Fantom 18x or 24x models have a protective cap on the motor gear. If you are replacing the motor on a white GMR Fantom 18x or 24x, the cap is optional.

1 Remove the dome (page 8).
2 Remove the antenna (page 8).
3 Remove the electronics box (page 9).
4 Remove the zip tie securing the motor cable to the radar housing (under the electronics box).
5 Remove the four #2 Phillips screws ① that connect the motor ② to the radar housing.
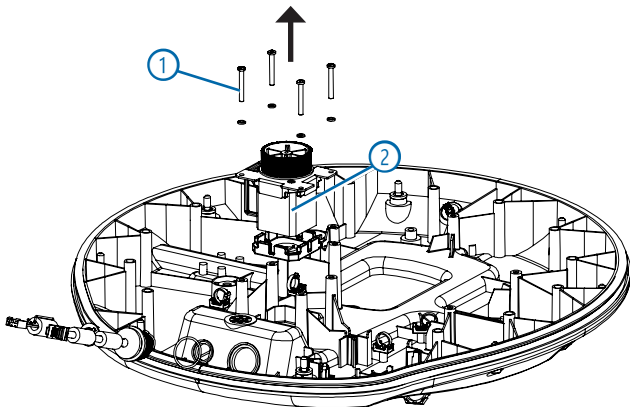
6 Remove the motor and the rubber pad from the radar housing.
7 Place the new rubber pad and motor in the radar housing, and secure it using the four #2 Phillips screws that you removed in step 5.

8 Using a zip tie, secure the motor cable to the radar housing (under the electronics box).
9 Reinstall the electronics box (page 9).
10 Reinstall the antenna (page 8).
11 Reinstall the dome (page 8).

Replacing the Electronics Box

The electronics box contains the primary PCBs for the radar. You may need to replace the electronics box to resolve a radar error. The electronics box also covers some cables, so you may need to remove the electronics box to replace other radar components.

Removing the Electronics Box

1 Remove the dome (page 8).
2 Remove the antenna (page 8).
3 Remove the fan cover (page 9)
4 Disconnect all cables from the electronics box (page 9).
5 Remove the four #2 Phillips screws ① that fasten the electronics box ② to the radar housing.
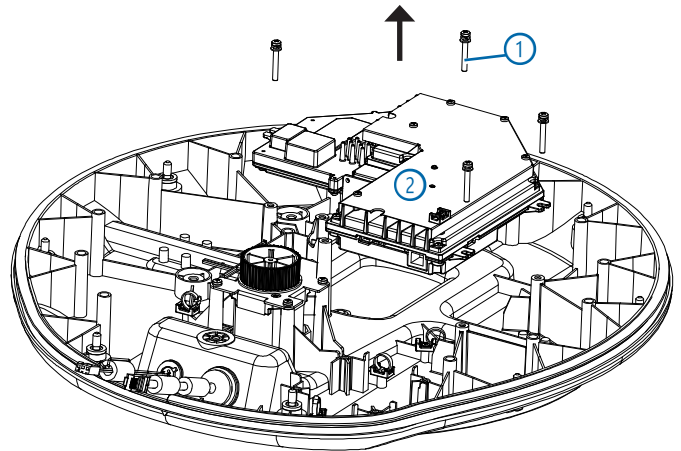
6 Remove the electronics box.

Reinstalling the Electronics Box

1 Place the electronics box into the housing.
2 Secure the new electronics box to the housing using the four #2 Phillips screws from the original electronics box.
3 Connect all the cables to the electronics box (page 10).
4 Apply a high viscosity, electronics-compatible RTV compound to the cable connectors.
5 Reinstall the fan cover.
6 Reinstall the antenna (page 8).
7 Reinstall the dome (page 8).

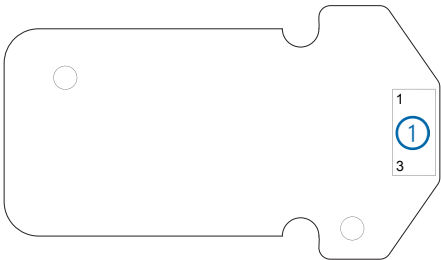# Connector Locations

Electronics Box
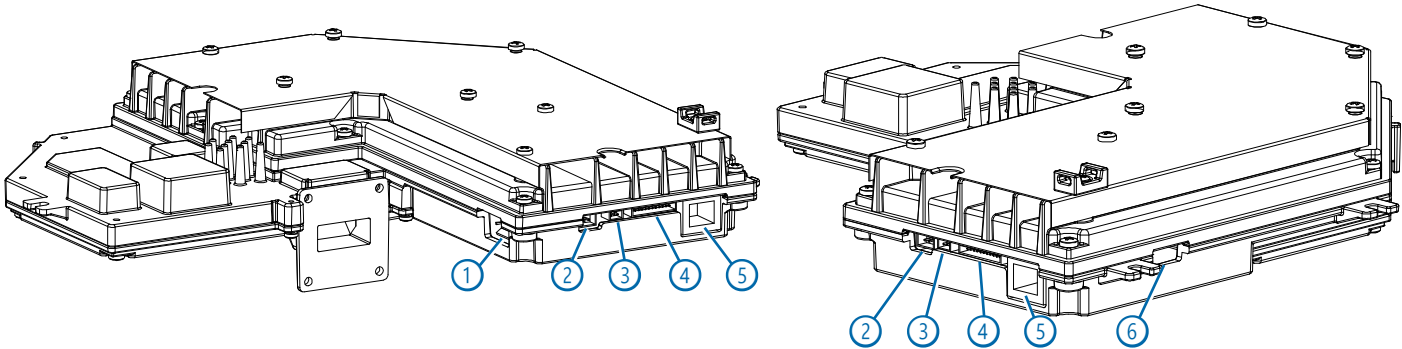
Item	Description
1	Power cable connector
2	Fan power cable connector
3	Status LED cable connector
4	Antenna position sensor cable connector
5	Network cable connector
6	Motor cable connector

Antenna Position Sensor PCB

Item	Description
1	Antenna position sensor cable connector

Replaceable Service Parts

Replaceable Cables
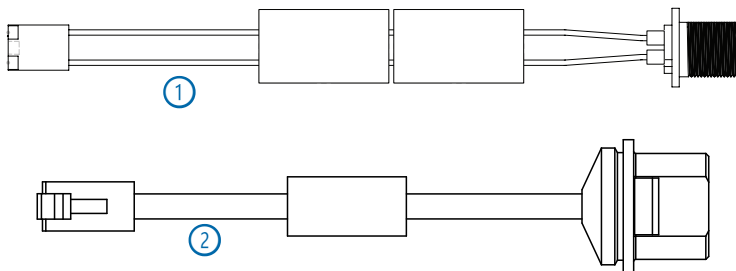
Item Number	Description	Kit Number			
		GMR Fantom 18	**GMR Fantom 18x**	**GMR Fantom 24**	**GMR Fantom 24x**
①	Internal power cable	S00-00700-15	S00-00700-15	S00-00700-15	S00-00700-15
②	Internal network cable	S00-00700-14	S00-00700-22	S00-00700-14	S00-00700-22
	Marine network cable, 15 m (not shown)	320-01052-00	S00-00700-17	320-01052-00	S00-00700-17
	Antenna position sensor cable (not shown)	S00-00700-16	S00-00700-16	S00-00700-16	S00-00700-16

Replaceable Service Parts

Replaceable Components
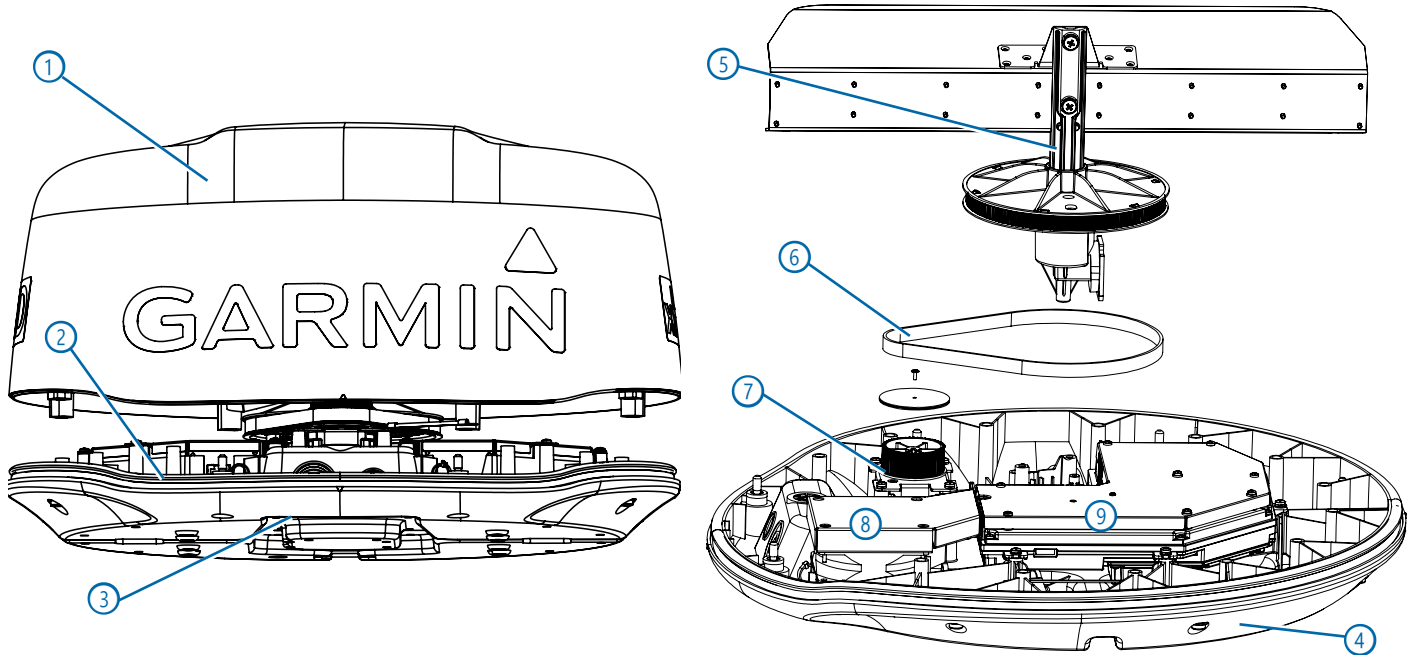
Item Number	Description	Kit Number			
		GMR Fantom 18	GMR Fantom 18x	GMR Fantom 24	GMR Fantom 24x
1	Top cover (dome), white	S00-00700-05	S00-00700-27	S00-00700-08	S00-00700-18
	Top cover (dome), black		S00-00700-30		S00-00700-24
2	Rubber housing gasket	S00-00481-00	S00-00481-00	S00-00489-00	S00-00489-00
3	Bottom assembly	S00-00700-06		S00-00700-09	
4	Bottom cover (white)		S00-00700-28		S00-00700-20
	Bottom cover (black)		S00-00700-31		S00-00700-25
5	Antenna/rotary joint	S00-00700-04	S00-00700-04	S00-00700-07	S00-00700-07
6	Drive belt	S00-00473-00	S00-00473-00	S00-00473-00	S00-00473-00
7	Motor module	S00-00700-02	S00-00700-02	S00-00700-02	S00-00700-02
8	Fan and fan cover	S00-00700-03	S00-00700-03	S00-00700-03	S00-00700-03
9	Electronics box	S00-00700-01	S00-00700-19	S00-00700-01	S00-00700-19
	Antenna position sensor PCB (not shown, located under the antenna drive gear)	S00-00476-00	S00-00476-00	S00-00476-00	S00-00476-00
	Fantom decal, port side (not shown)	S00-00700-10		S00-00700-12	
	Fantom decal, starboard side (not shown)	S00-00700-11		S00-00700-13	
	Logo kit, white (not shown)		S00-00700-29		S00-00700-21
	Logo kit, black (not shown)		S00-00700-32		S00-00700-26
	Grease, gear silencer (not shown)	S00-01028-00	S00-01028-00	S00-01028-00	S00-01028-00

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