Field Service Spares Replacement Procedure – Receive Path Troubleshooting

Approval:

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Revision History

Rev.	ECO	Description of Change	Date
A	8797	Initial release	08-11-2011
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1. Brief Summary:

Troubleshooting document for diagnosing a fault with the receive path of an installation.

2. Checklist:

- Switch LNB Bands
- Connection Issue
- LNB Power
- Bands Switching Correctly

3. Theory of Operation:

The LNB converts the satellites RF signal (C/Ku-Band) into IF (L-Band) so it can be passed down a coaxial cable into the DAC for tracking purposes.

The L-Band satellite signal is passed from the LNB down through a coaxial cable which runs through the pedestal, the vessel and is then fed into the tracking receiver inside the DAC. If using a DVB (Digital Video Broadcasting) receiver and tracking a carrier which provides a NID (Network Identity code), the receiver will decode the NID for positive satellite identification. SCPC (Single Channel Per Carrier) and NBIF (Narrow Band IF) receivers do not support the NID function and will display this value as "1234 or ABCD" by default. The DC voltage level from the receiver is then passed to the DAC motherboard where it's converted into the numerical AGC (Average Gain Count) value which is displayed on the screen of the DAC.

4. Troubleshooting:

A failure in the RF path of the system will result in a low AGC value. An AGC of around 200-300 counts is typically an indication that the internal tracking receiver in the DAC has failed, where as a AGC of approximately 700 counts is typically an indication that the tracking receiver is functioning correctly and no signal is being received from the LNB. 700 counts is the amount of noise generated by the tracking receiver, in this instance potential causes could be a bad connection in the RF path, no voltage to the LNB or LNB failure.

If the system uses a multi-band LNB such as the Euro Quad TVRO LNB or Swedish Microwave Quad LO VSAT LNB, the bands can be switched to see if signal returns. It is possible that a single band of the LNB has failed. Switching to a different band could verify this. (If using a quad linear LNB and both horizontal paths are defective this is typically caused by radar damage).

5. RF Path Connections:

If no signal is being received from the LNB then further troubleshooting will need to be undertaken. Verify all the connections throughout the receive line. This can be done by pining out coax cables, bypassing the rotary joint (if applicable) or switching cables in the installation (for verification purposes) from the LNB down to the receiver in the DAC. If troubleshooting a system where the pedestal communications are multiplexed onto the receive path, the connections between the ADE and BDE MUX's will be good, provided the DAC is communicating with the PCU.

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6. LNB Voltage:

The LNB requires DC voltage to operate, on a TVRO system this is typically provided by the multi-switch. On early VSAT systems (4003 and early XX06 etc) the LNB voltage is provided by the tracking receiver in the DAC via the receive path. On later VSAT systems such as the XX06RZA and XX09 the LNB voltage is provided by the ADE MUX/PCU.

With the pedestal energized, 13VDC - 18VDC should be measured on the coax cable entering the LNB. If no voltage is present further troubleshooting needs to be undertaken to diagnose the fault. Possible causes are a damaged cable, incorrect System Type setting or hardware failure. Systems which require voltage from the tracking receiver to power the LNB or switch bands of the multi- switch require "64" to be preset in the System Type parameter. The default value will be 0069 or 0077. Later VSAT systems where the LNB is powered by the above decks modem will have a System Type of 0005 or 0007 as default. Generally the System Type should be 23 if using i-Direct, 7 if using Com Tech and 151 if using Hughes. This is of course dependant on the configuration of the system.

If all connections are good and there is voltage present on the LNB coax then the LNB is defective (provided the DAC is displaying the 700 counts of AGC associated with no signal being received, not the 200-300 counts associated with a faulty tracking receiver).

Note: In some cases the satellite modem can provide the voltage to power the LNB depending on how the system has been configured.

7. Further Diagnostics:

If the signal is low and tracking is unstable, an incorrect band or polarity could be the issue.

Other potential failures which could occur in the RF path of a TVRO antenna is the multi-switch fails and won't select the correct band of the LNB causing no signal to be received, another similar cause is that the DVB receiver outputs fails and won't output a tone and voltage to the multi-switch.

When dealing with VSAT systems, if the tone or voltage supply to the multiband LNB fails, an incorrect band could be selected. A similar issue could be the coax switch not operating properly. This could result in the wrong LNB being selected on an X-Pol/Co-Pol system.

Other potential tracking issues could be caused by incorrect parameters in the DAC such as frequency, baud rate, tone or voltage, incorrect polarity being selected (TX polarity), or bad X-Pol isolation.

A system retargeting every 20 seconds is an indication that there is an incorrect NID value set in the DAC or that the external modem lock function of the system isn't configured correctly.

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8. Replacing the XX04 Series LNB:

8.1. Tools.

- Snips/Cutters
- 7/16" Wrench/Spanner
- 5/64" Allen Wrench/Key
- Loctite 242

8.2. Procedure.

Procedure for replacing the LNB on an XX04 series antenna. The XX04 series antennas can be easily fitted with a variety of LNB assemblies. The feed is capable of receiving linear or circular polarization signals; however the LNB must match the desired satellite polarization mode. Below are the instructions on how to install and align a replacement LNB.

***CAUTION:** Power down the pedestal before following this procedure.

1. Set the pol type to manual pol (0009) and drive the LNB to 120 counts. At this position the LNB should be vertical (with a pol offset of 0030).

2. Cut the tie wrap securing the coax cables to the body of the LNB and using a 7/16" wrench remove the coax connections from the LNB (it's advisable to photograph their order for future reference).

3. Loosen the 3 Allen set screws securing the LNB to the mounting collar using a 5/64" Allen key and extract the LNB.

4. Install the replacement LNB in exactly the same orientation (vertical) and tighten the set screws, applying Loctite 242 to the threads.

5. Reconnect the coax cables, if changing the LNB to another (i.e. circular to liner) the port orientation is as below and should be matched to the connections on the multi-switch…

Dual Circular	Dual Linear	Quad Linear
RHCP (Blue)	Vertical (Blue)	Horz High (Black)
LHCP (White)	Horizontal (White)	Vert High (Green)
		Horz Low (White)
		Vert Low (Blue)

6. If a linear LNB has been replaced with a circular LNB, leave the pol type set as 0009. If a linear LNB was fitted vertically at a pol count of 120, it's aligned correctly (with a pol offset of 30). Set the pol type back to auto pol (0072). The system will now resume normal operation.

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9. Replacing the XX06, XX09 and XX10 Series SWM Quad LNB:

9.1. Tools.

- 7/16" Wrench/Spanner
- 3mm Allen Wrench/Key

9.2. Procedure.

Procedure for replacing the Swedish Microwave quad band LNB on the XX06, XX09 and XX10 series antennas, Sea Tel kit part number: 135365 (LNB part number: 127386-2).

***CAUTION:** Power down the pedestal before following this procedure. 1. Using a 7/16" wrench disconnect the coax cable from the LNB.	
2. Using a 3mm Allen wrench undo the hardware securing the LNB to the waveguide and remove the LNB. Save the hardware for future use.	
3. Ensure the ½ thickness gasket is correctly located in the replacement LNB and install it to the waveguide. 4. Install the replacement LNB making sure the RX port of both the LNB and the waveguide are correctly aligned.	
6. Install the four sets of hardware to secure the LNB to the waveguide. Ensuring that both the lock washer and flat washers are installed on each screw (no need to Loctite). 7. Reinstall the coax cable, tightening with a 7/16" wrench.	

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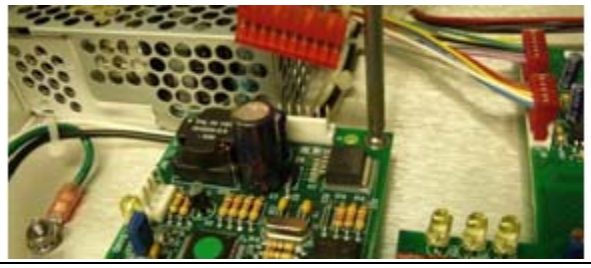
10. Replacing the L-Band Tracking Receiver:

10.1. Tools.

- #1 Phillips Screwdriver
- ½" Wrench/Spanner

10.2. Procedure.

Procedure for replacing the tracking receiver inside the DAC-2202. DVB receiver (TVRO) Sea Tel kit part number: 135336 (DVB receiver: 122307-1), SCPC receiver (VSAT) Sea Tel kit part number: 135367 (SCPC receiver part number: 127166-1).

***CAUTION:** Disconnect the AC Voltage to supply to control unit prior to performing the below procedure. ***Note:** PCB components are static sensitive and correct handling procedures must be adhered to. 1. Using a #1 Phillips screwdriver, undo the 6 screws retaining the DAC lid and remove it.	
2. Disconnect the IDC connector from the tracking receiver.	
3. Now using a ½" wrench or socket, remove the 2 securing nuts and lock washers from the F-connectors on the receiver and save for future use.	
4. Using #1 Phillips screwdriver remove the securing screw from the rear panel of the receiver.	
5. Finally, remove the screw securing the receiver into the DAC shell and remove the receiver. 6. Install the replacement receiver in the reverse of how it was removed then reconnect the IDC connector. 7. Reinstall the DAC lid and secure with the 6 screws removed in the first step of this procedure.	

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