Field Service Spares Replacement Procedure – Pol Motor Kit, XX97, XX97A, XX97B, XX00 & XX00B

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

Field Service Procedure - Pol Motor Kit, XX97, XX97A, XX97B, XX00 & XX00B

1. Brief Summary:

Troubleshooting document for diagnosing a fault with and replacing the pol motor on the XX97, XX97A, XX97B, XX00 and XX00B Series TVRO and VSAT antennas.

2. Checklist:

- Verify Range of Motion
- Verify Pot Range
- Measure Motor Voltage
- Verify Harness

3. Theory of Operation:

The antennas feed assembly is driven through its 180 degree range of motion by a 24VDC stepper motor for the correct orientation of the linear signal. Based on the vessels GPS position and the look angle to the desired satellite the DAC will calculate the numerical value for the position of the pol assembly, the PCU will then send the command to the POL Aux relay to issue voltage to drive the pol motor until the pol pot outputs the correct value at which point the feed will be aligned to the polarity of the satellite signal (provided s been calibrated correctly). Then as the vessel sails and the GPS position changes the look angle to the satellite will also change and adjustments will be made to maintain good cross pol isolation (alignment to the satellites linear signal).

An indication that there is a fault with the feed alignment of the system is the target light will be permanently illuminated on the DAC and the antenna won't target correctly, sitting 8 degrees above (or 8 degrees below at high elevation look angles) the satellites elevation look angle. As part of the antennas targeting procedure the system will target above (or below) the satellite, calculate the auto threshold setting based on the noise floor level and then align the feed for the correct reception position based on the vessels GPS position and the lookup table in the DAC before targeting the satellite.

If the system is unable to drive the pol motor so the correct feedback is received from the pot or the pot has failed and won't give the correct feedback the system can't complete the targeting process and the antenna will stay in this position. Setting the pol type to "0009" will make the antenna target by removing the auto pol function from the targeting process; however the miss alignment of the feed will cause bad cross pol isolation.

4. Verify Range of Motion:

Firstly verify the settings in the DAC are correct, the pol scale should be set to "0090" to give the feed 180 degrees of motion and the pol offset setting is "0030", however this may have been modified slightly to "trim" the pol angle.

Set the pol type setting in the setup menu of the DAC to "0009" to change the mode of the pol assembly from automatic (pol type "0072") to manual. This removes the automatic calculation based on the vessels GPS position and allows the feed assembly to be manually driven for diagnostic purposes. Now enter the pol window and drive the pol assembly down into its end stop, observe the position of the feed. Now drive the pol assembly up, the feed should move 180 degrees under normal operation.

5. Verify Pot Range:

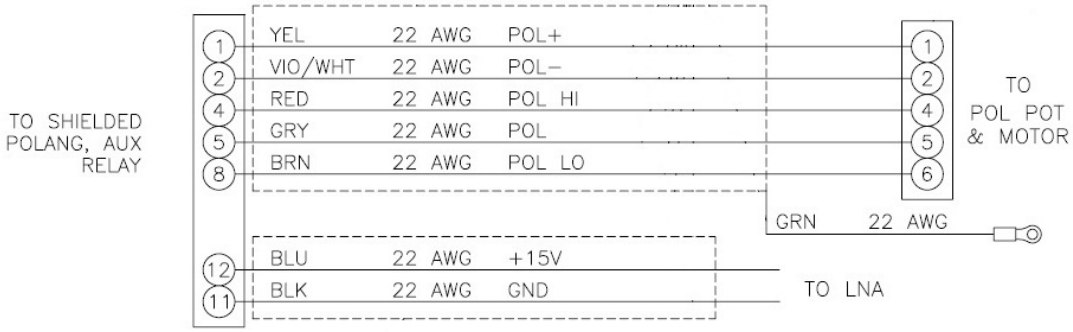
If no feed drive is present verify the pol reading on the DAC isn't out of range (i.e. displaying a value of either 0 or 255). If one of these values are displayed its possible the pot isn't aligned correctly and that adjusting it may bring it back within its range. Back the pot off from the main gear sprocket and rotate its pulley verifying if the feedback changes on the DAC once the pot has been realigned. If so calibrate the pol pot and verify operation as described in the later stages of this document.

If the pol count on the DAC doesn't change when the pot is adjusted the pot has failed and is outputting a default value, no drive will be issued to the pol motor as the value is out of the range which the system operates in. Then the pol pot must be changed.

6. Measure Motor Voltage:

Leaving the pol type in manual mode, apply drive to the feed assembly & measure the voltage to the motor on the IDC connector, 24VDC should be present. If voltage is present but the motor isn't driving the motor is defective & need replacing.

If no voltage is present verify the connections of the reflector harness by measuring pin to pin as per the below diagram.



If the harness connections are good, then the pol aux relay isn't outputting the voltage to drive the motor & needs replacing.

As long as the pol range is within the pot limits the DAC will issue the pol drive command to the PCU motherboard based on the antenna targeting, a change in the vessels GPS position or operator inputs.

The PCU motherboard will then issue the command to switch the pol aux relay to drive the pol motor, the motor will then drive the feed until the correct output from the pot has been received, at which point the feed will be in the correct reception position (providing the system is functioning & calibrated correctly). Therefore there is also the possibility for a pol drive fault to be caused by the PCU motherboard.

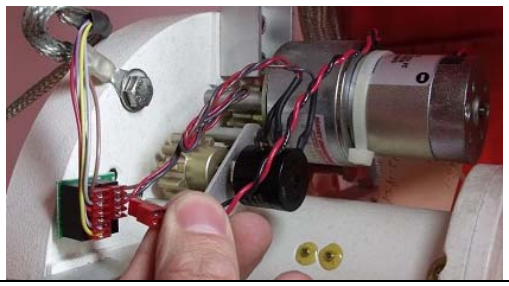
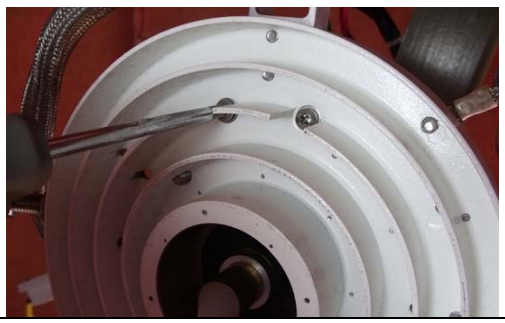
7. Replacing the 24VDC Polang Motor:

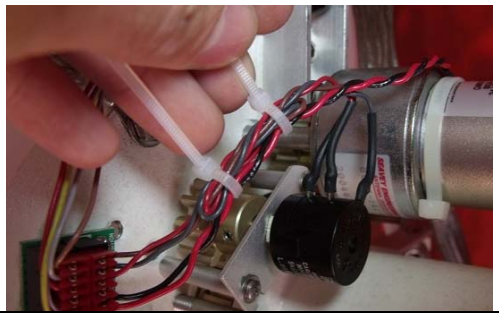
7.1. Tools.

- Snips/Cutters
- #2 Phillips Screwdriver
- 5/64" Allen Wrench/Key
- Loctite 222, 242 and 638

7.2. Procedure.

Procedure for replacing the polang motor on the XX97, XX97A, XX97B, XX00 and XX00B TVRO and VSAT antennas, Sea Tel kit part number: 134925 (motor part number: 121880-1).

***CAUTION:** Power down the pedestal before following this procedure. 1. Remove the cable ties securing the pol motor harness.	
2. Disconnect the pol motor IDC connector from the termination block.	
3. Using a #2 Phillips screw driver undo the two screws securing the pol motor to the feed and remove the motor. Take care not to lose the installing hardware.	

4. Apply Loctite 638 to the shaft and install the pulley on the replacement pol motor. 5. Apply Loctite 222 to the set screw and secure the pulley to the motor shaft using a 5/64" Allen wrench, make sure the set screw is against the flat edge of the shaft to prevent play on the motor. ***Note:** For further information refer to the Loctite Procedure 121730 provided with this kit. 2 pulleys are included in the pol motor kit, 24T for VSAT systems and 12T for TVRO.	
6. Install the replacement pol motor to the feed applying Loctite 242 to the threads.	
7. Secure the excess harness witch cable ties and reconnect the IDC connector. 8. Follow the below procedure to verify the pol pot is correctly calibrated.	

8. Pol Pot Alignment and Verification – TVRO:

1. Drive the reflector to zero degrees of elevation to view the orientation of the LNB:

   Press the TRACK button to turn the tracking function off (if applicable) to prevent the antenna from going into a search. Push the NEXT button until the 'Antenna' window is displayed (the screen will show the AZ, EL and REL values). Press the ENTER button twice to isolate the 'EL' window and then press the ◄ arrow to activate it (a cursor will be displayed). Now use the ◄ and ► arrow keys to scroll the cursor along and use the ▲ and ▼ arrow keys to change the elevation value to "00.0" and press the ENTER button.

2. Set the Pol Type to manual mode:

   Enter the 'Setup Menu' by pressing and holding the ◄ ► arrow keys together until the 'EL Trim' or 'Auto Trim' window is displayed. Push the ▼ arrow key until the 'Polang Type' window is displayed. Press the ◄ arrow key to activate the window. Now use the ◄ and ► arrow keys to scroll the cursor along and use the ▲ and ▼ arrow keys to change the characters. Set the 'Polang Type' to "0009" which is manual mode and press the ENTER button.

3. Press the ENTER button to go to the pol offset window and verify the default setting is "0030". (If necessary use arrow keys to select appropriate digits and change accordingly).

4. Now keep pressing the NEXT button until the 'Antenna' window is displayed (the screen will show the AZ, EL and REL values).

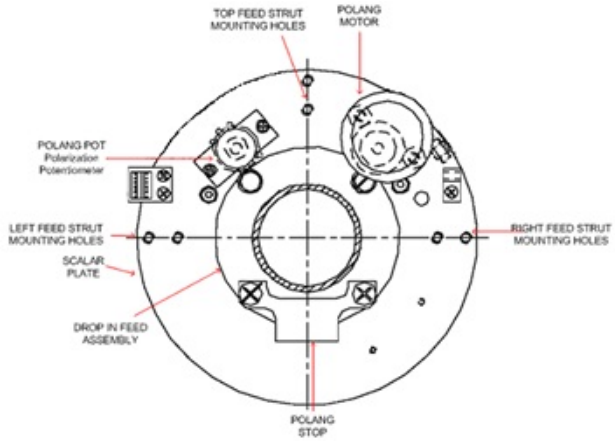
5. Press the ENTER button 4 times until 'POL xxx' is displayed and then press the ◄ arrow key to activate the window.

6. Now hold either the ▲ or ▼ arrow key to drive the pol until a count of "120" is displayed.

   Note: It's advisable to have someone watching the feed while it's being driven as if the pot isn't correctly calibrated there is the possibility to damage the assembly if the polang plate is allowed to drive into the end stop.

7. Observe the physical alignment of the polang plate:

   The polang stop should be facing downwards as shown below. If not continue on to step 8, otherwise skip ahead to step 12.



(***Steps 8-12 requires assistance to observe and operate antenna simultaneously***)

8. Using the DAC-2202 drive the polang plate to horizontal:

   Press the ▶ arrow key to activate the cursor on the pol window. Now hold either the ▲ or ▼ arrow key to drive the polang motor until the polang stop is facing downwards. Now press the ENTER button to de-activate the window.

9. Locate the polang potentiometer on the feed and loosen the screw that secures the slotted mounting plate (fig. 1.1) with a #1 Phillips screwdriver and then carefully move the pol pot gear out of alignment with the main sprocket (fig. 1.2).

(Fig 1.1)

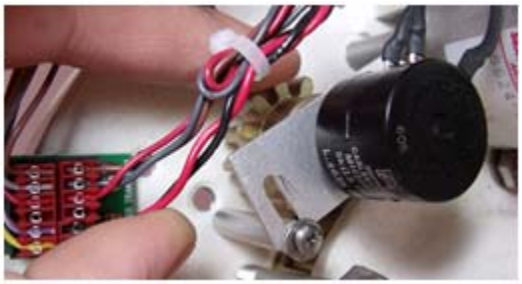
(Fig 1.2)

10. Align the potentiometer:

    On the DAC verify the cursor is not displayed on the pol window, if it is press the ENTER button (Fig 1.3) (failure to do this will result in display not changing). Now rotate the pot manually until a count of 120 is achieved (Fig 1.4) once calibrated reinstall the pot on the main sprocket.

    Note: When re-installing the pot onto the main sprocket its common for the reading to change as the teeth of the sprockets are engaged. Because of this the tolerance is +/- 2 degrees so 118-122 counts.

(Fig 1.3)



(Fig 1.4)

11. Drive the pol motor to its upper and lower electrical limits and verify the assembly drives in the correct direction and that the feed assembly has 180 degrees of rotation:

    On the DAC press the ▶ arrow key to display cursor underneath the pol value and then press and hold the ▲ arrow key to drive the feed to its upper end stop. Verify the assembly drives 90 degrees so the polang stop is horizontal and facing to the right (the pol reading should be approximately 211 counts). Now press and hold the ▼ arrow key to drive the feed to its lower end stop and verify the polang stop is horizontal and facing to the left (the pol count should be approximately 28 counts).

12. Set the Pol Type to Automatic (auto pol):

    Press and hold the ◀ ▶ arrow keys together until the 'EL Trim' or 'Auto Trim' window is displayed. Push the ▼ arrow key to scroll through the settings until the 'POL Type' window is displayed and press the ◀ arrow key to activate the window. Now use the ◀ and ▶ arrow keys to scroll the cursor along and use the ▲ and ▼ arrow keys to change the value from "0009" to "0072" and then press the ENTER button to put the system back into automatic polang (auto pol) mode.

    Watch the LNB and verify it returns to the correct reception position (while the POL motor is driving the target light will be illuminated on the DAC).

13. Save the settings in the DAC-2202:

    Press and hold the ◀ ▶ arrow keys together briefly, "Save New Parameters" will be displayed. Press the ▶ arrow key to activate the window and then press the ENTER button, "Parameters Saved" will be displayed and the pol type and pol offset will be stored in the DAC.

9. Pol Pot Alignment and Verification - VSAT:

1. Drive the reflector to zero degrees of elevation to view the orientation of the LNB:

   Press the TRACK button to turn the tracking function off (if applicable) to prevent the antenna from going into a search. Push the NEXT button until the 'Antenna' window is displayed (the screen will show the AZ, EL and REL values). Press the ENTER button twice to isolate the 'EL' window and then press the ◄ arrow to activate it (a cursor will be displayed). Now use the ◄ and ► arrow keys to scroll the cursor along and use the ▲ and ▼ arrow keys to change the elevation value to "00.0" and press the ENTER button. Set the Pol Type to manual mode:

   Enter the 'Setup Menu' by pressing and holding the ◄ ► arrow keys together until the 'EL Trim' or 'Auto Trim' window is displayed. Push the ▼ arrow key until the 'Polang Type' window is displayed. Press the ◄ arrow key to activate the window. Now use the ◄ and ► arrow keys to scroll the cursor along and use the ▲ and ▼ arrow keys to change the characters. Set the 'Polang Type' to "0009" which is manual mode and press the ENTER button.

2. Press the ENTER button to go to the 'Pol Offset' window and verify the default setting is "0030". (If necessary use arrow keys to select appropriate digits and change accordingly).

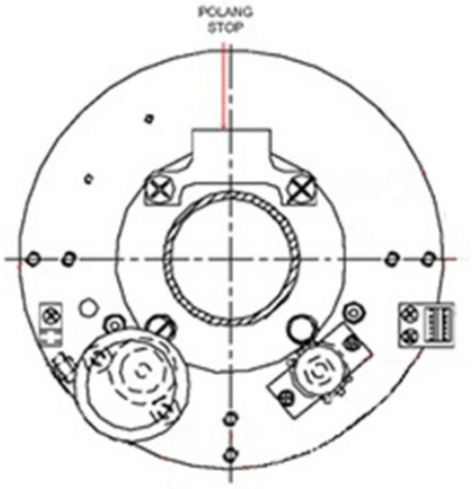
3. Now keep pressing the NEXT button until the 'Antenna' window is displayed (the screen will show the AZ, EL and REL values).

4. Press the ENTER button 4 times until 'Pol xxx' is displayed and then press the ◄ arrow key to activate the window.

5. Now hold either the ▲ or ▼ arrow key to drive the pol until a count of "120" is displayed.

   Note: It's advisable to have someone watching the feed while it's being driven as if the pot isn't correctly calibrated there is the possibility to damage the assembly if the polang plate is allowed to drive into the end stop.

6. Observe the physical alignment of the polang plate:
   The polang stop should be facing upwards as shown below. If not continue on to step 8, otherwise skip ahead to step 12.



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   On the DAC verify the cursor is not displayed on the pol window, if it is press the ENTER button (Fig 1.3) (failure to do this will result in display not changing). Now rotate the pot manually until a count of 120 is achieved (Fig 1.4) once calibrated reinstall the pot on the main sprocket

   ***Note:** When re-installing the pot onto the main sprocket its common for the reading to change as the teeth of the sprockets are engaged. Because of this the tolerance is +/- 2 degrees so 118-122 counts.

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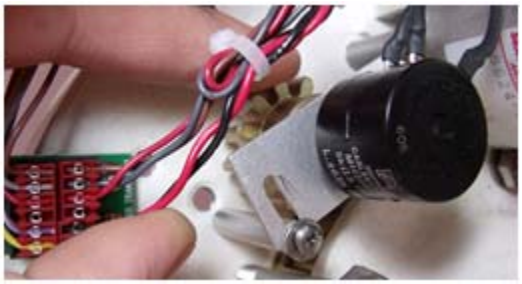

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    On the DAC press the ◄ arrow key to display cursor underneath the pol value and then press and hold the ▲ arrow key to drive the feed to its upper end stop. Verify the assembly drives 90 degrees so the polang stop is horizontal and facing to the left (the pol reading should be approximately 211 counts). Now press and hold the ▼ arrow key to drive the feed to its lower end stop and verify the polang stop is horizontal and facing to the right (the pol count should be approximately 28 counts).

11. Set the Pol Type to Automatic (auto pol):

    Press and hold the ◄ ► arrow keys together until the 'EL Trim' or 'Auto Trim' window is displayed. Push the ▼ arrow key to scroll through the settings until the 'Pol Type' window is displayed and press the ◄ arrow key to activate the window. Now use the ◄ and ► arrow keys to scroll the cursor along and use the ▲ and ▼ arrow keys to change the value from "0009" to "0072" and then press the ENTER button to put the system back into automatic polang (auto pol) mode.

    Watch the LNB and verify it returns to the correct reception position (while the POL motor is driving the target light will be illuminated on the DAC).

    ***Note:** If making adjustments to the polarization alignment of a VSAT antenna contacting the NOC to run through a cross-pol isolation test and calibrating the Pol Offset will be necessary.

12. Save the settings in the DAC-2202:

    Press and hold the ◄ ► arrow keys together briefly, "Save New Parameters" will be displayed. Press the ► arrow key to activate the window and then press the ENTER button, "Parameters Saved" will be displayed and the pol type and pol offset will be stored in the DAC.