GPSMAP® 8400/8600 Series Field Service Manual

Use this manual to identify and replace certain failed components of a GPSMAP 8400/8600 series chartplotter.

⚠ WARNING

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

Components on the circuit boards hold a high-voltage charge. To be safe, disconnect the device from power before opening it for service. If you have power applied to the device while it is open, use caution when working around the circuit boards located on the inside of the front housing.

NOTICE

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

Follow the guidelines set forth by Garmin regarding static discharge protection and a dust-free repair environment to avoid damaging the chartplotter during repair.

Verify all gaskets are reinstalled or replaced correctly when repairing the chartplotter to maintain water-resistance.

Table of Contents

Tools Needed

- A 16 to 32 GB memory card formatted in FAT32 (to update the chartplotter)
- An SD card reader (8400/8600 series SD card reader).
- A 10 to 35 Vdc, 6 to 10 A power supply (for bench testing)
- T6 screwdriver (removing the case screws)
- 14 mm, 16 mm, 21 mm, and 29 mm wrenches or sockets (removing the nuts on each port)
- Torque wrench (pneumatic) with:
  - 14 mm, 16 mm, 21 mm, and 29 mm sockets (securing the nuts on each port)
  - T6 bit (securing the case screws)
- Replacement part kit (specified in the repair topic)
- Voltmeter
- NMEA 2000 cable (testing NMEA 2000 ports)
- Garmin Marine Network cable (testing Network ports)

Important Information Regarding the Field Repair

- This manual covers the repair of all GPSMAP 8400/8600 series chartplotters.
- Before performing any service to the chartplotter, ensure that the system software is up to date. If it is not, you should update the software. Only proceed with the service if the software update does not resolve the issue.
- Record the serial number or unit ID of your chartplotter. The serial number or unit ID will be needed when you order replacement parts.
- Replacement parts are available through Garmin Product Support. Call your regional Garmin product support group to speak with a representative.
  - In the USA, call 866-418-9438
  - In the UK, call 0808 238 0000.
  - In Europe, call +44 (0) 870 850 1241
- Never use replacement parts from other chartplotters, even from the same model. Order all replacement parts from Garmin Product Support to ensure compatibility with your chartplotter.
- Although some replacement kits include cables, if the original cables are in good working condition, you should use them instead of the new ones supplied in the kit.
- Each time you remove copper tape from internal components, you must replace it. Copper tape is supplied with applicable parts kits.

Troubleshooting

Important Troubleshooting Information

If possible, you should perform troubleshooting procedures while on the boat to best determine the failed component. If the repair need is not readily apparent, such as a broken keypad or a broken power connector, you should boot the chartplotter in test mode to identify the failed components.

Software Update

Before performing any service to the chartplotter, ensure that the system software is up to date. If it is not, you should update the software. For the instructions on how to update the software using the ActiveCaptain® app, see the owner's manual at support.garmin.com.

Loading the New Software on a Memory Card

1. Insert a memory card into the card slot on the computer.
2. Install the Garmin Express™ app.
3. Select your vessel and device.
4. Select **Software Updates** > **Continue**.
5. Read and agree to the terms.
6. Select the drive for the memory card.
7. Review the reformat warning, and select **Continue**.
8. Wait while the software update is copied to the memory card.

   NOTE: Copying the update file onto the card may take from a few minutes up to a few hours.
9. Close the Garmin Express app.
10. Eject the memory card from the computer.

Updating the Device Software

Before you can update the software, you must obtain a software-update memory card and an SD card reader.

1. Turn on the chartplotter, and wait for the home screen to appear.

   NOTE: In order for the software update instructions to appear, the device must be fully booted before the card is inserted.
2. Connect an SD card reader to the device.
3. Insert the memory card, and press it in until it clicks.
4. Select **Update Software** > **Yes**.
5. Wait several minutes while the software update process completes.

   The device returns to normal operation after the software update process is complete.
6. Remove the memory card.

   NOTE: If the memory card is removed before the device restarts fully, the software update is not complete.

Test Mode Screen

The Test Mode screen provides hardware diagnostics and software information.

Use the test mode screen to identify problems. Any failed tests could be problematic, and should be examined further.

NOTE: Testing the NMEA 2000 and Garmin Network functionality requires either a special cable or a known working Garmin Marine Network device.

Activating Test Mode

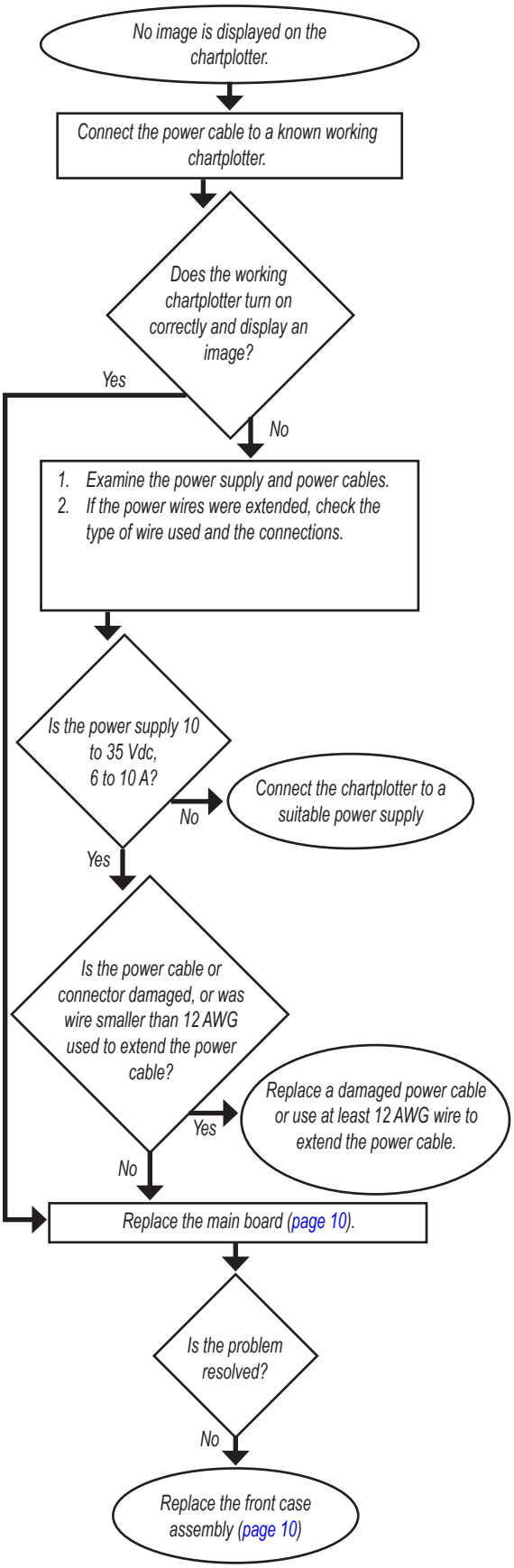
1. Select **Settings** > **System** > **System Information** > **Software Information**.
2. Hold above the software version number ① until the screen changes.

3. Select **Field Diagnostics** > **Test Mode**.

   To navigate the Test Mode Screen, select a board or a test from the options on the right side of the screen.

Testing

Testing the Display



Testing the Display Output

You can test the display or troubleshoot the video output by using the test mode.

1. Turn on the device in test mode, and wait 2–3 minutes for the self-tests to complete.
2. Select **Color Pages**.

   The screen will completely white.
3. Select **Next** or **Previous** to cycle through color pages.
4. Use the white, black, red, green, and blue screens to determine if the display or the video output is working correctly.
5. Select **Main Page** to exit the color page at any time.

   Note: Verify the cable connections to the screen are secure before replacing any components. A screen failure requires replacement of the front case assembly (page 10).

Testing the Touchscreen

If the touchscreen on the chartplotter does not correctly recognize touch input, you can test it by using the test mode.

1. Turn on the device in test mode, and wait 2–3 minutes for the self-tests to complete.
2. Select **Touchscreen test**.

   Red lines appear on the screen.
3. Swipe across each line and observe the behavior:
   - If each line changes from red to green when you swipe across it, then the touchscreen is functioning correctly. You may have to swipe across the bars multiple times to get each bar to turn green.
   - If each line does not change from red to green, then the touchscreen is not functioning correctly.
4. Press the Power key to exit the touchscreen test at any time.

Testing the Power Button Board

1. Activate test mode (page 2).
2. On the main page, observe the Push Button field. Confirm the field says UP when the power button is not pressed and DOWN when it is pressed.
3. Select the Display Page button and confirm you can hear the beeper.
4. On the Display page, observe the Light Sensor mV. Confirm the voltage is less than 500 mV while covering the sensor with a thumb and greater than 3000 mV while in full sunlight.

   If a failure is detected during any step while testing the power button board, then replace the power button board.

Locating Problems

Use the following table to locate the source of problems with specific systems.

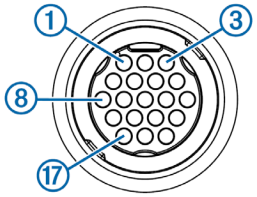
Board	System Name
Main Board	System Power Display Backlight Video Ethernet NMEA 2000 NMEA 0183 Connectors Wi-Fi / Bluetooth ANT J1939
ICB Board	Backlight Beeper
Power Button Board	Power Key Photocell

Testing NMEA 0183

If you are experiencing problems with NMEA 0183 data transmission, you will need to connect a known working cable before you can identify NMEA 0183 problems on the Test Mode screen.

1. Connect a test NMEA 0183 cable to the device, as shown below.
2. Turn on the chartplotter in test mode.
3. On the test page, examine the results on the SERIAL field.
   - If the ports are working correctly, the field displays PASS.
   - If the field displays FAIL, then there is a problem with NMEA 0183. See Locating Problems for more information (page 3).

Connecting a Test Power Cable



NMEA 0183 Diagram

Port	Wire Function	Wire Color	Pin
Input port 1	RX/A (-) RX/B (+)	White Orange/White	1 2
Output port 1	TX/A (-) TX/B (+)	Gray Pink	3 4
Input port 2	RX/A (-) RX/B (+)	Brown Brown/White	5 6
Output port 2	TX/A (-) TX/B (+)	Blue Blue/White	7 8
Input port 3	RX/A (-) RX/B (+)	Violet Violet/White	9 10
Input port 4	RX/A (-) RX/B (+)	White/Black Red/White	11 12
N/A	Audio Common	Blue/Red	13
N/A	Audio Right Channel	Red	14
N/A	Audio Left Channel	White	15
N/A	Alarm	Yellow	16
N/A	Accessory On	Orange	17
N/A	Ground (Shield)	Black	18
N/A	Spare	N/A	19

1. Connect Output Port 1 TX/A- to Input Port 1 RX/A- and Input Port 2 RX/A-
2. Connect Output Port 1 TX/B+ to Input Port 1 RX/B+ and Input Port 2 RX/B+
3. Connect Output Port 2 TX/A- to Input Port 3 RX/A- and Input Port 4 RX/A-
4. Connect Output Port 2 TX/B+ to Input Port 3 RX/B+ and Input Port 4 RX/B+

Testing NMEA 2000

1. Connect an NMEA 2000 device on the network with the device.
2. Verify the NMEA 2000 device appears on the device list.

Testing HDMI Input

1. Connect the device to an input source, such as a laptop or DVD player.
2. On the device, select **A/V, Guages, Controls** > **Video**.
3. From the video screen, select **Menu** > **Source**.
4. Select the source of the video feed.
5. Verify the video functions correctly.

Testing HDMI Output

1. Connect the device to a television.
2. Verify the chartplotter image is reproduced on the television.

Testing Composite Video

1. Connect the device to an input source, such as a GC10 or a DVD player.
2. On the device, select **A/V, Guages, Controls** > **Video**.
3. From the video screen, select **Menu** > **Source**.
4. Select the source of the video feed.
5. Verify the video functions correctly.

Testing J1939

1. Connect the device to a J1939 network.
2. Verify the device is receiving engine data from the network.

Testing Wi-Fi

1. On the device, select **Settings** > **Communications** > **Wi-Fi® Network** > **Wi-Fi®**.
2. Verify the Wi-Fi setting is turned on.
3. On a smartphone or compatible mobile device, enable Wi-Fi technology and search for the chartplotter wireless network.
4. Verify the chartplotter wireless network is visible on your compatible smartphone or mobile device.

Testing ANT

Connect a compatible Garmin device, such as a Marine Remote, and verify you can use it to scroll through the menu.

NOTICE

Observe the cable connections during all parts of the following repair procedures. If at any point during this procedure you notice a cable is disconnected, connect the cable and repeat any applicable test procedures.

Separating the Housings

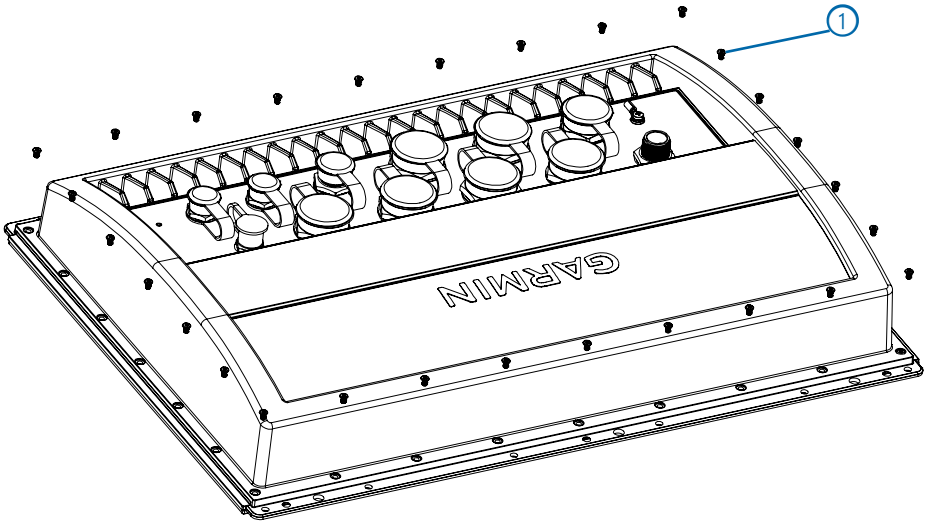
NOTICE

Before opening the housing, ensure you have static discharge equipment in place.

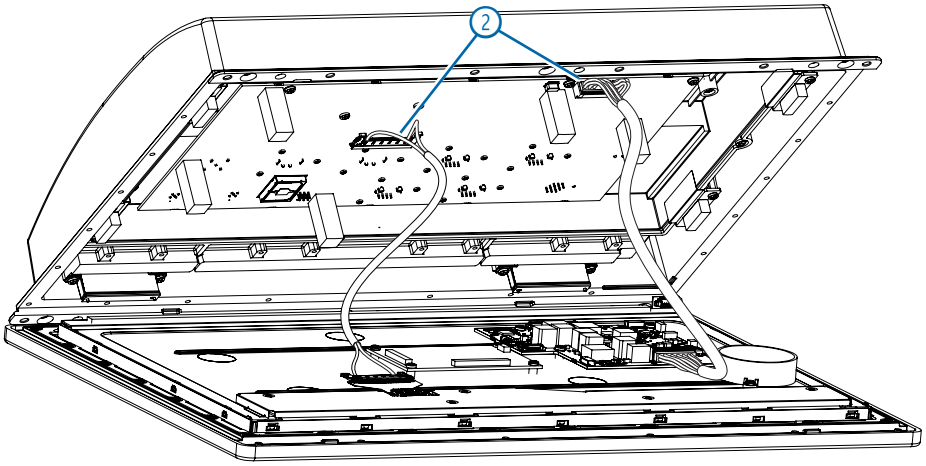
Before you can access the main CPU board, you must first open the rear housing.

Separating the Rear Housing from the Front Housing

1. Position the device so the logo is upside down when facing you.
2. Remove the screws ① from the perimeter of the device that fasten the rear housing to the front housing.



3. Carefully lift the top of the rear case.
4. Disconnect the two cables ② from the rear case assembly.

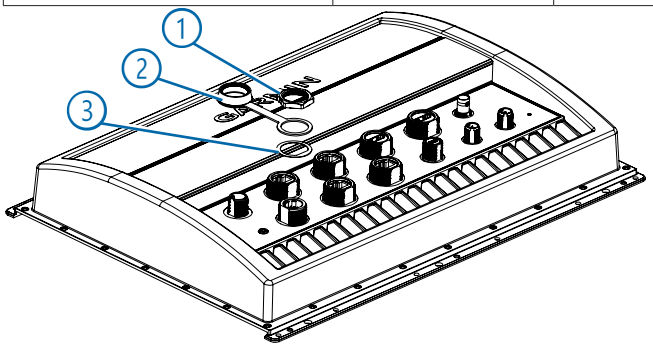


Removing the Main Board

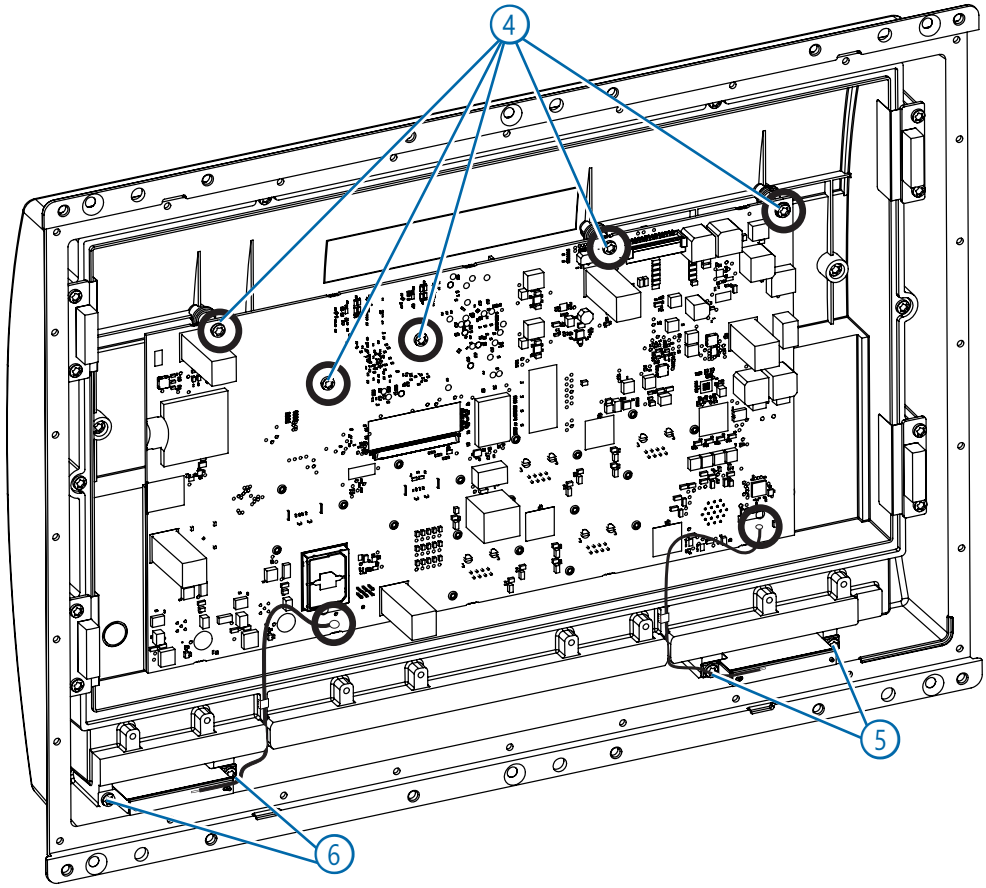
1 Separate the housings (page 5).

2 Remove the nuts ①, weathercaps ②, and washers ③ from each port on the rear case assembly.

Screw or Nut	Socket or Bit Size	Torque Measurment
Garmin Marine Network port	29 mm socket	15 kgf/cm
Power/data and transducer ports	21 mm socket	11 kgf/cm
NMEA 2000 port	16 mm socket	7 kgf/cm
BNC port	14 mm socket	11 kgf/cm



3 On the inside of the rear case assembly, remove the screws ④ securing the main board to the rear case.



4 Remove the two screws securing the ANT / BLE antenna wire ⑤.

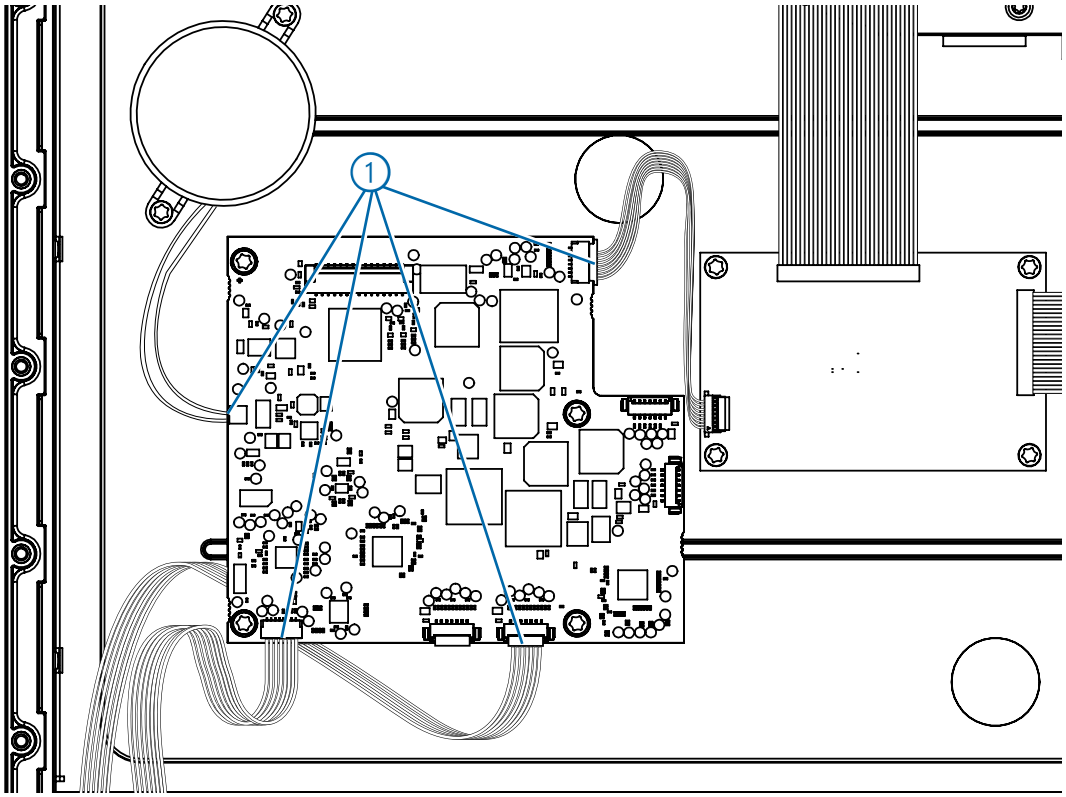
5 Remove the two screws securing the Wi-Fi antenna wire ⑥.

6 Carefully lift the main board and antennas out of the rear housing.

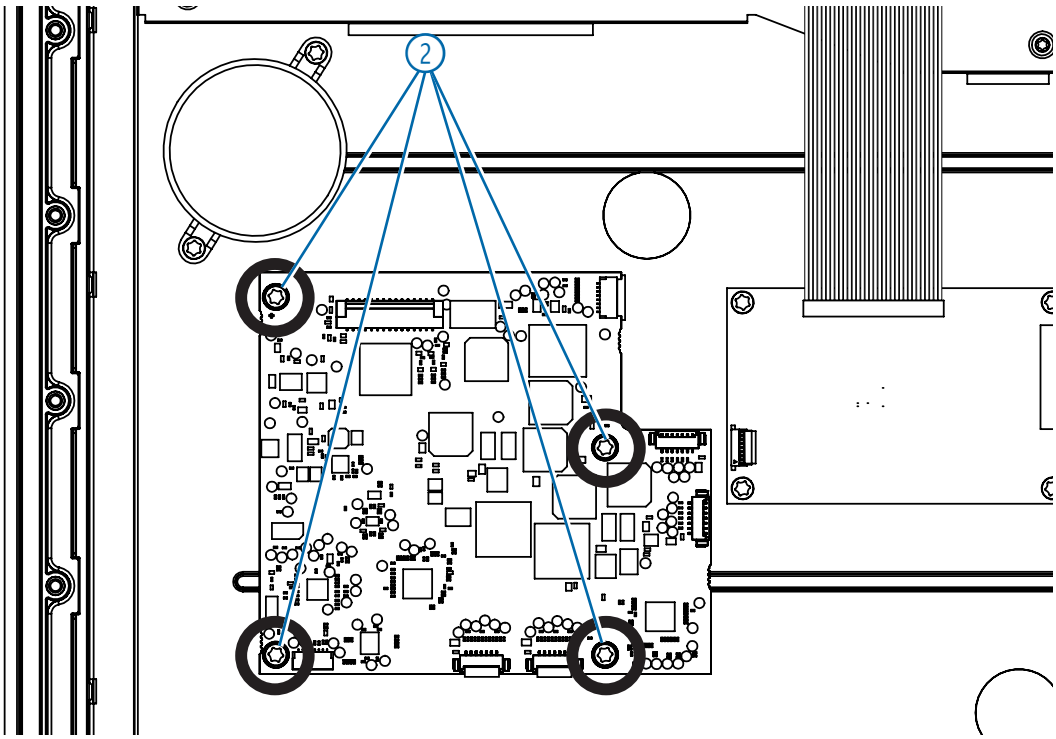
Removing the ICB Board

1 Separate the housings (page 5).

2 Disconnect the four cables ① leading to the ICB board.

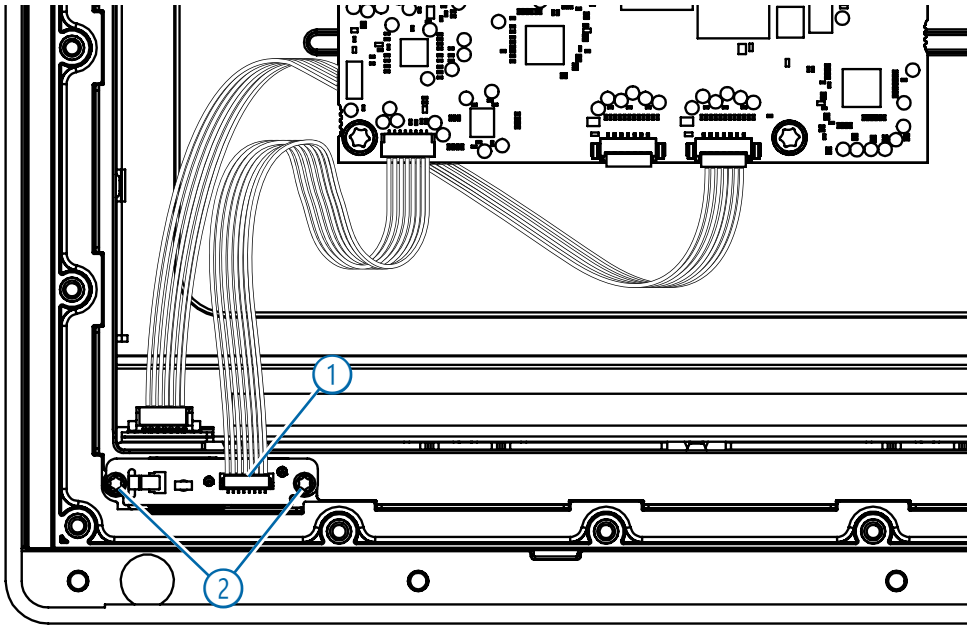


3 Remove the four screws ② securing the ICB board to the front case assembly.



Removing the Power Button Board

1 Disconnect the cable ① leading to the power button board.



2 Remove the two screws ② securing the power button board to the front case assembly.

Reassembling the Housing

NOTICE

After you have replaced a component or completed a repair, it is vital that you correctly reassemble the unit housing to ensure IEC 60529 IPX7 water resistance.

1 Ensure that all replaced or repaired components are properly installed, and that all of the internal cables are connected.
2 Ensure the blue thermal paste is kept in place.
3 Examine the large gasket along the rim of the device.
   - Replace the gasket if it is damaged or distorted.
   - Ensure that the gasket channel and the gasket are free of dust and debris.
   - The gasket will only fit one way, and will loosely fit into the channel along the edge of the housing when installed correctly.
4 Examine the O-rings around each of the connectors.
   - Replace any O-rings that appear damaged or distorted.
   - Ensure O-ring channels and gaskets are free of dust and debris.
5 Ensure the large gasket is in place and the cables are not pinched by the lid.
   - The lid will fit snugly on the main housing. You should not force the lid closed.
6 Using a torque wrench with the appropriate socket or bit, tighten the case screws and the nuts around each connector according to the values in the table.

Repair Procedures

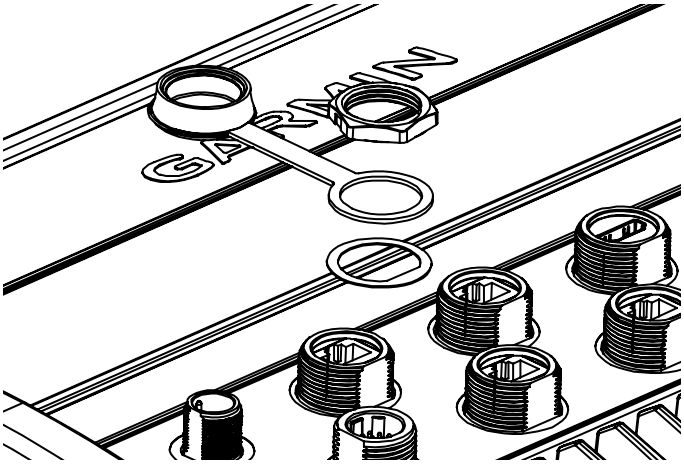
Replacing Weather Caps

If the weather caps are worn or damaged, you can replace them.

Kit required:

Port Name	Kit Number	Description
Ethernet / HDMI Port	S00-00533-03	Ethernet weather cap/spacer
NMEA 2000 / J1939 Port	S00-00533-04	NMEA2000 weather cap/spacer
BNC Port	S00-00533-06	BNC weather cap
USB Port	S00-00533-23	12 / 8 pin XDCR weather cap/spacer

1 Remove the hex nut, spacer, and all remaining pieces of the original weathercap.



2 Replace the weathercap, spacer, and hex nut.

3 Using a torque wrench with the appropriate socket, tighten the nut around the connector according to the values in the table

Screw or Nut	Socket or Bit Size	Torque Measurment
Garmin Marine Network / HDMI port	29 mm socket	15 kgf/cm
Power/data and USB port	21 mm socket	11 kgf/cm
NMEA 2000 / J1939 port	16 mm socket	7 kgf/cm
BNC port	14 mm socket	11 kgf/cm

Replacing the Rear Housing

Each model of the 8400/8600 series chartplotters has a single replaceable rear housing.

Kit required:

Chartplotter Model	Kit Number	Description
8617	S00-00670-02	8617 Rear Case
8622	S00-00670-06	8x22 Rear Case
8624	S00-00670-08	8x24 Rear Case

1 Separate the housings (page 5).

2 Install the replacement rear housing.

3 Reassemble the housing (page 8).

Replacing the Front Case Assembly

Each model of the 8400/8600 series chartplotters has a single replaceable front case assembly. The front case assembly includes the screen

Kits required:

Chartplotter Model	Kit Number	Description
8x17	S00-00670-01	8x17 Front Case
8x17	S00-00670-11	8x17 Front Case, Redesign
8x17	S00-00670-14	8x17 Front Case, III
8x22	S00-00670-05	8x22 Front Case
8x22	S00-00670-12	8x22 Front Case, Redesign
8x22	S00-00670-15	8x22 Front Case, III
8x24	S00-00670-09	8x24 Front Case
8x24	S00-00670-13	8x24 Front Case, Redesign
8x24	S00-00670-16	8x24 Front Case, III

1. Open the housing (page 5).
2. Remove the ICB board (page 6).
3. On the replacement front case, install the ICB Board you removed in step 2.
4. Reassemble the housing (page 8).

Replacing the Main Board

Kits required:

Chartplotter Model	Kit Number	Description
8417	S11-03774-60	GPSMAP 8417 Main Bd
8617	S11-03774-61	GPSMAP 8617 Main Bd
8417	S11-03774-66	GPSMAP 8417 Main Bd, Redesign
8617	S11-03774-67	GPSMAP 8617 Main Bd, Redesign
8417	S11-03774-6Q	GPSMAP 8417 Main Bd, III
8617	S11-03774-6R	GPSMAP 8617 Main Bd, III
8422	S11-03774-62	GPSMAP 8422 Main Bd
8622	S11-03774-63	GPSMAP 8622 Main Bd
8422	S11-03774-68	GPSMAP 8422 Main Bd, Redesign
8622	S11-03774-69	GPSMAP 8622 Main Bd, Redesign
8422	S11-03774-6S	GPSMAP 8422 Main Bd, III
8622	S11-03774-6T	GPSMAP 8622 Main Bd, III
8424	S11-03774-64	GPSMAP 8424 Main Bd
8624	S11-03774-65	GPSMAP 8624 Main Bd
8424	S11-03774-6C	GPSMAP 8424 Main Bd, Redesign
8624	S11-03774-6D	GPSMAP 8624 Main Bd, Redesign
8424	S11-03774-6U	GPSMAP 8424 Main Bd, III
8624	S11-03774-6V	GPSMAP 8624 Main Bd, III

1. Open the housing (page 5).
2. Remove the main board and antennas (page 7).
3. Secure the replacement board and antennas to the rear case using the screws removed in step 2.
4. Reassemble the housing (page 8).

Replacing the ICB Board

Kits required:

Chartplotter Model	Kit Number	Description
8417, 8617	S00-00670-04	8x17 ICB Board
8422, 8622	S00-00670-07	8x22 ICB Board
8424, 8624	S00-00670-10	8x24 ICB LED Controller

1. Separate the housings (page 5).
2. Remove the ICB board (page 7).
3. Secure the replacement ICB board to the front case assembly using the screws removed in step 2.
4. Connect the cables to the replacement board.

Replacing the Power Button Board

Kit required:

Chartplotter Model	Kit Number	Description
8417, 8422, 8424, 8617, 8622, 8624	S00-00670-00	PWR Button

1. Separate the front and rear housings (page 5).
2. Remove the power button board (page 8).
3. Replace the power button board and connect the cable to the main board.
4. Reassemble the housing (page 8).