Field Service Spares Replacement Procedure – Furuno GPS Antenna

Approval:

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Revision History

Rev.	ECO	Description of Change	Date
A	8801	Initial release	08-05-2011
B	9041	Clerical revisions	10-18-2011
C	9289	Revise theory of operation text	01-17-2011

1. Brief Summary:

Troubleshooting document for diagnosing a fault with and replacing the internal Furuno GPS antenna.

2. Theory of Operation:

A GPS antenna is installed on the pedestal to provide the vessels co-ordinates into the DAC for targeting purposes. Based on feedback from the GPS antenna, the system will calculate the azimuth; elevation and polarity look angles of the desired satellite. Should the GPS antenna fail and stop updating tracking will keep the system on satellite as the vessel sails, but the polarity angle won't update, causing signal degradation; and as a result poor reception and/or cross-pol isolation. Should the antenna re-target, it will mispoint due to a miscalculation of the azimuth and elevation positions.

If the system loses its GPS update, it is common to see a satellite out of range error (error 128) displayed on the DAC. This error would also be flagged if the DACs calculated target elevation position was below 0 or above 90 degrees. A sign of a hardware failure with the Furuno GPS antenna is when the position defaults to Japanese co-ordinates where the antennas are manufactured (approximately 35N, 135E); again this will cause the antenna to mispoint.

On a VSAT system, the GPS position will typically be fed into the satellite modem via the terminal mounting strip (TMS), this is required to calculate the distance from the satellite when using a TDMA link which in turn will aid the network to allocate the correct time slot for the data transfer. If the satellite modem loses the GPS input it will drop out of the network.

3. Latitude/Longitude Auto-Update Check:

This verifies that the integrated GPS antenna is automatically updating the positional information.

1. Press the **NEXT** key until the Ship's menu is displayed.	LAT 38N LON 122W HDG 123.4 123.4
2. Press the **ENTER** key to isolate the Latitude entry menu.	LAT 38N
3. Press the **LEFT** arrow key to display a cursor under the numeric value.	LAT 38N
4. Press the **UP** arrow key to increment the displayed value.	LAT 39N
5. Press the **ENTER** key to submit change.	LAT 39N
6. If automatic updating is working properly the Longitude value display will return to the current ships position within a few seconds.	LAT 38N

4. Troubleshooting:

Four polar orbiting GPS satellites cover any one location at any given time. In order to triangulate the GPS position, the GPS antenna needs to receive a signal from three out of the four satellites. If partial blockage of the GPS antenna on the pedestal causes only two or less of the satellites to be received, the GPS position will stop updating. If blockage is causing a problem with the update then there is a possibility of running the vessels GPS into the DAC via the TMS. If this is carried out then the antennas GPS must be disconnected. Do this by disconnecting the BNC connector at the PCU. Tie up any loose cable to prevent catching.

Older revision PCU's have a battery onboard to assist the Furuno engine and help GPS update quicker. It's possible the battery can become flat. This can be rectified by unplugging the BNC connector from the PCU for a short period of time whilst the pedestal is energized, then reconnect it and test the position updates correctly.

5. Replacing the GPS Antenna:

5.1. Tools.

- Snips/Cutters
- Tie Wraps/Cable Ties
- Acetone

5.2. Procedure.

Universal procedure for replacing the Furuno GPS antenna.

***CAUTION:** Power down the pedestal before following this procedure. 1. Cut the cable ties which secure the GPS antennas cable. 2. Unplug the GPS antennas BNC connector from the PCU. 3. Remove the defective GPS by cutting the double sided sticky tape between the GPS antenna and its mounting position.	
4. Clean the original mounting position with acetone solvent. 5. Apply the sticky side of the tape to the mounting position. 6. Remove the foam tape from the bottom of the replacement GPS antenna. 7. Peel the paper off of the double-sided sticky tape to expose the second sticky side and mount the replacement GPS antenna to the tape with the cable in the original orientation. 8. Secure the GPS cable run with cable ties. 9. Coil the excess GPS cable and secure with cable ties. 10. Plug the GPS cables BNC connector into the PCU. 11. Verify the system moves freely in elevation and does not pull on the GPS antenna cable.