
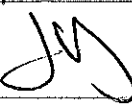
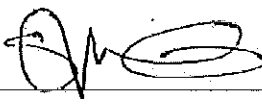


Field Service Spares Replacement Procedure – Pol Motor Kit, 4012

Approval:

| Approving Authority | Signature | Date |
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Revision History

| Rev. | ECO | Description of Change | Date |
|------|------|-----------------------|------------|
| A | 9487 | Initial release | 05-15-2012 |
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Field Service Procedure – Replacement Pol Motor Kit, 4012

1. Brief Summary:

Troubleshooting document for diagnosing a fault with and replacing the pol motor on the 4012 antenna.

2. Checklist:

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

3. Theory of Operation:

To ensure the LNB is correctly aligned to the linear polarized receive signal the antennas feed assembly can be driven through a 270 degree range of motion by a 24VDC motor. Based on the vessels GPS position and the look angle to the desired satellite the system will calculate the numerical value for the position of the pol assembly. The ICU will then send the voltage to drive the pol motor until the pol pot outputs the correct value, at which point the feed will be aligned to the incoming satellite signal (provided the pot has 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).

One indication that there is a fault with the feed alignment of the system is that the target light will be permanently illuminated on the MXP and the antenna won't target correctly. If this is the case it will sit 8 degrees above or 8 degrees below of the elevation look angle. This is because part of the antennas targeting procedure is to target the system above or below the satellite, to calculate the auto threshold setting based on the noise floor level, then it will align the feed for the correct reception position based on the vessels GPS position before targeting the satellite.

If the system is unable to drive the pol motor or the pol pot has failed, the correct feedback signal is not obtained, the system can't complete the targeting process and the antenna will stay in this position. Setting the pol type manual mode will allow the antenna to target correctly, misalignment of the feed will cause bad cross pol isolation.

4. Verify the Feed Assemblies Range of Motion:

To verify if the 4012 antennas polarity function is calibrated correctly refer to section 3 of this document.

Once verified that the pot is calibrated the next step will be to verify that the system has the full range of motion (135 degrees of physical rotation), verifying that the pol pot is outputting the correct resistance through its range and also that the pol motor is driving the assembly correctly.

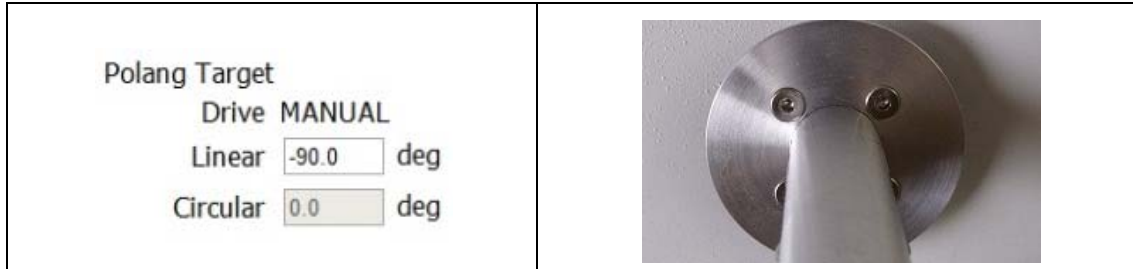
1. To verify the range of motion on the feed assembly enter into the "Reflector" screen under the configuration options and set the polang drive mode to manual and click the save button.

Polang
Drive Auto Manual
Linear Offset deg
Circular Offset deg

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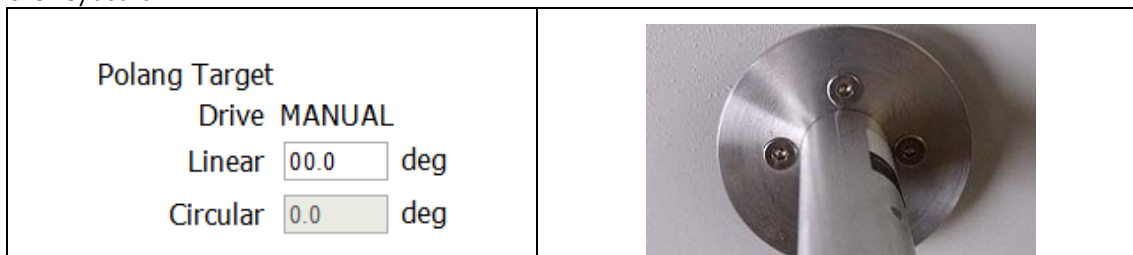
This will now give you the ability to manually drive the pol as opposed to the feed automatically aligning itself based on the vessels GPS location and the look angle to the desired satellite.

2. Now enter into the "Position Antenna" screen from the tools menu and enter the value "-90.0" into the linear window of the polang target option and press the enter key on the keyboard.



The feed horn should rotate 45.0 degrees clockwise (when viewed from the front of the reflector) so that the alignment marks of the phase card in the feed horn are aligned vertically, from left to right (as shown above).

3. Now enter into the value "00.0" into the linear window of the polang target option and press the enter key on the keyboard.



The feed horn should rotate 45.0 degrees counter-clockwise (when viewed from the front of the reflector) so that the alignment marks of the phase card in the feed horn are aligned diagonally in a north/east position (as shown above).

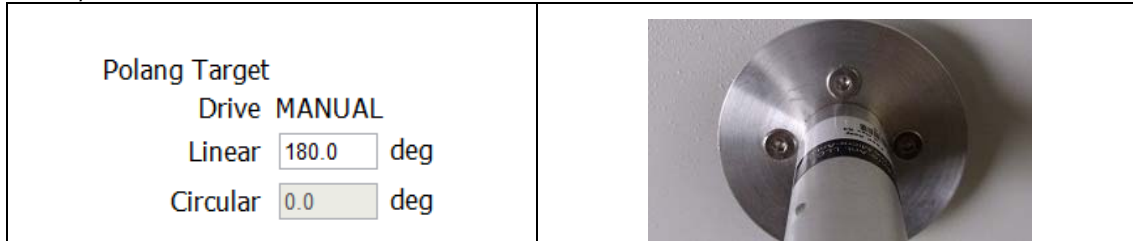
4. Now enter into the value "90.0" into the linear window of the polang target option and press the enter key on the keyboard.



The feed horn should rotate 45.0 degrees clockwise (when viewed from the front of the reflector) so that the alignment marks of the phase card in the feed horn are aligned horizontally, from top to bottom (as shown above).

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- Now enter into the value "180.0" into the linear window of the polang target option and press the enter key on the keyboard.



The feed horn should rotate 90.0 degrees clockwise (when viewed from the front of the reflector) so that the alignment marks of the phase card in the feed horn are aligned diagonally, in a north/west position (as shown above).

- If the system completes all of the above tests than the polang assembly is operating correctly.
Set the antenna back into automatic polang mode by entering into the "Reflector" screen under the configuration options and set the polang drive mode to "Automatic" and click the save button.



The antenna will now automatically calculate the correct reception position for the feed based on the vessels GPS location and the look angle to the desired satellite.

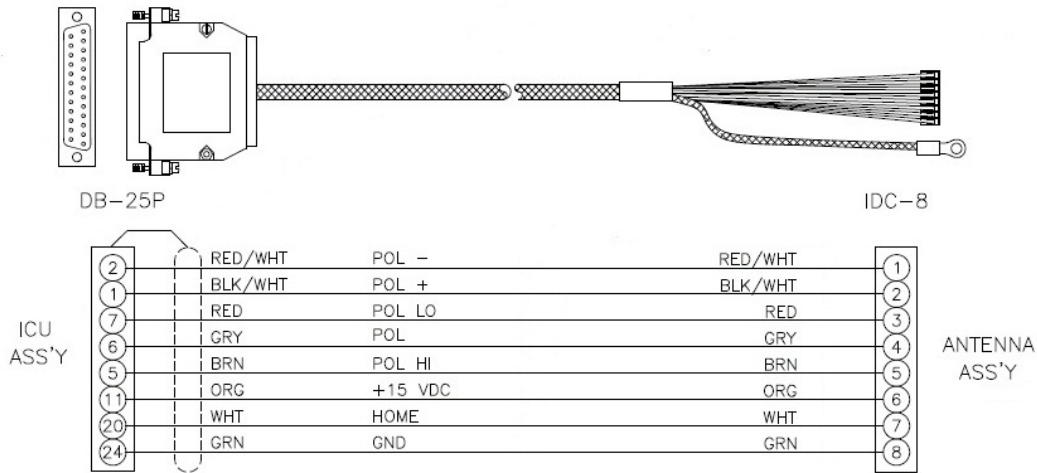
Should the feed assembly drive, but not target the correct position this is an indication that the pol pot is not calculating the feedback correctly and its resistance should be verified as per the verify resistance of the pot section of this document.

No drive at all indicates a failure with the 24DC polang motor as per the measure motor voltage section of this document.

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5. Measure Motor Voltage:

Leaving the polang setting in manual mode apply drive to the feed assembly and 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 and needs 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 ICU main PCB isn't outputting the voltage to drive the motor and needs replacing. As long as the pol range is within the pot limits the ICU will issue the voltage to drive the motor based on the antenna targeting, a change in the vessels GPS position or operator inputs. 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 and calibrated correctly). Therefore there is also the possibility for a pol drive fault to be caused by the ICU main PCB.

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6. Replacing the 4012 Pol Motor Assembly:

6.1. Tools.


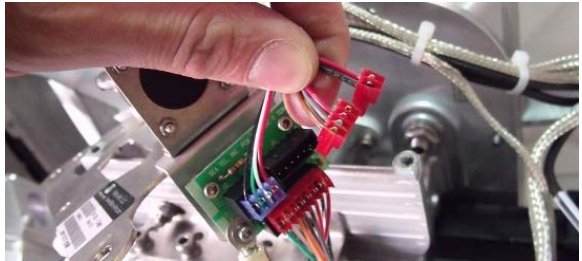

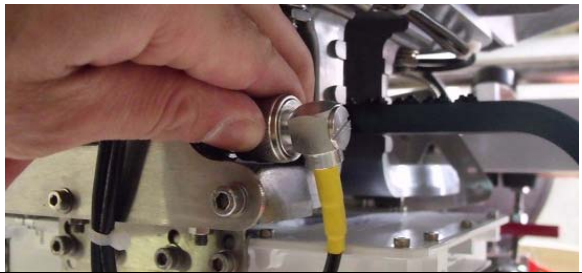

- 2.5mm Allen Wrench/Key
- 4mm Allen wrench/Key
- Snips/Cutters
- 17mm Wrench/Spanner
- 3mm Allen Wrench/Key
- 2mm Flat Blade (Terminal) Screwdriver
- Cable Ties/Tie Wraps
- Loctite 242

6.2. Procedure.



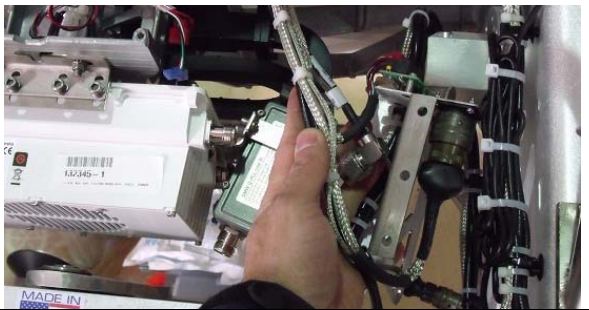
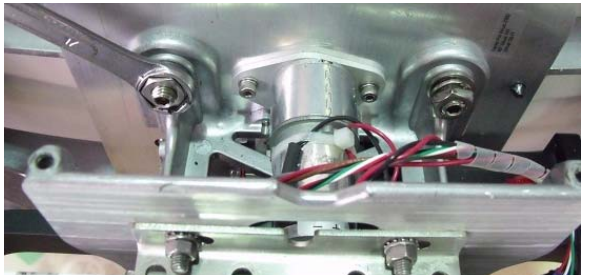

Procedure for replacing the pol motor, Sea Tel kit part number: 136742 (pol pot part number: 134870-3).

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| <p>*Caution: Power down the pedestal before following this procedure.</p> <p>1. Using a 2.5mm Allen wrench remove the four screws securing the feed horn to the front of the reflector and remove the feed horn. Save the hardware for futures use.</p> |  |
| <p>2. Disconnect the military spec connector from its socket to allow access to the screws to remove the upper bracket.</p> |  |
| <p>3. Remove the 5 screws which securing the mounting plate with the cannon connection and IDC connection PCB to the RF cage. Retain the hardware for future use.</p> <p>*Note: The mounting plate will remain attached to the harness while the RF cage is removed from the rear of the reflector.</p> |  |

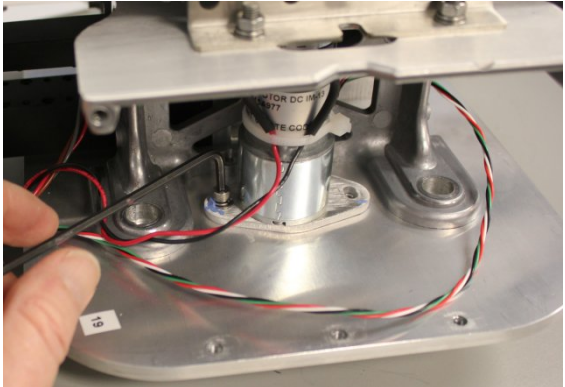

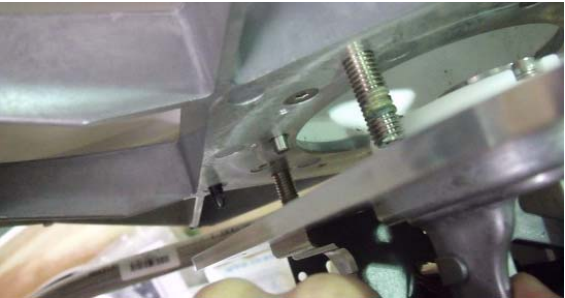

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| <p>4. Snip the cable tie securing the RF cage harness to the mounting plate.</p> |  |
| <p>5. Disconnect the pol pot, pol motor and optical switch IDC connections from the termination block.</p> |  |
| <p>6. Disconnect the orange coax cable from the X-Pol LNB.</p> |  |
| <p>7. Disconnect the yellow coax cable from the Co-Pol LNB, mounted on the underside of the RF cage.</p> |  |
| <p>8. Snip the cable tie securing the receive coax cables to the RF cage.</p> |  |




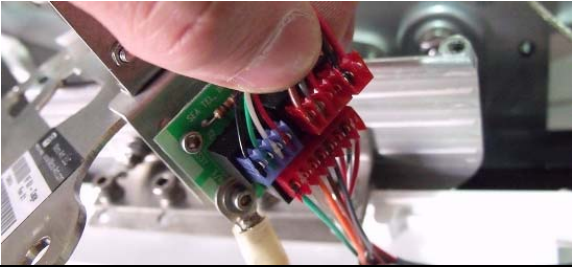

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| <p>9. Disconnect the DC power connection from the BUC (also mounted on the underside of the RF cage).</p> |  |
| <p>10. Disconnect the TX IF coax cable from the BUC.</p> |  |
| <p>11. Unwind the harness from around the RF cage and set it over the cross level beam to allow removal of the RF cage from the rear of the reflector.</p> |  |
| <p>12. Using a 17mm wrench remove the four mounting nuts and washers securing the RF cage from the back of the reflector. Save the hardware for future use.</p> <p>13. Support the weight of the RF cage while removing it from the rear of the reflector.</p> |  |
| <p>14. Remove the cable wrap to free the pol motor harness so the assembly can be removed</p> |  |

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| <p>15. Use a 3mm Allen wrench to remove the 2 screws that mount the polarity motor bracket to the RF cage bottom plate. Retain this hardware for future use.</p> <p>16. Pull the defective motor forward and tip the it towards you to remove the polarity motor assembly.</p> <p>17. Install the replacement motor in the same manner and applying Loctite 242 to the threads. Do not tighten the screws at this time.</p> |  |
| <p>18. Flip the RF cage over to expose the feed/motor/pot gears.</p> <p>19. Use a small flat blade screwdriver to hold the bottom half of the backlash gear steady while rotating the top half CW one tooth (against the spring action) and push the motor assembly forward to mate into the driven gear in the feed.</p> <p>20. Once engaged tighten the screws securing the pol motor to the bottom plate of the RF cage.</p> <p>*Note: Calibration of the pol pot is not required when replacing the motor.</p> |  |
| <p>21. Locate the RF cage onto the rear of the reflector.</p> <p>*Note: When reinstalling the RF cage ensure that it is oriented correctly so that the alignment pin on the left side of the reflector will locate into the hole on the back of the RF cage. (In this orientation the X-Pol LNB will be on the right of the RF cage).</p> |  |
| <p>22. Using the hardware removed in step 12 secure the RF cage to the rear of the reflector using a 17mm wrench. Apply Loctite 242 to the threads.</p> |  |

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| <p>23. Route the harness assembly back over the RF cage and connect the following connections:</p> <p>24. Connect the orange coax cable to the X-Pol LNB (on the right of the BUC).</p> <p>25. Connect the yellow coax cable to the Co-Pol LNB (underneath the BUC).</p> <p>26. Connect the black, TX IF cable to the BUC.</p> |  |
| <p>27. Secure the coax cables to the underside of the RF cage using cable ties.</p> |  |
| <p>28. Route the BUC DC power cable around between X-Pol LNB and the RF cage and connect it to the BUC.</p> |  |
| <p>29. Sit the upper bracket on top of the RF cage and reconnect the IDC connectors with the 4-pin sensor connector on the left, the 5-pin pot connector in the center and the 2-pin motor connector on the right (as shown in the image on the right).</p> |  |
| <p>30. Secure the pot, motor and sensor harness to the underside of the upper bracket using a cable tie.</p> |  |

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31. Using the hardware removed in step 3 secure the upper bracket to the RF cage, tightening with a 4mm Allen wrench. Apply Loctite 242 to the threads.



32. Reconnect the military spec connector to its mounting bracket.



33. Reinstall the feed horn using the hardware removed in step 1, tighten with a 2.5mm Allen wrench. Apply Loctite 242 to the threads.

***Note:** The feed horn has alignment pins located in it so it can only be installed with the phase card in the correct orientation. Verify these are in the correct position when installing.

