Field Service Spares Replacement Procedure – AZ Encoder Kit, XX97, XX97A & XX00

Approval:

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Revision History

Rev.	ECO	Description of Change	Date
X1	8878	Initial release	08-18-2011
A	9059	Clerical revisions	10-30-2011

1. Brief Summary:

Troubleshooting document for diagnosing a fault with and replacing the azimuth encoder on the XX97, XX97A and XX00 series antennas.

2. Checklist:

- Verify Initialization
- Pedestal Error
- Verify Encoder Feedback

3. Theory of Operation:

The azimuth encoder is used during stabilization, satellite targeting and signal tracking decisions requiring drive in azimuth.

A high output digital encoder is positioned on the azimuth axis to provide the relative position (relative to the bow of the vessel) into the PCUs azimuth control loop. During initialization the relative position will be calibrated when the switch comes into contact with the home flag and is then calibrated every time the system completes a clockwise revolution. The PCU receives relative drive commands from changes in heading which are fed into the DAC from the vessels gyro compass as well as drive commands from the azimuth rate sensor.

4. Verify Initialization:

- Power cycle the pedestal
    1. Level cage drives to its end stop, then backs off exactly 45 degrees
    2. Elevation axis drives to 45 degrees based on the level cages horizon reference
    3. Cross level axis drives to level based on the level cages horizon reference
    4. Unlimited azimuth axis drives clockwise until the home flag & switch make contact

If any of these steps fail, or the DAC reports model "xx97" the PCUs No parameter needs calibrating & verifying that it saves correctly. A drive issue or pedestal error requires further troubleshooting.

5. Pedestal Error (Error 8):

5.1. Decoding a Pedestal Error.

When the DAC displays a pedestal error enter into the remote command window & input "Soooo" then press enter twice. The error code will now be displayed in the Remote Monitor screen. Decode the 4th character of the error code from the below table…

@	None	**K**	Ref + LV + CL	**V**	Stab Limit + AZ + LV
A	CL	**L**	Ref + AZ	**W**	Stab Limit + AZ + LV + CL
B	LV	**M**	Ref + AZ + CL	**X**	Stab Limit + Ref
C	CL + LV	**N**	Ref + AZ + LV	**Y**	Stab Limit + Ref + CL
D	AZ	**O**	Ref + AZ + LV + CL	**Z**	Stab Limit + Ref + LV
E	AZ + CL	**P**	Stab Limit	**[**	Stab Limit + Ref + LV + CL
F	AZ + LV	**Q**	Stab Limit + CL	****	Stab Limit + Ref + AZ
G	AZ + LV + CL	**R**	Stab Limit + LV	**]**	Stab Limit + Ref + AZ + CL
H	Ref	**S**	Stab Limit + CL + LV	**^**	Stab Limit + Ref + AZ + LV
I	Ref + CL	**T**	Stab Limit + AZ	**_**	Stab Limit + Ref + AZ + LV + CL
J	Ref + LV	**U**	Stab Limit + AZ + CL		

5.2. Error Types.

The 3 types of pedestal error are….

1. **Servo Limit (CL, LV & AZ**) **–** A servo limit error means the PCU motherboard is issuing the command to the motor driver PCB/servo amp to drive the relevant axis harder than it should under normal operation (the servo limit has been reached). This could be whilst the antenna is trying to maintain its pointing angle, or whilst the antenna is driving the axis to a target position.
2. **Stability Limit –** A stability limit error means the antenna has mispointed from its desired target position by more than half a degree. When a stability limit error is flagged on a VSAT antenna the DAC will send the TX Mute command to inhibit the transmit function of the satellite modem (It's common to see the servo limit & stability limit errors together).
3. **AZ Reference Error –** An azimuth reference error means there is a corrupt reading in the antennas relative scale. This could be caused by the system completing a 360 degree rotation without the switch coming into contact with the home flag, the switch coming into contact with the home flag to early, or a physical problem such as the chain slipping on the motor pulley or the pulley slipping on the motor shaft.

5.3. Troubleshooting Pedestal Errors – Azimuth Reference Error.

1. Reinitialize the system and verify the switch comes into contact with the home flag as the system drives in azimuth. If not verify if the switch is present.
2. Drive the azimuth axis in 90 degree increments and verify that the antenna points correctly and that the DAC displays the correct relative position. Also; verify that there is no physical restriction on the azimuth axis such as the chain slipping on the motor pulley, or the pulley slipping on the motor shaft

6. Verify Encoder Feedback:

During initialization the switch & home flag will come into contact (typically when the antenna is facing the bow of the ship) at which point the relative position will be calibrated. Changes in relative should be equal to the amount of drive from the pedestal. Drive the azimuth axis of the antenna in 90 degree increments & verify that the pedestal & relative position on the DAC move the correct amount.

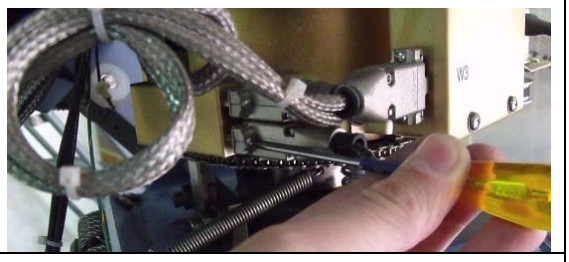
7. Replacing the Azimuth Encoder:

7.1. Tools.

- 2mm Flat Blade (Terminal) Screwdriver
- #1 Phillips Screwdriver
- 5/64" Allen Wrench / Key
- Heat Gun
- Loctite 222, 242 and 638

7.2. Procedure.

Procedure for replacing the azimuth encoder on the XX97, XX97A and XX00 series pedestals, Sea Tel kit part number: 134941 (encoder part number: 116053).

***CAUTION:** Power down the pedestal before following this procedure. 1. Using a 2mm flat blade screwdriver disconnect the encoder harness from the home switch assembly.	
2. Remove the screw and P-clip securing the encoder harness to the servo amplifier using a #1 Phillips screwdriver. Take care not to lose the standoff in between the servo amp and mounting bracket.	

3. Remove the 3 screws securing the encoder mounting bracket to the side of the azimuth motor bracket using a #1 Phillips screwdriver.	
4. Disengage the pulley from the belt and remove the encoder assembly.	
5. Remove the set screws from the encoder pulley using a 5/64" Allen wrench. Note the position the pulley is installed in and apply heat to the pulley and remove it from the defective encoder. 6. Take the mounting bracket and plate from the defective motor and install them on the replacement encoder, with the harness exiting away from the bracket (as shown on the right). 7. Install the pulley to the replacement encoder, apply Loctite 638 to the shaft and secure the set screw with Loctite 222. ***Note:*** For further information refer to the Loctite Procedure 121730 provided with this kit.	
8. Apply Loctite 242 to the 4 screws securing the encoder to main bracket and install them loosely.	

9. Slip the encoder assembly into the belt, making sure it's engaged with the azimuth motor pulley. 10. Apply Loctite 242 to the three mounting screws and reinstall the encoder assembly to the side of the azimuth motor bracket.	
11. Pull the encoder away from the azimuth motor to tension the belt and tighten the four screws. Verify the tension of the belt and repeat this procedure if necessary.	
12. Apply Loctite 242 to the mounting screws and reinstall the P-clip, securing the encoder harness to the servo amplifier.	
13. Reinstall the encoder D-sub connector to the home switch assembly. ***Note:*** The encoder will automatically calibrate itself upon initialization when the home switch is engaged; therefore no physical calibration of the encoder is required.