




Field Service Spares Replacement Procedure – PCU Kit, ST24

Approval:

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Revision History

Rev.	ECO	Description of Change	Date
A	9145	Initial release	03-06-2012

Field Service Procedure – Replacement PCU Kit, ST24

1. Brief Summary:

Troubleshooting document for diagnosing a fault with and replacing the main PCU PCB on the ST24 antenna.

2. Checklist:

- Verify Initialization
- Built-In Test

3. Theory of Operation:

The ST24 is a two axis antenna (elevation and azimuth) with a motorized polarization assembly to keep the LNB in the correct reception position as the vessel rolls. The PCU assembly houses a single PCB with integrated PCU motherboard for stabilization and DVB receiver for tracking the RF signal.

The PCU motherboard is responsible for the stabilization of the antenna housing a solid state MEM sensor which acts as the horizon reference for the elevation, pol and 3 rate sensors for stabilization for the azimuth, elevation and pol axis (acting like the antennas cross level axis). When motion is detected by the relevant rate sensor the PCU motherboard will issue the drive to move the axis the opposite amount for maintaining stabilization.

No gyro connection is integrated in the system when searching the antenna targets in elevation based on the vessels GPS position and desired satellite, the azimuth axis then sweeps in search of signal above threshold. Once the NID for the desired satellite has been decoded tracking will be enabled.

The DVB receiver integrated onto the PCU motherboard takes a feed directly from the LNB to receive the satellite signal and will also decode the NID (Network Identity) from the carrier the antenna is tracking as the output of the receiver is passed to the multi-switch.

4. Initialization:

To reinitialize the pedestal, cycle the Power to the antenna by toggling the power switch to the GACP control panel. During the initialization process the antenna will calibrate the encoders on the elevation and pol motors as well as verifying the motor drive and acquiring GPS lock. The initialization process is as follows:

1. EL drive – The elevation axis drives down into its end stop to calibrate the encoder and then up to a zero degree look angle.
2. Pol Drive – The feed drives counter clockwise into its end stop to calibrate the encoder and then drives clockwise until the LNB is vertical.
3. EL Drive 45 – The elevation axis then drives the reflector to a 45 degree look angle.

Once the initialization process is complete the system will then target the last preset satellite in the GACP.

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5. Verify Power to PCU PCB:

The pedestal is powered by 12VDC if the GACP is powered but the system won't energize remove the PCU PCB cover and disconnect the communications cable from the PCU PCB (black one in the centre of the board). 12VDC should be present across the centre pin to the outer connector, if the voltage is present but the pedestal isn't energizing the PCU PCB is defective and needs to be replaced. If no voltage is present troubleshoot the source down to the coax cable entering the communications (black) port in the radome base and the output from the GACP in the "RF-IN" F-connector. If the 12VDC is present entering the termination block on the rear of the GACP but the GACP won't energize the GACP is defective and needs to be replaced.

6. Verify Communications With the PCU PCB:

If the control panel is energized and states on the display "PCU Communication error" this is an indication that the control panel is powered, but not in communication with the PCU PCB. Verify if the pedestal is powered, if the pedestal is powered yet no feedback is being received from the PCU PCB this is an indication that the coax connection is good, but there is communication problem. The control panel is potentially defective, replace the control panel. If the control panel is replaced and communications with the PCU PCB are not established replace the PCU PCB assembly (the original control panel can be refitted as it's unlikely to be defective).

7. Run the ST24 Built-In Test:

To run the internal system test on the ST24 antenna access the home page of the control panel. If there is a locked padlocked displayed in the lower right corner of the screen, press this to access the options.

Select the antenna option from the home page and then select the advanced options, you'll now see the option to run "system test". Select the system test option to display the different tests available. You'll now have the following options:

7.1. Power on Self Test Results PCU:

Displays the PCU's test results for the elevation motor and encoder, pol motor and encoder, azimuth motor, tilt sensor, rate sensors, GPS, and some internal communication tests which were recorded when the antenna was last initialized. Possible Failure results are:

1. EL Motor and Encoder – Loose connection, a winding is down in the motor, encoder failure. Verify connection, replace the motor.
2. Pol Motor and Encoder – Loose connection, a winding is down in the motor, encoder failure. Verify connection, replace the motor.
3. AZ Motor – Loose connection, a winding is down in the motor. Verify the connection, replace the motor. This test is not currently active at time of print contact your local Sea Tel service department to verify if it's supported by your PCU software (version 1.11 or higher).
4. Tilt (MEM) Sensor – Failure of the solid state accelerometer or the pedestal is tilted more than 15 degrees, rerun test with pedestal level, or replace the PCU.
5. Rate Sensor – Failure of one of the rate sensors, replace the PCU. This test is not currently active at time of print contact your local Sea Tel service department to verify if it's supported by your PCU software (version 1.11 or higher).

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6. GPS – The GPS is only tested during the in service test due to the amount of time required for the GPS antenna to acquire lock.
7. Processor – Failure of the main PCU processor to communicate properly with onboard devices, replace the PCU.
8. Tuner Communication – Failure of the DVB tuner, replace the PCU.

7.2. In Service Test PCU:

Tests the internal components on the PCU PCB including the tilt (MEM) sensor, rate sensor, GPS, processor and tuner communication. Possible Failure results are:

1. Tilt (MEM) Sensor – Failure of the solid state accelerometer or the pedestal is tilted more than 15 degrees, rerun test with pedestal level, or replace the PCU.
2. Rate Sensor – Failure of one of the rate sensors, replace the PCU.
3. GPS - No active GPS update, verify connection, replace GPS antenna, or replace PCU.
4. Processor – Failure of the main PCU processor to communicate properly with onboard devices, replace the PCU.
5. Tuner Communication – Failure of the DVB tuner, replace the PCU.

7.3. Out of Service Test PCU:

This will take the antenna off satellite by doing a software reset of the PCU, reinitializing the system. In doing this it re-runs the PCU's power on self test which include the elevation motor and encoder, pol motor and encoder, azimuth motor, tilt sensor, rate sensors, GPS, and some internal communication tests. Possible Failure results are:

1. EL Motor and Encoder – Loose connection, a winding is down in the motor or encoder failure. Verify the connection, replace the motor.
2. Pol Motor and Encoder – Loose connection, a winding is down in the motor or encoder failure. Verify the connection, replace the motor.
3. AZ Motor – Loose connection, a winding is down in the motor. Verify the connection, replace the motor. This test is not currently active at time of print contact your local Sea Tel service department to verify if it's supported by your PCU software (version 1.11 or higher).
4. Tilt (MEM) Sensor – Failure of the solid state accelerometer or the pedestal is tilted more than 15 degrees, rerun test with pedestal level, or replace the PCU.
5. Rate Sensor – Failure of one of the rate sensors, replace the PCU. This test is not currently active at time of print contact your local Sea Tel service department to verify if it's supported by your PCU software (version 1.11 or higher).
6. GPS – The GPS is only tested during the in service test due to the amount of time required for the GPS antenna to acquire lock.
7. Processor – Failure of the main PCU processor to communicate properly with onboard devices, replace the PCU.
8. Tuner Communication – Failure of the DVB tuner, replace the PCU.

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7.4. Power on Self Test Results Panel:

Displays the control panels test results for the GACPs processor, touch screen, modem board and PCU communications which were recorded when the antenna was initialized. Possible Failure results are:

1. Processor - Failure of the GACP processor, replace the GACP.
2. Touch Screen - Failure of the GACP touch screen, replace the GACP.
3. Modem Board - Failure of the GACP modem board, replace the GACP.
4. PCU (communications) – Failure of communication with the PCU, verify the cable connection, verify voltage to the PCU/antenna powered, replace the GACP.

7.5. In Service Test Panel:

Tests the internal components on the control panel including the GACP processor, touch screen, modem board and PCU communications. Possible Failure results are:

1. Processor - Failure of the GACP processor, replace the GACP.
2. Touch Screen - Failure of the GACP touch screen, replace the GACP.
3. Modem Board - Failure of the GACP modem board, replace the GACP.
4. PCU (communications) – Failure of communication with the PCU verify cable, verify voltage to the PCU/antenna powered, replace the GACP.

7.6. Out of Service Test Panel:

Runs the panels power on tests which include the GACP processor and touch screen. Possible Failure results are:

1. Processor - Failure of the GACP processor, replace the GACP.
2. Touch Screen - Failure of the GACP touch screen, replace the GACP.

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8. Replacing the ST24 PCU PCB:

8.1. Tools.





- #1 Phillips Screwdriver
- 7/16" Wrench/Spanner
- Loctite 248

8.2. Procedure.

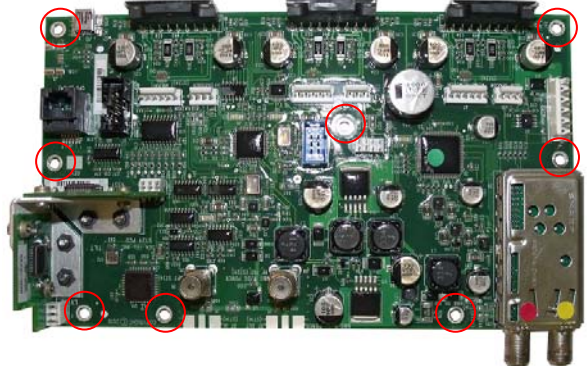



Procedure for replacing the ST24 Main PCU PCB, Sea Tel kit part number: 135913 (ST24 PCU PCB part number: 132362-1).

<p>*Caution: Power down the pedestal before following this procedure.</p> <p>1. Remove the four screws securing the PCU PCB cover using a #1 Phillips screwdriver. Save the hardware for future use.</p>	
<p>2. Disconnect the RF coax cables from the DVB receiver using a 7/16" wrench.</p>	
<p>3. Now disconnect the communications cable from the main PCU PCB using a 7/16" wrench.</p>	

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<p>4. Remove the GPS antennas RJ-45 connector from the PCU PCB.</p>	
<p>5. Disconnect the azimuth elevation and pol motor and encoder IDC connectors from the PCU PCB.</p>	
<p>6. Remove the six screws securing the PCU PCB's heat sinks to the back of the yoke using a #1 Phillips screwdriver. Save the hardware for future use.</p>	
<p>7. Remove the 8 screws securing the PCU PCB to the yoke, save the hardware for future use.</p> <p>*Note: The orientation of the screws is shown below.</p>	

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<p>8. The 8 mounting points of the PCU PCB.</p>	
<p>9. Install the replacement PCU PCB using the hardware removed in the previous step applying Loctite 248 to the threads.</p>	
<p>10. Reinstall the six screws removed in step 6 to secure the heat sinks to the yoke.</p>	
<p>11. Connect the azimuth, elevation and pol motor and encoder IDC connectors to the PCU PCB.</p>	

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12. Reconnect the communication coax cable to the PCU PCB.

***Note:** The communications connector is the one in the center of the PCU PCB.



13. Reconnect the RF coax cables to the DVB tuner, with the yellow cable on the right & the yellow on the left. Angle the cables as shown in the image on the right.



14. Apply Loctite 248 to the hardware removed in step 1 and reinstall the PCU PCB cover to the yoke.

