

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**TROUBLESHOOTING GUIDE TABLE OF CONTENTS**

| CODE               | DESCRIPTION                            | PG  |
|--------------------|----------------------------------------|-----|
| <a href="#">1</a>  | Angle Sensor Calibration Required      | 252 |
| <a href="#">4</a>  | Drive 5V Fault                         | 67  |
| <a href="#">5</a>  | Drive 12V Fault                        | 80  |
| <a href="#">6</a>  | Drive Temp High                        | 32  |
| <a href="#">8</a>  | Coolant Pump 1 Fault                   | 50  |
| <a href="#">12</a> | Brake Pressure [1] Low                 | 4   |
| <a href="#">16</a> | Discrete Seawater Pump                 | 55  |
| <a href="#">19</a> | Angle Sensor Fault [Active Range High] | 252 |
| <a href="#">32</a> | Vertical Accel High                    | 263 |
| <a href="#">35</a> | Display Fault                          | 93  |
| <a href="#">36</a> | Motor Fault                            | 105 |
| <a href="#">37</a> | Gyro Travel Fault                      | 7   |
| <a href="#">38</a> | Gyro Motion Fault                      | 7   |
| <a href="#">40</a> | Input Voltage High                     | 80  |
| <a href="#">41</a> | Input Voltage Low                      | 80  |
| <a href="#">43</a> | Power Relay                            | 111 |
| <a href="#">44</a> | Sensor Power High                      | 120 |
| <a href="#">45</a> | Sensor Power Low                       | 120 |
| <a href="#">50</a> | Angle Sensor Fault                     | 252 |
| <a href="#">55</a> | Angle Sensor Fault [Active Range Low]  | 252 |
| <a href="#">56</a> | Angle Sensor - Unresponsive            | 252 |
| <a href="#">72</a> | Motor Underspeed                       | 124 |
| <a href="#">75</a> | IMU Fault                              | 132 |
| <a href="#">76</a> | Roll Rate Fault                        | 142 |
| <a href="#">77</a> | Yaw Rate Fault                         | 142 |
| <a href="#">78</a> | Brake Valve Fault                      | 22  |
| <a href="#">82</a> | Drive Age Count                        | 145 |
| <a href="#">83</a> | Drive Voltage Fault                    | 158 |
| <a href="#">84</a> | Drive CANBus Fault                     | 145 |
| <a href="#">85</a> | Drive Software Fault                   | 164 |
| <a href="#">86</a> | Drive Memory Fault                     | 164 |
| <a href="#">87</a> | Drive Configuration Incorrect          | 164 |
| <a href="#">88</a> | Drive Wiring Fault                     | 164 |
| <a href="#">89</a> | Drive Motor Control Fault              | 164 |
| <a href="#">90</a> | Motor Fault                            | 164 |
| <a href="#">91</a> | Drive Hardware Incompatible            | 164 |
| <a href="#">92</a> | Drive MOSFET Fault                     | 164 |
| <a href="#">93</a> | Drive IGBT Fault                       | 164 |
| <a href="#">94</a> | Drive Preoperational                   | 176 |
| <a href="#">95</a> | Drive Hardware Fault                   | 177 |
| <a href="#">96</a> | Drive Fault                            | 177 |

| CODE                  | DESCRIPTION                       | PG  |
|-----------------------|-----------------------------------|-----|
| <a href="#">98</a>    | AC Mains Low                      | 186 |
| <a href="#">99</a>    | Motor Fault                       | 191 |
| <a href="#">100</a>   | Drive DSPPF Fault                 | 191 |
| <a href="#">101</a>   | Drive Pulsing Error               | 191 |
| <a href="#">102</a>   | Drive OP Circuit                  | 191 |
| <a href="#">103</a>   | Drive Sensorless                  | 206 |
| <a href="#">104</a>   | Drive Temperature                 | 32  |
| <a href="#">106</a>   | Angle Sensor Fault                | 252 |
| <a href="#">107</a>   | Display Software Incompatible     | 213 |
| <a href="#">108</a>   | Drive Software Incompatible       | 213 |
| <a href="#">109</a>   | Drive Software Model Incompatible | 213 |
| <a href="#">110</a>   | IMU Software Incompatible         | 213 |
| <a href="#">111</a>   | DC Input Voltage Low              | 216 |
| <a href="#">112</a>   | DC Input Voltage Low              | 216 |
| <a href="#">115</a>   | Prop Valve Current High in Lock   | 26  |
| <a href="#">119</a>   | Encoder Failure                   | 67  |
| <a href="#">120</a>   | GCM to Drive Comm Lost            | 145 |
| <a href="#">123</a>   | Battery State of Charge Low       | 225 |
| <a href="#">126</a>   | Encoder Sig SIN                   | 67  |
| <a href="#">127</a>   | Encoder Sig COS                   | 67  |
| <a href="#">129</a>   | Incorrect Serial Number           | 227 |
| <a href="#">130</a>   | Model Change Detected             | 227 |
| <a href="#">131</a>   | GPS Signal Lost                   | 228 |
| <a href="#">132</a>   | ConnectBox Software Incompatible  | 213 |
| <a href="#">154</a>   | Power Relay Stuck on Fault        | 111 |
| <a href="#">155</a>   | Encoder Temperature               | 32  |
| <a href="#">156</a>   | Drive Voltage                     | 80  |
| <a href="#">157</a>   | Drive Temperature                 | 32  |
| <a href="#">163</a>   | Slow Spool Up                     | 233 |
| <a href="#">167</a>   | High Current DC Voltage Low       | 216 |
| <a href="#">168</a>   | High Current DC Voltage High      | 216 |
| <a href="#">170</a>   | Drive Reset Fault                 | 67  |
| <a href="#">251</a>   | No Connection to Gyro             | 93  |
| <a href="#">252</a>   | Gyro Incompatible                 | 213 |
| <a href="#">BRAKE</a> | Brake Override Inoperable         | 29  |
| <a href="#">CORR</a>  | Corrosion                         | 278 |
| <a href="#">MFD</a>   | MFD Integration Issues            | 241 |
| <a href="#">PERF</a>  | Performance Issues                | 283 |
| <a href="#">NOISE</a> | Noise & Vibration                 | 270 |
| <a href="#">TORQ</a>  | Torque Specifications             | 288 |
| <a href="#">SCHEM</a> | Wire Harness Schematics           | 248 |

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**INTRODUCTION**

All alarms cut power to the flywheel motor, lock the brake, and display an alarm pop up. The reset button must be pressed from the alarm overlay page to clear alarms. The power button must be pressed to begin respooling.

Certain alarm codes require power cycle to reset the alarm(s) due to the seriousness of the applicable alarms. In the event of these alarms, the Seakeeper must be visually inspected for issues. A list of the applicable codes are as follows:

- Codes **19, 50, 55, 56,** and **106:** Angle sensor Faults
- Codes **26, 27, 78, 79,** and **80:** Brake Valve Faults
- Codes **37, 38, 39,** and **115:** Seakeeper Travel and Motion Faults
- Codes **44** and **45:** Sensor Power Faults

Continued operation may result in damage to equipment or injury

If apparent causes cannot be found during troubleshooting, the technician is requested to compile the following information for submission to Seakeeper Product Support Team for review to better assist the technician:

|                                     |                                                                                   |
|-------------------------------------|-----------------------------------------------------------------------------------|
| Vessel Make & Model                 | Photo of display Service screen                                                   |
| Case Number, if opened              | Photo of Alarm History                                                            |
| Reported issue                      | Summary of troubleshooting performed with readings recorded                       |
| Photo of display Information screen | Video of unusual RPM readings, noises from sphere, any occurrence out of ordinary |

Once all requested data compiled, submit to Seakeeper Product Support Team via email ([support@seakeeper.com](mailto:support@seakeeper.com)) or through Drop Box, or similar service.

To navigate through links within this document (Attachments, other guides, and step references), use the [Alt] + [←] to return to source link. The first page of each guide has a home icon [△] to return user to table of contents page (or press home key on keyboard). External links open windows of the Dealer Access portal. These links are referenced documents, drawings and other procedures throughout the guide. In order to maintain your location in this document, open these links by right-clicking on them and selecting "Open link in new tab" if viewing this document in a browser.

Subsystems are listed as follows:

|                                |                  |
|--------------------------------|------------------|
| Brake Subsystem                | Pages 4 to 31    |
| Coolant Subsystem              | Pages 32 to 68   |
| Electrical Subsystem           | Pages 69 to 253  |
| Foundation/Enclosure Subsystem | Pages 254 to 288 |

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**PRECAUTIONS**

1. **PERSONNEL INJURY MAY RESULT** if Seakeeper is NOT locked and at zero RPM before removing covers or accessing unit for service.
2. **PERSONNEL INJURY MAY RESULT** if attempting to perform maintenance on Seakeeper without removing flywheel motor power and applying lockouts due to remote start capabilities.
3. **PERSONNEL SHOCK HAZARD EXISTS** in Motor Drive when flywheel rotating OR at zero speed for minimum of ten minutes.
4. **PERSONNEL SHOCK MAY OCCUR** if NOT wearing appropriate OSHA Class 00 electrical personal protective equipment when troubleshooting Seakeeper live electrical circuits.
  - a. Seakeeper recommends arc-flash gloves (McMaster #9353T9), or similar, and safety glasses.



5. **INACCURATE RESISTANCE READINGS MAY RESULT** from resistance checks on energized circuits.
6. **CONNECTOR SOCKETS MAY BE DAMAGED** if using unapproved test probes and accessories when troubleshooting electrical connectors.
7. **PERSONNEL CRUSHING HAZARD EXISTS** when working near operating Seakeeper when in UNLOCKED/SEA mode.

| REVISION | DESCRIPTION     | APPROVAL   | DATE      |
|----------|-----------------|------------|-----------|
| 1        | Initial Release | A Patricio | 27OCT2023 |

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 12**

Troubleshoot and repair HYDRAULIC BRAKE PRESSURE SWITCH 1 LOW: Code 12.

**BACKGROUND**

The Seakeeper hydraulic brake subsystem is charged to a set pressure depending on the model. If the brake pressure drops below a setpoint pressure, the Seakeeper will indicate a low brake pressure alarm. An alarm will lock the hydraulic system, and the Seakeeper will start spooling down. The alarm set point is 27 PSI for Seakeeper 1, 4, and 4.5.

**REFERENCES**

[SWI-211 - Seakeeper Brake Assembly Replacement](#)

P/N 10384 or 90485, Seakeeper brake service kit & brake service bundle kit

**PRECAUTIONS**

- See [PRECAUTIONS](#) section.



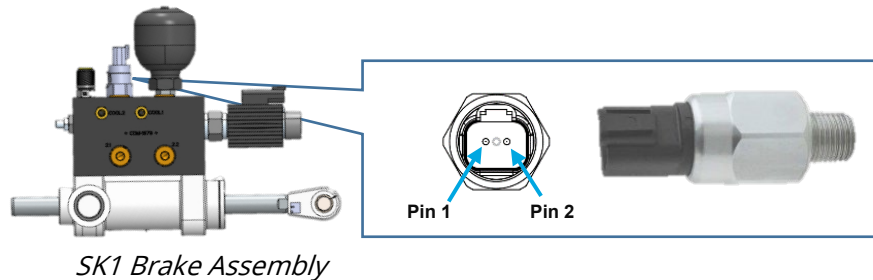
**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 12

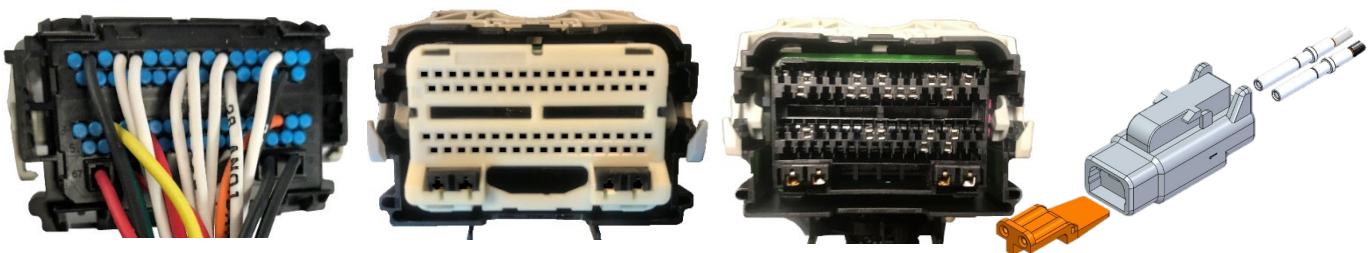
**PROCEDURE**

1. **CONFIRM** pressure switch status:
  - a. **DISCONNECT** harness from brake pressure switch on manifold.

**NOTE:**

The brake pressure switch should be closed when above 27 psi.

- b. With multimeter in Resistance mode, **TEST** resistance between pressure switch pins **1** and **2**.
  - c. **IF** switch shows greater than  $0.3\Omega$ ,  
**THEN REPLACE** brake assembly per [SWI-211](#).
  - d. **IF** switch shows  $0.3\Omega$  or less,  
**THEN CONTINUE** to Step 2.
2. With multimeter in DC Volts mode, **CONFIRM** 4.8 – 5.2 VDC across pins **1** and **2** of pressure switch harness connector.
3. **IF** voltage UNSATISFACTORY,  
**THEN:**
  - a. **DISCONNECT** GCM 70-pin connector.
  - b. **INSPECT** GCM 70-pin connector and pressure switch connector for loose wires and crimps.



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 12

Step 3 continued

**CAUTION:**

GCM connector damage can occur if a large pin is inserted into the plug.  
Multimeter test pins cannot exceed 0.10 inch in diameter.

- c. **CONFIRM** 0.3Ω or less between pressure switch connector pin **1** and GCM pin **25**.
- d. **CONFIRM** 0.3Ω or less between pressure switch connector pin **2** and GCM pin **32** (Pin **2** on Seakeeper 4 and 4.5).



*Rectified Manifold  
Pressure Switch*

| <b>Pressure Switch Pinout to GCM</b> |                                                        |
|--------------------------------------|--------------------------------------------------------|
| 1                                    | = GCM Pin 25 (white)                                   |
| 2                                    | = GCM Pin 32 (black)<br>GCM Pin 2 on Seakeeper 4 & 4.5 |



- e. **IF** greater than 0.3Ω resistance,  
**THEN CONTACT** Seakeeper Product Support Team with test results data for review.
4. **IF** alarm persists,  
**THEN REPLACE** brake assembly per [SWI-211](#).

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 37/38**

To troubleshoot and repair travel and motion fault alarms:

CODE 37: GYRO TRAVEL FAULT

CODE 38: GYRO MOTION FAULT

**BACKGROUND**

Continued operation with either of these codes may result in damage to equipment or injury. **Power to the Seakeeper must be cycled to reset any of these alarms.**

As the enclosure approaches the programmed end stop angles of the GCM software, a travel fault (Code 37) can be produced to warn the operator of abnormal operating conditions in the Seakeeper.

The motion fault (Code 38) can occur anywhere in the path of precession (it warns of an excessive precession rate) – not just near the end stops. It, too, is indicative of abnormal operations that will be addressed in this guide. It would not be unusual to see it accompany a Code 37.

Table with model and alarm setpoints:

| Model                            | Alarm                      | Setpoint               |
|----------------------------------|----------------------------|------------------------|
| Seakeeper 1                      | Code 37: Gyro Travel Fault | >80°/sec at >±60°      |
| Seakeeper 4 and 4.5              |                            | >55°/sec at >±57°      |
| All single brake cylinder models | Code 38: Gyro Motion Fault | >150°/sec at any angle |

Experience has shown that many of these faults have been produced by brake system issues: low brake pressure, air in the brake system or the loosening of the rod end assembly at the gimbal. Beyond the brake system, the angle sensor or the GCM may also be at fault.

## SEAKEEPER TROUBLESHOOTING GUIDE - 206

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PRODUCT      SEAKEEPER 1, 4, AND 4.5

### REFERENCES

[SWI-108A - Angle Sensor Calibration](#)

[SWI-209 - Brake Bushing Replacement](#)

[SWI-211 - Seakeeper Cylinder Replacement](#)

[SB-90767 - Seakeeper 1 and Code 38](#)

Applicable Seakeeper Service Drawings on [Dealer Access](#)

### PRECAUTIONS

See [PRECAUTIONS](#) section in introduction.

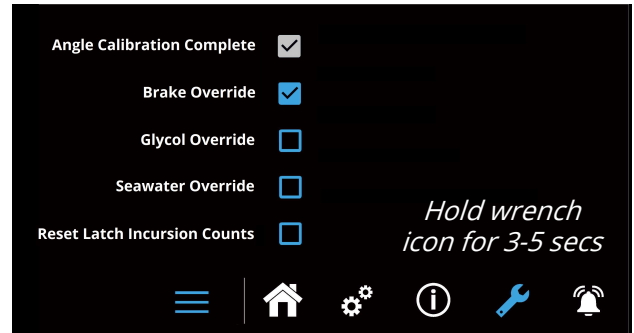
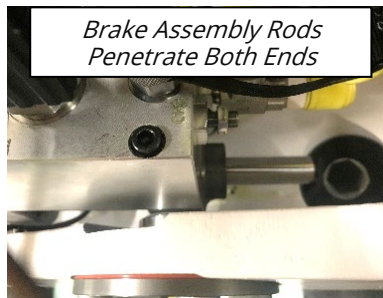
**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

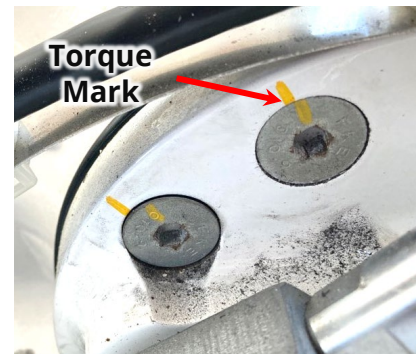
Code 37/38

**PROCEDURE****Section 1: Initial Observations**

1. **IF** Seakeeper 1 with Code 38,  
**THEN CONSULT** SB-90767, Seakeeper 1 and Code 38 bulletin for possible correction.
2. **ENSURE** flywheel at zero RPM at display/MFD app.
3. **ACTIVATE** brake override.
4. **CHECK** for hydraulic leaks:
  - a. **RUN** finger beneath cylinder rod near seals to check for oil film.



- b. **CHECK** beneath brake assembly for indication of oil leak and below hose fittings.
5. **CHECK** rod end clevis for threads backing out.
6. **ENSURE** all gimbal shaft screw yellow torque marks are aligned.
7. **CHECK** angle sensor wiring for sharp bends, pinching or damage.

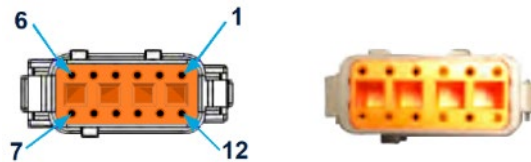


**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

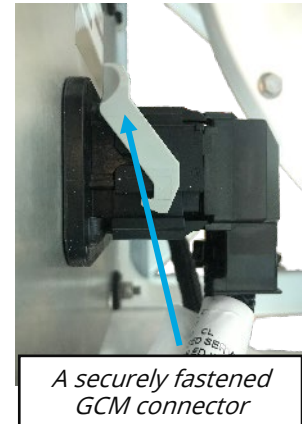
Code 37/38

PRODUCT      SEAKEEPER 1, 4, AND 4.5

8. **MANUALLY PRECESS** enclosure full forward and aft observing following:
  - a. On display, two extreme angle readings should be within  $\pm 1.0^\circ$  from  $\pm 63^\circ$ .
  - b. The two extremes (all way forward and all way aft) should be within  $1.0^\circ$  of each other. (For example, a  $-62.8^\circ$  and a  $+63.1^\circ$  would be satisfactory; the two are within  $\pm 1.0^\circ$  of each other.
  - c. **VERIFY** following issues do not exist:
    - excessive travel
    - enclosure failing to remain stationary at full forward or full aft
    - brake cylinder lateral movement
9. **INSPECT** electrical connections at following for full engagement **AND** free of corrosion buildup:
  - a. GCM 70-pin connector
  - b. Angle Sensor connector to wire harness
  - c. Proportional Brake Valve
  - d. IMU harness connector



*IMU 12-pin Connector with  
locking wedges on sides*



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 37/38

10. **APPLY** appropriate torque to Seakeeper mounting screws.  
[**NOTE:** See [Torque Specifications](#) section for proper torque]
  - a. **NOTE** any movement below torque specification.
  - b. **NOTE** any damage to vessel foundation structure.
  - c. **NOTE** excessive corrosion to mounting fasteners and hardware.
11. Using appropriate model Electrical Subsystem or Assembly drawing, **VERIFY** IMU mounted securely and in correct orientation.
  - a. **IF** IMU installation issue found,  
**THEN CORRECT** installation issue **AND PERFORM** sea trial to ensure alarms clear.
12. From inspections above, **DETERMINE** appropriate actions:
  - a. **IF** cylinder rod seal leak was found in Step 4,  
**THEN REPLACE** brake assembly per [SWI-211, Seakeeper Cylinder Replacement](#).
  - b. **IF** low brake pressure alarm (Code 12) present,  
**THEN REPLACE** Brake Assembly per [SWI-211 - Seakeeper Cylinder Replacement](#).
  - c. **IF** any manifold fitting leak was found in Step 4,  
**THEN PROCEED** to [Section 2](#).
  - d. **IF** threads were backing out in Step 5 **OR** misalignment found **OR** issues in cylinders while precessing in Step 8, **OR** gimbal shaft screw torque marks not aligned in Step 6,  
**THEN PROCEED** to [Section 3](#).
  - e. **IF** issue was found with angle sensor in Steps 8.a or 8.b,  
**THEN PROCEED** to [Section 4](#).
  - f. **IF** electrical connection issue was seen in Step 9,  
**THEN PROCEED** to [Section 5](#).
  - g. **IF** issues found in Step 10 (foundation and mounting hardware issues) above,  
**THEN PROCEED** to [Section 6](#).
  - h. **IF NO** issues found in Section 1,  
**THEN PROCEED** to [Section 7](#).

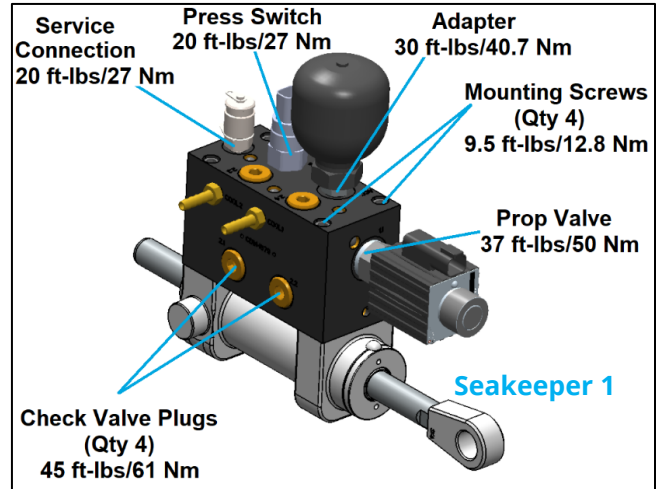
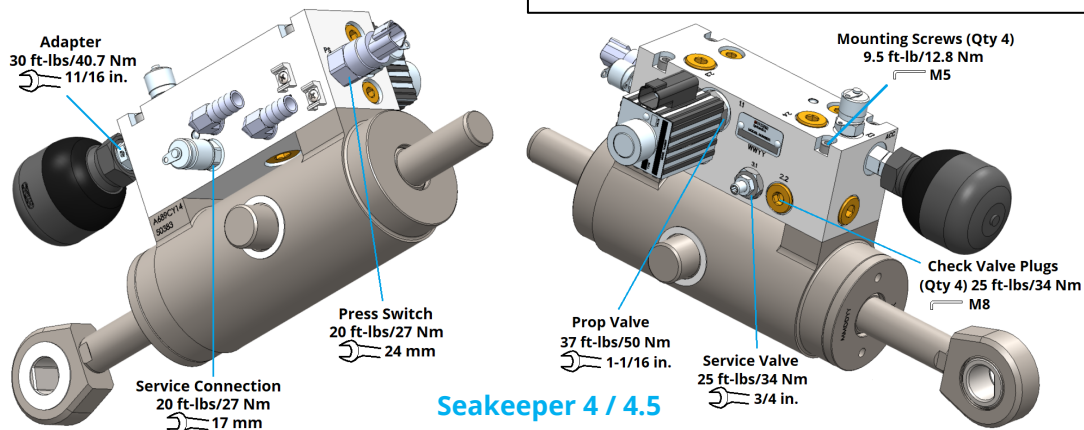
**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 37/38

**Section 2: Miscellaneous Hydraulic Leaks**

1. **IF** hydraulic leak(s) found on manifold, **THEN:**
  - a. **ATTEMPT TORQUING** leaking component per diagrams.
  - b. **WIPE** manifold dry of oil residue **AND OBSERVE** for leakage.
  - c. **IF** leakage persists, **THEN REPLACE** Brake Assembly per [SWI-211 - Seakeeper Cylinder Replacement](#).

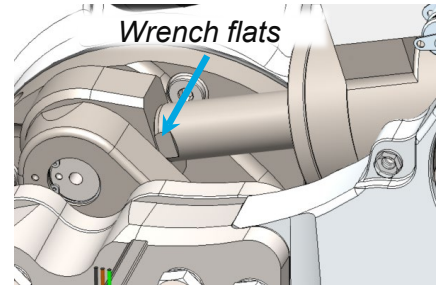


2. **IF** cylinder rod seals leaking, **THEN REPLACE** brake assembly per [SWI-211, Seakeeper Cylinder Replacement](#).
3. **IF** leaks repaired, **THEN PERFORM** sea trial.
4. **IF** other issues were found, **THEN PROCEED** to relevant section(s) from [Section 1, step 12](#).
5. **IF** alarm returns, **THEN PROCEED** [Section 7](#).



**Section 3: Cylinder Issues**

1. **IF** rod end threads have backed out at clevis,  
**THEN:**
  - a. **ACTIVATE** brake override.
  - b. **MANUALLY PRECESS** enclosure to gain wrench access to flats of rod.
  - c. **UNTHREAD** rod from rod-end clevis assembly.
    - **IF** excessive force is required to unthread rod and cross-threading suspected,  
**THEN REPLACE** cylinder per [SWI-211, Seakeeper Cylinder Replacement](#).
  - d. **CLEAN** rod threads and internal threads of rod-end clevis assembly.
  - e. **APPLY** red (high strength) thread lock fluid to threads of rod.
  - f. **COMPLETELY THREAD** rod back into rod-end clevis assembly.
2. **IF** gimbal shaft screw torque marks not aligned,  
**THEN:**
  - a. **ENSURE** cylinder rod and rod end clevis are not damaged or bent.
  - b. **REPLACE AND TORQUE** gimbal shaft screws per applicable Enclosure drawing.
3. **IF** all work complete,  
**THEN PERFORM** sea trial.
4. **IF** other issues were found,  
**THEN PROCEED** to appropriate section(s) of [Section 1, Step 12](#).
5. **IF** alarm persists,  
**THEN GO TO** [Section 7](#).



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

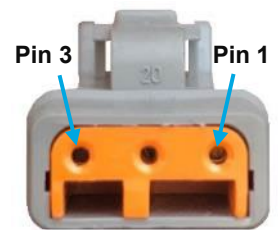
Code 37/38

**Section 4: Angle Sensor Issues**

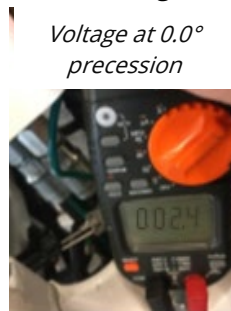
1. **IF** wiring of angle sensor is issue (e.g., sharp bends, pinched leads, etc.), **THEN INSPECT** leads for damage **AND REROUTE** wiring if no damage found.
2. **IF** angle sensor is out of calibration, **THEN CALIBRATE** angle sensor per [SWI-108A](#).
3. **PERFORM** following tests:
  - a. **CONFIRM** 4.8 to 5.2 VDC is available between pins **1 & 3** of angle sensor connector from harness.
  - b. With angle sensor connected to wire harness, **MEASURE** voltage (by back-probing) between Pin **2** and Pin **3**, as shown.



*Deutsch plug with back probes  
inserted into pins 2 & 3.*



- At 0.0° precession, voltage should be about 2.5 VDC
- At -63° precession, voltage should be about 4.25 VDC. (travel angles vary)
- At +63° precession, voltage should be about 0.75 VDC. (travel angles vary)



*Voltage at 0.0°  
precession*



- c. **IF** any voltages are out of range in step 3.b (more than 0.15 VDC), **THEN:**
  - i. **REPLACE** angle sensor.
  - ii. **CALIBRATE** replacement sensor per [SWI-108A](#).

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

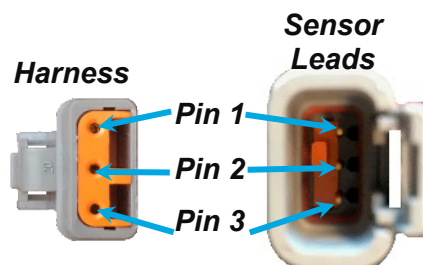
Code 37/38

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Section 4, Step 3 continued

- d. **IF** angle sensor required recalibration/replacement,  
**THEN PERFORM** sea trial.
  - e. **IF** alarm returns,  
**THEN RETURN** to [Section 1](#).
4. **IF** angle sensor did NOT show 4.8 to 5.2 VDC in Step 3.a of this section,  
**THEN PERFORM** following tests:
- a. **DEACTIVATE** brake override.
  - b. **REMOVE** low current DC power from Seakeeper.
  - c. **CONFIRM** 0.3Ω or less on angle sensor harness plug between pin **1** and GCM 70-pin connector pin **48**.

| Angle Sensor Pin-out    |                                  |
|-------------------------|----------------------------------|
| Pin 1 is +5VDC Supply   | GCM pin 48                       |
| Pin 2 is signal voltage | GCM pin 28                       |
| Pin 3 is Ground         | Curtis B- terminal (Seakeeper 1) |
|                         | GCM pin 2 (Seakeeper 4/4.5)      |



- d. **CONFIRM** 0.3Ω or less on harness plug between pin **2** and GCM 70-pin connector pin **28**.
- e. **CONFIRM** 0.3Ω or less on harness plug between pin **3** and GCM 70-pin connector pin **2** (for Seakeeper 4 / 4.5) or **B-** terminal at Curtis motor drive (for Seakeeper 1).
- f. **IF** any test in Step 4.c through 4.e of this section showed high or intermittent resistance (open),  
**THEN REPLACE** wire harness.
- g. **IF** resistances satisfactory in harness but 5 VDC was NOT seen,  
**THEN REPLACE** GCM.
- h. **RECONNECT** angle sensor to wire harness.
- i. **RESTORE** low current DC power to Seakeeper.



## SEAKEEPER TROUBLESHOOTING GUIDE - 206

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Code 37/38

PRODUCT        SEAKEEPER 1, 4, AND 4.5

1. **IF** all work complete,  
**THEN PERFORM** sea trial.
2. **IF** other issues were found,  
**THEN PROCEED** to relevant section(s) of [Section 1, Step 12](#).
3. **IF** alarm persists,  
**THEN GO TO** [Section 7](#).

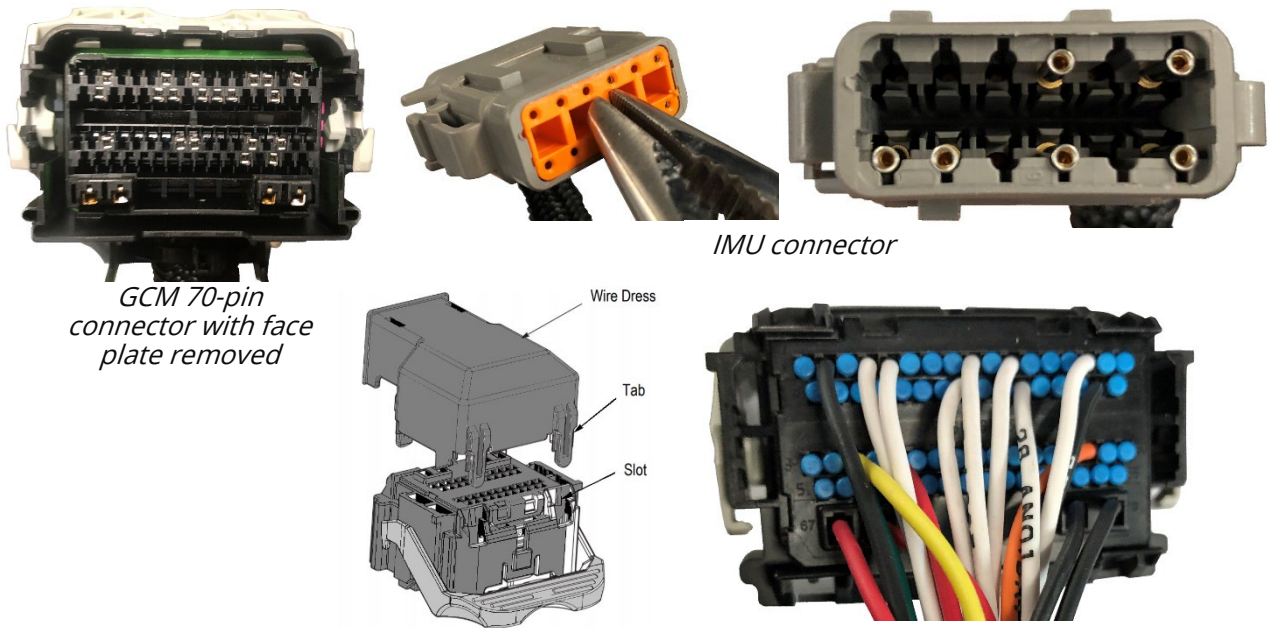
**Section 5: Electrical Connection Issues**

1. **IF** any following connectors are loose, corroded or damaged,

- GCM 70-pin connector
- Angle Sensor connector to wire harness
- Manifold Brake/Proportional Valve
- IMU harness connector

**THEN REMOVE** all power from Seakeeper.

2. **DISCONNECT** affected connector(s).
3. **DISASSEMBLE AND CLOSELY INSPECT** associated connector(s) pins and sockets for loose or missing connections.



4. **IF** associated connector(s) corroded,  
**THEN CLEAN** connectors with contact cleaner and/or wipe all corrosion with clean rag.
5. **IF** angle sensor wiring affected,  
**THEN PERFORM Section 4, Step 4** tests of wire harness and sensor leads.

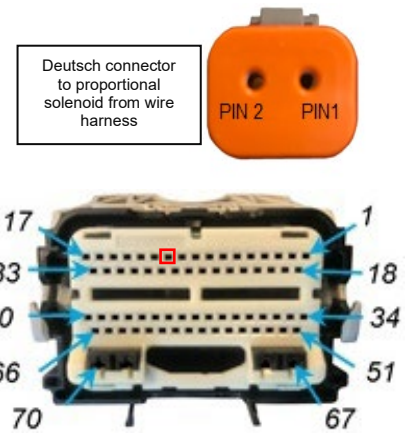
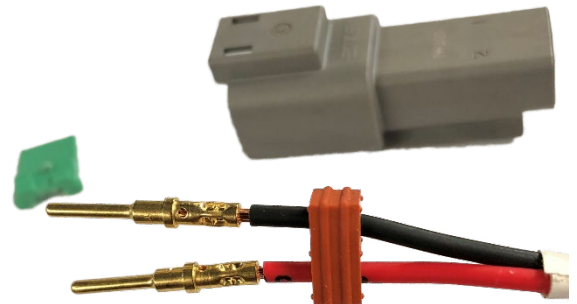
**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 37/38

6. **PERFORM** following:

- a. **REMOVE** low-current DC power.
- b. **DISCONNECT** GCM 70-pin connector.
- c. **CONFIRM** 0.3Ω or less between brake valve connector pin 2 and GCM pin 11.
- d. **CHECK** for short between pin 1 and GCM pin 11.
- e. **RESTORE** low-current DC power.
- f. **ACTIVATE** brake override.
- g. **MEASURE** for 12/24 VDC at proportional valve connector of harness, per table shown above.
  - i. **NOTE:** Back-probe proportional valve connection while connected to check voltage, if possible. It will be different voltage than when disconnected.
- h. **IF** high resistance is seen in Step 6.c **OR** resistance other than OPEN LOOP seen in Step 6.d, **THEN:**
  - i. **DISASSEMBLE AND INSPECT** connectors for corrosion, loose or disconnected crimps.
  - ii. **IF** connectors SATISFACTORY, **THEN REPLACE** wire harness.
- i. **IF** checks of Steps 6.c and 6.d **AND** voltage in Step 6.g are SATISFACTORY **AND** alarm persists, **THEN PROCEED** to Step 7 of this section.



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

Code 37/38

PRODUCT      SEAKEEPER 1, 4, AND 4.5

7. **IF** other issues found,  
**THEN PROCEED** to appropriate section(s).
8. **IF** all work complete,  
**THEN PERFORM** sea trial.
9. **IF** alarm persists,  
**THEN:**
  - a. **OBTAIN** photo of display/MFD app Information screen.
  - b. **SUBMIT** photo to Seakeeper Product Support Team for software version evaluation with test results from troubleshooting.
  - c. **PROCEED** to [Section 7](#).



**Section 6: Bolt-In Mounting Issues**

1. **IF** torque discovered on any mounting screw was below specification, **THEN ATTEMPT** to torque mounting screw(s) to appropriate torque.

**NOTE:**

- Mounting fasteners should **NOT** be re-used once removed.
- On through-bolt installations, it may be difficult to see or wrench nut.
- Aluminum backing/tapping plates **MUST** have thread inserts installed.

2. **IF** screw turns before obtaining torque, **THEN:**
  - a. **REMOVE** fastener(s).
  - b. **INSPECT** mounting hole for possible thread insert damage or backing plate thread damage.
3. **IF** excessive corrosion is found on mounting fasteners and hardware, **THEN REPLACE** hardware with new bolt-in kit for model (Visit [Seakeeper Partner Center](#) for proper kit).
4. **INSPECT** stringer and foundation structure for cracking, flexing, or delamination. (This will require a sea trial with Seakeeper operation)
5. **IF** no other issue is suspected, **THEN PERFORM** sea trial to verify alarm clear.
6. **IF** all mounting issues are addressed **AND** alarm persists, **THEN CONTINUE** to [Section 7](#).
7. **IF** other issues were found, **THEN RETURN TO** [Section 1](#) to be directed to appropriate section to address issues.





## SEAKEEPER TROUBLESHOOTING GUIDE - 206

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PRODUCT        SEAKEEPER 1, 4, AND 4.5



Code 37/38

### Section 7: Other Issues

1.    **IF** submitted photo of Information screen showed improper software versions (from Section 5, Step 9),  
      **THEN REPROGRAM / REPLACE** GCM.
2.    **IF** GCM recently reprogrammed or replaced,  
      **THEN CONTACT** Seakeeper Product Support Team. [proportional valves require pairing with GCM]
3.    **PERFORM** sea trial **AND LOG** CAN data using Seakeeper Service Tool per [SWI-118](#).
4.    **IF** alarm persists,  
      **THEN SUBMIT** all test results data and photos from complete troubleshooting to Seakeeper Product Support Team at support@seakeeper.com.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 78**

To troubleshoot and repair the locking and proportional valve fault alarms.

CODE 78: BRAKE VALVE FAULT (All Seakeeper models)

**BACKGROUND**

Continued operation with this code may result in damage to equipment or injury. **Power to the Seakeeper must be cycled to reset any of these alarms.**

This code will alarm at any time the GCM senses a loss of connection to the proportional valve coil OR the valve is not operating correctly. The proportional brake valve is used to regulate flow to the cylinders when unlocked. The proportional valve is energized when Seakeeper is unlocked at speed or manually overridden at 0 rpm.

Likely Alarm Causes:

- Faulty valve solenoid coil
- Disconnected wire harness connectors or damage connector pins
- An open or short of wires within wire harness
- Faulty GCM

**WARNING:**

**BURN HAZARD exists** on brake solenoid coils after energized for extended periods.

**REFERENCES**

Applicable Seakeeper Service Drawings on Dealer Access

**PRECAUTIONS**

See [PRECAUTIONS](#) section in introduction.

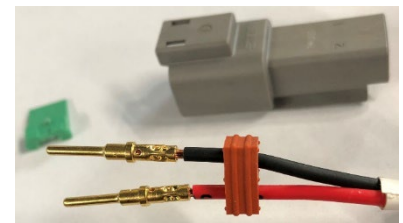
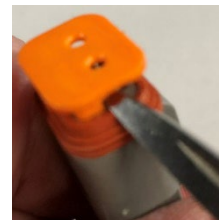
**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 78

**PROCEDURE**

1. With multimeter in DC Volts mode, **MEASURE** voltage between pins **1** and **2** of DC INPUT supply connector to verify within 11 to 15 VDC.
  - a. **IF** voltage unsatisfactory,  
**THEN TROUBLESHOOT** vessel electrical.
2. **VERIFY** wire harness connectors at manifold are connected properly per labels.
3. **ACTIVATE** brake override.
4. **DISCONNECT** wire harness connector from coil of proportional brake valve.
5. **VERIFY** code 78 has set on MFD app/display.
6. With multimeter in DC Volts mode, **VERIFY** voltage between pins **1** and **2** of the valve's wire harness connector is within 1 volt of DC INPUT supply voltage to wire harness from step 1.
7. In solenoid harness connector, **VERIFY** pins are fully inserted and wire crimps intact.
8. **IF** loose wires or crimps found,  
**THEN:**
  - a. **OPEN / TURN OFF** low-current DC power breaker
  - b. **REPAIR** connector.



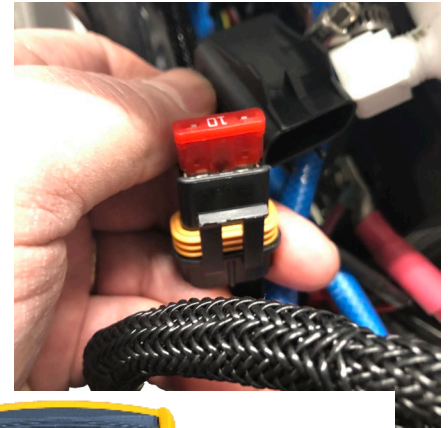
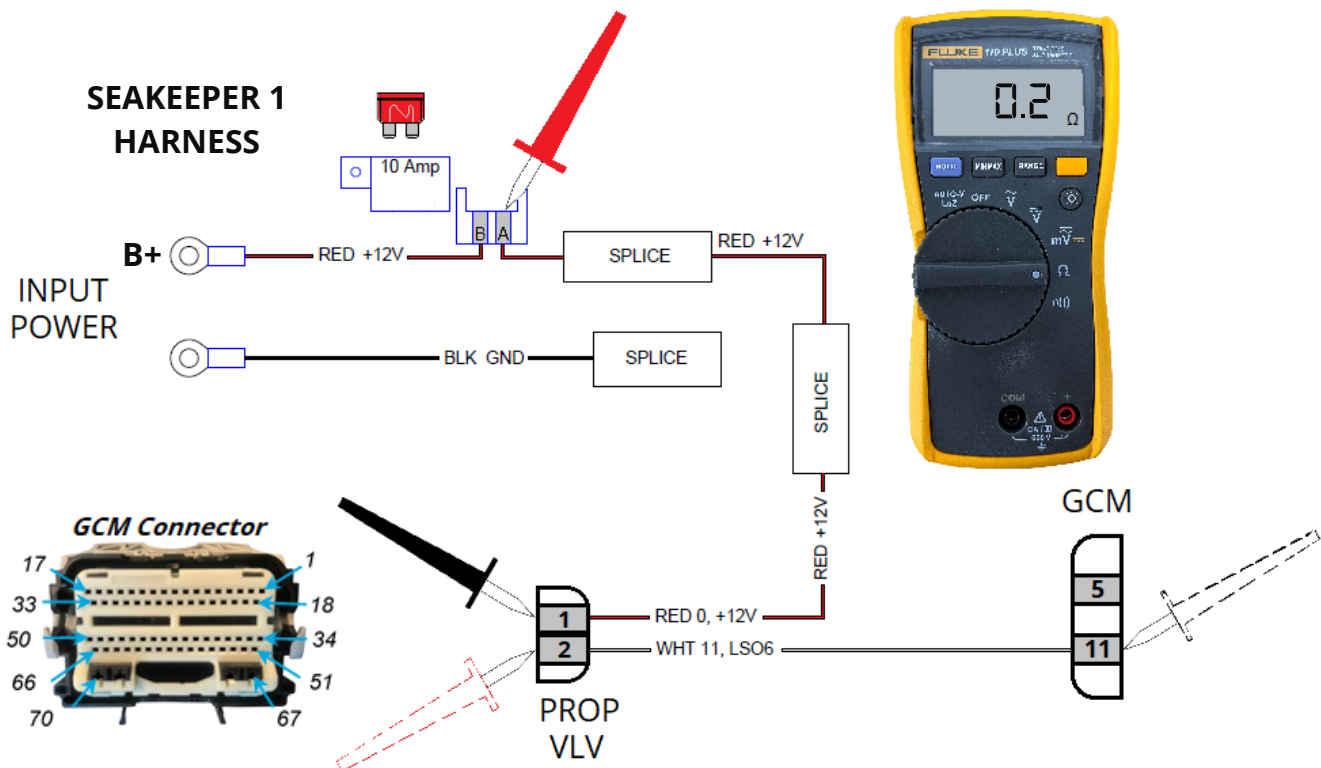
**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 78

9. **PERFORM** following for Seakeeper 1:

- a. **REMOVE** control power red 10A fuse (beneath brake assembly in rear).
- b. With multimeter in Resistance mode, **CONFIRM** resistance below  $0.3\Omega$  between brake valve pin **1** and terminal **A** of control power 10A fuse holder.
- c. **CONFIRM** resistance  $0.3\Omega$  or less between brake valve pin **2** and GCM pin **11**.



- d. **VERIFY** no short between prop valve pin **1** and pin **2**.
- e. In both GCM and brake valve connector, **VERIFY** pins are fully inserted and wire crimps intact.
  - i. **IF** loose wires or crimps found, **THEN REPAIR** affected wire(s).
- f. **IF** any above resistance or electrical short checks are UNSATISFACTORY, **THEN SUBMIT** readings and display information screen photo to Seakeeper Product Support Team at support@seakeeper.com before replacing harness.

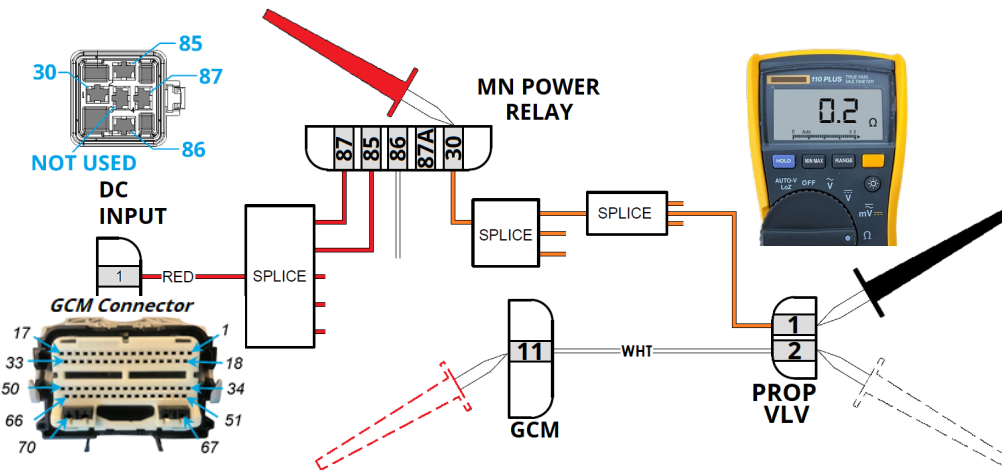
**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 78

10. **PERFORM** following for Seakeeper 4 and 4.5:

- a. **DISCONNECT** main power relay from harness.
- b. With multimeter in Resistance mode, **CONFIRM** resistance below  $0.3\Omega$  between power relay connector pin **30** and pin **1** of brake valve connector.
- c. **CONFIRM** resistance  $0.3\Omega$  or less between brake valve pin **2** and GCM pin **11**.



- d. **VERIFY** no short between prop valve pin **1** and pin **2**.
- e. In both GCM and brake valve connector, **VERIFY** pins are fully inserted and wire crimps intact.
  - i. **IF** loose wires or crimps found, **THEN REPAIR** affected wire(s).
- f. **IF** any above resistance or electrical short checks are UNSATISFACTORY, **THEN REPLACE** wire harness.

11. **IF** alarm persists,

**THEN CONTACT** Seakeeper Product Support Team at [support@seakeeper.com](mailto:support@seakeeper.com) with data from electrical checks and summary of steps taken.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 115**

To troubleshoot and repair the “PROP VALVE CURRENT HIGH IN LOCK” alarm (Code 115).

**BACKGROUND**

The Seakeeper models are equipped with rectified brake electrical systems that maintain a current through the proportional valve (prop valve) when in the “LOCKED” mode of operation. The purpose of this small current is to keep the solenoid warm for operation when the operator takes the system to “UNLOCKED” or “SEA” mode. Code 115 was programmed into the GCM’s software to alert the operator of an abnormal current in this warming circuitry.

The code will appear on the display when the current to the proportional valve coil exceeds 1.47 amps (1467 mA) for 1 second. The code will clear once the current is below 0.75 amps (750 mA). The code would only occur during spool-up, while the Seakeeper is LOCKED.

There are three faults that could cause the alarm:

1. A short in the wiring to the proportional valve,
2. A GCM failure,
3. The proportional valve is physically jammed from foreign material or failure.

Each cause is addressed here.

**PRECAUTIONS**

See [PRECAUTIONS](#) section in introduction.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

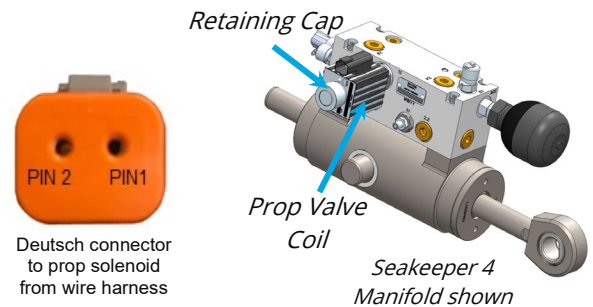
PRODUCT      SEAKEEPER 1, 4, AND 4.5



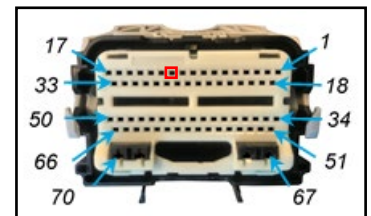
Code 115

**PROCEDURE**

1. **VERIFY** all electrical connections to manifold solenoid and GCM are made securely.
2. **CHECK** labels of harness connectors correspond to appropriate device.
3. **ENSURE** coil is secured to proportional valve by checking threaded coil retaining caps tight.
4. **OPEN/TURN OFF** all DC power to Seakeeper.
5. **TEST** proportional valve per following:
  - a. **DISCONNECT** GCM 70-pin connector.
  - b. **TEST** resistance  $0.3\Omega$  or less between pin **2** of prop valve connector and GCM pin **11**.
  - c. **VERIFY** no short between pin **1** and pin **2** of brake valve connector.
  - d. **RECONNECT** all harness connectors.
  - e. **RESTORE** low current DC power.
  - f. **ACTIVATE** brake override.
  - g. **ENSURE** manual precession is available.



Deutsch connector to prop solenoid from wire harness



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 115

Step 5 continued

- h. **USE** decision table to decide remedy steps:

| CONDITION                                    | REPLACE<br>WIRE<br>HARNESS | GO TO BRAKE<br>OVERRIDE<br>INOPERABLE<br>SECTION | GO TO<br>STEP 6 |
|----------------------------------------------|----------------------------|--------------------------------------------------|-----------------|
| Step 5.b resistance high (greater than 0.3Ω) | ✓                          |                                                  |                 |
| Step 5.c has low resistance (short)          | ✓                          |                                                  |                 |
| Step 5.g manual precession NOT available     |                            | ✓                                                |                 |
| Checks of Step 5 were SATISFACTORY           |                            |                                                  | ✓               |

6. **IF** alarm persists,  
**THEN:**

- a. **LOG** CAN data using Seakeeper Service Tool app per [SWI-118](#) with alarm active.
- b. **CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all data collected from testing.

\*\*\*\*\* **END** \*\*\*\*\*



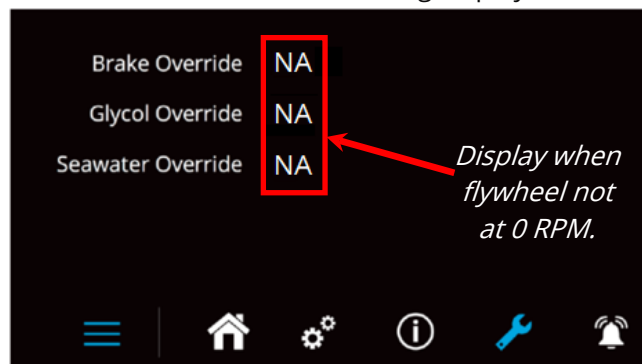
PRODUCT      SEAKEEPER 1, 4, AND 4.5

**BRAKE OVERRIDE INOPERABLE**

To troubleshoot and repair the inability to engage Brake Override from the display(s)/MFD app.

**BACKGROUND**

This procedure assumes there are no alarms on the display; this issue's symptom is only the inability to precess the enclosure with the override activated. If an alarm is active, address it first per TROUBLESHOOTING GUIDE. **No override is available if the flywheel is rotating;** verify the flywheel RPM reads zero RPM on service screen before attempting to engage any override. One should see the following displays if the overrides are unavailable:



When the flywheel is at rest and the brake override activated, a clicking sound should be heard at the stabilizer from the manifold solenoid activating. If this sound is not heard, attention should be given to the electrical troubleshooting of connections and wiring harness integrity.

Rectified brake manifolds resist manual precession due to design. It may be necessary to use mechanical advantage to precess a sphere manually.

**REFERENCES**

Applicable Seakeeper Service Drawings on [Dealer Access](#)  
[SWI-211 – Seakeeper Cylinder Replacement](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) section in introduction.

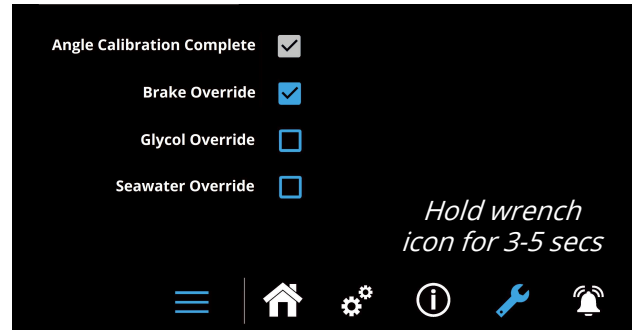
**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

Brake Override Inop.

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**PROCEDURE**

1. **VERIFY** display functional:
  - a. **CYCLE** DC control power to Seakeeper.
  - b. **TEST** MFD app / 5" touch display functionality:
    - i. **ACTIVATE** Glycol Override.
    - ii. **DEACTIVATE** Glycol Override.
  - c. **IF** any issues found in display, **THEN CONNECT** spare 5" display at Seakeeper **AND ACTIVATE** brake override.
  - d. **IF** enclosure can now be manually precessed, **THEN TROUBLESHOOT** MFD app/display connectivity.



2. **VERIFY** electrical connections at brake valve and GCM are made securely.

*Brake Valve**Properly connected GCM 70-pin connector*

3. **CHECK** labels of harness connectors correspond to appropriate devices.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

Brake Override Inop.

PRODUCT SEAKEEPER 1, 4, AND 4.5

4. **ENSURE** DC supply voltage in normal range:
  - a. **DISCONNECT** DC INPUT connector.
  - b. On vessel supply connector, **VERIFY** DC voltage within 0.6 VDC of battery voltage.
  - c. **VERIFY** DC voltage 11-15 VDC (12V system) or 22-32 VDC (24V system).
5. For Seakeeper 4.5, **ENSURE** MFD app/display Service screen does NOT show "1234 RPM."
  - a. **IF** this Motor Drive fault is seen, **THEN REPLACE** Motor Drive Box.
6. **IF** no sound heard locally at manifold **OR** solenoid does NOT become warm when brake override activated, **THEN CHECK** manifold solenoids per [Code 78](#) Troubleshooting Guide.
7. **IF** solenoid energizes and only limited manual precession is allowed, **THEN CHECK** for freedom of movement of enclosure and guide bands.
8. **IF** brake override remains inoperable, **THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with summary of all actions taken and results of troubleshooting tests.

**\*\*\*\*\* END \*\*\*\*\***

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 6/104/155/157**

To troubleshoot and repair the following:

- DRIVE TEMP HIGH alarm (Code 6)
- DRIVE TEMPERATURE alarm (Code 104)
- ENCODER TEMP alarm (Code 155)
- DRIVE TEMPERATURE warning (Code 157)

**BACKGROUND**

Code 6 is triggered when the motor drive box (MDB) temperature exceeds a setpoint to initiate lock and coasting of the stabilizer. The alarm can be reset when drive temperature drops below a lower temperature setpoint. The setpoints are listed here.

| <b>DRIVE HIGH TEMPERATURE SET POINTS</b> |                               |              |                               |              |
|------------------------------------------|-------------------------------|--------------|-------------------------------|--------------|
| <b>MODEL</b>                             | <b>SEA MODE HI TEMP ALARM</b> |              | <b>SPOOLING HI TEMP ALARM</b> |              |
| Seakeeper 1                              | 85°C                          | Under 85°C   | 85°C                          | Under 85°C   |
| Seakeeper 4                              | Alarm @ 75°C                  | Clear @ 65°C | Alarm @ 78°C                  | Clear @ 65°C |
| Seakeeper 4.5                            | Alarm @ 70°C                  | Clear @ 65°C | Alarm @ 75°C                  | Clear @ 65°C |

Upon activation of a Code 6, the Seakeeper will lock, and coast the flywheel. If the drive temperature continues to rise and exceeds a threshold set in the drive's software, it would trigger Code 104. The higher temperature may drive further action to reduce or eliminate power consumption to reduce its heat.

Code 157 is enabled in AC-powered models as a warning when temperature in the MDB approaches the Code 6 set point. The Seakeeper will continue to operate when this warning is triggered but may not appear on display to operator. It will, however, be logged in alarm history.

Code 155 is intended to warn the user of an over-temperature condition (70°C) in the enclosure on Seakeeper 1 models. If the temperature sensor fails due to an electrical fault, it will display -40°C. If the display reads above 70°C, take action to cool the Seakeeper.

On Seakeeper 1, Code 157 alarm is enabled to secure Seakeeper operation during low-temperature conditions (-40°C). This code is unexpected due to the setpoint being set very low.

Several conditions can cause a high drive temperature: seawater supply failures, glycol coolant loop failures, or electrical failures. Bearing high-temperature alarm(s) or "Coolant Pump Fault" may also be in alarm history.

The glycol coolant system is shipped with a 50/50 Ethylene Glycol and distilled water mixture. If a different type of antifreeze liquid desired, a full system flush is required first. When glycol types are mixed, they can cause blockage of coolant paths and lead to high operating temperatures.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 6/104/155/15

Pod drives and large outboards with the station-keeping capability and/or joystick operation may cause an air-locked seawater pump. Additionally, clogged seawater strainers or impellers will restrict flow resulting in a high drive temperature. These possible causes should be kept in mind when troubleshooting temperature alarms.

The run times of a seawater pump after the Seakeeper is turned off will vary with the GCM programming. Some models' pump may run for 10 minutes, while other pumps will secure with the flywheel motor. If the Seakeeper secured and restarted within a short time, the time for heat dissipation may be inadequate to prevent a Code 6 or 104. Ensure operators understand that for short durations, it is better to place the Seakeeper in "LOCK" mode than to secure its operation.

Many new models use a seawater pump power relay. These models accommodate a DC-powered seawater pump. The motor drive temperature set point for seawater pump start and stop varies; see table for set points.

| SEAKEEPERS EQUIPPED WITH INTERNAL SEAWATER PUMP RELAY |                                                               |
|-------------------------------------------------------|---------------------------------------------------------------|
| MODEL                                                 | Drive temperature set points for seawater pump (Start / Stop) |
| Seakeeper 1                                           | 46°C / 44°C                                                   |
| Seakeeper 4                                           | 40-46°C / 38-44°C*                                            |
| Seakeeper 4.5                                         |                                                               |
| * Dependent on sea state                              |                                                               |

**REFERENCES**

Applicable Seakeeper Service Drawings on [Dealer Access](#)

Applicable Seakeeper Cooling Water Schematic

[SWI-207 - Seakeeper Glycol Flush work instruction](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) section of Introduction.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

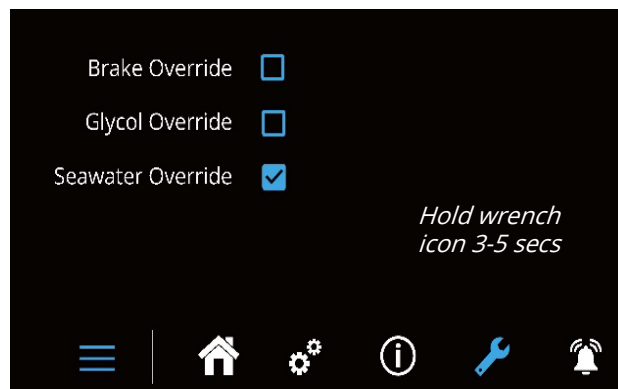
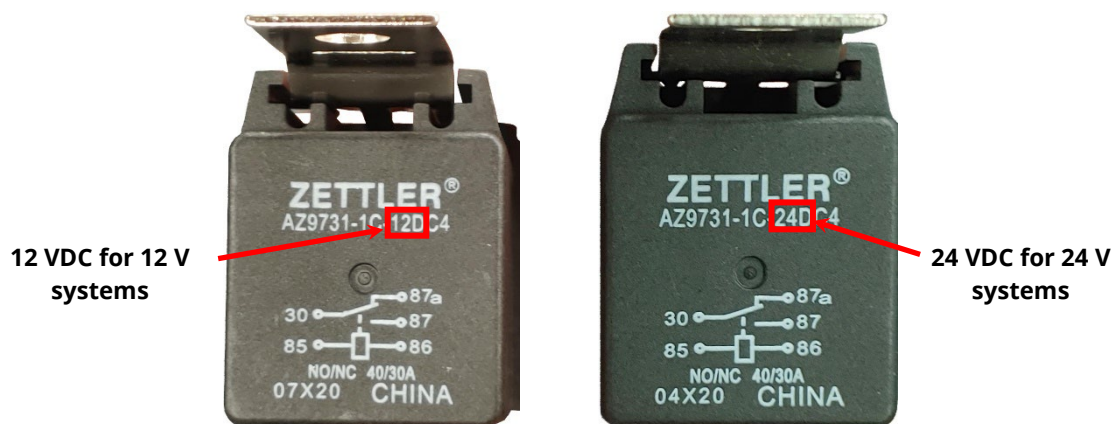
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 6/104/155/157

**PROCEDURE****NOTE:**

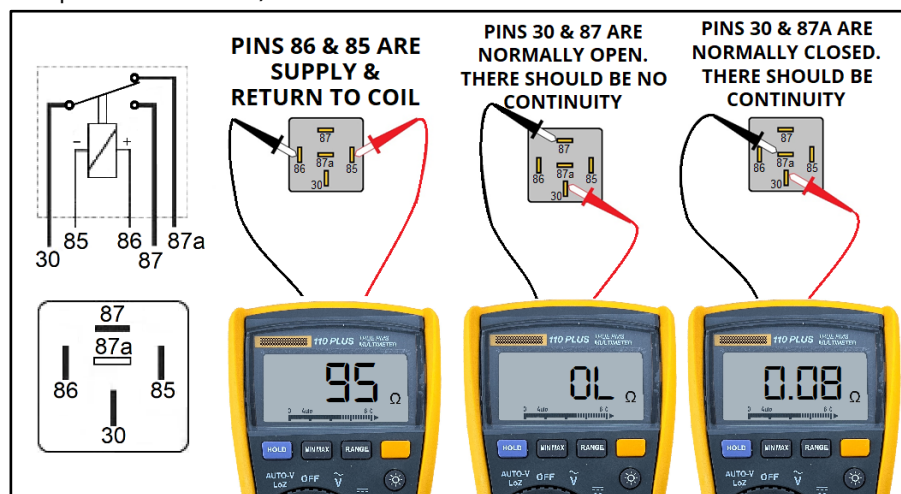
If boat is out of the water, using Seawater Override to electrically rotate seawater pump for less than 10 seconds should be acceptable for both AC & DC-powered models. Ensure an observer is local to pump to ensure it rotates.

1. **ACTIVATE** Seawater Override.
2. **IF** seawater pump running with override, **THEN PROCEED** to [Step 5](#).
3. **IF** seawater pump NOT running with override, **THEN DEACTIVATE** seawater override **AND PERFORM** following:
  - a. **VERIFY** independent seawater pump supply breaker closed/ON.
  - b. **VERIFY** seawater relay (POWER RELAY 2) voltage rating is appropriate for model.



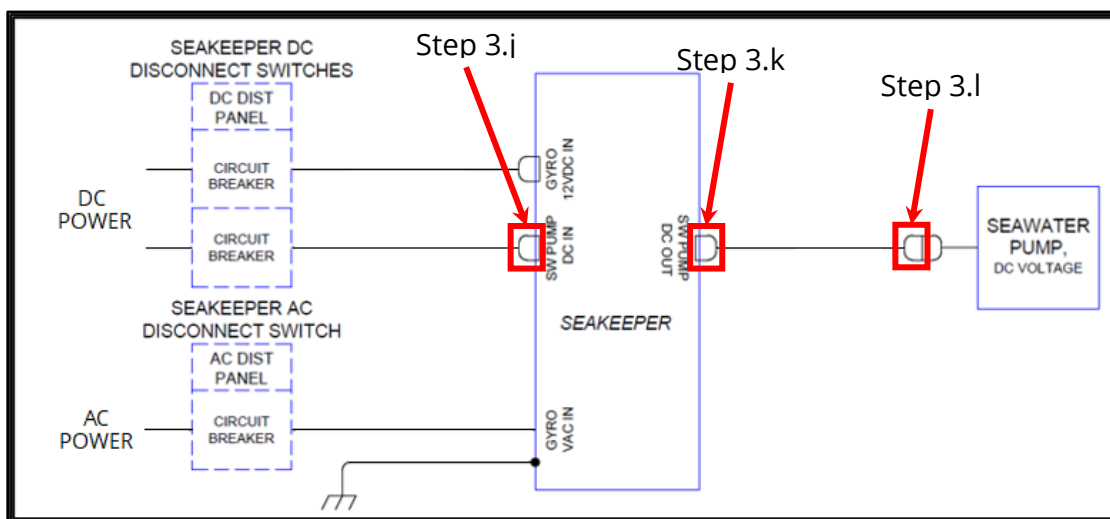
## Step 3 continued

- c. **REMOVE** seawater pump relay from harness.
- d. **TEST** contacts of relay with multimeter in Resistance mode using relay's markings as guide (pin **30** to pins **87A** and **87**):



- i. With multimeter in Resistance mode, **TEST** relay coil resistance (pin **85** and **86**).  
**Resistance:** \_\_\_\_\_ ohms
- ii. **ENSURE** NO continuity between pins **30** and **87**.
- iii. **ENSURE** less than 0.3 Ω between pins **30** and **87A**.
- e. **IF** relay resistance checks of step 3.d.ii and 3.d.iii **UNSATISFACTORY**, **THEN REPLACE** seawater pump relay.
- f. **IF** relay coil resistance is NOT between 324 to 396 ohms for 24-volt systems (81 – 99 for 12 V systems) in Step 3.d.i, **THEN REPLACE** seawater pump relay.
- g. **IF** supply breaker and seawater relay checks are satisfactory, **THEN VERIFY** wiring at seawater pump is correctly terminated.
- h. **DISCONNECT** seawater output power to seawater pump at DC SW pump.
- i. **ACTIVATE** seawater override.

## Step 3 continued



- j. **TEST** seawater pump power from boat as follows:
  - i. **DISCONNECT** SW PUMP IN cable at Seakeeper wire harness.
  - ii. **CHECK** 12/24 VDC in SW PUMP IN cable from boat breaker between pins **1** and **2**.
  - iii. **IF** voltage NOT present,  
**THEN:**
    - 1. **INSPECT** breaker connections secure.
    - 2. **IF** breaker connections secure,  
**THEN REPLACE** SW pump cable from boat to Seakeeper.
  - iv. **RECONNECT** SW PUMP IN cable to harness.
- k. **TEST** seawater pump power out of Seakeeper as follows:
  - i. **DISCONNECT** SW PUMP OUT cable from Seakeeper harness.
  - ii. **CHECK** 12/24 VDC at SW PUMP OUT harness connector between pins **1** and **2**.
  - iii. **IF** voltage NOT present,  
**THEN:**
    - 1. **VERIFY** wires and crimps of harness SW input and output connectors secure.
    - 2. **IF** wire(s) or crimp(s) NOT secure,  
**THEN REPAIR** affected connector(s).
    - 3. **IF** wires and crimps secure,  
**THEN REPLACE** wire harness.
  - iv. **RECONNECT** SW PUMP OUT cable to Seakeeper harness.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT        SEAKEEPER 1, 4, AND 4.5

Code 6/104/155/157

## Step 3 continued

- I.    **TEST** seawater pump power at the seawater pump as follows:
  - i.    **DISCONNECT** SW PUMP OUT cable at seawater pump.
  - ii.    **CHECK** 12/24 VDC between pins **1** and **2** of SW PUMP OUT cable at seawater pump.
    - i.    **IF** voltage NOT present at end of SW PUMP OUT cable,  
**THEN REPLACE** SW PUMP OUT cable.
    - ii.    **IF** voltage present,  
**THEN REPLACE** seawater pump.
  - m.    **DEACTIVATE** seawater override **AND RECONNECT** all connections.
4.    **TEST** seawater flow rate as follows:
  - a.    **ACTIVATE** seawater override.
  - b.    **VERIFY** seawater flow is adequate for applicable model per [ATTACHMENT 1](#). [Flow meter, as shown, is desirable, but a bucket and stopwatch can be used.]
  - c.    **IF** flow rate insufficient,  
**THEN:**
    - i.    **ENSURE** seawater plumbing vented of all air.
    - ii.    **ENSURE** seawater plumbing routed on continuous uphill from intake to discharge to minimize air in system per [ATTACHMENT 2](#).
    - iii.    **CHECK** seawater strainer for clogging.
    - iv.    **CHECK FULLY OPEN** flow valve (if applicable) and seacock.
    - v.    **REPLACE** seawater pump per [TB-90191, Seawater Pump Recommendations](#).
  - d.    **DEACTIVATE** seawater override.



PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 6/104/155/157

5. **IF** seawater pump cavitating or air locked,  
**THEN ENSURE** no leaks in seawater line as follows:
  - a. **INSPECT** piping/hoses/components from hull penetration to seawater pump for indications of air in-leakage.
  - b. **INSPECT** heat exchanger for any signs of external leakage.
  - c. **INSPECT** discharge hose/piping for any signs of leakage.
  - d. **REPAIR** any leakage found.
  - e. **ACTIVATE** seawater override.
  - f. **OPEN** heat exchanger reservoir cap to monitor level.
  - g. **IF** level rising/over-flowing (due to seawater leakage into coolant system),  
**THEN:**
    - i. **REPLACE** heat exchanger.
    - ii. **FLUSH** glycol system with freshwater (5 gal./ 19 L at minimum).
    - iii. **REFILL AND FLUSH** system with glycol per [SWI-207](#).
  - h. **IF** seawater pump still air-locked,  
**THEN CONSIDER:**
    - i. Educating vessel owner of operations that can cause air-locking
    - ii. Moving intake scoop
    - iii. Upgrading to self-priming pump

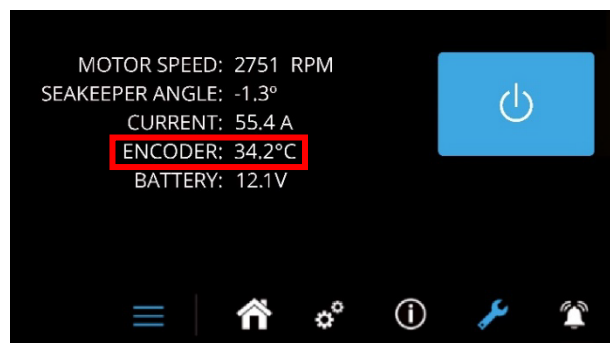
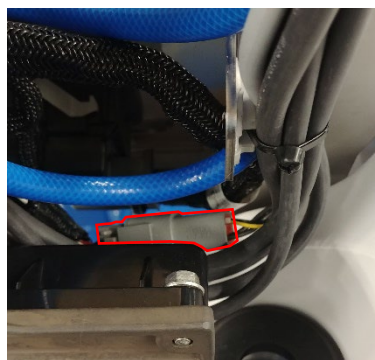
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

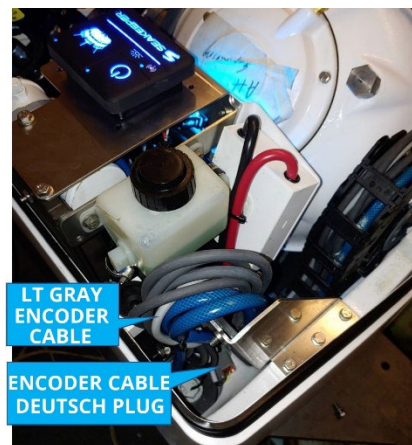
Code 6/104/155/157

6. **IF** ENCODER TEMP (Code 155)(Seakeeper 1)  
**AND** issue NOT resolved,  
**THEN:**

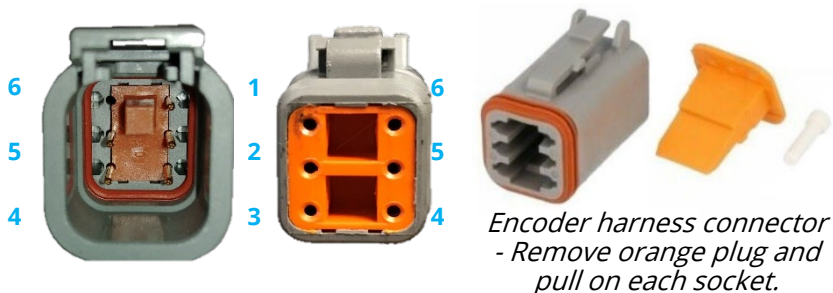
- a. At display/MFD app, **OBSERVE** enclosure temperature.
- b. **IF** temperature reads “-40°F/C,”  
**THEN CONTINUE** in this step.
- c. **OPEN / TURN OFF** 12 VDC supply breaker to Seakeeper.
- d. **DISCONNECT** encoder from harness.



*Encoder connector located at left rear of Seakeeper.*



- e. **VERIFY** pins and wires of Deutsch connectors of wire harness and encoder are secure.
- f. With multimeter, **MEASURE** resistance between pins **4** and **5** of encoder connector.



- g. **ACCESS** Curtis drive per [ATTACHMENT 3](#).
- h. **DISCONNECT** wire harness connector from Curtis Drive.

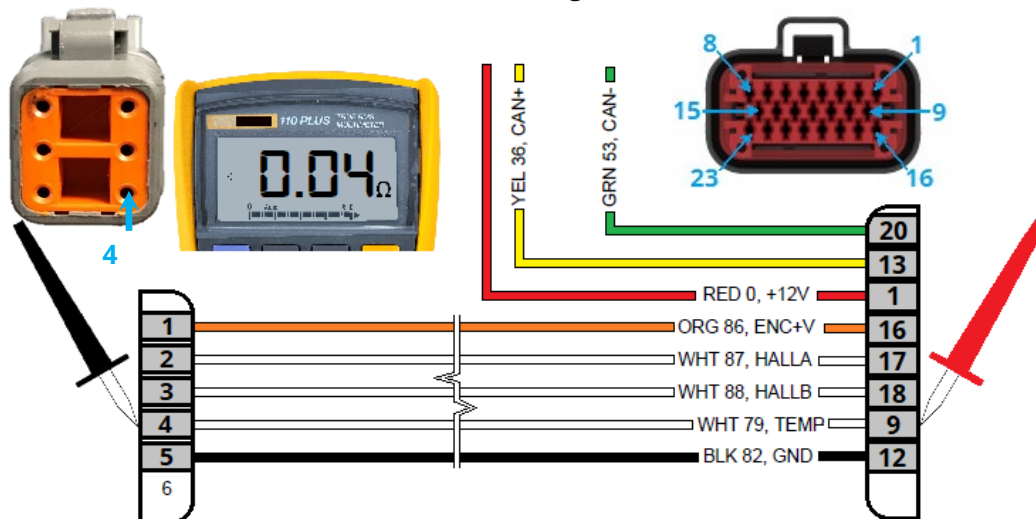
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 6/104/155/157

Step 6 continued

- i. **VERIFY** pins of Curtis drive box **AND** sockets of harness connector for damage or excessive corrosion. [See [ATTACHMENT 3](#) for accessing GCM and Curtis Drive]

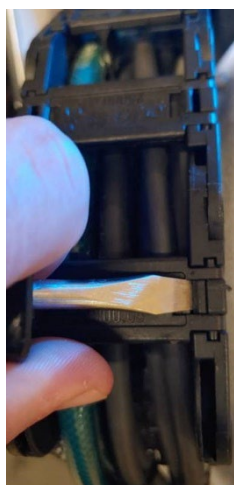


- j. With multimeter, **VERIFY** 0.3Ω or less within wire harness from encoder connector to Curtis drive connector:
- CONFIRM** 0.3Ω or less between pin **4** of encoder connector and pin **9** of Curtis connector.
  - CONFIRM** 0.3Ω or less between pin **5** of encoder connector and pin **12** of Curtis connector.
  - IF** either wire has no or intermittent continuity,  
**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with information and details.
  - IF** resistances SATISFACTORY,  
**THEN RECONNECT** Curtis drive **AND REATTACH** coolant reservoir and DC filter.

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 6/104/155/157

Step 6 continued

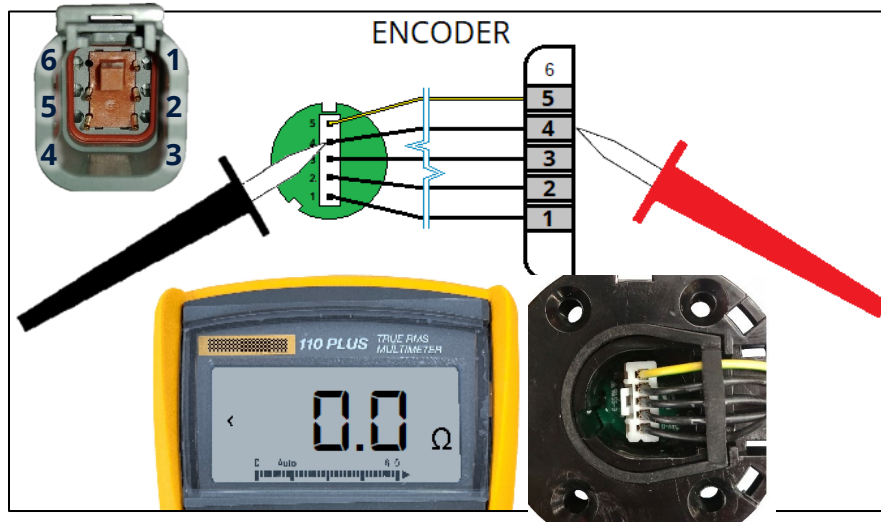
k. **TEST** encoder leads as follows:i. **ACTIVATE** brake override.ii. **MANUALLY PRECESS** enclosure fully toward rear latch.iii. **REMOVE** encoder housing snap cover.iv. **REMOVE** encoder wiring shroud from enclosure by removing two M2.5 Phillips pan head screws where wires enter shroud.v. **REMOVE** encoder housing and lead from enclosure by removing four Phillips flat head screws on encoder housing.vi. **OPEN** links of flexible chain, as needed, to remove enough encoder cable for testing.

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 6/104/155/157

Step 6.k continued

- vii.    **VERIFY**  $0.3\Omega$  or less between circuit board pin **4** and encoder connector pin **4**.
- viii.   **VERIFY**  $0.3\Omega$  or less between circuit board pin **5** and encoder connector pin **5**.



- ix.    **IF** greater than  $0.3\Omega$  or intermittent continuity,  
      **THEN REPLACE** encoder.
- x.    **RESTORE** encoder, shroud, and flexible chain lead.
- l.    **RESTORE** power to Seakeeper.

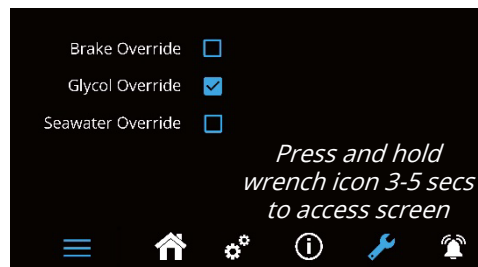
**CAUTION:**

**GLYCOL PUMP DAMAGE MAY OCCUR FROM RUNNING WITHOUT  
VISIBLE GLYCOL IN RESERVOIR.**

7. **ENSURE** proper amount of coolant inside heat exchanger by removal of reservoir filler cap.
  - a. **IF** coolant level is low,  
**THEN:**
    - i. **INSPECT** glycol system for leak.
    - ii. **IF** leak found,  
**THEN REPAIR** leaking component.
    - iii. **FILL** reservoir with same type glycol in system (typically 50/50 - Ethylene Glycol and Distilled Water) per [SWI-207](#).



8. **ACTIVATE** glycol override to circulate coolant.





**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

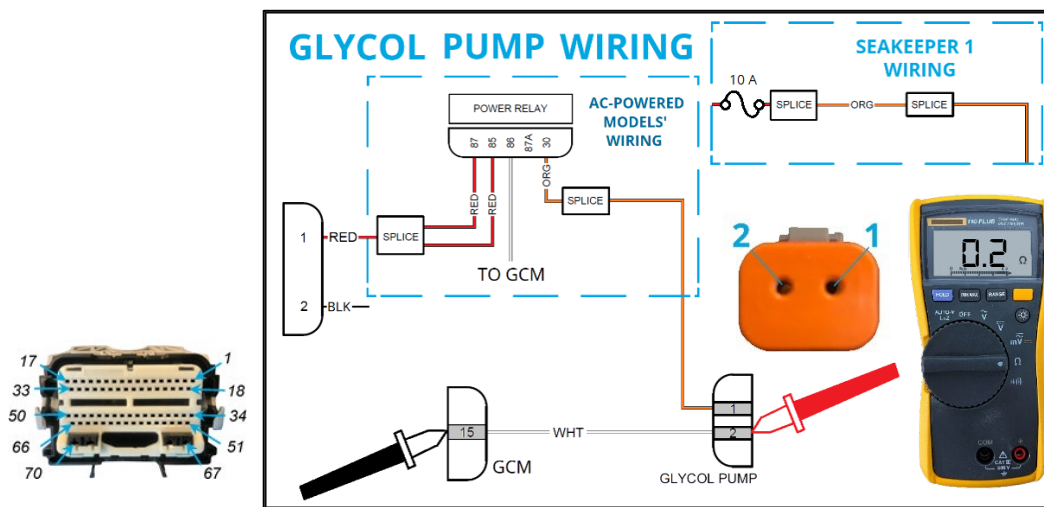
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 6/104/155/157

9. **REMOVE** reservoir filler cap **AND CHECK** for turbulent flow within reservoir.
- IF** no flow turbulence seen,  
**THEN PINCH/RESTRICT** bypass hose of enclosure cooling jackets **AND LISTEN** for flow noise.
  - IF** no indication of flow,  
**THEN PERFORM** following:
    - With glycol override still activated, **CONFIRM** voltage between pins **1** and **2** of harness connector to glycol pump by back-probing Deutsch connector.



- IF** voltage NOT within 0.3 volts of DC INPUT voltage,  
**THEN:**
  - DEACTIVATE** glycol override.
  - DISCONNECT** GCM 70-pin connector.
  - VERIFY** 0.3Ω or less between pin **2** of harness glycol pump connector and GCM pin **15**.



- VERIFY** 0.3Ω or less between harness glycol pump connector pin **1** and harness power relay pin **30** (AC-powered models) **OR** pin **1** of low current DC input harness connector (DC-powered models).



## Step 9.b continued

**NOTE:**

A faulty glycol pump or pump motor can burn out internal GCM glycol pump circuit. Issue may remain if just replacing glycol pump.

- iii. **IF** voltage in Step 9.b.ii and resistance checks in Step 9.b.ii.3 & 4 are SATISFACTORY **AND** no Code 8,  
**THEN:**
  - 1. **PERFORM** bench test of glycol pump (with independent power source with DC voltage matching Seakeeper)
  - 2. **IF** pump does not operate,  
**THEN REPLACE** glycol pump.
  - 3. **IF** pump operates on bench but not in Seakeeper,  
**THEN REPLACE** GCM **AND** glycol pump.
- iv. **RECONNECT** all harness connections opened.
- v. **IF** glycol flow NOT re-established,  
**THEN CHECK** for blockage in coolant paths as follows:
  - 1. **OBTAIN** bucket/container to catch glycol from system.
  - 2. **REMOVE** coolant hose at each component in cooling loop **AND ACTIVATE** glycol override with hose directed into bucket/container.
  - 3. **FLUSH** glycol loop with freshwater hose.
  - 4. **IF** blockage suspected in water jackets of enclosure,  
**THEN CONTACT** Seakeeper Product Support Team for guidance in opening and cleaning water jackets.
  - 5. **PERFORM** [SWI-207](#), Glycol Service procedure to restore glycol.
- c. **PERFORM** sea trial to ensure alarm cleared.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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PRODUCT        SEAKEEPER 1, 4, AND 4.5

Code 6/104/155/157

10. **IF** alarm persists,  
**THEN:**
  - a. **COLLECT** all data taken from testing and summary of all steps taken.
  - b. **SUBMIT** data to Seakeeper Product Support Team at [support@seakeeper.com](mailto:support@seakeeper.com) for review.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

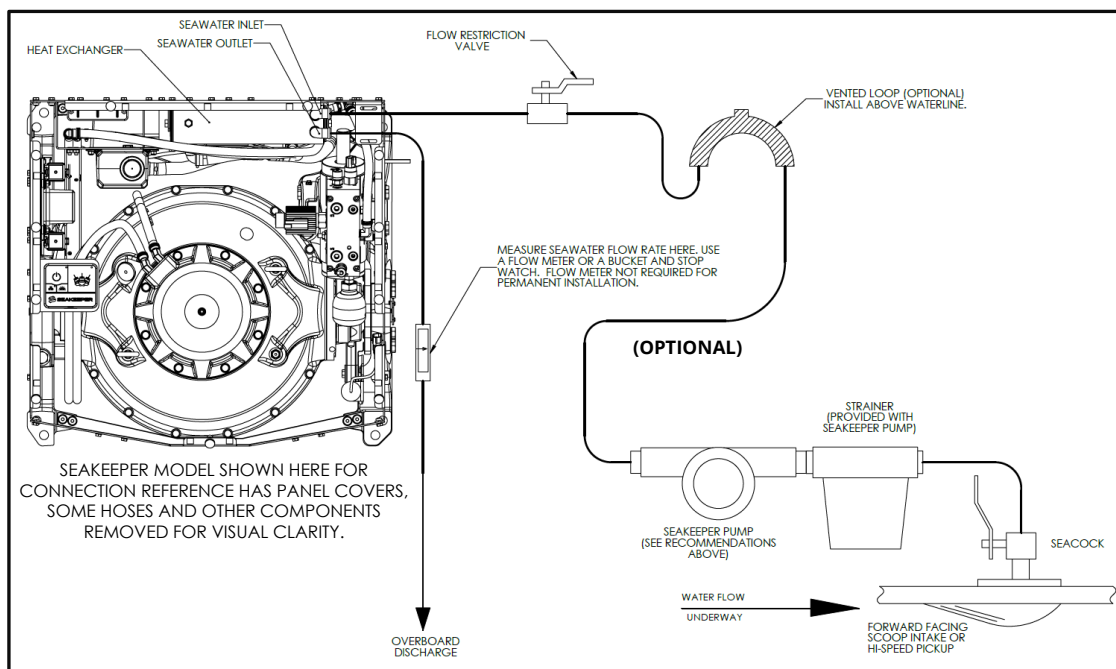
Code 6/104/155/157

**ATTACHMENT 1 - Seawater Requirements per Model**

| MODEL<br>(S/N RANGE) | FLOW<br>RANGE<br>GPM (LPM) | SEAWATER<br>PUMP POWER        |
|----------------------|----------------------------|-------------------------------|
| <b>Seakeeper 1</b>   | 2 – 4<br>(7.6 – 15.1)      | 12 VDC, 15A                   |
| <b>Seakeeper 4</b>   | 2.5 – 4<br>(9.5 – 15.1)    | 12 VDC, 15A                   |
| <b>Seakeeper 4.5</b> |                            | 12 VDC, 15A or<br>24 VDC, 10A |

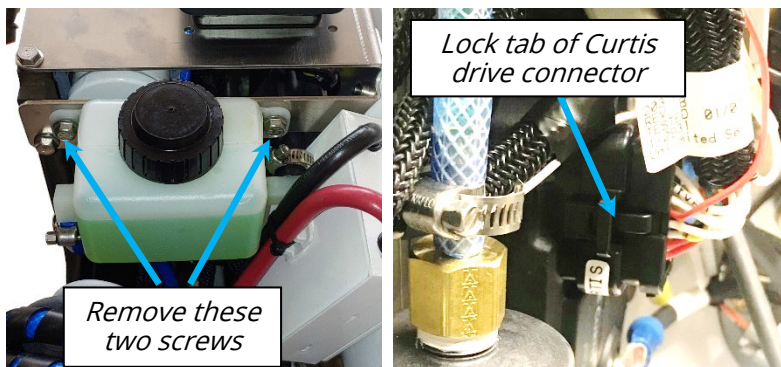
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 6/104/155/157

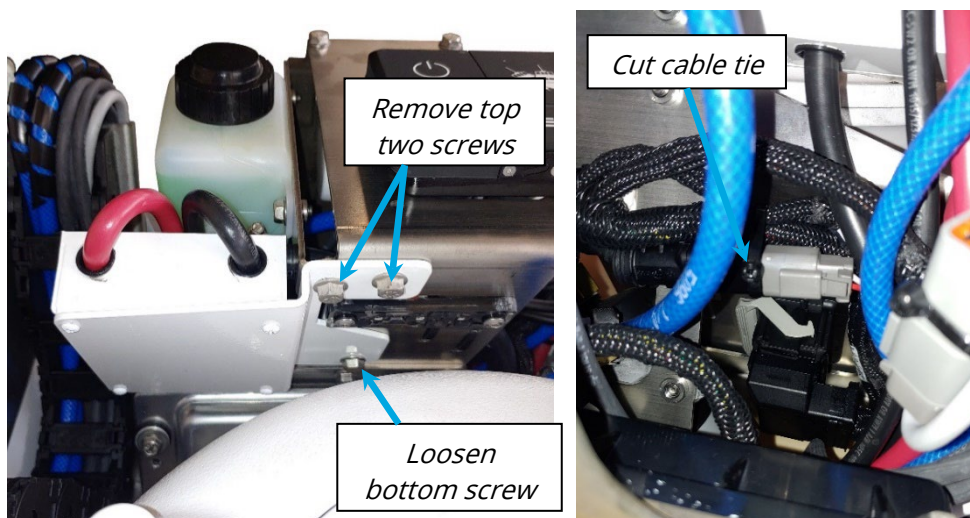
**ATTACHMENT 2 - Typical Seawater Plumbing**

**ATTACHMENT 3 – Accessing Seakeeper 1 GCM and Curtis Drive**

1. **REMOVE** two screws securing glycol reservoir to frame.



2. **MOVE** reservoir to side.
3. **DISCONNECT** harness glycol pump connector, if desired.
4. **DISCONNECT** harness Curtis drive connector, if desired.
5. To access GCM, **REMOVE** top two screws of DC Filter.



6. **LOOSEN** third lower screw of DC Filter.
7. **PULL** DC Filter up and away from mounting bracket.
8. **PLACE** DC filter to side.
9. **CUT** cable tie to access GCM 70-pin connector, if desired.

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 8**

To troubleshoot and repair a COOLANT PUMP 1 FAULT alarm (Code 8).

**BACKGROUND**

The Coolant Pump 1 Fault alarm is produced when the glycol pump current draw is less than 0.25 amps, indicating a bad connection, a faulty pump motor, or a lack of coolant. Subsequently, the alarm will clear once the amperage rises above 0.25 A. The alarm will remove power from the flywheel motor and lock the Seakeeper.

In factory testing, it was determined that a low DC voltage may trigger a Code 8 in addition to Code 41 (DC Input Voltage Low). If Code 8 is accompanied by Code 41, troubleshoot Code 41 first.

**REFERENCES**

Applicable Seakeeper Service Drawings on [Dealer Access](#)

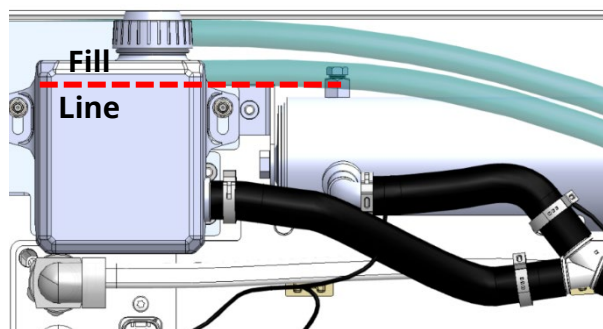
[SWI-207 - Seakeeper Glycol Service work instruction](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) of Introduction section.

**PROCEDURE****WARNING:****PERSONNEL PINCH HAZARD EXISTS. Seakeeper may be started remotely.**

1. **PERFORM** following:
  - a. **OPEN/TURN OFF** AC or high current DC breaker to Seakeeper.
  - b. **ENSURE** flywheel at zero RPM at display/MFD app.
2. **INSPECT** all electrical connections are secure as follows:
  - a. **VERIFY** glycol pump's connection is secure.
  - b. **ENSURE** GCM 70-pin connector is secure.
3. **CHECK** that glycol level is near maximum fill level.
  - a. **IF** glycol level is low,  
**THEN FILL** reservoir per [SWI-207](#).
4. **ACTIVATE** glycol override
5. **VERIFY** glycol pump is running by touch or noise.



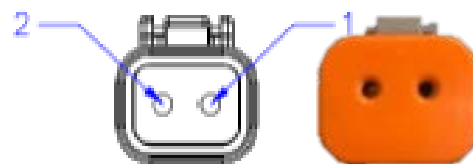
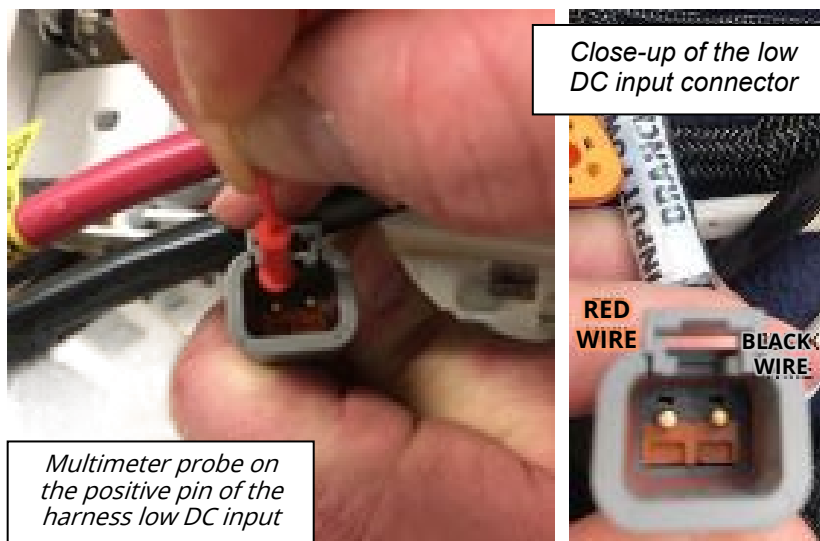
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 8

6. **IF** glycol pump is not running,  
**THEN PERFORM** following:
- With multimeter and back-probes, **VERIFY** DC voltage at glycol pump connector within 0.3 volts of DC INPUT voltage.

\_\_\_\_\_ VDC

- IF** no (or low) voltage present,  
**THEN PERFORM** following tests:
  - At DC INPUT, **VERIFY** voltage read in step 6.a for model. (For 12VDC models, voltage should be 11.0-14.0VDC. If 24VDC model, voltage should be 22.0-28.0VDC.)
  - IF** input DC voltage NOT SATISFACTORY,  
**THEN TROUBLESHOOT** vessel electrical system.
  - IF** DC model,  
**THEN TEST** for 0.3Ω or less between pin **1** of glycol connector and low DC Input Power positive pin **1** (Red Wire).



- IF** AC model,  
**THEN TEST** for 0.3Ω or less between pin **30** of Power Relay and pin **1** of glycol pump harness connector.

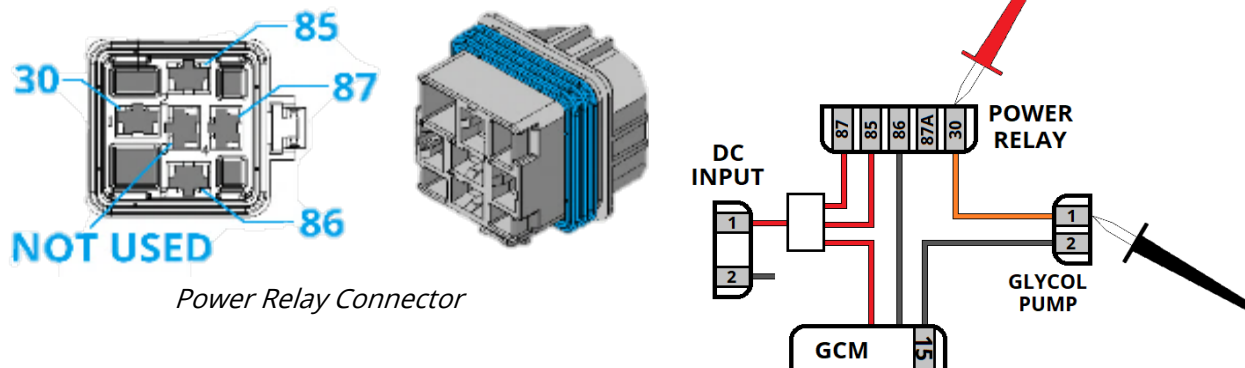


PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 8

Step 6.b continued

- v. **TEST** for  $0.3\Omega$  or less between pin **2** and corresponding GCM pin **15**.



- vi. **IF** all resistance tests are satisfactory **AND** voltage present,  
**THEN REPLACE** glycol pump.

**Glycol Pump Part No.**

Seakeeper 1.....40635

Seakeeper 4 &amp; 4.5.....40434

- vii. **IF** there was high resistance,  
**THEN:**

1. **INSPECT** associated connectors for loose wires or crimps.
2. **REPAIR** loose wires or crimps if found.
3. **RETEST** harness for resistances.
4. **IF** resistances remain greater than  $0.3\Omega$ ,  
**THEN REPLACE** wire harness.

- viii. **RECHECK** for voltage at Glycol Pump.

- ix. **IF** no voltage at Glycol Pump after wire harness repair/replacement,  
**THEN REPLACE** GCM.



Testing continuity

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

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Code 8

PRODUCT        SEAKEEPER 1, 4, AND 4.5

7.    **IF** Glycol Pump replaced,  
      **THEN FILL** cooling system with glycol mixture per [SWI-207](#).
8.    **DEACTIVATE** all overrides.
9.    **VERIFY** all alarms clear.
10. **IF** alarm persists,  
      **THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all test results collected from procedure and any photos.

**\*\*\*\*\* END \*\*\*\*\***

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 16**

To troubleshoot and repair the DISCRETE SEAWATER PUMP alarm (Code 16).

**BACKGROUND**

Seakeeper models are equipped with seawater pump power relays that provide seawater pump motor power via a second source of DC power. The glycol pumps for these units run if the flywheel motor is energized. However, the seawater pump is powered on and off through the seawater pump power relay, as needed, based on the MDB internal temperature and operating conditions. The MDB temperature set point for seawater pump start varies between models (see Code 6 [Background](#) for set points).

Troubleshooting will concentrate on the relay and the coil circuitry. In addition to the relay, the above-mentioned models have a diode module that can create conditions for an alarm if a failure occurs; troubleshooting will address this module as well.

If other cooling system related alarms are active (i.e., [Code 6, "DRIVE TEMPERATURE HIGH"](#)), address this alarm first to possibly clear this fault.

**PRECAUTIONS**

See [PRECAUTIONS](#) of Introduction Section.

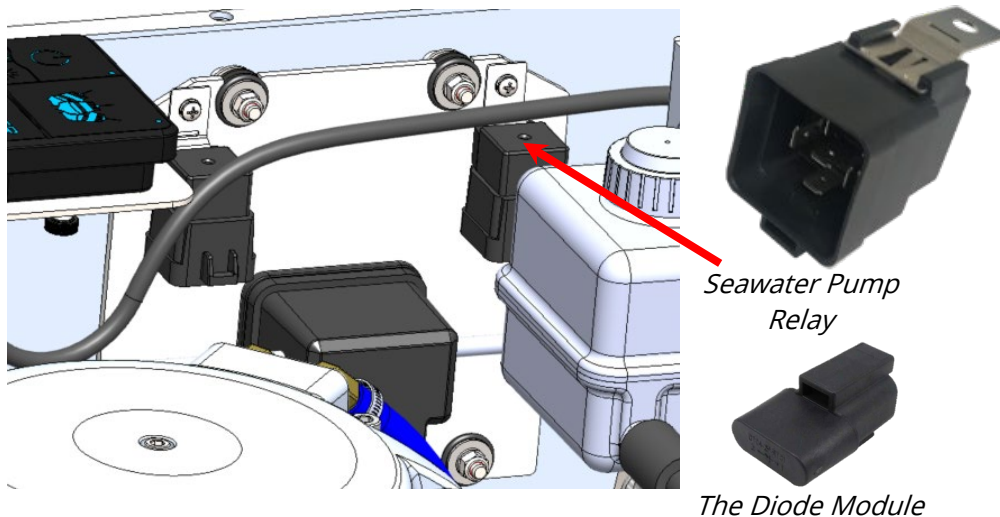
**PROCEDURE**

1. **PERFORM** following:
  - a. **OPEN / TURN OFF** AC or high current DC breaker to Seakeeper.
  - b. **ENSURE** flywheel at zero RPM at MFD app / display.
2. **CHECK** all electrical connections secure on seawater pump power relay.

**NOTE:**

Diode module is located on wire harness below seawater pump power relay.

3. **CHECK** diode module securely attached to wire harness.



4. **VERIFY** Seawater pump power as follows:
  - a. **VERIFY** DC breaker for seawater pump is closed / ON.
  - b. **ACTIVATE** seawater pump override at MFD app / display.
  - c. **TEST** for 12 / 24 VDC at seawater pump power line from breaker by back probing connection.
  - d. **TEST** for 12 / 24 VDC at Seakeeper pump output line by back probing connection.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 16

Step 4 continued

- e. **IF** voltage is 10 VDC or less for 12V systems or 18 VDC or less for 24V systems, **THEN TROUBLESHOOT** vessel electrical system. [**NOTE:** If seawater pump is aligned to different voltage source, verify that source voltage is satisfactory.]
- f. **DEACTIVATE** seawater pump override.

**WARNING:**

**PERSONNEL SHOCK HAZARD EXISTS** when working on energized circuits. Seakeeper may be started remotely.

- 5. **TEST** seawater pump power relay as follows:
  - a. **OPEN/TURN OFF** DC control power supply breaker.
  - b. **OPEN/TURN OFF** DC seawater pump supply breaker.
  - c. **VERIFY** nameplate voltage of seawater pump power relay is proper rating for seawater pump installed (as shown in photo).
  - d. **IF** data marked on relay does NOT state *12DC* (12V system) or *24DC* (24V system), **THEN REPLACE** seawater pump relay with one of proper rating.

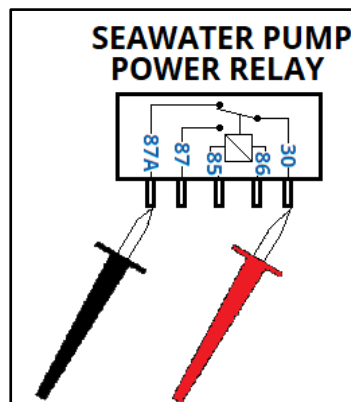


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 16

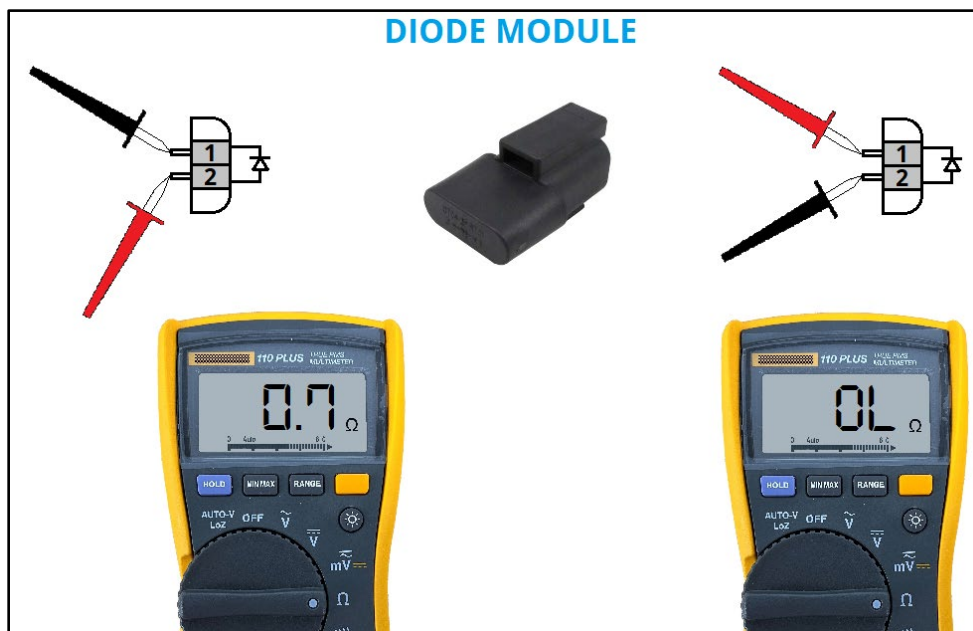
Step 5 continued

e. **DISCONNECT** wire harness from seawater pump power relay.f. **REMOVE** relay from GCM mount screw.g. With multimeter, **VERIFY**  $0.3\Omega$  or less between pin **30** and pin **87A on relay** (as shown in figure).h. **CHECK** coil resistance between pin **85** and pin **86 on relay**.i. Acceptable coil resistances are 81 to 99  $\Omega$  for 12V system, and 315 to 385  $\Omega$  for 24V system.i. **IF** resistance in Steps 5.g or 5.h were **UNSATISFACTORY**, **THEN REPLACE** seawater relay.j. **IF** seawater pump relay replaced, **THEN:**i. **RECONNECT** all connectors.ii. **RESTORE POWER** to Seakeeper.iii. **CHECK** Code 16 alarm clear.

**NOTE:**

Seakeeper 1 does NOT have a diode module.

6. **TEST** diode module as follows:

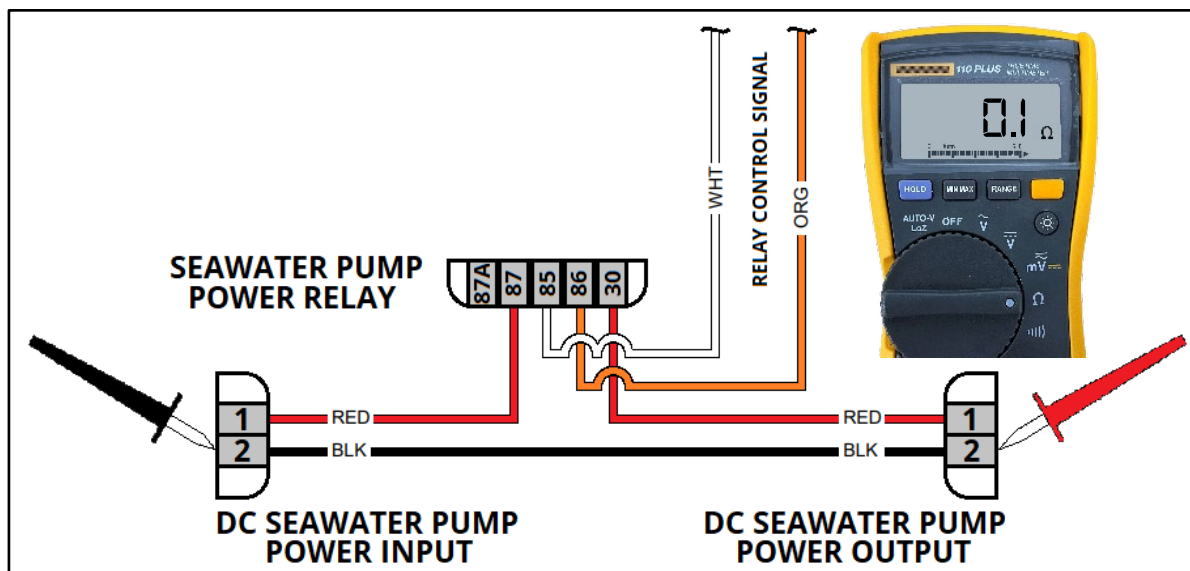


- UNPLUG** diode module from wire harness.
- With multimeter in resistance mode, **TEST** for high (OPEN LOOP) resistance in one direction **AND** 0.5 to 0.8-ohm resistance in other direction on two pins of diode module.
- IF** both resistances measured are high or "OL," **THEN REPLACE** diode module.
- IF** both resistances measured are relatively low (continuity in both directions), **THEN REPLACE** diode module.

**NOTE:**

Manipulate harness in a manner to recreate slight movement during operation in event an open is not seen when cable is stationary.

7. **TEST** wire harness as follows:
  - a. **ENSURE** DC control power and seawater pump supply breakers are OPEN/OFF.
  - b. **DISCONNECT** 70-Pin GCM connector from GCM.
  - c. **TEST** for 0.3Ω or less as follows:
    - i. **TEST** for resistance between Pin 2 of *DC SW Pump In* connector AND Pin 2 of *DC SW Pump Out* connector.





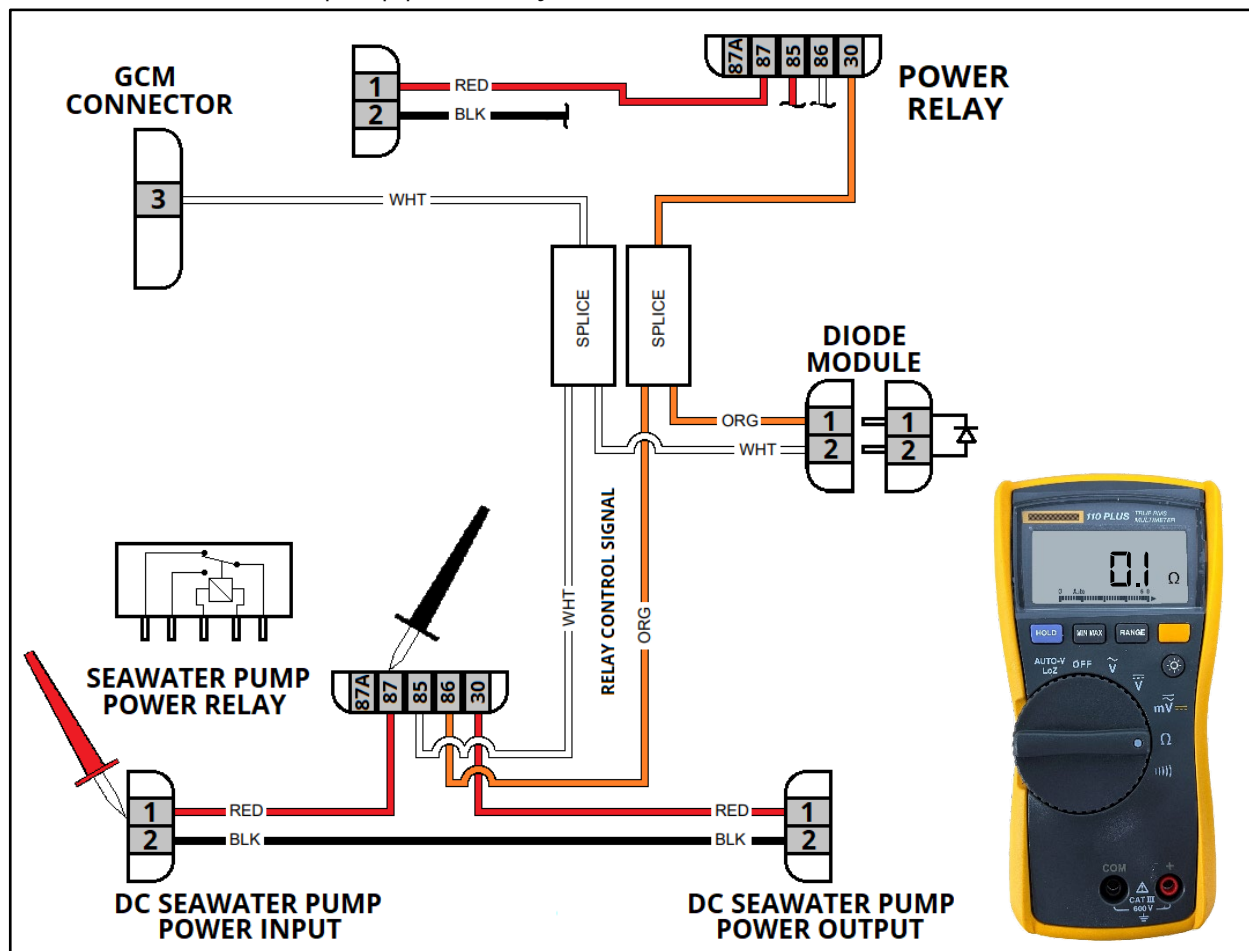
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 16

Step 7.c continued

- ii. **TEST** for  $0.3\Omega$  or less between Pin **1** of DC SW PUMP IN connector and Pin **87** of seawater pump power relay connector.

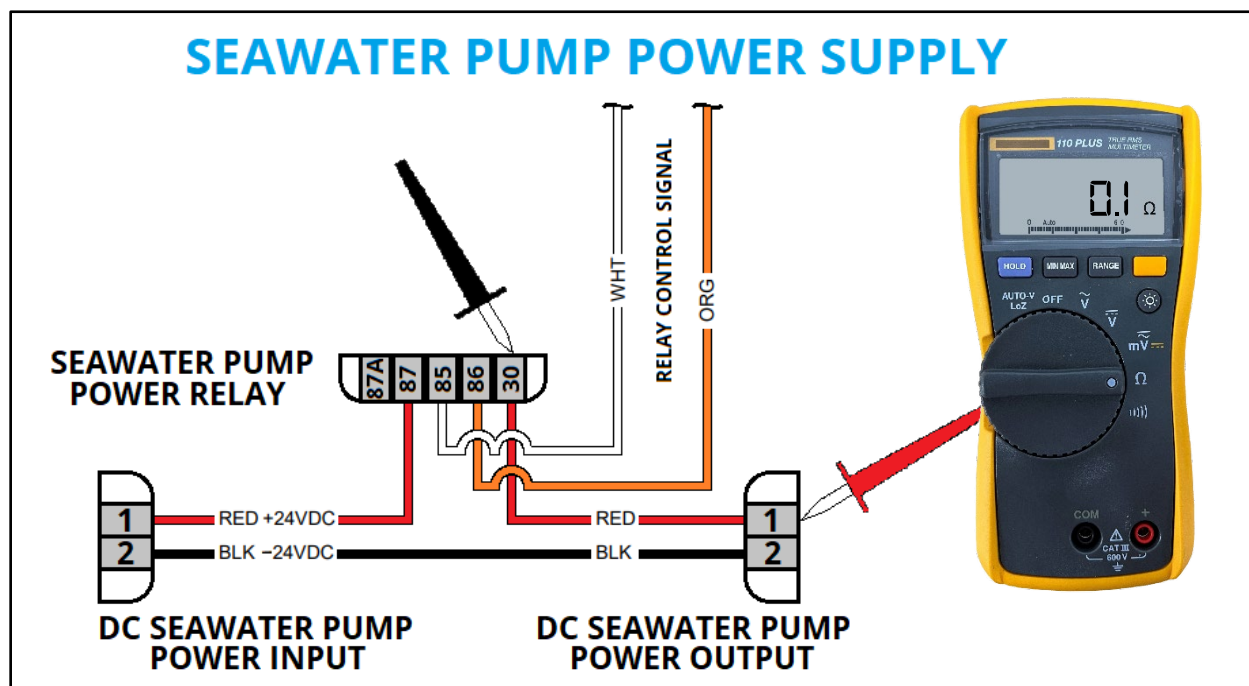


PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 16

Step 7.c continued

- iii. **TEST** for  $0.3\Omega$  or less between Pin **30** of seawater pump power relay connector and Pin **1** of DC SW PUMP OUT connector.



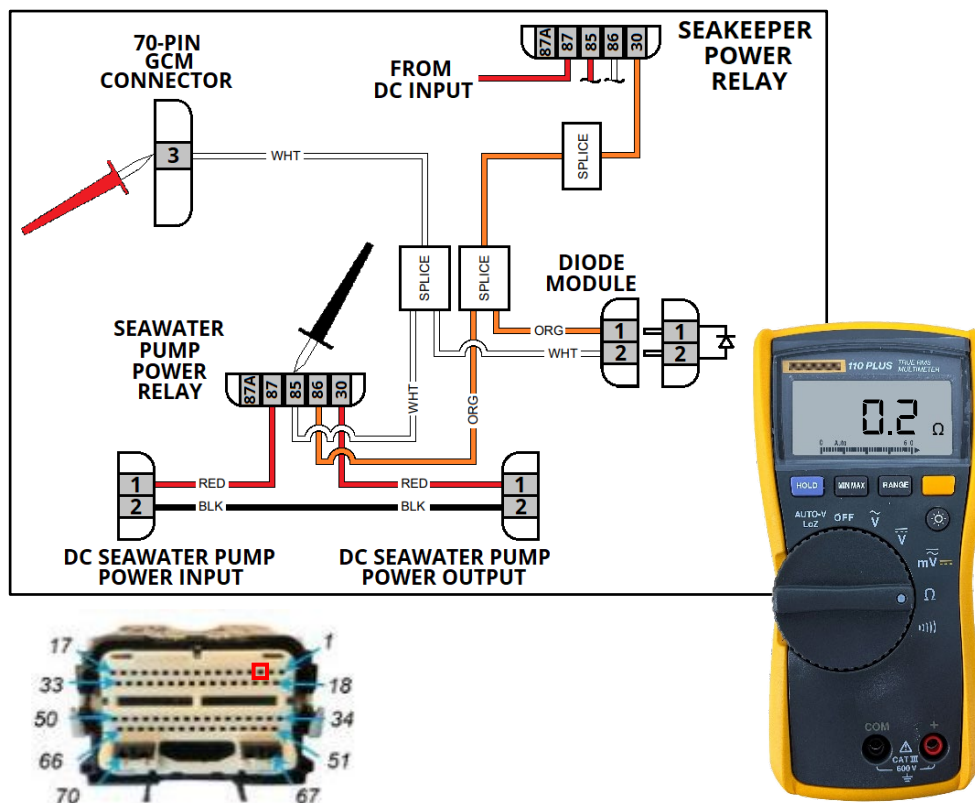
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 16

Step 7.c continued

- iv. **TEST** for  $0.3\Omega$  or less between Pin **85** of seawater pump power relay connector and Pin **3** of 70-pin GCM connector.



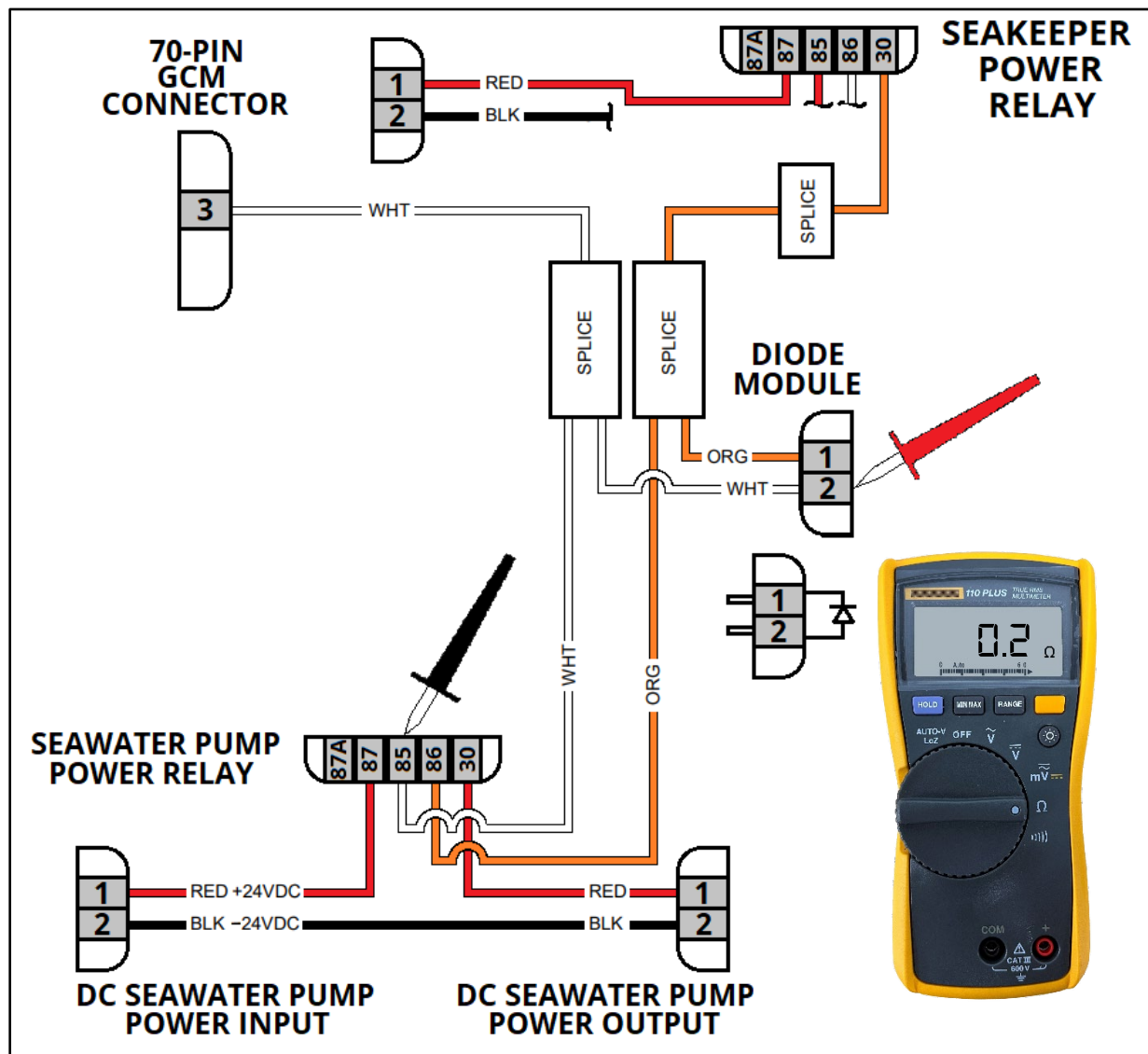
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 16

Step 7.c continued

- v. On AC models, **TEST** for  $0.3\Omega$  or less between Pin **85** of seawater pump power relay connector and Pin **2** of diode module connector.



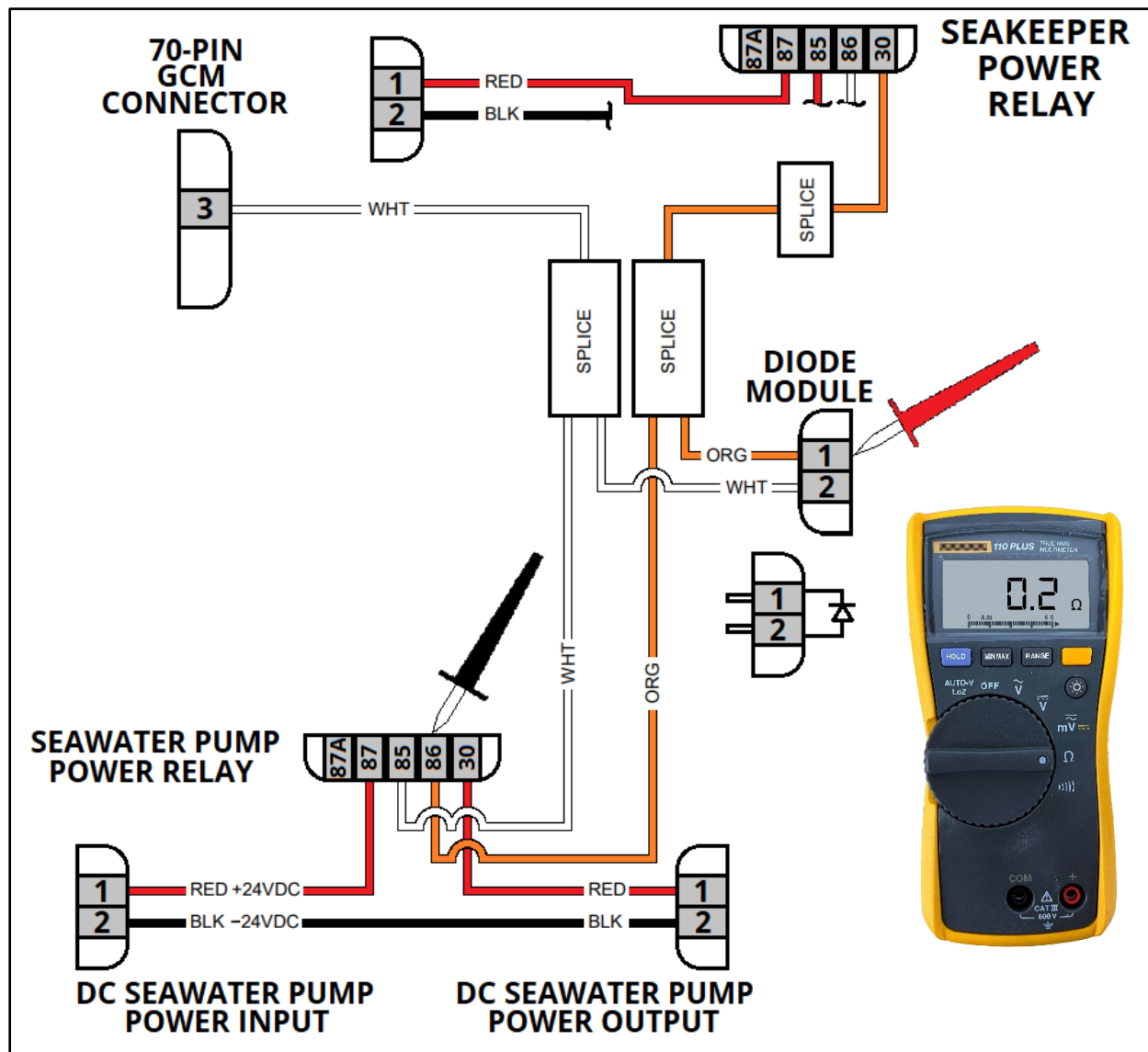
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 16

Step 7.c continued

- vi. On AC models, **TEST** for  $0.3\Omega$  or less between Pin **86** of seawater pump power relay connector and Pin **1** of diode module.



8. **IF ANY** test of Step 7.c is UNSATISFACTORY,  
**THEN REPLACE** wire harness.
- a. **IF** Seakeeper 1,  
**THEN CONTACT** Seakeeper Product Support Team before replacing harness.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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PRODUCT        SEAKEEPER 1, 4, AND 4.5

Code 16

9.    **IF** previous steps showed no faults,  
      **THEN REPLACE** GCM.
10.   After replacing GCM, **CHECK** Code 16, Discrete Seawater Pump Fault clear.
11.   **IF** alarm persists,  
      **THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all data collected from testing and summary of steps taken.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 4/119/126/127/155/170**

Troubleshoot and repair:

- "DRIVE 5V FAULT" alarm (Code 4)
- "ENCODER FAILURE" alarm (Code 119)
- "ENCODER SIG SIN" alarm (Code 126)
- "ENCODER SIG COS: alarm (Code 127)
- "DRIVE RESET FAULT" alarm (Code 170)

**BACKGROUND**

Code 4 is intended to alert the user of a fault in the Curtis motor controller 5 VDC system. This system powers the Encoder, at the bottom of the enclosure. Additionally, the alarm can be tied to the motor phases of the motor drive; if an open between motor drive phases occurs, the fault may produce this alarm.

Code 119 is received when there is a loss of either A or B signals from the Encoder while spooling or at speed. The fault can either be from an open loop or a short. If the user takes no action, the Seakeeper will attempt to restart and, after 15 seconds, will produce a Code 96 Drive Fault alarm. If Code 119 is accompanied by Code 4, the Encoder A or B signal may be shorted to the +5VDC supply on lead 1. If Code 119 is accompanied by Code 155, the Encoder ground cable may have an open loop. A fault in this wire will trigger Code 119, followed by Code 155 several seconds later.

Codes 126 and 127 are alarms associated with the Halls signal from the Encoder. A loss of either signal would trigger the associated signal's code.

Code 170 is triggered if the Curtis drive fails to boot up correctly at power on. The issue may be due to alarms immediately present or a drive hardware failure.

**REFERENCES**

[12093 - Seakeeper 1 Cooling Sub-system Drawing](#)

[12642 - Seakeeper 1 Upper Foundation Assembly](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

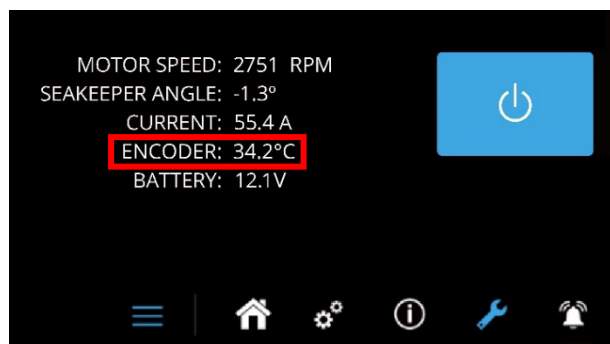
PRODUCT      SEAKEEPER 1, 4, AND 4.5

**PROCEDURE**

1. **PERFORM** this procedure in its entirety (multiple failures may cause a single code).

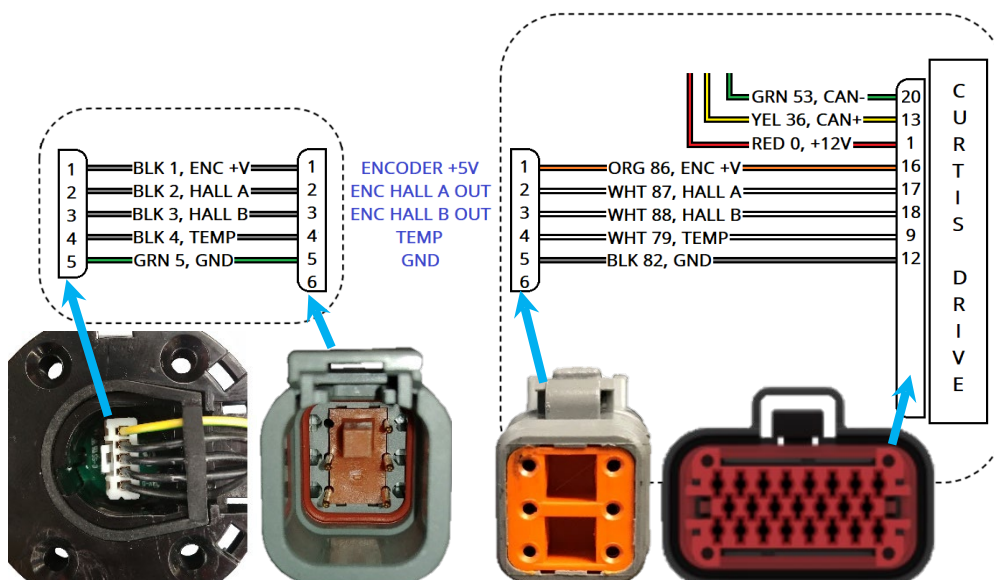
2. **IF** addressing Code 4 without Codes 119 and 155,  
**THEN:**

- a. At MFD app / display, **OBSERVE** enclosure temperature.
- b. **IF** temperature reads “-40°C”,  
**THEN PROCEED** to Step 4.
- c. **IF** temperature reads higher than expected  
**OR** Code 6 in recent alarm history,  
**THEN TROUBLESHOOT** per [Code 6 Troubleshooting Guide](#).

**WARNING!**

**PERSONNEL INJURY HAZARD EXISTS due to remote start capability.**

- d. **ENSURE** flywheel at zero RPM at MFD app / display.
- e. **ENSURE** all electrical connections are made securely at encoder, encoder wire harness connection **AND** Curtis drive. [Encoder located on bottom of enclosure sphere.]

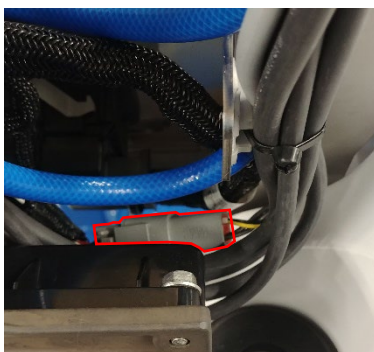




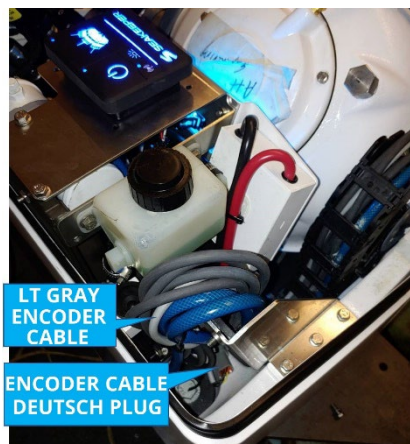
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

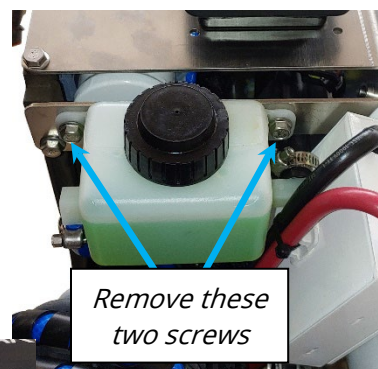
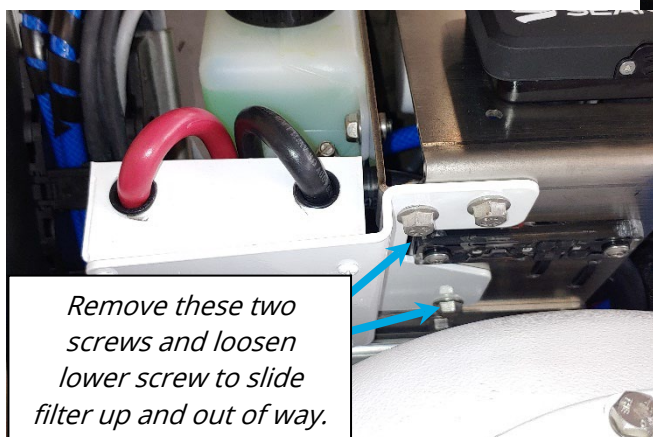
Code 4/119/126/127/170

3. **PERFORM** following:a. **DISCONNECT** Encoder from harness.

*Encoder connector located  
at right rear of Seakeeper.*

i. **IF** necessary for access,  
**THEN REMOVE** glycol reservoir **AND** DC Filter as follows:

1. **REMOVE** two screws securing glycol reservoir to frame.
2. **MOVE** reservoir aside.
3. **REMOVE** top two screws of DC Filter bracket.



4. **LOOSEN** lower screw of DC Filter bracket.
5. **LIFT AND MOVE** DC Filter aside.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 4/119/126/127/170

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Step 3 continued

- b. With multimeter in DC Volts mode, **TEST** for **4.5** to **5.5** VDC between pins **1** and **5** at Encoder harness connector.

**Voltage:** \_\_\_\_\_ V

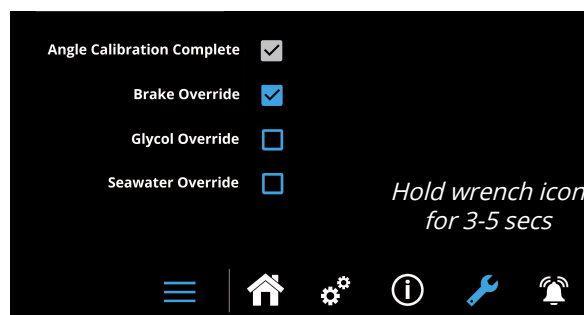
- i. **IF** NO voltage,  
**THEN PROCEED** to [Step 17](#).
- c. **ENSURE** pin wire crimps in Encoder connector are satisfactory.
- d. **ENSURE** pins/sockets are fully inserted and locked into both connectors.
- e. **IF** any issues found in wire harness or Encoder connectors,  
**THEN CONTACT** Seakeeper Product Support Team for parts.



*Encoder harness connector - Remove orange plug and pull on each socket.*

**WARNING!****PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.**

4. **ENSURE CLOSED/ON** Seakeeper breaker or isolator switch.
5. **ACTIVATE** brake override.
6. **MANUALLY PRECESS** enclosure fully toward rear latch **AND REMOVE** 10-amp control power fuse [for safety and to maintain enclosure in place].



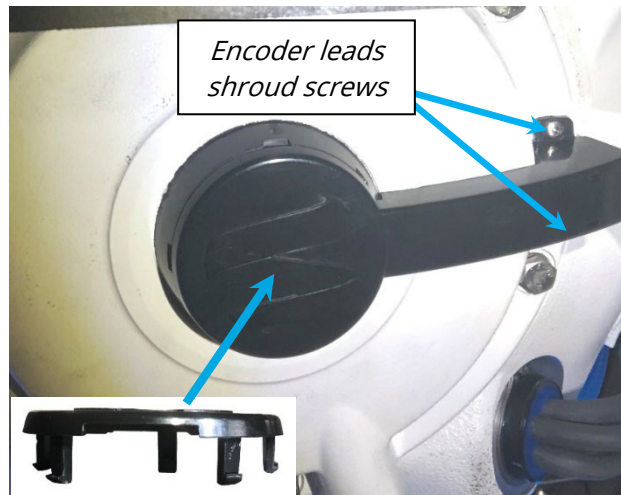
## SEAKEEPER TROUBLESHOOTING GUIDE- 206



PRODUCT      SEAKEEPER 1, 4, AND 4.5

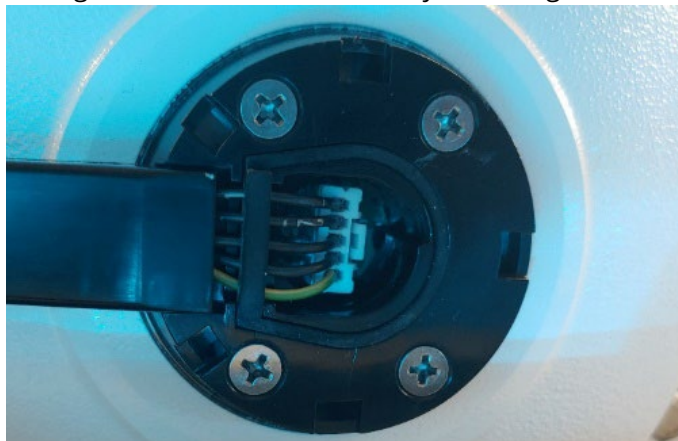
Code 4/119/126/127/170

7.     **REMOVE** Encoder housing snap lid.



8.     **REMOVE** Encoder wiring shroud from enclosure by removing two M2.5 Phillips pan head screws where wires enter shroud.

9.     **REMOVE** Encoder housing and lead from enclosure by removing four Phillips flat head screws.

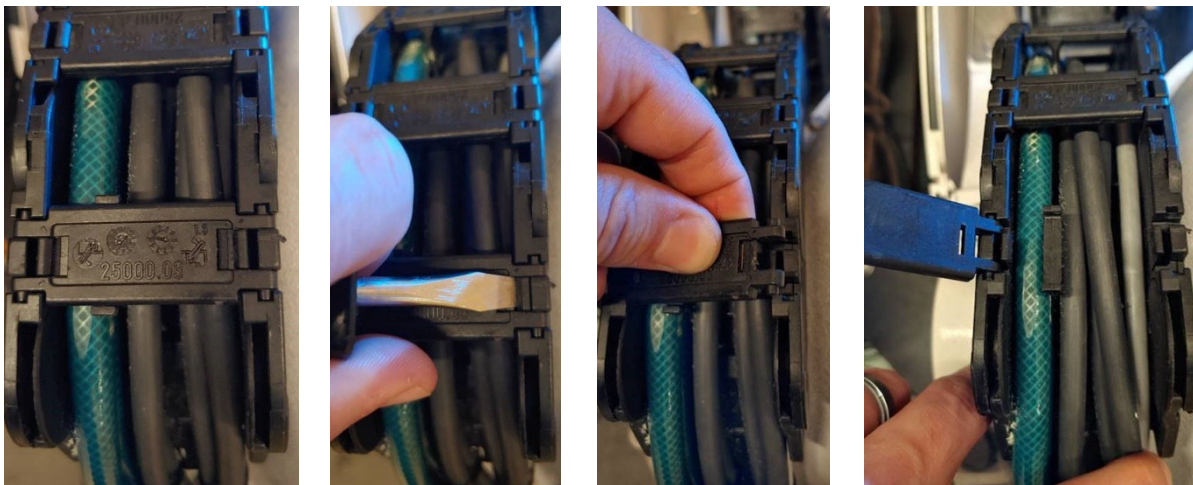


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

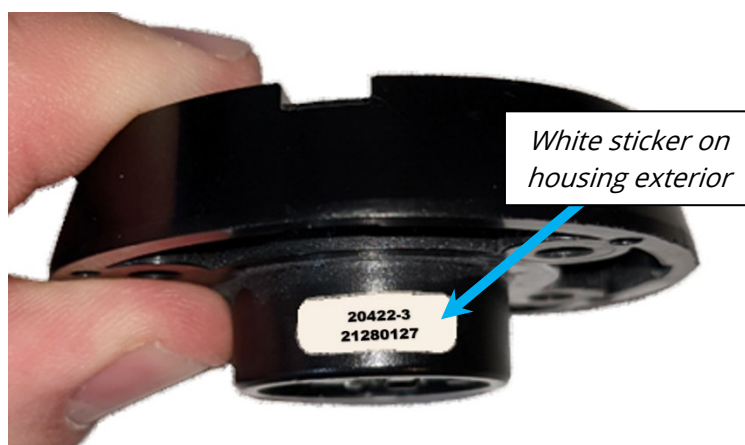
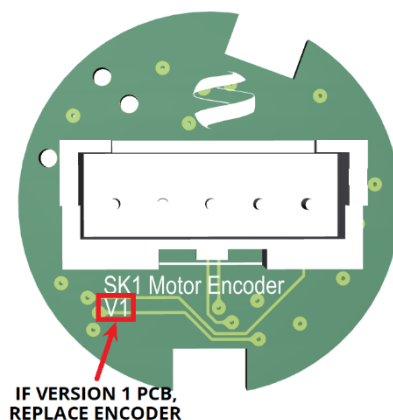
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 4/119/126/127/170

10. **OPEN** links of flexible chain, as needed, to remove Encoder light gray cable.
- a. **REMOVE** light gray Encoder cable and cable ties from chain around gimbal to gain access to encoder cable to harness connectors.



11. **IF** damage to connector, board **OR** connector and wires are NOT fully inserted **THEN REPLACE** Encoder **AND PROCEED** to Step 20 and 21 to verify harness integrity.
12. **IF** Encoder board is marked as "V1" and has NO white sticker, **THEN REPLACE** Encoder **AND PROCEED** to Step 20 and 21 to verify harness integrity.



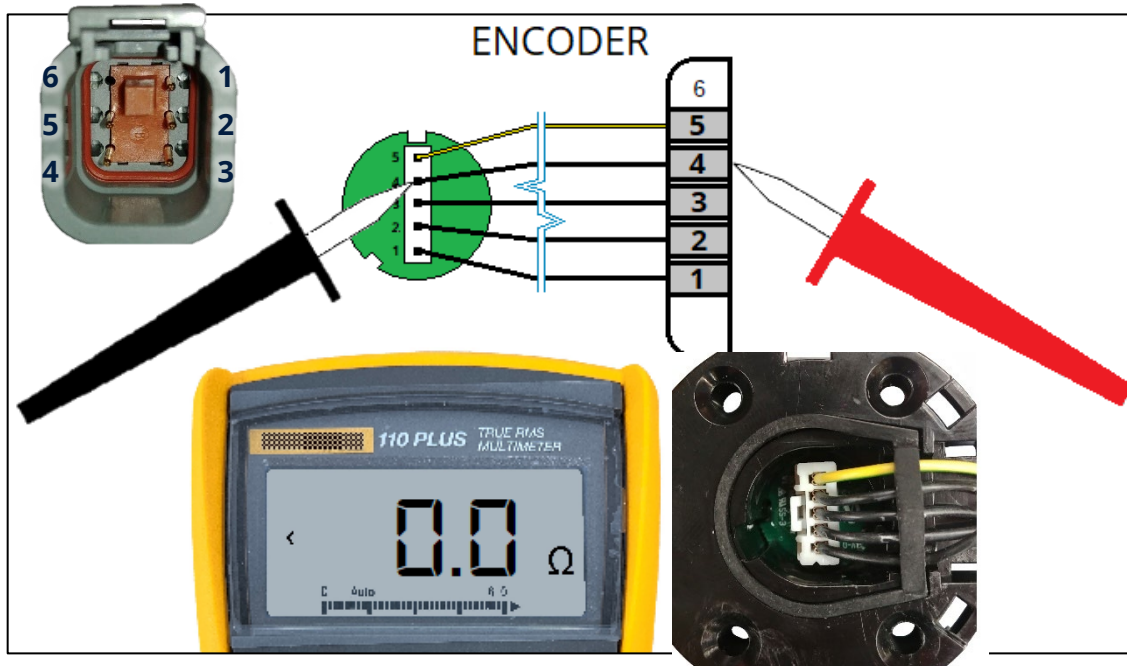


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 4/119/126/127/170

13. With multimeter in resistance mode, **PERFORM** following tests:



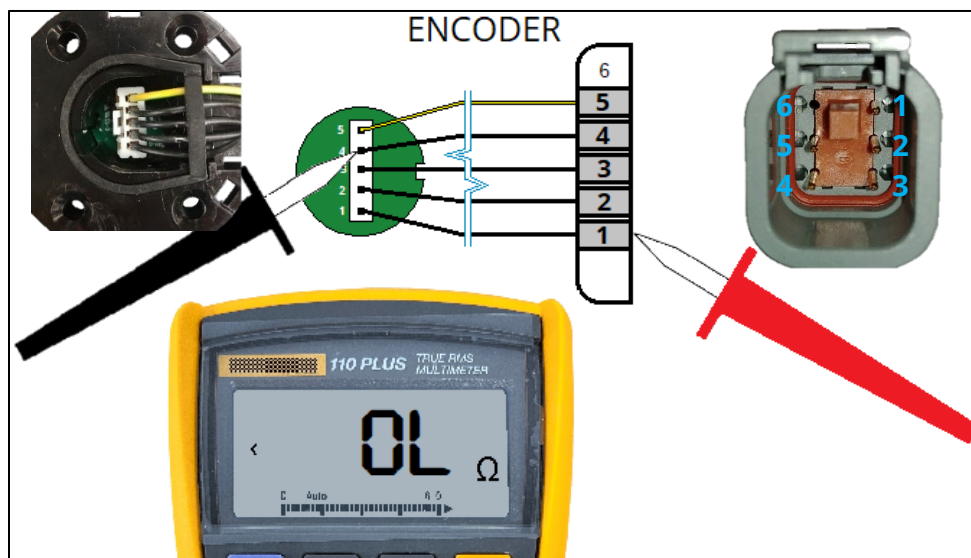
- a. **MEASURE** for RTD resistance between circuit board pins 4 and 5 to be in range of **1000-1450 ohms** (corresponds to temperature range of 0-120°C, linearly).
- b. **MEASURE** RTD resistance at connector pins 4 and 5 for same resistance seen above.
- c. **DISCONNECT** circuit board connector and Encoder harness connector
- d. **CONFIRM** below 0.3Ω between circuit board connector **1** and pin **1** of Encoder leads.
- e. **CONFIRM** below 0.3Ω between circuit board connector **2** and pin **2** of Encoder leads.
- f. **CONFIRM** below 0.3Ω between circuit board connector **3** and pin **3** of Encoder leads.
- g. **CONFIRM** below 0.3Ω between circuit board connector **4** and pin **4** of Encoder leads.
- h. **CONFIRM** below 0.3Ω between circuit board connector **5** and pin **5** of Encoder leads.
- i. **IF** any resistance indicated OPEN **OR** outside expected range in these sub-steps, **THEN REPLACE** Encoder.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 4/119/126/127/170

14. With circuit board and Encoder leads disconnected, **TEST** for short in Encoder leads as follows:



- Between circuit board connector **1** and Encoder lead pins **2, 3, 4,** and **5**.
  - Between circuit board connector **2** and Encoder lead pins **1, 3, 4,** and **5**.
  - Between circuit board connector **3** and Encoder lead pins **1, 2, 4,** and **5**.
  - Between circuit board connector **4** and Encoder lead pins **1, 2, 3,** and **5**.
  - Between circuit board connector **5** and Encoder lead pins **1, 2, 3,** and **4**.
  - IF** any resistance indicated short in these sub-steps,  
**THEN REPLACE** Encoder.
15. **RECONNECT** Encoder connector to wire harness and circuit board connector.
16. **RESTORE** Encoder cable on flexible chain around gimbal with cable ties, where removed.

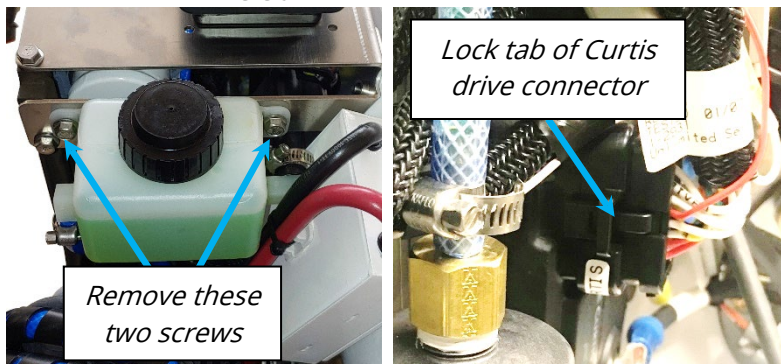
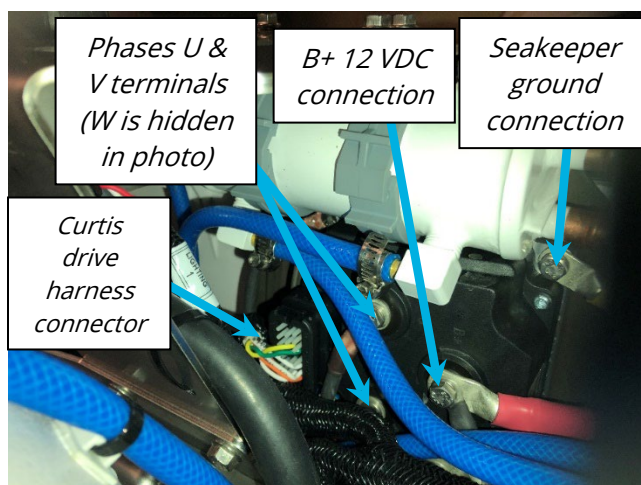
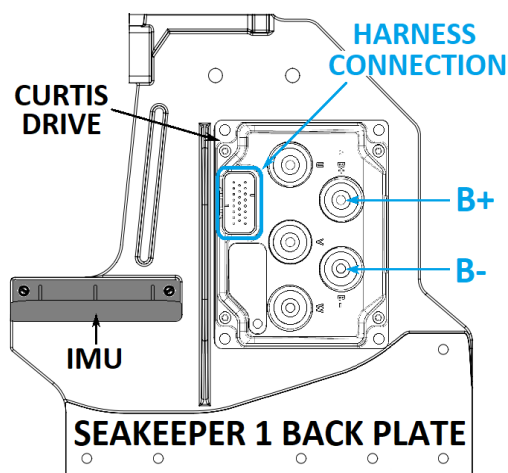
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

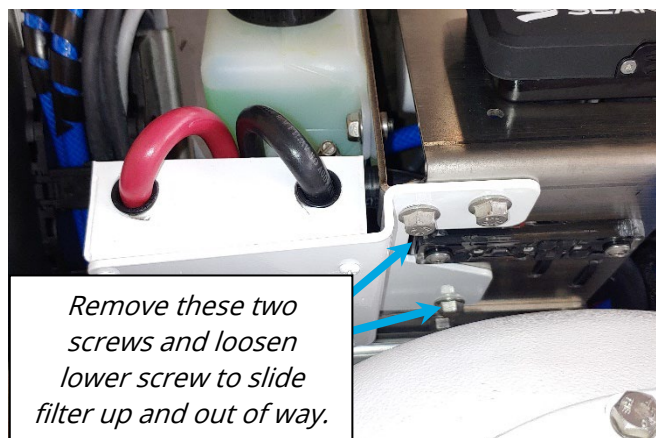
Code 4/119/126/127/170

17. **DISCONNECT** wire harness connector at Curtis drive box as follows:

- a. **REMOVE** two screws securing glycol reservoir to frame.



- b. **MOVE** reservoir to side.
- c. **REMOVE** top two screws of DC Filter bracket.



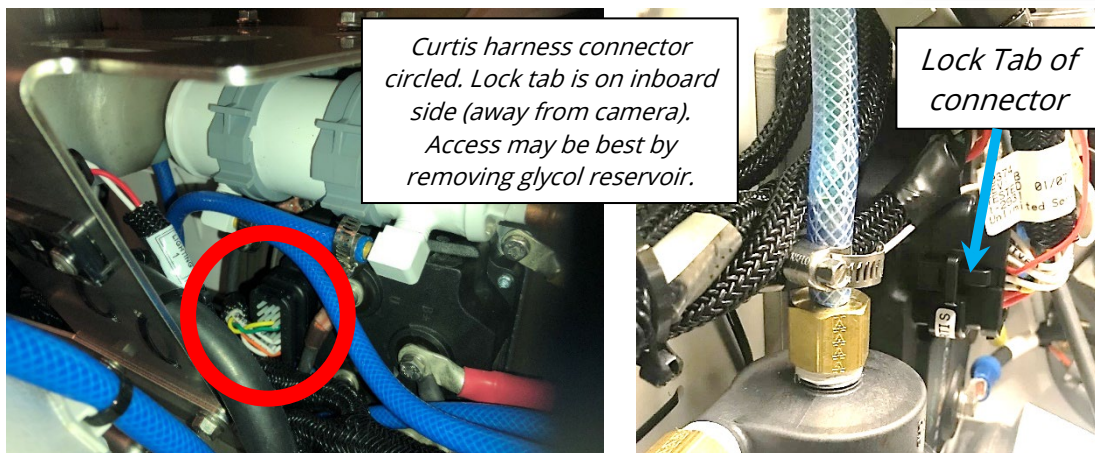
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 4/119/126/127/170

PRODUCT SEAKEEPER 1, 4, AND 4.5

Step 17 continued

- d. **LOOSEN** lower screw of DC Filter bracket.
  - e. **LIFT AND MOVE** DC Filter aside.
18. **DISCONNECT** harness Curtis drive connector.
  19. **INSPECT** pins of Curtis drive box **AND** sockets of harness connector for damage, loose crimps/wires, or excessive corrosion.
    - a. **IF** any issues found with drive box pins, **THEN CORRECT** problem(s).
    - b. **IF** any issues found in wire harness connector, **THEN REPAIR** Curtis drive connector.



- c. **IF** any issues found in connectors and unsure of tools or parts required, **THEN CONTACT** Seakeeper Product Support Team for guidance.



*Curtis Drive connector – Remove red face plate and inspect pins/crimps.*



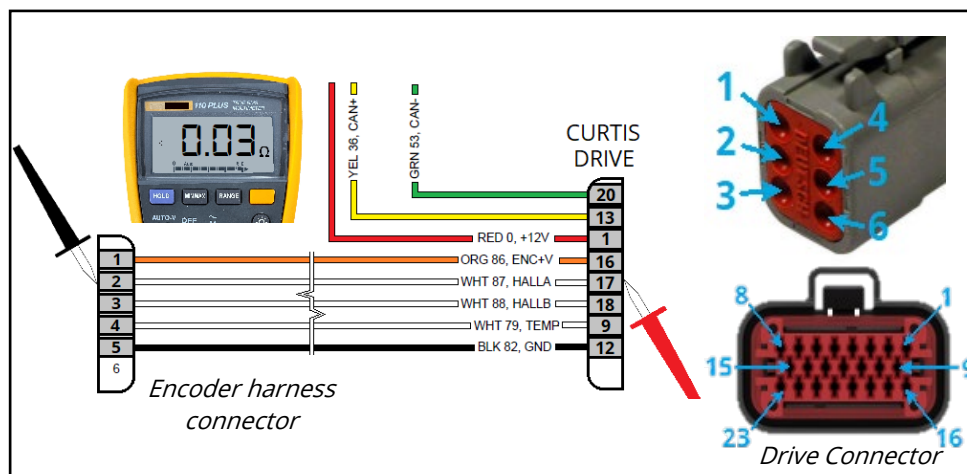
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 4/119/126/127/170

20. With multimeter in resistance mode, **CONFIRM** below 0.3Ω in wire harness as follows:

- a. **CONFIRM** continuity between:
  - i. Pin **1** of Encoder harness and pin **16** of drive connector.
  - ii. Pin **2** of Encoder harness and pin **17** of drive connector.
  - iii. Pin **3** of Encoder harness and pin **18** of drive connector.
  - iv. Pin **4** of Encoder harness and pin **9** of drive connector.
  - v. Pin **5** of Encoder harness and pin **12** of drive connector.

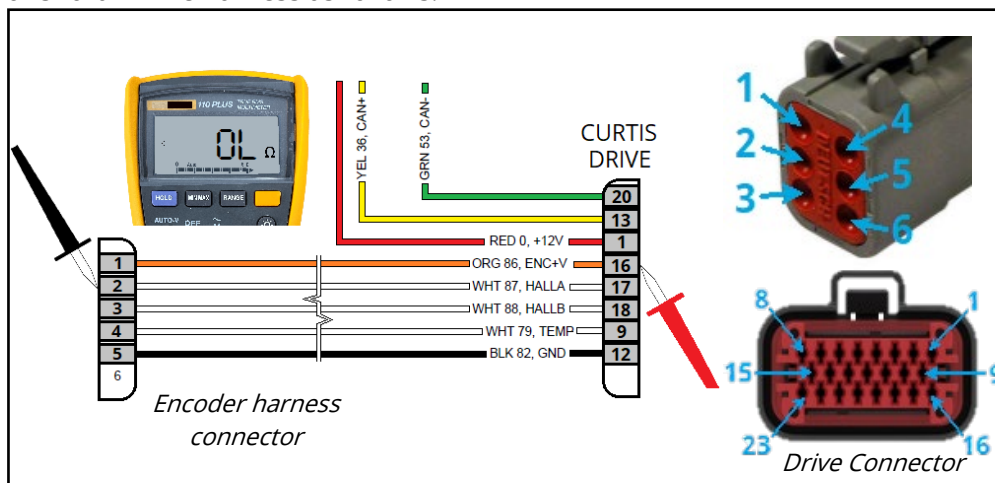


- b. **IF** any continuity displayed high resistance or OPEN LOOP,  
**THEN:**
  - i. **VERIFY** wires and crimps secure within connectors.
  - ii. **CONTACT** Seakeeper Product Support Team with data collected above at [support@seakeeper.com](mailto:support@seakeeper.com).

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 4/119/126/127/170

21. **TEST** for short in wire harness as follows:

- a. Between drive pin **16** and Encoder plug pins **2, 3, 4,** and **5**.
- b. Between drive pin **17** and Encoder plug pins **1, 3, 4,** and **5**.
- c. Between drive pin **18** and Encoder plug pins **1, 2, 4,** and **5**.
- d. Between drive pin **9** and Encoder plug pins **1, 2, 3,** and **5**.
- e. Between drive pin **12** and Encoder plug pins **1, 2, 3,** and **4**.
- f. Between drive pin **1** and Encoder plug pins **1, 2, 3, 4,** and **5**.
- g. Between drive pin **13** and Encoder plug pins **1, 2, 3, 4,** and **5**.
- h. Between drive pin **20** and Encoder plug pins **1, 2, 3, 4,** and **5**.
- i. **INSPECT** connector wire crimps are secure in drive connector.
- j. **IF** any check performed in this step displayed less than OL, **THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com.

22. **INSTALL** encoder cap and lead shroud on enclosure sphere.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 4/119/126/127/170

23. **REINSTALL** 10-amp control power fuse.
24. **ENSURE** all alarms clear.
25. **IF** alarm persists,  
**THEN:**
  - a. **PHOTOGRAPH** MFD app / display information screen.
  - b. **PHOTOGRAPH** alarm history pages.
  - c. **COLLECT** results of all test readings.
  - d. **SUBMIT** results of all tests and photos to Seakeeper Product Support Team at support@seakeeper.com.

**\*\*\*\*\* END \*\*\*\*\***

## SEAKEEPER TROUBLESHOOTING GUIDE- 206



PRODUCT      SEAKEEPER 1, 4, AND 4.5

### CODE 5/40/41/156



To troubleshoot and repair the cause of the

- "DRIVE 12V FAULT" alarm (Code 5)
- "DC INPUT VOLTAGE HIGH" alarm (Code 40)
- "DC INPUT VOLTAGE LOW" alarm (Code 41)
- "DRIVE VOLTAGE" warning (Code 156)

### BACKGROUND

Continued operation with any of these codes may result in damage to equipment or injury. **Power to the Seakeeper must be cycled to reset Codes 40 or 41.**

Codes 40 and 41 are developed by the GCM when low current DC input voltage varies from a reasonable range for the design voltage. For 12 VDC systems code 40 alarms at 15 VDC and code 41 alarms at 10 VDC.

Code 40 or 41 will be able to be reset when voltages are between 10-15 VDC for 12 VDC systems. If they can be quickly reset after alarming, the cause may have been a DC load starting/stopping to create a spike in the vessel's DC system.

Code 156 is triggered by the motor drive when it senses low voltage on the harness +VDC pin. The drive sends a code to the GCM which triggers the code.

In the event of a low voltage event (Code 41 or 156), additional alarms may appear at the display as voltage continues to drop. On both 12 and 24 VDC systems, as voltage continues to drop, a Code 43 (Power Relay Fault) may be seen. Additionally, Code 8 (Coolant Pump Fault) may be seen. Eventually, the voltage can drop to the point a 5" display goes dark (around 8 VDC on all models).

Code 5 is enabled in Seakeeper 1 models only. The alarm is developed in the Curtis motor controller when the controller senses control power input voltage outside of normal range: 10.2 to 13.8 VDC. It may also alarm on input current at zero amps or above 0.2 amps.

Troubleshooting will examine the low current DC input to the Seakeeper and then examine components on the Seakeeper that when experiencing a fault can produce this alarm.

### REFERENCES

[TB-90603-1 - DC SEAKEEPER ELECTRICAL INTEGRATION DIAGRAMS](#)

### PRECAUTIONS

see [PRECAUTIONS](#) section of Introduction.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT SEAKEEPER 1, 4, AND 4.5

Code 5/40/41/156

**PROCEDURE**

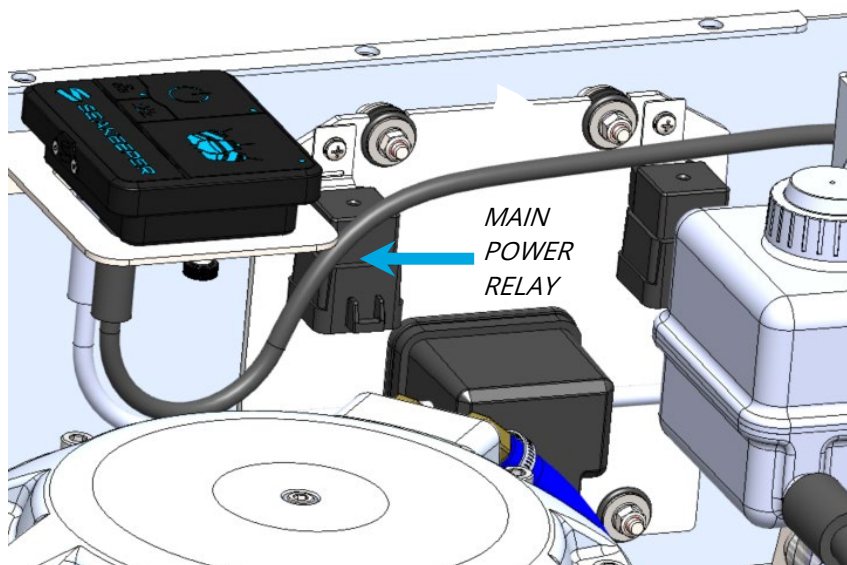
1. **VERIFY** DC input voltage at Seakeeper within proper voltage range: **11-15 VDC**.
  - a. **IF** voltage BELOW required voltage range,  
**THEN CHECK** vessel's electrical supply:
    - i. **RECORD** battery bank voltage across terminals. \_\_\_\_\_ **VDC**
    - ii. On positive supply, **VERIFY** fuse/breaker NOT blown/tripped.
    - iii. **VERIFY** leads of breaker contacts/fuse contacts are seated securely.
    - iv. **IF** DC power supply fused,  
**THEN VERIFY** fuse is seated correctly.
    - v. **VERIFY** protection is of proper rating.
    - vi. **CHECK** battery terminals secured tightly.
    - vii. On negative terminal block, **VERIFY** connection is free of corrosion.
    - viii. **IF** terminal is double-stacked with other loads' cables,  
**THEN ENSURE** largest ampacity cable is closest to base of terminal stud **AND** no more than four terminals stacked on post.
  - b. **IF** voltage ABOVE required voltage range,  
**THEN CHECK** vessel's electrical supply:
    - i. **IF** vessel powered by outboard engines,  
**THEN PERFORM** sea trial at high engine RPMs.
      1. With multimeter, **CHECK** voltage from engine alternator(s).
      2. **IF** battery charge is above **15 VDC**,  
**THEN INVESTIGATE** charge relay(s) or alternator voltage regulation.
    - ii. **CHECK** battery charger output voltage.
  - c. **MONITOR** system voltage as other high-current vessel loads are started and stopped.
    - i. **IF** a particular load creates a voltage spike (to produce Code 5, 40 or 41),  
**THEN INVESTIGATE OR MITIGATE** voltage spike cause. [Consider placing Seakeeper or load on another battery bank]

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 5/40/41/156

PRODUCT SEAKEEPER 1, 4, AND 4.5

2. For Code 5 troubleshooting, **PROCEED** to [Step 8](#).
3. **IF** Seakeeper 4 or 4.5 (equipped with main power relay), **THEN**:
  - a. **OPEN / TURN OFF** DC control power breaker.
  - b. **CHECK** nameplate data of main power relay for voltage rating.

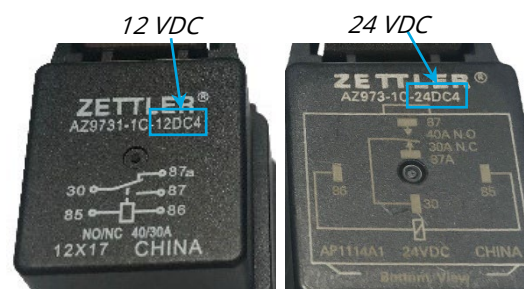


- c. **VERIFY** stated voltage matches voltage rating of Seakeeper model.

- i. **IF** data marked on relay does NOT match voltage rating for Seakeeper, **THEN REPLACE** main power relay with properly-rated relay.

- ii. **CLOSE / TURN ON** DC control power.

- iii. **VERIFY** Code 40 / 41 alarm clear.



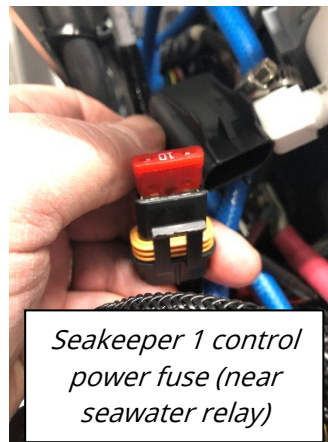
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

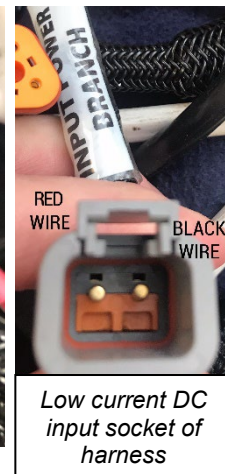
Code 5/40/41/156

**WARNING!****PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.**4. **CHECK** wiring harness for short to ground as follows:

- a. **DISCONNECT** low current DC power from Seakeeper.
  - i. On Seakeeper 1, pull 10A control power fuse located near seawater relay.
  - ii. All other models use a Deutsch connector, as shown to right.
- b. For Seakeeper 1, **REFERENCE** [ATTACHMENT 2](#) for access instructions to components for various models for following steps.
- c. **DISCONNECT** Glycol Pump from wire harness.
- d. **DISCONNECT** GCM from wire harness.
- e. **DISCONNECT** IMU from wire harness.
- f. **IF** 5" display used,  
**THEN DISCONNECT** display from Seakeeper.
- g. With multimeter in resistance mode, **CHECK** for SHORT between pin **1** and pin **2** of low current DC input socket of harness [or red and black control power wires of Seakeeper 1].
- h. **IF** SHORT **OR** intermittent SHORT found,  
**THEN REPLACE** wire harness.
  - i. **IF** Seakeeper 1,  
**THEN CONTACT** Seakeeper Product Support Team for guidance in replacing wire harness.



*Seakeeper 1 control power fuse (near seawater relay)*



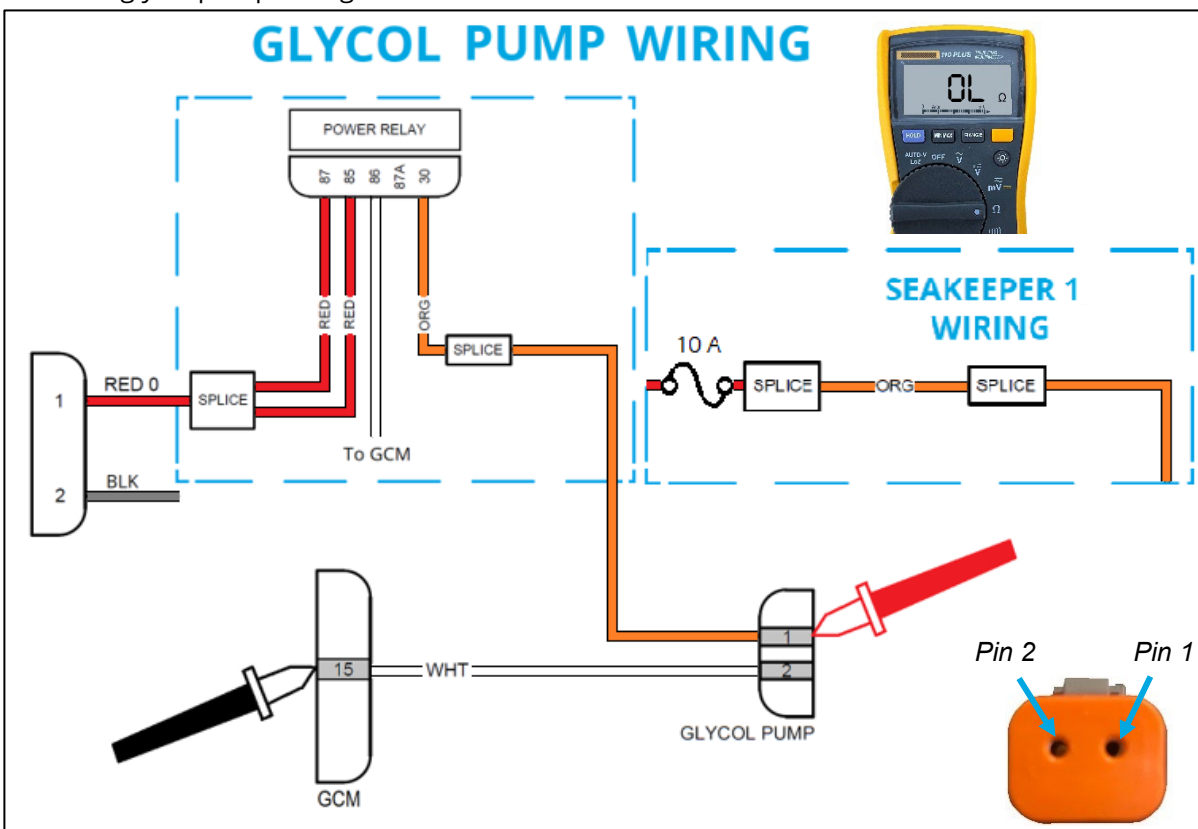
*Low current DC input socket of harness*

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

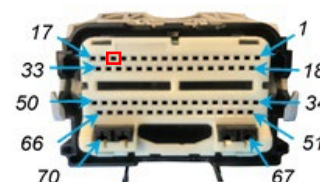
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 5/40/41/156

5. **CHECK** glycol pump wiring for short as follows:



- a. **TEST** for SHORT between glycol pump harness connector Pin **1** and Pin **2**.
- b. **IF** SHORT or intermittent SHORT found,  
**THEN REPLACE** wire harness. [**CONTACT** Seakeeper Product Support Team if Seakeeper 1]

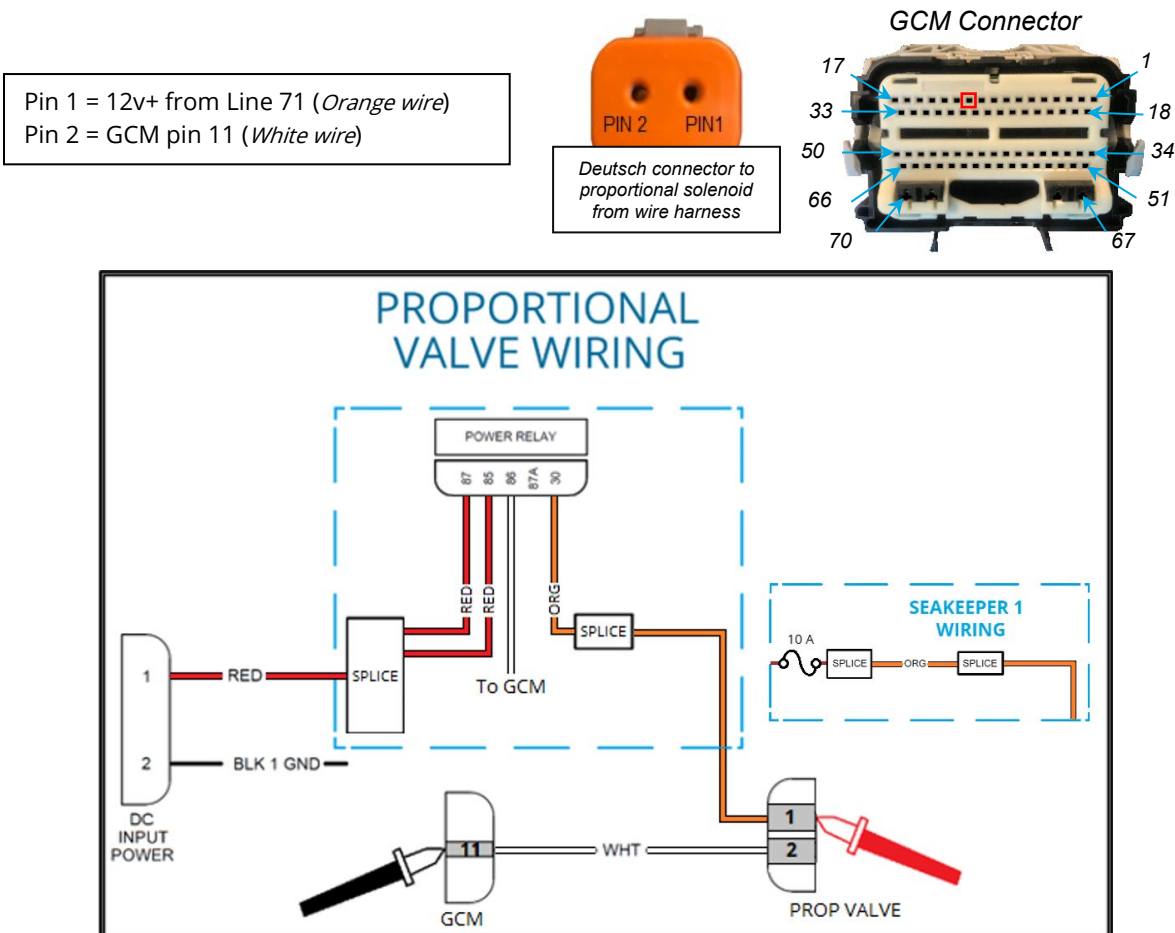




**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 5/40/41/156

6.      **CHECK** Brake (Proportional) Valve for SHORT as follows:a.      **PERFORM** following:

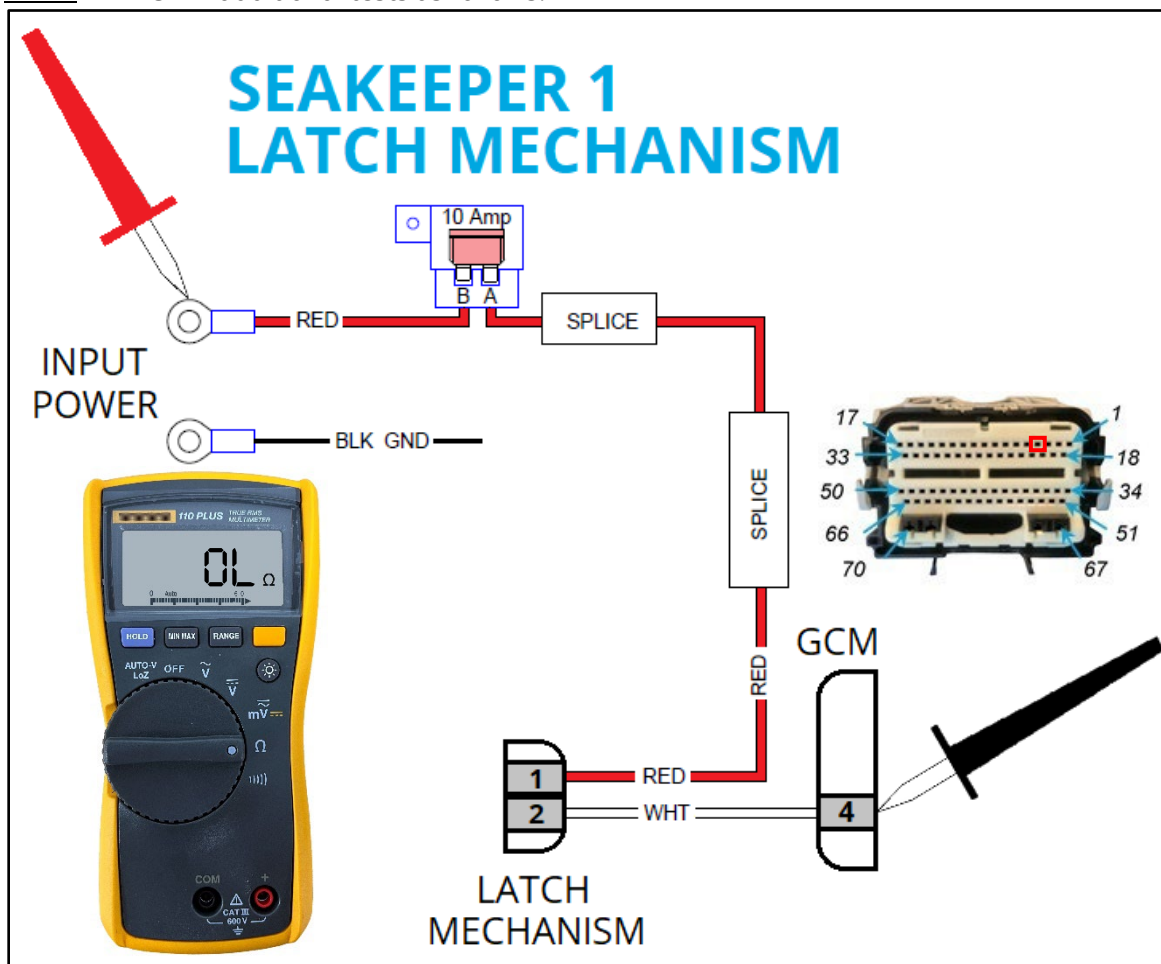
- i.      **DISCONNECT** Brake (Proportional) Valve from wire harness.
- ii.     **TEST** for SHORT between harness prop valve connector pin **1** and pin **2**.
- iii.    **IF** SHORT **OR** intermittent SHORT found,  
          **THEN REPLACE** wire harness.
  1.    **IF** Seakeeper 1,  
       **THEN CONTACT** Seakeeper Product Support Team for guidance.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 5/40/41/156

7. **IF** Seakeeper 1,  
**THEN PERFORM** additional tests as follows:



- DISCONNECT** latch mechanism from harness.
- DISCONNECT** control power leads from Curtis Drive.
- ENSURE** 10-amp control power fuse installed.
- TEST** for SHORT between **positive lug** and GCM pin 4.



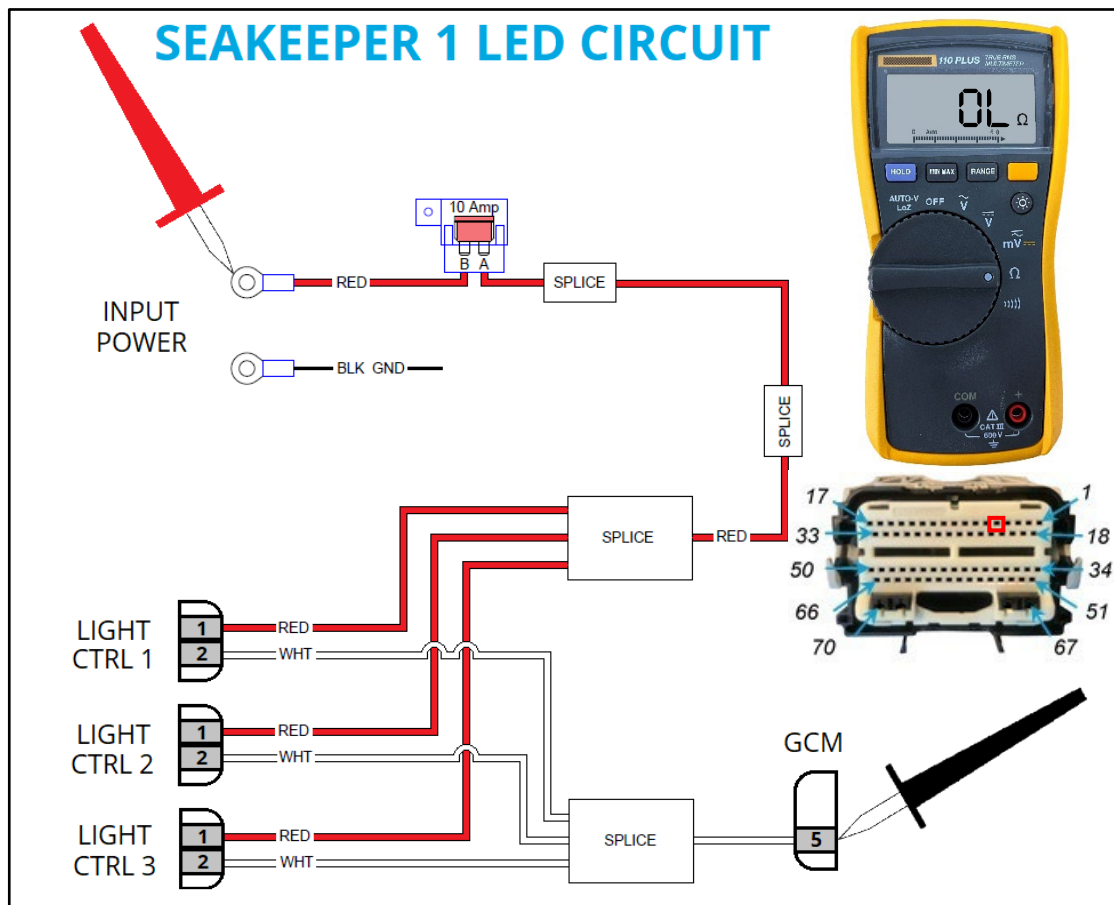
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 5/40/41/156

Step 7 continued

- e. **DISCONNECT** three LED connectors from harness.



- f. **TEST** LED circuits for short between **positive lug** and GCM pin 5.
8. For Code 5 troubleshooting, **PERFORM** following:
- REMOVE** red 10-amp control power ATC fuse from fuse housing near seawater relay.
  - DISCONNECT** wire harness from Curtis drive. [see [ATTACHMENT 2](#) on how to access Curtis Drive]

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

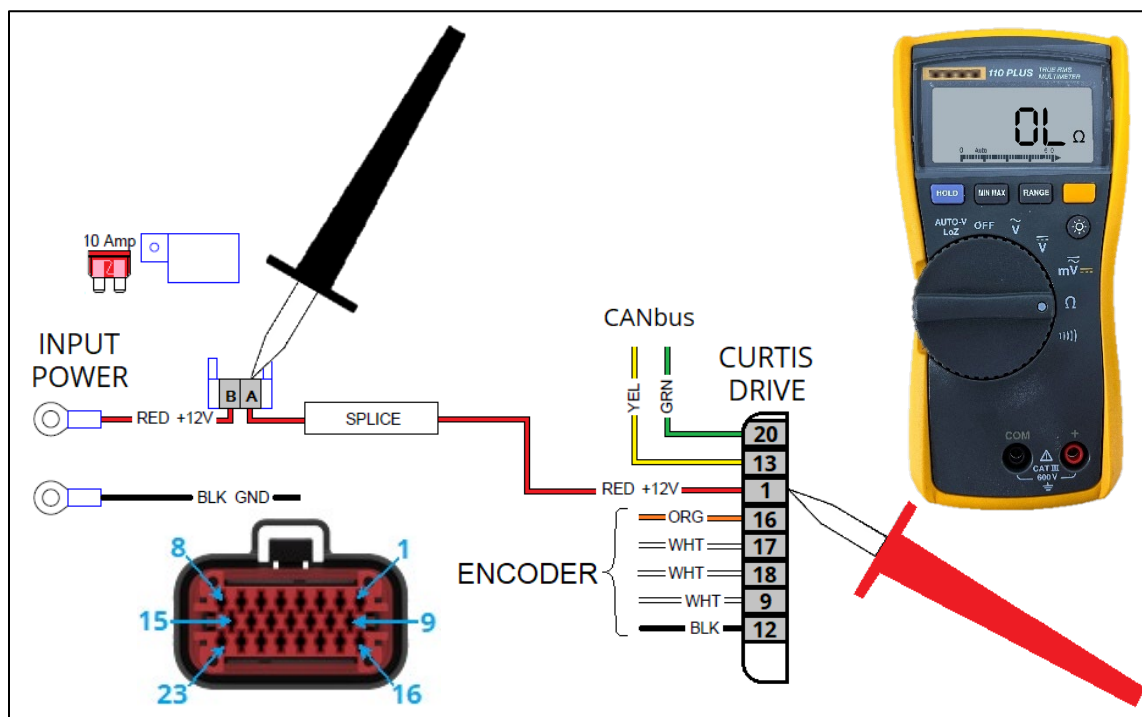
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Step 8 continued

- c. **INSPECT** Curtis drive harness connector and drive pins for damage.



- d. **PULL** wires at rear of Curtis harness connector to check for loose crimps.
- e. With multimeter in resistance mode, **TEST** for less than  $0.3\Omega$  between control power fuse terminal **A** and Drive harness connector **Pin 1**.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 5/40/41/156

PRODUCT SEAKEEPER 1, 4, AND 4.5

Step 8 continued

- f. **VERIFY** no short between Drive harness connector **Pin 1** and **Ground** (using metal base of Curtis drive).



- g. **IF:**

- issue found in connector wiring/crimps,
- no continuity between fuse terminal "**A**" and **Pin 1**, or
- short exists between **Pin 1** and **ground**,

**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all data from tests for evaluation of harness.

- h. **IF** damaged pins in Curtis motor controller,  
**THEN REPAIR or REPLACE** Curtis motor controller.

9. **IF** alarm persists,  
**THEN:**

- COMPILE** troubleshooting test results and a photo of information screen.
- PHOTOGRAPH** any physical damage found.
- SUBMIT** data and photos collected to Seakeeper Product Support Team at support@seakeeper.com.

\*\*\*\*\* **END** \*\*\*\*\*

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 5/40/41/156

**ATTACHMENT 1**

| <b>POWER REQUIREMENTS</b> |                                        |                                 |                                   |                                     |
|---------------------------|----------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|
| <b>MODEL</b>              | <b>HI CURRENT<br/>INPUT TO<br/>MDB</b> | <b>BREAKER/<br/>FUSE RATING</b> | <b>DC CONTROL<br/>POWER INPUT</b> | <b>BREAKER/<br/>FUSE<br/>RATING</b> |
| Seakeeper 1               | 12 VDC                                 | 80 A @ 12VDC                    | 12 VDC                            | 10 A                                |
| Seakeeper 4               | 12 VDC                                 | 100 A @ 12VDC                   | 12 VDC                            | 15 A                                |
| Seakeeper 4.5             | 110/230 VAC                            | 30 A @ 110VAC<br>20A @ 230VAC   | 12 VDC                            | 15 A                                |



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

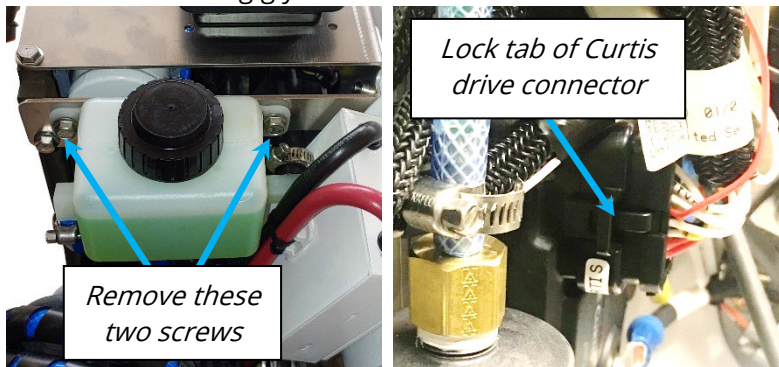
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 5/40/41/156

**ATTACHMENT 2**

1. For Seakeeper 1 access to GCM, IMU, Curtis drive, and glycol pump:

a. **REMOVE** two screws securing glycol reservoir to frame.

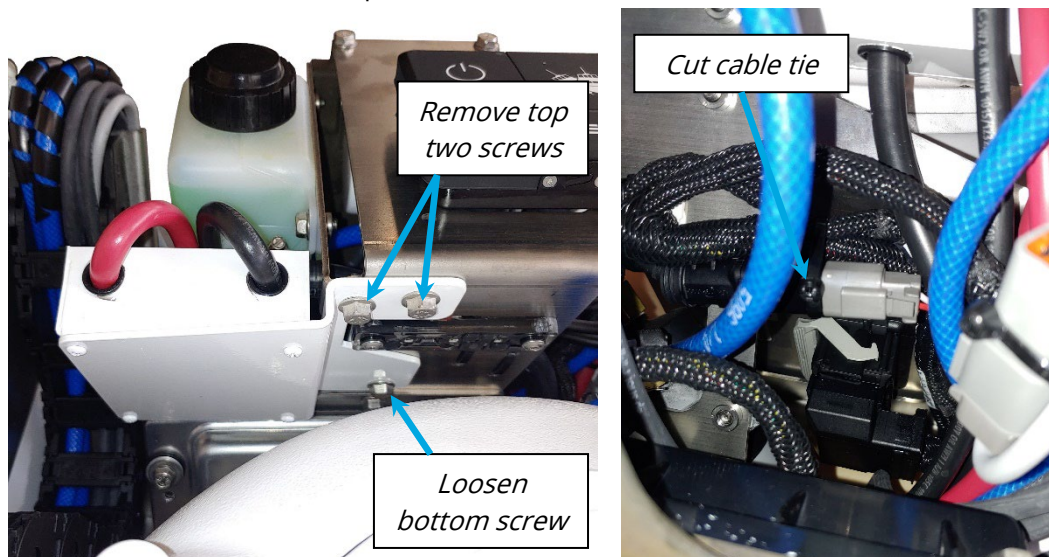


b. **MOVE** reservoir to side.

c. **DISCONNECT** harness glycol pump connector, if desired.

d. **DISCONNECT** harness Curtis drive connector, if desired.

e. To access GCM, **REMOVE** top two screws of DC Filter.



f. **LOOSEN** third lower screw of DC Filter.

g. **PULL** DC Filter up and away from mounting bracket.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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PRODUCT        SEAKEEPER 1, 4, AND 4.5



Code 5/40/41/156

Att. 2, Step 1 continued

- h.    **PLACE** DC filter to side.
- i.    **CUT** cable tie to access GCM 70-pin connector, if desired.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 35/251**

To diagnose and repair the “DISPLAY FAULT” alarm (Code 35) or the similar “NO CONNECTION TO GYRO” alarm (Code 251).

**BACKGROUND**

The “Display Fault” alarm (Code 35) may appear on an MFD app / 5” display whenever the GCM has lost communication with an installed 5” display. The reset condition is for communications to be returned to the display for a total of one minute. When the alarm is activated by the GCM (seen by the display or not), the Seakeeper will continue to run as normal for about 30 seconds. Afterward, the Seakeeper will spool down, and the brakes locked. When the display is reconnected with Seakeeper, the alarm will appear on the display and should clear immediately with a press of the POWER button.

The “No Connection to Gyro” alarm (Code 251) is very similar to Code 35 and is included in this troubleshooting. This alarm is produced (but may not be seen by the operator because of a failed display) when there is a loss of all communication in the wiring of the Controller Area Network of the Seakeeper: either by an OPEN in the wiring or a SHORT. The latter has even produced Code 75 (IMU FAULT), in addition to Code 251, during testing. The “No Connection to Gyro” fault reacts as most code responses: an immediate removal of power and locking the stabilizer.

Multifunction displays connected to Seakeeper models have shown Code 251. Technicians may erroneously replace the ethernet adapter cable or the MFD adapter cable to clear the issue. If the Seakeeper-to-MFD link (Ethernet adapter cable and MFD adapter cable) were faulty, the Seakeeper MFD web app should fail to open or set web app exception overlays. The Code 251 suggests the issue is in the connection between the ConnectBox and the GCM; it is most likely due to connection issues or failure of the T-Adapter, Terminator (resistor), the short CAN cable between the tee-adapter and the ConnectBox, or a ConnectBox port being damaged.

A common cause for this alarm is the loosening of a display cable connection, terminal resistor, or T-adapter. Other causes can be the updating of software, a failure in the display plug, or GCM connection issues. This alarm may result from a wire open due to a tight bend radii (less than 1-1/2 in. (36 mm) bend radius) or crushing of the display cable that may have damaged the internal conductors.

**REFERENCES**

Applicable Seakeeper [Cable Block Diagram](#)

[TB-90637 - Code 251 Connectivity Issues Update](#)

**PRECAUTIONS**

see [PRECAUTIONS](#) section of Introduction.

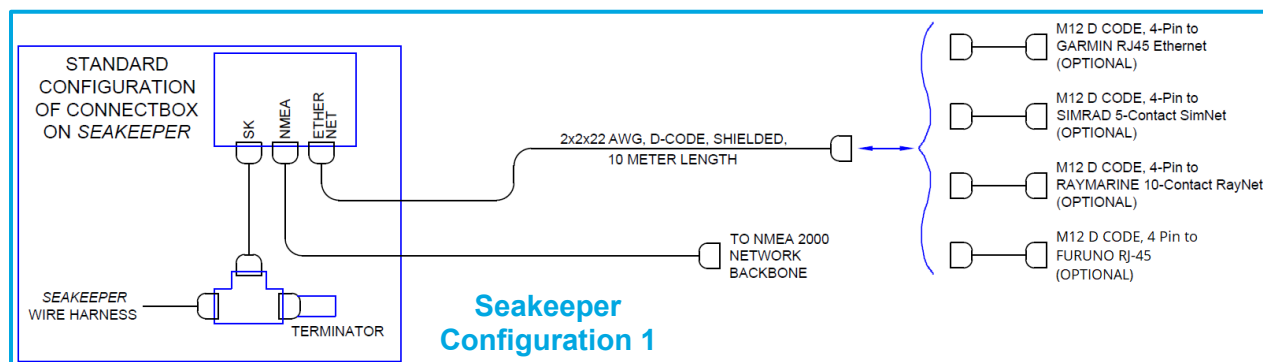
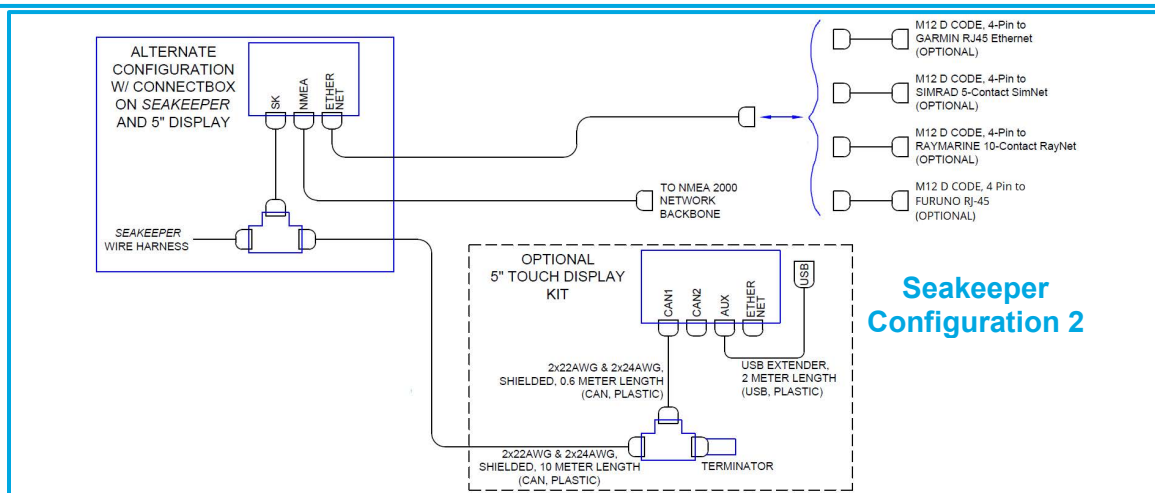
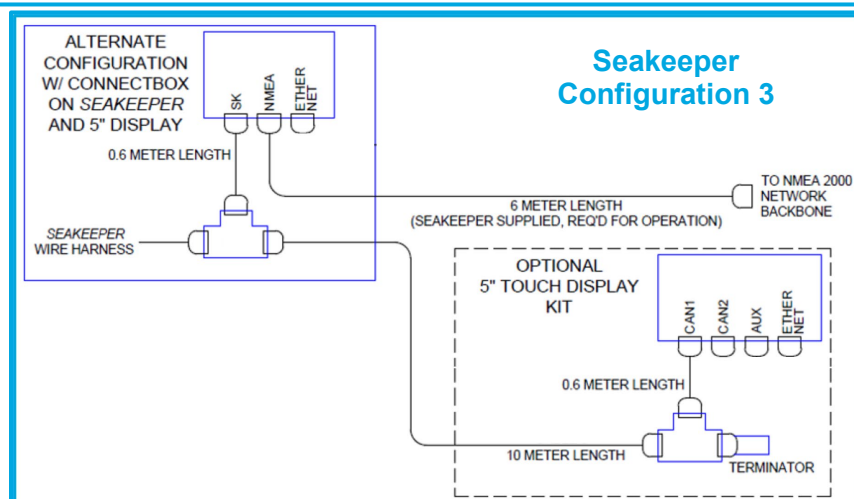
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 35/251

**PROCEDURE**

1. **IF** vessel has experienced lightning strike or electrical surge just before alarm **AND** other electrical appliances have been affected,  
**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com.
2. **IF** display software was recently updated,  
**THEN CYCLE** low current DC input to Seakeeper.

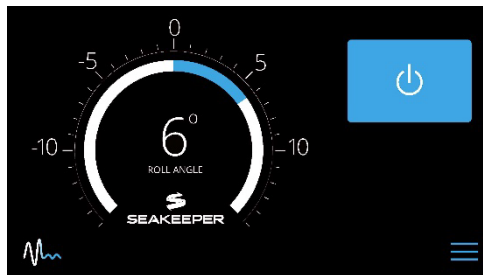


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

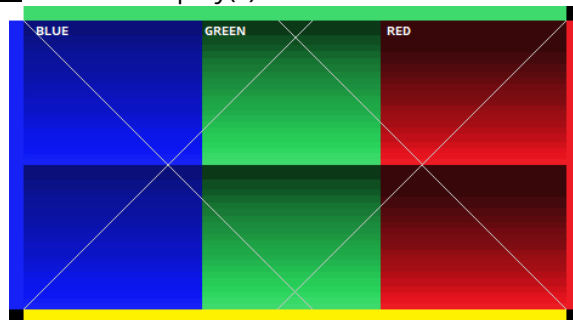
Code 35/251

PRODUCT      SEAKEEPER 1, 4, AND 4.5

3. **IF** spare 5" display or ConnectBox **of same design** available,  
**THEN CONNECT** spare user interface in place of installed device.

*ConnectBox**5" Touch Display*

- a. **IF** alarm will clear and ALL data from Information screen populated,  
**THEN REPLACE** installed display.
4. **INSPECT** all CANbus cable connections as follows:
- a. **VERIFY** following:
- If applicable, **GO TO** optional helm mounted ConnectBox or 5" display:
    - VERIFY** CANbus cable from Seakeeper is correctly threaded into tee adapter.
    - VERIFY** terminator is correctly threaded into tee adapter of a second display or only single display attached to system.
    - VERIFY** display cable from display/ConnectBox is threaded correctly into tee adapter.
    - IF** helm device is a 5" display and shows color blocks (as shown),  
**THEN UPDATE** display(s) software with latest software release.



- CHECK** alarm cleared.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

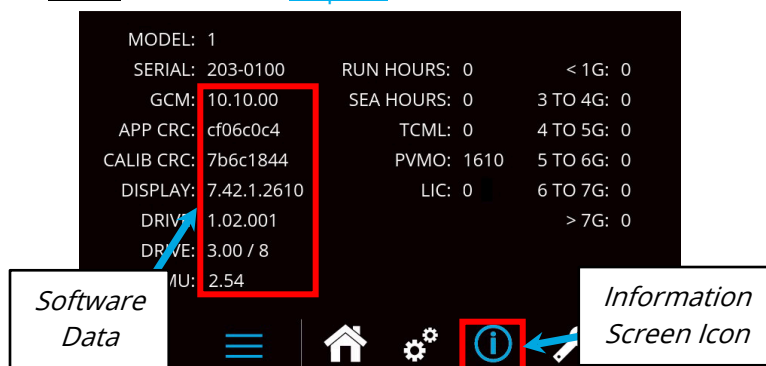
Code 35/251

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Step 4.a continued

ii. **GO TO** Seakeeper:

1. **VERIFY** display CAN cable correctly threaded to display output cable.
2. **CONNECT** spare 5" display or ConnectBox into CAN cable from Seakeeper.
3. **IF** spare device is 5" display AND shows data on Information screen, **THEN REPLACE** CAN cable from Seakeeper to helm.
4. **DISCONNECT** IMU connector from wire harness.
5. **IF** Code 251 clear and data from Information screen populated (except for IMU), **THEN PROCEED** to [step 7.d](#).



6. **RECONNECT** IMU.
7. **DISCONNECT** MDB / Curtis Drive from wire harness.
8. **IF** Code 251 clear and data from Information screen populated (except for MDB), **THEN PROCEED** to [step 7.e](#).

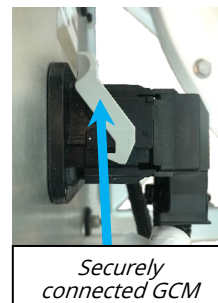
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 35/251

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Step 4.a.ii continued

9. **IF** Seakeeper 1,  
**THEN PERFORM** Steps 4.a.i on ConnectBox tee adapter.
10. **VERIFY** GCM 70-Pin connector is correctly engaged in GCM.
11. **IF** NO spare display is available,  
**THEN DISCONNECT** helm display **AND INSTALL** it locally at Seakeeper output.

**NOTE:**

Even though display cable is keyed, it is possible to force it together incorrectly.

- b. **VERIFY** all CAN cable pins not bent and connections made correctly.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

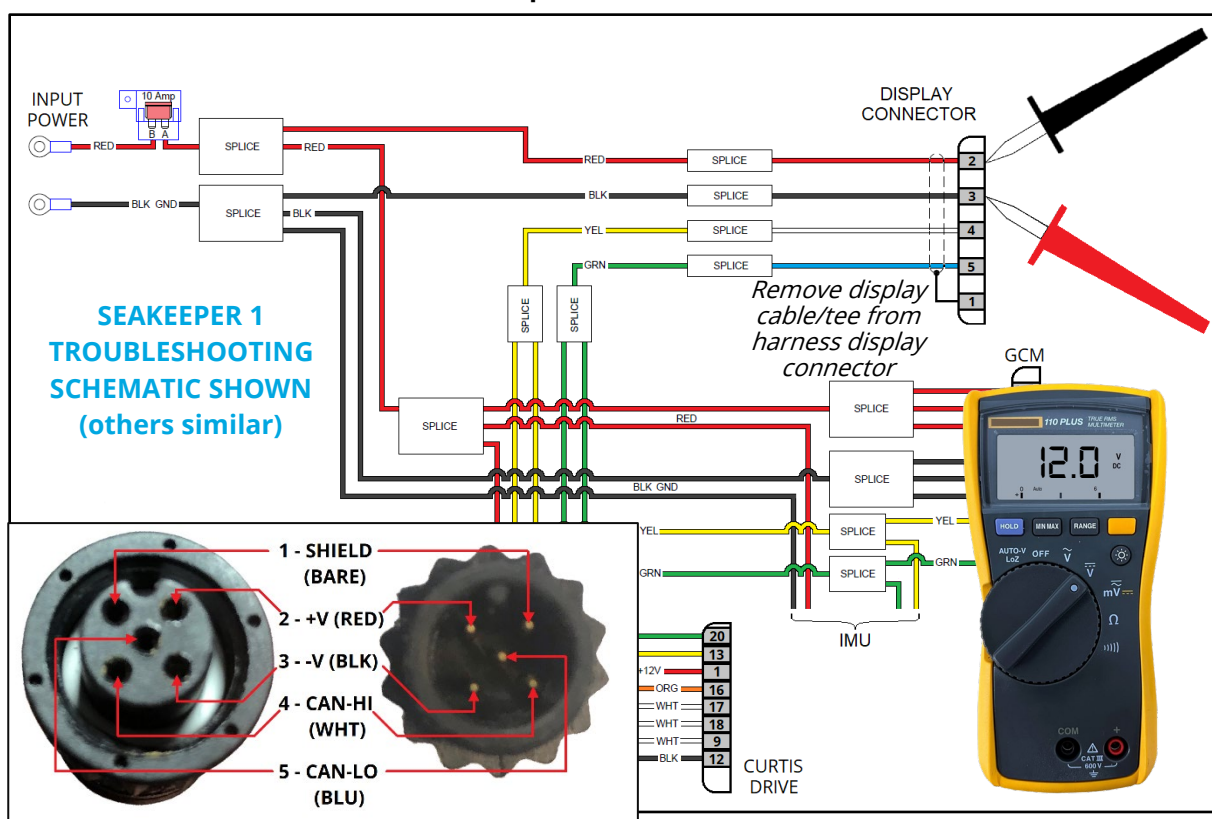
Code 35/251

5. **IF** alarm cleared in step 4 by connection of spare display/ConnectBox,  
**THEN REPLACE** originally installed display/ConnectBox.

**NOTE:**

5" display is used as spare display on Seakeeper 1 models.

6. **IF** no spare display available **OR** alarm did not clear in Step 4,  
**THEN TEST** for voltage and resistance as follows:
- a. At Seakeeper unit, **PERFORM** following on CAN cable of harness:
- i. **VERIFY** 12 VDC exists between **pins 2 & 3**.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 35/251

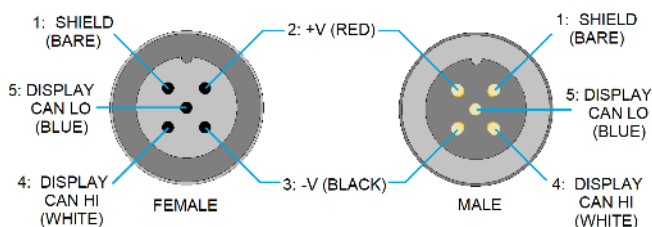
Step 6.a continued

- ii. **OPEN / TURN OFF** low current DC breaker to Seakeeper.
- iii. **VERIFY** NO short exists between pin **1** and all other pins on CAN cable.
- iv. **VERIFY** resistance of more than 1000Ω exists between pin **5** and pin **2**.
- v. **VERIFY** resistance of more than 1000Ω exists between pin **5** and pin **3**.
- vi. **VERIFY** resistance of more than 1000Ω exists between pin **4** and pin **2**.
- vii. **VERIFY** resistance of more than 1000Ω exists between pin **4** and pin **3**.

**NOTE:**

If terminating resistor not attached, this resistance will be about 59-60Ω in this measurement.

- viii. **VERIFY** resistance of 120Ω exists between pin **4** and pin **5**.
  - ix. **IF** any checks in Step 6.a are UNSATISFACTORY, **THEN REPLACE** wire harness.
  - x. **IF** checks of Step 6.a are SATISFACTORY, **THEN CONNECT** display cable from Seakeeper to helm station.
- b. **GO TO** helm station and perform following on display cable from Seakeeper to helm display end connector:
- i. **VERIFY** 12 VDC exists between pins **2 & 3** at display end of CAN cable at helm.
  - ii. **VERIFY** high resistance (NO short) exists between pin **1** and **all other pins** at display end of cable at helm.
  - iii. **VERIFY** resistance of more than 1000Ω exists between pin **5** and pin **2**.
  - iv. **VERIFY** resistance of more than 1000Ω exists between pin **5** and pin **3**.





**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 35/251

Step 6.b continued

- v. **VERIFY** resistance of more than  $1000\Omega$  exists between pin **4** and pin **2**.
- vi. **VERIFY** resistance of more than  $1000\Omega$  exists between pin **4** and pin **3**.

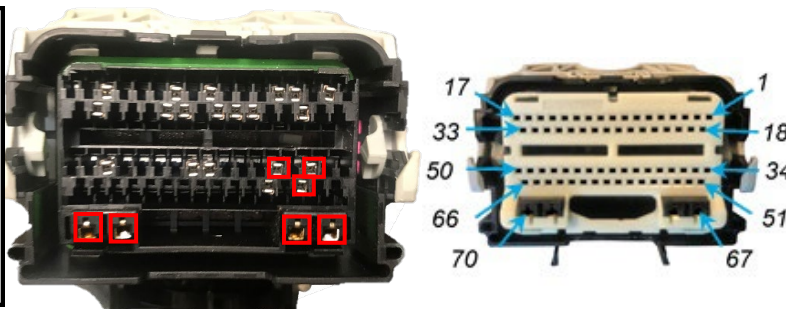
**NOTE:**

If terminating resistor attached, this resistance will be about  $120\Omega$  in this measurement.

- vii. **VERIFY** resistance of  $60\Omega$  exists between pin **4** and pin **5**.
  - c. **IF** voltage or continuity checks in Step 6.b were **UNSATISFACTORY**, **THEN REPLACE** CAN cable from Seakeeper to helm.
  - d. **IF** Code 35 and alarm persists, **THEN PROCEED** to [step 8](#).
7. **IF** Code 251, **THEN TEST** CANbus components as follows:
- a. **ENSURE** low current DC breaker closed/turned ON.
  - b. **DISCONNECT** IMU and MDB from wire harness. [See [Code 5, Attachment 2](#) for accessing Seakeeper 1 components]
  - c. **CHECK** active alarms on display:
    - i. **IF** Code 251 cleared (by disconnecting IMU and MDB. Other alarms expected), **THEN PROCEED** to step 7.d.
    - ii. **IF** Code 251 still in alarm (Codes 75 and 82 are expected), **THEN:**
      - 1. **DISCONNECT AND INSPECT** GCM 70-pin connector for loose pins or crimps.

**GCM 70-PIN**

Pin 36: CAN - HI (YLW)  
 Pin 53: CAN - LO (GRN)  
 Pin 38: +12V (RED or ORG)  
 Pin 67: +12V (RED or ORG)  
 Pin 68: +12V (red or ORG)  
 Pin 69: GRND (BLK)  
 Pin 70: GRND (BLK)



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 35/251

Step 7.c.ii continued

2. **IF** loose pins or crimps found in 70-pin connector,  
**THEN REPAIR OR REPLACE** wire harness.
3. **OPEN / TURN OFF** low current DC power to Seakeeper.

4. **INSPECT** GCM for damaged or bent pins.

5. **IF** bent pins found on GCM,  
**THEN PERFORM** one of following:

- **STRAIGHTEN** GCM pin(s).
- **REPLACE** GCM.



6. **CLOSE / TURN ON** low current DC power breaker.

7. With multimeter in DC Volts mode, **CHECK** for 12 VDC between following pins of GCM 70-Pin connector:

**GCM 70-PIN CONNECTOR**

Pin 38: +12V (RED or ORG)  
 Pin 67: +12V (RED or ORG)  
 Pin 68: +12V (RED or ORG)  
 Pin 69: GRND (BLK)  
 Pin 70: GRND (BLK)

- a) Pin **38** and:

- Pin **69**
- Pin **70**

- b) **[Seakeeper 1 ONLY]**

Pin **67** and:

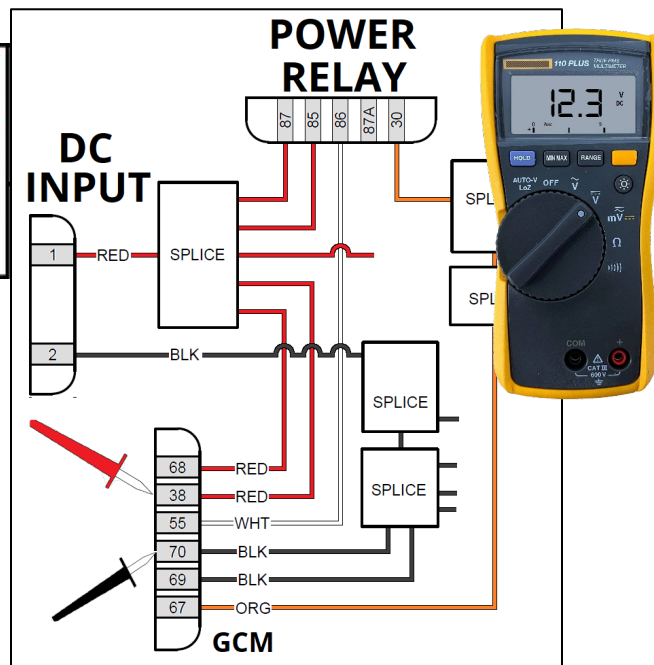
- Pin **69**
- Pin **70**

- c) Pin **68** and:

- Pin **69**
- Pin **70**

- d) **IF** no voltage seen in any check of Step 7.c.ii.7,  
**THEN REPLACE** wire harness.

- iii. **RECONNECT** GCM 70-pin connector.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

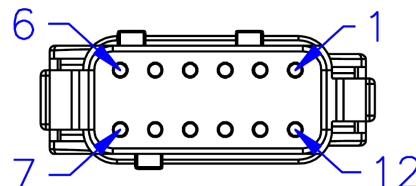
PRODUCT SEAKEEPER 1, 4, AND 4.5

Code 35/251

Step 7 continued

d. **PERFORM** following at IMU:

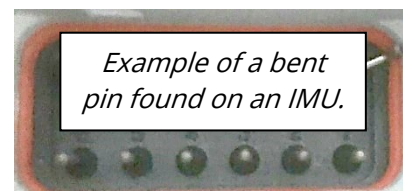
- i. In harness IMU connector, **CHECK** for 120  $\Omega$  resistance between CANbus pins **3** and **10**.
- ii. **IF** resistance higher or Open Loop, **THEN REPLACE** wire harness.
- iii. **RECONNECT** IMU connector into IMU.
- iv. **IF** code 251 remains clear (Code 82 expected), **THEN PROCEED** to step 7.e.
- v. **IF** code 251 alarm returns (Code 82 expected), **THEN:**



1. **INSPECT** 12-pin connector for loose pins and crimps on pins.



2. **INSPECT** IMU pins for damaged or bent pins.
3. **IF** NO loose or damaged pins found, **THEN REPLACE** IMU.
4. **IF** loose pins/crimps found in connector, **THEN REPAIR** pin(s) **OR REPLACE** wire harness.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

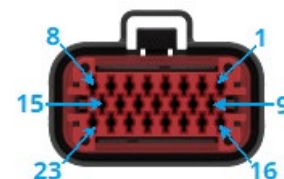
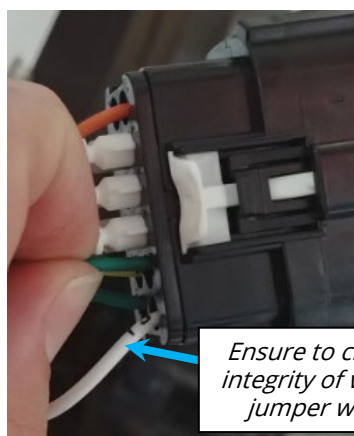
Code 35/251

PRODUCT      SEAKEEPER 1, 4, AND 4.5

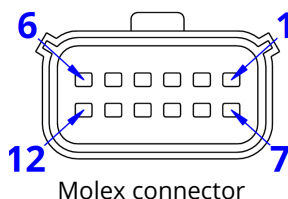
Step 7 continued

e. **PERFORM** following at MDB:i. In motor drive connector, **CHECK** for 120  $\Omega$  resistance in CANbus:

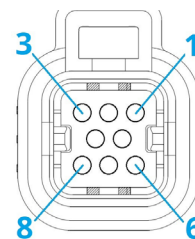
1. For Seakeeper 1 – between pins **13** and **20**.
2. For Seakeeper 4 – between pins **5** and **6**.
3. For Seakeeper 4.5 - between pins **11** and **12**.

Seakeeper 1  
Curtis connectorii. **IF** resistance higher or Open Loop,  
**THEN REPLACE** wire harness.iii. **CONNECT** IMU connector to IMU.iv. **IF** code 251 alarm returns,  
**THEN:**1. **INSPECT** MDB / Curtis connector for loose pins or crimps by pulling on wires.

Ensure to check  
integrity of white  
jumper wire



Molex connector

Seakeeper 4  
drive connector2. **INSPECT** MDB pins for damaged or bent pins.

Curtis pins

Seakeeper 4  
drive pins

Molex pins

3. **IF** MDB harness connector pin(s) loose,  
**THEN REPAIR** MDB harness connector **OR REPLACE** wire harness.4. **IF** motor drive pins irreparable **OR** UNSATISFACTORY,  
**THEN REPLACE** motor drive.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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Code 35 / 251

PRODUCT      SEAKEEPER 1, 4, AND 4.5

8.    **IF** checks of Steps 6 **AND** 7 are SATISFACTORY **AND** NO spare display was available,  
**THEN REPLACE** display.
9.    **RESTORE** all power to Seakeeper.
10. **IF** alarm persists,  
**THEN:**
  - a.    **COMPILE** all data recorded and photo of information screen.
  - b.    **SUBMIT** summary of all steps taken and any photo(s) to Seakeeper Product Support Team at support@seakeeper.com for review.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 36**

To troubleshoot and repair the cause of the “MOTOR FAULT” alarm (Code 36).

**BACKGROUND**

Code 36 is triggered when the flywheel motor is spinning faster than a programmed limit in the Seakeeper drive software. The Code 36 alarm will clear once the flywheel motor is powered and running at a speed less than programmed limit in drive software.

Basic troubleshooting can eliminate some likely causes: electrical connections in the MDB and at the GCM harness connection. Replacement of the MDB may be necessary to clear the alarm.

Megohm testing is performed in this guide to determine the condition of the insulation and potting of the motor drive cable and flywheel motor. Because megohmmeters vary in quality and accuracy, the guide uses a time-resistance test that eliminates some of these variables. A meter that can provide a continuous test voltage for 60 seconds is required. Most multimeters have a temperature sensor packaged with them. HVAC surface thermometers can also be used to obtain the enclosure temperature for the corrections.

**REFERENCES**

[SWI-093 - Molex Connector Work Instruction](#)

[SWI-124 - Seakeeper Motor Lead Testing](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) of Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

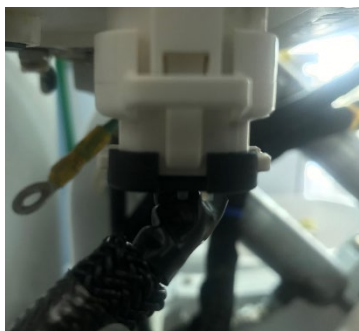
**PROCEDURE****SECTION 1: INITIAL CHECKS**

1. **PHOTOGRAPH** Information screen of MFD app / display (showing software versions).
2. **SUBMIT** photo to Seakeeper at support@seakeeper.com for evaluation.
3. **WHEN** told by Seakeeper to proceed in troubleshooting,  
**THEN CONTINUE** in this procedure.

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS** when working on live circuitry.  
**Seakeeper may start remotely.**

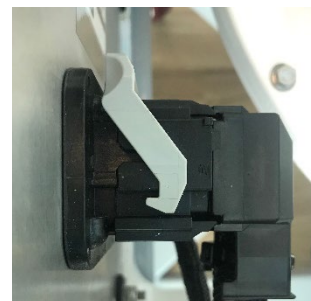
4. **ENSURE** flywheel at zero RPM at MFD app/ display.
5. **OPEN / TURN OFF** low current DC breaker to Seakeeper.
6. At MDB, **VERIFY** harness connector is fully inserted into MDB per photos.  
[See [Code 5, Attachment 2](#) for accessing Seakeeper 1 Curtis drive]
7. **IF** connector not seated fully,  
**THEN FULLY SEAT** connector into MDB.
8. At GCM, **VERIFY** 70-pin connector is fully seated.
9. **IF** connector not seated fully,  
**THEN FULLY SEAT** connector into MDB.
10. **INSPECT** wire harness for any damage near MDB.
  - a. **IF** damage found,  
**THEN REPLACE** wire harness.
  - b. **SPOOL** unit to verify alarm clear.



*TE Connectivity connector of a Seakeeper 4 showing locking tab engaged*



*Molex Connector of an Seakeeper 4.5 shown with white locking tab fully inserted*



*GCM connector fully inserted and locked*



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

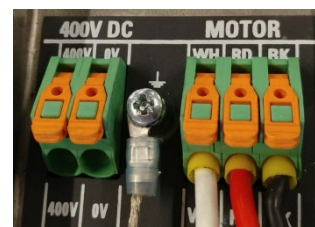
Code 36

**WARNING!**

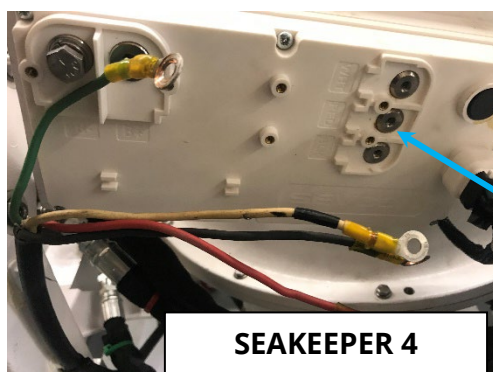
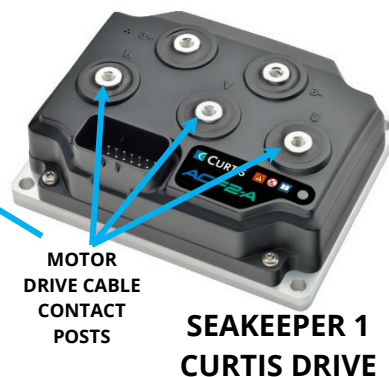
**SHOCK HAZARD EXISTS WHEN FLYWHEEL ROTATING  
OR POWER APPLIED TO SEAKEEPER.**

11. **IF** Seakeeper 4.5,  
**THEN PERFORM** following:

- a. **OPEN / TURN OFF** Seakeeper AC power breaker.
- b. **REMOVE** MDB cover to expose "MOTOR" lead terminal.
  - i. **INSPECT** crimps at end of each motor cable lead.
  - ii. **LOOSEN** MDB feed-through grommet.
  - iii. **EXAMINE** motor drive cable insulation at grommet.
  - iv. **ENSURE** interior of MDB is free of moisture.



12. **IF** Seakeeper 1 or 4,  
**THEN INSPECT** motor drive contacts at MDB.

**SEAKEEPER 4****SEAKEEPER 1  
CURTIS DRIVE**

- a. **OPEN / TURN OFF** high current DC power breaker for Seakeeper.
  - b. **REMOVE** cover at motor drive cable contact posts.
  - c. **INSPECT** for severe corrosion at contacts or damage to cables.
13. For AC and DC-powered models, **DISCONNECT AND ELECTRICALLY ISOLATE** motor drive cable leads.
14. **GO TO** [Section 2](#) for Seakeeper 4.5 models.
15. **GO TO** [Section 3](#) for Seakeeper 1 or 4.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 36

**SECTION 2: SEAKEEPER 4.5**

1.    **PERFORM AND RECORD** testing of motor leads per [SWI-124 - Seakeeper Motor Lead Testing](#).

2.    **IF:**

- motor drive cable has any phase-to-phase resistance greater than 2.0Ω,
- any phase-to-phase resistance significantly different from other two, **OR**
- unsatisfactory results from megohm tests,

**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all data recorded and photos of any damage to motor power cable found.

3.    **RE-ATTACH** all motor cable leads to their respective terminal.

4.    **TORQUE** MDB cover screws to **19 in-lbs (2.2 Nm)** to minimize moisture intrusion into MDB.

5.    **CLOSE / TURN ON** all Seakeeper power breakers.

6.    **IF** issue NOT found,  
**THEN CONTINUE** to [Section 4](#).



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 36

**SECTION 3: DC-POWERED MODELS**

1. **PERFORM AND RECORD** testing of motor leads per [SWI-124 - Seakeeper Motor Lead Testing](#).  
[See [Code 5, Attachment 2](#) for accessing Seakeeper 1 components]
2. **IF:**
  - motor drive cable has any phase-to-phase resistance greater than 2.0Ω,
  - any phase-to-phase resistance significantly different from other two, **OR**
  - unsatisfactory megohm results,**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all data recorded and any photos of damaged motor power cable.
3. **RE-ATTACH** all motor cable leads to their respective terminal, if not already done.
4. **ENSURE** all terminals torqued per [Torque Specifications](#) section.
5. **INSTALL** cover at motor drive cable contact posts **AND** High DC current input terminals.
6. **CLOSE / TURN ON** all Seakeeper power breakers.
7. **IF** issue not found,  
**THEN CONTINUE** to [Section 4](#).

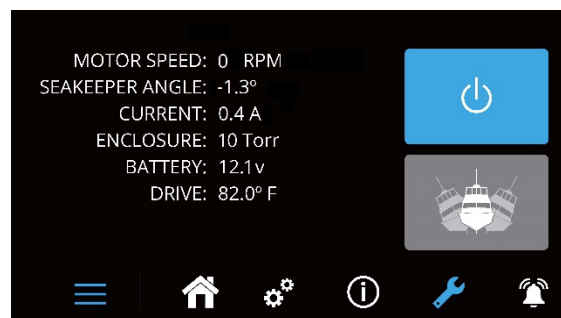
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 36

**SECTION 4: COMPLETION OF TROUBLESHOOTING**

1. **IF** previous steps have not discovered cause of alarm,  
**THEN REPLACE** MDB.
2. **SPOOL** unit to verify alarm clear.
3. **IF** alarm persists,  
**THEN:**
  - a. **RECORD** video of display maintenance screen (showing RPM and Current draw) while trying to spool up Seakeeper if possible.
  - b. **COMPILE** all data taken and any photos of damage and display information screen.
  - c. **SUBMIT** data and recordings to Seakeeper Product Support Team at support@seakeeper.com for review.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 43/154**

To troubleshoot and repair the “POWER RELAY” [Stuck Off] alarm (Code 43) and the “POWER RELAY STUCK ON FAULT” alarm (Code 154).

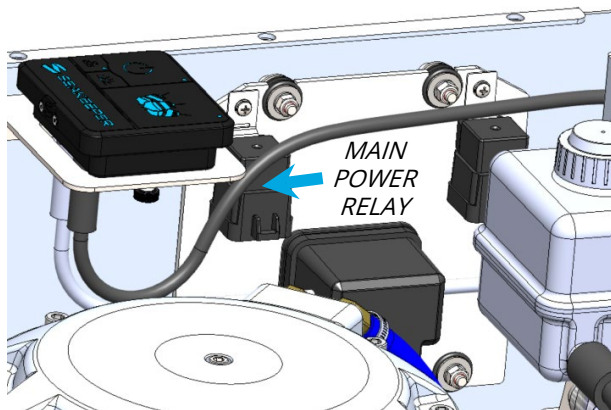
**BACKGROUND**

Code 43 is introduced when the voltage supplied to the 12/24 VDC system of the electrical sub-system drops below 10/17 VDC on AC-powered Seakeeper models. This voltage supplies the glycol pump, the brake solenoids, MDB and IMU. On larger Seakeeper models, it also powers the heater, if installed. This code closes the brake valves to stop precession (because they will de-energize by the nature of the code) and de-energizes the flywheel motor. Because this code has been triggered by low DC input voltage, if accompanied by a Code 41, troubleshoot Code 41 first.

Code 154 is introduced when driver power remains high after the Power Relay has been de-energized. This is highly unlikely to occur, based on the conditions required. Troubleshoot in the same manner as the relay being “stuck off.”

One common cause of this code is the starting of large DC loads while the Seakeeper is in operation. Another cause is an improper Power Relay installed (e.g., a 12VDC relay installed in a 24VDC system). A short to ground in wiring can also cause this code.

AC-powered Seakeepers are equipped with a relay that is an electromechanical, single pole, double throw (SPDT) relay. It uses a low current coil to activate a higher current switch. The coil has no diode or resistor protection. The Seakeeper 1 does not have a main power relay installed though it has a DC seawater relay.

**PRECAUTIONS**

See [PRECAUTIONS](#) of Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 43/154

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**PROCEDURE**

1. **VERIFY** DC input voltage at Seakeeper is within proper voltage band: 11-15 VDC.
  - a. **IF** voltage is not within required voltage band,  
**THEN CHECK** vessel's power supply.
    - i. On positive supply, **VERIFY** fuse/breaker is not blown/tripped.
    - ii. **IF** positive is protected by a fuse,  
**THEN VERIFY** fuse is seated properly.
    - iii. **VERIFY** protection is of proper rating.
    - iv. On negative terminal block, **VERIFY** connection is free of corrosion.
    - v. **IF** terminal is double stacked with other loads' cables,  
**THEN ENSURE** largest ampacity cable is closest to base of terminal stud.
  - b. **IF** input voltage found to be within specification,  
**THEN CONTINUE** with this procedure.



*DC input  
connector from  
vessel's DC  
power supply.*

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 43/154

**TABLE 1: POWER REQUIREMENTS**

| MODEL         | HI CURRENT<br>INPUT TO<br>MDB | BREAKER/<br>FUSE RATING        | DC INPUT | BREAKER/<br>FUSE RATING |
|---------------|-------------------------------|--------------------------------|----------|-------------------------|
| Seakeeper 4   | 12 VDC                        | 100 A @ 12 VDC                 | 12 VDC   | 15 A                    |
| Seakeeper 4.5 | 110/230 VAC                   | 30 A @ 110VAC<br>20 A @ 230VAC | 12 VDC   | 15 A                    |

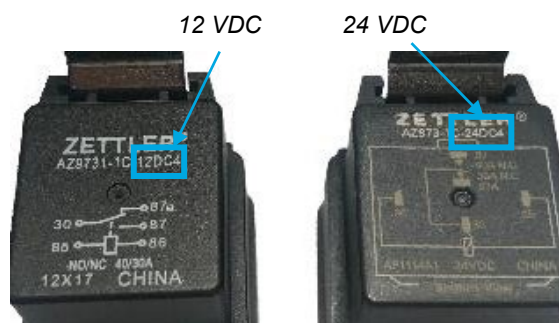
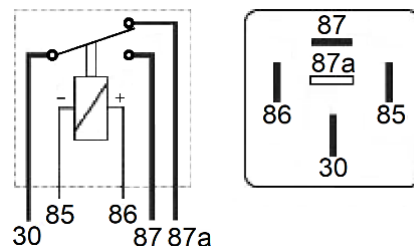
2. **DISCONNECT** DC power supply **AND PERFORM** following checks:

- a. **VERIFY** power relay nameplate voltage matches voltage rating of Seakeeper model per TABLE 1. Power relay is attached near GCM.

- b. **IF** data marked on relay does NOT match DC input voltage rating for Seakeeper, **THEN REPLACE** main power relay.

- c. **TEST** relay as follows:

- DISCONNECT** power relay from wire harness.
- With a multimeter **CHECK** for 0.3Ω or less between pin **30** and pin **87A**.
- With a multimeter **MEASURE** resistance between pin **85** and pin **86**. [NOTE: A 12V relay will show about 88 ohms]

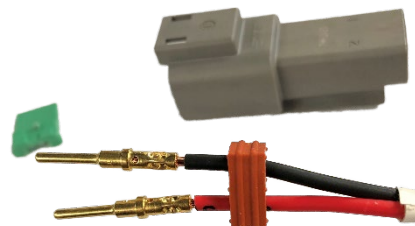


- IF** resistance in Steps 2.c.ii or 2.c.iii were UNSATISFACTORY, **THEN REPLACE** power relay.
- d. **REPOWER** Seakeeper **AND CHECK** Code 43 (154) alarm clear.



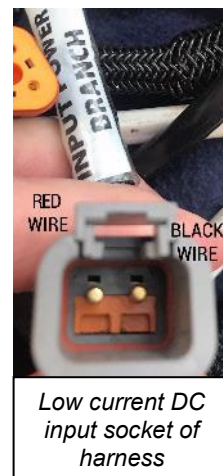
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

3.    **CHECK** wire harness as follows:a.    **DISCONNECT** DC power from Seakeeper.i.    **INSPECT** connector for loose wires and crimps.ii.    **REPAIR** any issue found.b.    **DISCONNECT** following:

## i.    GCM from harness.

## ii.    Display from Seakeeper.

c.    With a multimeter, **CHECK** for short between pin **1** and pin **2** of DC input socket of harness.d.    **IF** multimeter reads any resistance other than "OL" (Open Loop),  
**THEN REPLACE** wire harness.i.    After replacing harness, **RESTORE** all connections to harness.ii.    **RECONNECT** DC power **AND VERIFY** alarm clear.

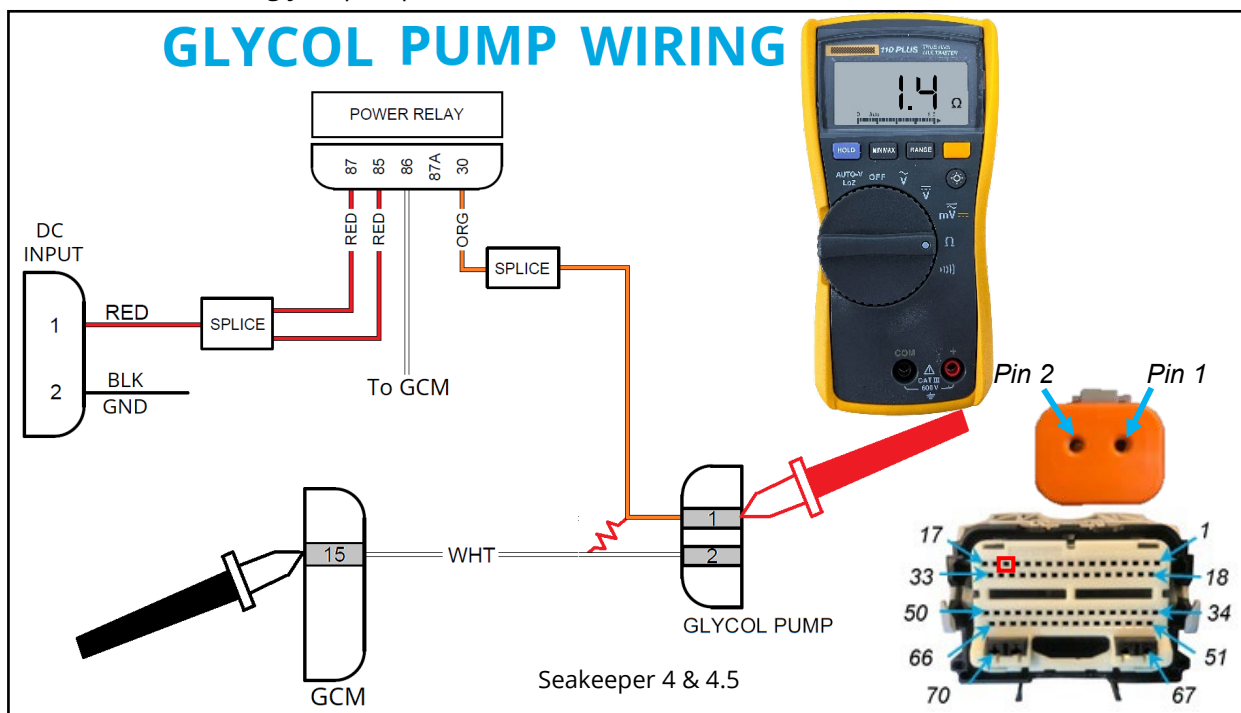


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 43/154

4. **CHECK** glycol pump wiring for a short as follows:
  - a. **DISCONNECT** DC Input connector to Seakeeper.
  - b. **DISCONNECT** glycol pump and GCM from wire harness.

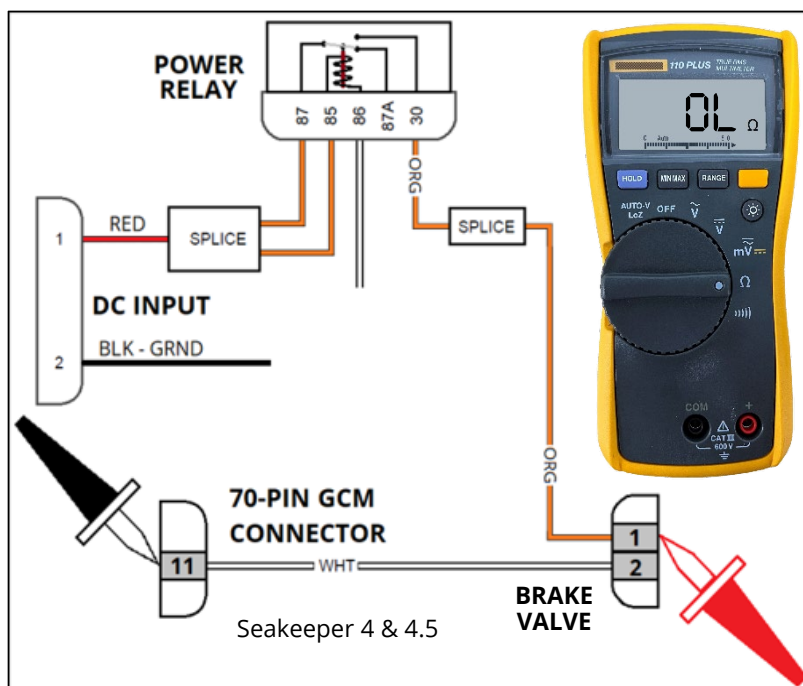


- c. With multimeter, **TEST** resistance between glycol harness connector Pin **1** and GCM Pin **15**.
- d. **IF** resistance in Step 4.c was any resistance other than "OL" (Open Loop), **THEN REPLACE** wire harness.
- e. On male connector from pump, **TEST** for resistance across motor between two male pins.
- f. **IF** resistance across two pins of glycol pump below 1000Ω, **THEN REPLACE** glycol pump.
- g. **IF** alarm not clear, **THEN LEAVE** DC Input and GCM disconnected **AND CONTINUE** this procedure.

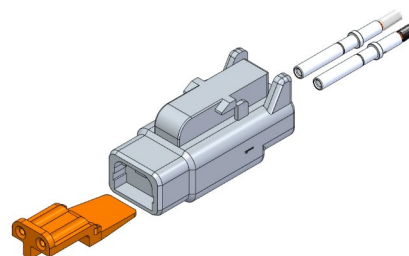
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 43/154

5.      **CHECK** Proportional Valve for a short as follows:

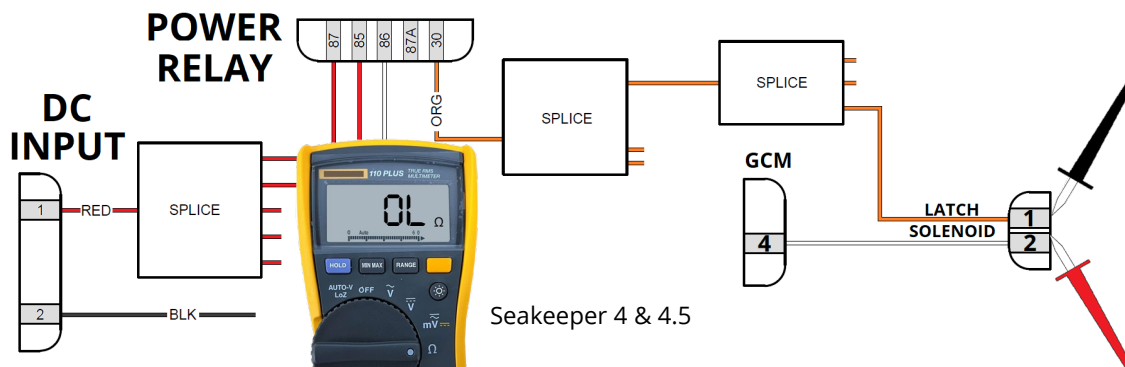
- i.      **DISCONNECT** proportional (brake) valve from harness.
- ii.    **INSPECT** proportional valve connector for loose wires and crimps.
- iii.    **CHECK** for short between harness connector pin **1** and pin **2**.
- iv.    **IF** resistance found is less than "OL" (Open Loop), **THEN REPLACE** wire harness.
- v.      **RECONNECT** brake valve to harness.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 43/154

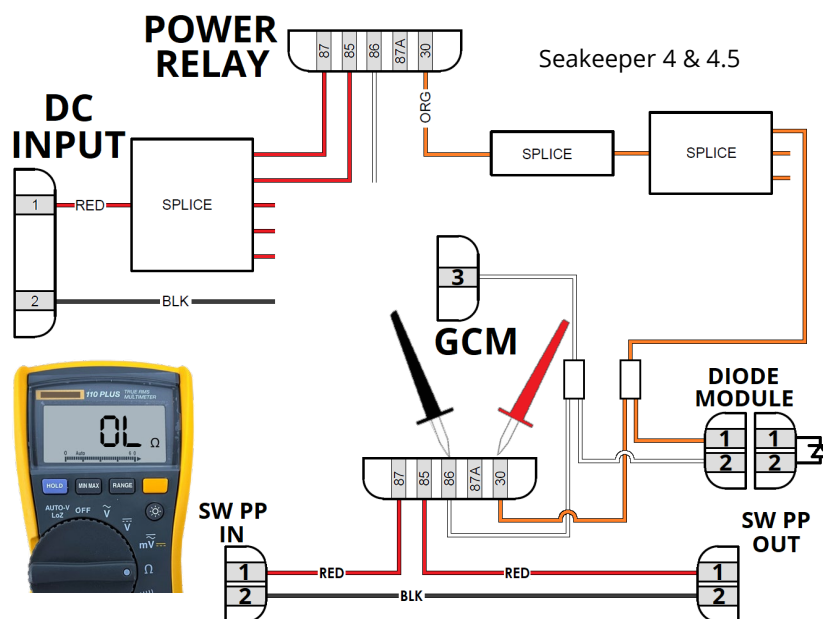
PRODUCT      SEAKEEPER 1, 4, AND 4.5

6. **CHECK** latch solenoid for short as follows:a. **DISCONNECT** latch solenoid from harness.b. **INSPECT** solenoid connector for loose wires and crimps.c. **CHECK** for short between harness connector pin **1** and pin **2**.d. **IF** resistance found is less than "OL" (Open Loop),  
**THEN REPLACE** wire harness.e. **RECONNECT** latch solenoid to harness.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

7. **CHECK** Seawater Relay for short as follows:
- DISCONNECT** seawater relay from harness.
  - DISCONNECT** diode module from harness.



- INSPECT** relay connector for loose wires and crimps.
- CHECK** for short between relay connector pin **30** and pin **86**.
- IF** resistance found is less than "OL" (Open Loop), **THEN REPLACE** wire harness.
- RECONNECT** seawater relay to harness.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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PRODUCT        SEAKEEPER 1, 4, AND 4.5

8.     **RECONNECT** 70-pin GCM and DC Input connector.
9.     **RESTORE** all power to Seakeeper.
10.   **IF** alarm has not cleared,  
      **THEN REPLACE** GCM.
11.   **IF** alarm persists,  
      **THEN:**
  - a.     **COMPILE** all data taken and a photo of information screen.
  - b.     **SUBMIT** test results data and photo to Seakeeper Product Support Team at support@seakeeper.com for review.

\*\*\*\*\* **END** \*\*\*\*\*

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 44/45**

To troubleshoot and repair the “SENSOR POWER HIGH/LOW” alarm (Code 44/45, respectively).

**BACKGROUND**

These codes alarm at a voltage higher (5.15 VDC) or lower (4.85 VDC) than a standard sensor voltage band of 5 VDC. The 5 VDC is created by the GCM from the 12 VDC input and is used to power the following: angle sensor and brake pressure switch. Code 44 and 45 are implausible to alarm unless damage has occurred to the wire harness or a significant electrical event (surge, such as from a lightning strike) has happened in the vessel’s DC distribution system. If a spike does occur, it is possible that Code 40 would alarm with Code 44. In that event, troubleshoot per Code 40 first; if Code 44 still in alarm afterward, then proceed with this procedure. Likewise, if a voltage drop occurs and alarms Code 41 first, troubleshoot that alarm first.

Troubleshooting will focus on the wire harness and sensor connection integrity. The Seakeeper must be power cycled to reset the alarm.

**PRECAUTIONS**

See [PRECAUTIONS](#) of Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

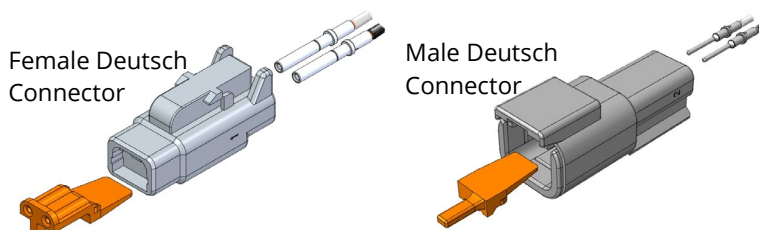
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 44/45

**PROCEDURE**

| <b>POWER REQUIREMENTS</b> |                                        |                                 |                                   |                                     |
|---------------------------|----------------------------------------|---------------------------------|-----------------------------------|-------------------------------------|
| <b>MODEL</b>              | <b>HI CURRENT<br/>INPUT TO<br/>MDB</b> | <b>BREAKER/<br/>FUSE RATING</b> | <b>DC CONTROL<br/>POWER INPUT</b> | <b>BREAKER/<br/>FUSE<br/>RATING</b> |
| Seakeeper 1               | 12 VDC                                 | 80 A @ 12VDC                    | 12 VDC                            | 10 A                                |
| Seakeeper 4               | 12 VDC                                 | 100 A @ 12VDC                   | 12 VDC                            | 15 A                                |
| Seakeeper 4.5             | 110/230 VAC                            | 30 A @ 110VAC<br>20A @ 230VAC   | 12 VDC                            | 15 A                                |

1. **PERFORM** this procedure in its entirety (multiple failures may cause a single code) **AND RECORD** all test and inspection results for submittal if cause not found.
2. With power aligned, **VISUALLY INSPECT** as follows:
  - a. **INSPECT** individual sensors:
    - i. **UNPLUG** gimbal angle sensor and brake pressure sensor **AND VERIFY** no corrosion buildup within connectors of sensors and harness.
    - ii. **INSPECT** leads of each sensor for loose wires and crimps.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 44/45

Step 2 continued

- b. **INSPECT** wire harness throughout foundation and guide band:
  - i. **ACTIVATE** Brake Override.
  - ii. **MANUALLY PRECESS** enclosure to check clearances for harness on guide band.
  - iii. **DEACTIVATE** Brake Override.
3. **IF** any heat or physically damaged sensors or connectors found during visual inspection, **THEN PHOTOGRAPH AND REPLACE** affected components (wire harness or sensor).
4. **IF** no sensor or wiring damage found during visual inspection, **THEN PERFORM** following for angle sensor and brake pressure switch:
  - a. **OPEN / TURN OFF** low current DC breaker to Seakeeper.

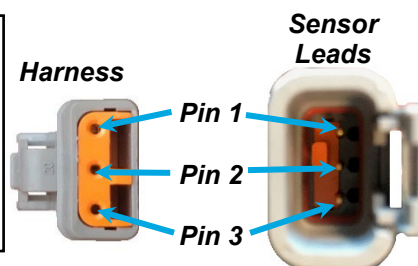
**CAUTION:**

**Connector damage may result if test probe exceeds 0.10 inch in diameter.**

- b. **UNPLUG** GCM 70-pin connector from GCM.
- c. Angle Sensor:
  - i. **UNPLUG** angle sensor from wire harness.
  - ii. **TEST** for short on angle sensor harness plug between pin 1 and pin 2.

**Angle Sensor GCM Pinout**

Pin 1: GCM Pin 48 +5 VDC supply  
 Pin 2: GCM Pin 28 signal voltage  
 Pin 3: GCM Pin 2 Ground  
           GND lug (Seakeeper 1)



- iii. **CHECK** for short in harness between pin 1 and pin 3.
- iv. **CHECK** for short in harness between pin 3 and pin 2.
- v. **IF** any test in Step 4.c.ii through 4.c.iv showed a resistance less than 1000Ω, **THEN REPLACE** wire harness.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

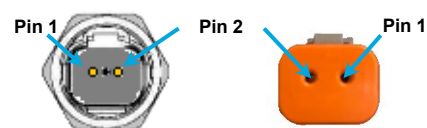
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Step 4.c continued

- vi. **TEST** resistance between three prongs of angle sensor leads.
  - vii. **IF** any resistance in Step 4.c.vi is less than 1000Ω, **THEN REPLACE** angle sensor.
  - viii. **IF** all checks of angle sensor SATISFACTORY, **THEN RECONNECT** angle sensor.
  - ix. **LEAVE DISCONNECTED** GCM 70-pin connector.
  - d. Brake Pressure Switch(es):
    - i. **DISCONNECT** brake manifold pressure switch from wire harness.
    - ii. **TEST** for short between pressure switch #1 harness connector pin **1** and pin **2**.
    - iii. **IF** any test showed resistance less than 1000Ω, **THEN REPLACE** wire harness.
  - e. **ENSURE** all connections of wire harness, GCM and sensors are made securely.
  - f. **CLOSE / TURN ON** low current DC power.
5. **CYCLE** DC low-current power.
6. **CHECK** alarm clear at MFD app / display.
7. **IF** alarm persists, **THEN REPLACE** GCM.

**Pressure Switch Pinout to GCM:**

- 1: GCM Pin 25 (White)
- 2: GCM Pin 32 **Seakeeper 1** (Black)  
Pin 2 **Seakeeper 4 & 4.5**



2-Pin Deutsch connector used on Seakeeper 1, 4, and 4.5

\*\*\*\*\* **END** \*\*\*\*\*

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 72**

To troubleshoot and repair the “MOTOR UNDER SPEED” alarm (Code 72).

**BACKGROUND**

This code will be displayed because of the motor slowing while unlocked in “SEA MODE.” The alarm is triggered at a speed of two-thirds (2/3) of target motor speed. Depending on what caused the drop in speed, other codes may appear with Code 72. If so, troubleshoot the other alarms first. If Code 72 remains active after the other alarms are reset, return to this procedure.

Some causes can be damage to the motor power cable due to rubbing or contact, intermittent power supplied to drive box, sphere vacuum loss which rises, increased flywheel bearing drag, faulty vessel electrical system, loss in enclosure vacuum, motor winding fault and Motor Drive Box (MDB) faults.

Megohm testing is performed in this guide to determine the condition of the insulation and potting of the motor drive cable and flywheel motor. Because megohm meters vary in quality and accuracy, the guide uses a time-resistance test that eliminates some of these variables. A meter that can provide a continuous test voltage for 60 seconds is required.

**REFERENCES**

Applicable Seakeeper Service Drawings on [Dealer Access](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) of Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 72

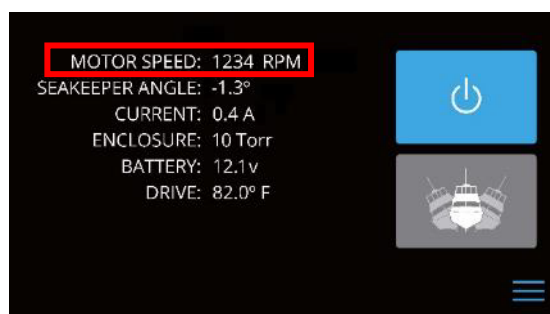
**PROCEDURE****SECTION 1: INITIAL CHECKS**

1. **COMPLETE** this procedure in its entirety (Multiple failures may cause a single code) **AND RECORD** all test and inspection results for submittal if cause not found.
2. **IF** no vacuum sensor equipped,  
**THEN CHECK** vacuum pressure with digital vacuum gauge (P/N 40605) per [SWI-129 - Vacuum Gauge Operation](#).
  - a. **RECORD** enclosure pressure: \_\_\_\_\_ Torr
  - b. **IF** enclosure pressure of greater than 85 Torr,  
**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com to determine actions to restore vacuum.
3. **VERIFY** flywheel at zero RPM at MFD app / display.
4. **OPEN / TURN OFF** AC or high current DC breaker to Seakeeper. [N/A for Seakeeper 1]

**NOTE:**

Overrides would not be available if MDB fault shows "1234 RPM." Seakeeper would lock-out overrides because of sensed RPM greater than 0 RPM.

5. **IF** Seakeeper 4.5 display reads "1234 RPM" with flywheel at rest,  
**THEN PROCEED** in procedure to [Section 2](#).



6. **ACTIVATE** brake override.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

7.    **MANUALLY PRECESS** enclosure of Seakeeper to observe clearances of motor power cable through whole path of precession.
8.    **INSPECT** motor power cable feedthrough on enclosure bottom.
9.    **IF** cable contacts any structure or component in travel,  
**THEN CAREFULLY INSPECT** cable at point of contact.
10. **IF** damage of cable insulation is found,  
**THEN DOCUMENT** damage in photo and retain for later submittal to Seakeeper Product Support Team.
11. **IF** Seakeeper 4.5,  
**THEN CONTINUE** to [Section 2](#).
12. **IF** Seakeeper 1 or 4,  
**THEN CONTINUE** to [Section 3](#).

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

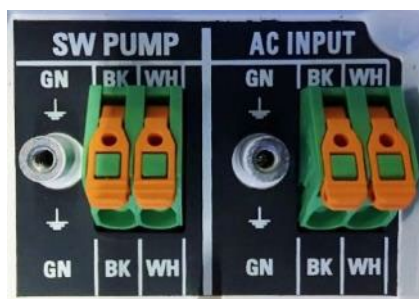
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 72

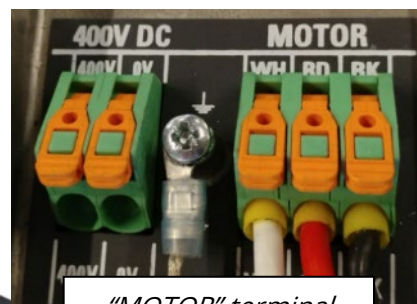
**SECTION 2: AC-POWERED MODELS****WARNING!**

**SHOCK HAZARD EXISTS WHEN FLYWHEEL ROTATING.  
OR POWER APPLIED TO SEAKEEPER.**

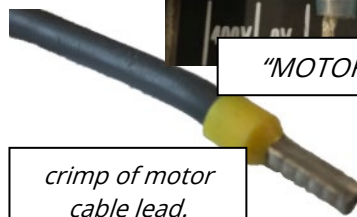
1. With Seakeeper locked and at zero RPM, **REMOVE** MDB cover.
2. **ENSURE** interior of MDB is free of moisture.
3. With a multimeter in "AC Volts" mode, **MEASURE** voltage at "AC INPUT" terminal.



4. **IF** voltage below 80 VAC or above 300 VAC, **THEN TROUBLESHOOT** vessel electrical supply.
5. **VERIFY** leads at "MOTOR" and "AC INPUT" terminals are in correct position by color.
6. **VERIFY** leads are crimped properly, fully inserted into terminal, and locked firmly.
7. **IF** any issues found with leads, **THEN CORRECT** issues with motor cable leads.



"MOTOR" terminal



crimp of motor cable lead.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

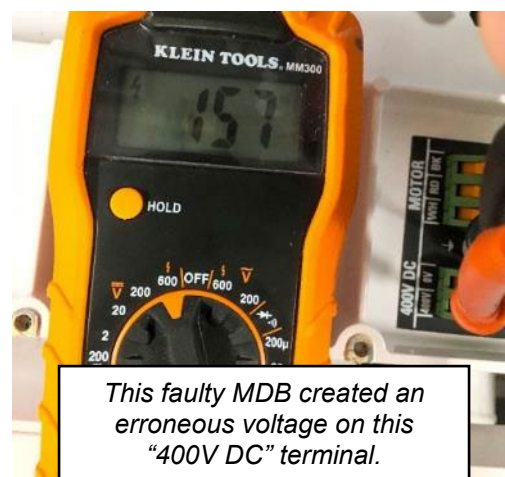
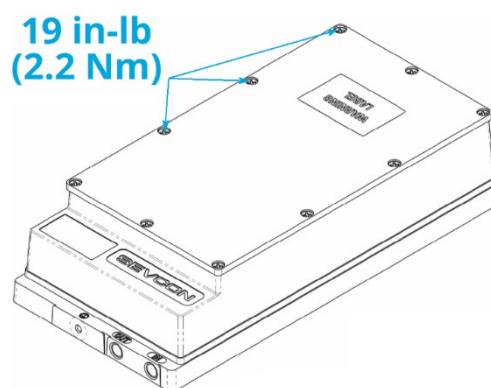
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 72

8. **LOOSEN** MDB feed-through grommet of motor power cable.
9. **EXAMINE** motor drive cable insulation at grommet.
10. **IF** damage is found in cable,  
**THEN DOCUMENT** damage in a photo for later submittal to Seakeeper Product Support Team.
11. **TEST** voltage at "400V DC" terminal.
12. **RECORD** voltage at "400V DC" terminal.

Voltage: \_\_\_\_\_ VDC

13. **MONITOR** input AC voltage during operation. (Brief periods of AC voltage dropout take several minutes to register as alarms. If voltage is regularly dropping out and coming back, it could result in speed loss.)
14. **IF** voltage at "400V DC" terminal is NOT steady between 390 and 400 VDC,  
**THEN REPLACE** MDB.
15. **INSTALL** MDB cover.
16. **TORQUE** ten cover M4 screws to **19 in-lbs (2.2 Nm)**.
17. **IF** display indicated 1234 RPM,  
**THEN REPLACE** Motor Drive per [SWI-094](#).
18. **IF** issue persists,  
**THEN CONTINUE** to [Section 4](#).



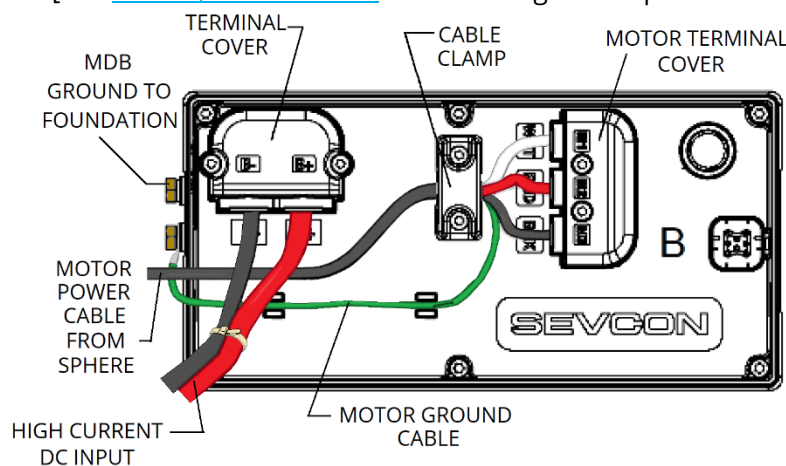
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 72

**SECTION 3: DC-POWERED MODELS****WARNING!****PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.**

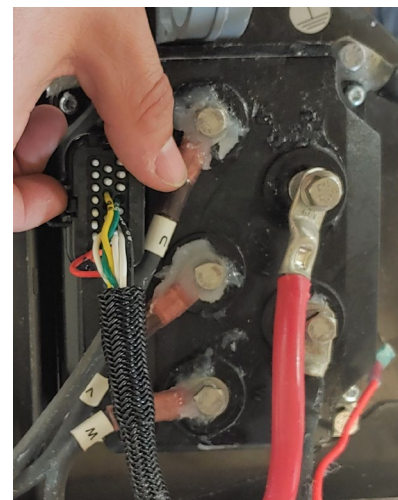
1. **OPEN / TURN OFF** high current DC breaker for Seakeeper.
2. For Seakeeper 4, **REMOVE** cover at motor terminal contacts **AND** at High DC current input terminals with T15 Torx bit. [See [Code 5, Attachment 2](#) for accessing Seakeeper 1 Curtis Drive]



3. For Seakeeper 1, **REMOVE** protective grease covering Curtis Drive terminals.
4. **INSPECT** for severe corrosion or heat damage at contacts or loose crimps.
5. **VERIFY** all terminals torqued per [Torque Specifications](#) section **AND** motor cable leads in proper color location.
6. **CLOSE / TURN ON** high current DC power breaker to Seakeeper.
7. **START** Seakeeper.
8. **MEASURE** high DC voltage at "DC INPUT" terminals during precession operation.

**NOTE:** Voltage should be 11.0 to 15.0 VDC.

9. **IF** not at a proper voltage (11.0 to 15.0 VDC), **THEN TROUBLESHOOT** vessel's electrical system.



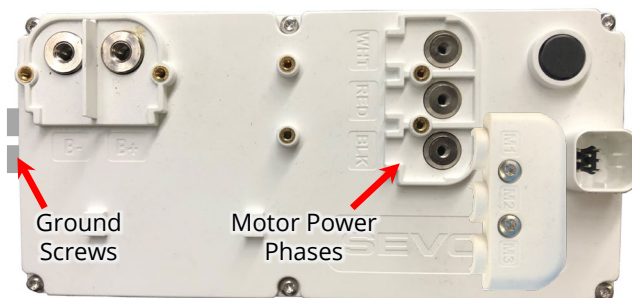


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

10. **MEASURE** DC voltage from one motor power phase to ground:

- a. On Seakeeper 1, **VERIFY** phase to ground voltage around 12 VDC.
- b. On Seakeeper 4, **VERIFY** phase to ground voltage around 48 VDC.



- c. **IF** phase voltages UNSATISFACTORY,  
**THEN REPLACE** MDB / Curtis Drive.

11. **STOP** Seakeeper from spooling by pressing power button on MFD app / display / ConnectBox.
12. **IF** alarm persists,  
**THEN CONTINUE** to [Section 4](#).



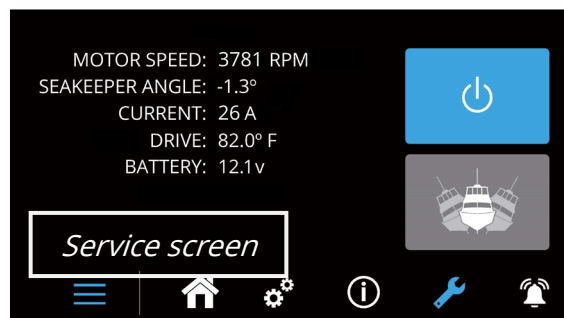
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 72

**SECTION 4: COMPLETION OF TROUBLESHOOTING**

1. **IF** electrical measurements were satisfactory and alarm still active,  
**THEN REPLACE** MDB / Curtis Drive **AND RETURN** faulty drive unit.
2. **ENSURE** all Seakeeper power restored.
3. **IF** alarm persists,  
**THEN:**
  - a. **CAPTURE** video of display service screen during coast down from maximum achieved speed with a visible timer beside display.
  - b. **COMPILE** all data collected and photos.
  - c. **SUBMIT** all data, photos, and videos to Seakeeper Product Support Team at support@seakeeper.com for review.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 75**

To troubleshoot and repair the “IMU FAULT” alarm (Code 75).

**BACKGROUND**

This code alarms when the GCM detects a break in CAN communication. Communication is accomplished through the Seakeeper CAN bus high and low leads. Any component connected to the CAN could create a break in communication, not just the IMU.

The most likely cause for this code is the IMU becoming unplugged from the wiring harness. In factory tests, it has been discovered that the Code 75 could appear if the CAN bus high or low lead is shorted; this guide will address this possibility. Other codes would be present in alarm history with Code 75 if this were the cause. Other codes seen may be Code 82: “Drive Age Count,” “Code 35: Display Fault,” and “Code 251: No Connection to Gyro.” Though IMU failure is unlikely, it may need to be replaced if the alarm persists after all other possible causes have been eliminated.

**REFERENCES**

Applicable model Electrical or Upper Foundation drawing in [Dealer Access](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) of Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

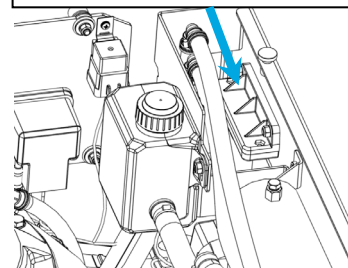
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 75

**PROCEDURE****WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.**  
**Seakeeper may start remotely.**

1. **ENSURE** zero RPM on MFD app / display **AND OPEN / TURN OFF** all breakers to Seakeeper.  
[See [Code 5, Attachment 2](#) for accessing Seakeeper 1 IMU]
2. **DISCONNECT** IMU harness connector.
3. **VISUALLY INSPECT** all wiring and pins of IMU:
  - a. **CUT** cable ties securing harness near IMU, as necessary.
  - b. **INSPECT** wiring near IMU for exposed leads with damage.
  - c. **INSPECT** IMU connector for loose wires or crimps.

*IMU of Seakeeper 4 & 4.5*

- d. **IF** loose wires or crimps found,  
**THEN REPAIR** connector.
- e. **IF** damaged wire harness/wires,  
**THEN REPLACE** wire harness.
- f. **REPLACE** any cable ties cut for inspection.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 75

PRODUCT      SEAKEEPER 1, 4, AND 4.5

4.    **RECONNECT** IMU connector, ensuring it is fully seated in IMU.

NOTE: Connector has two wedge tabs that engage IMU at each side. Three tabs molded into connector should prevent connector from being inserted upside down.

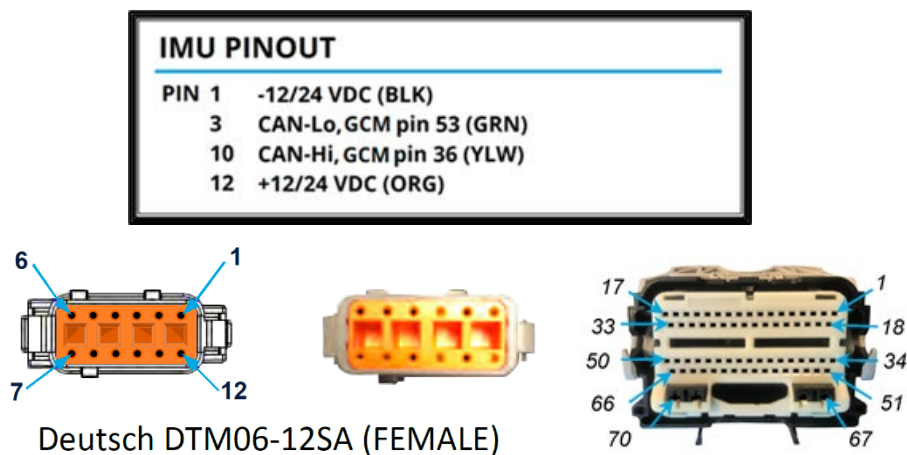
- a.    **CYCLE** DC control power to Seakeeper.
- b.    **VERIFY** IMU mounted in correct orientation per applicable Electrical or Upper Foundation drawing in [Dealer Access](#).
- c.    **CHECK** alarm clear on MFD app / display.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 75

PRODUCT      SEAKEEPER 1, 4, AND 4.5

5. **PERFORM AND RECORD** electrical checks of CANbus as follows:

**NOTE:**

Intermittent opens in a wire may not be seen without manipulating the harness to duplicate movement of precession.

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.**  
**Seakeeper may start remotely.**

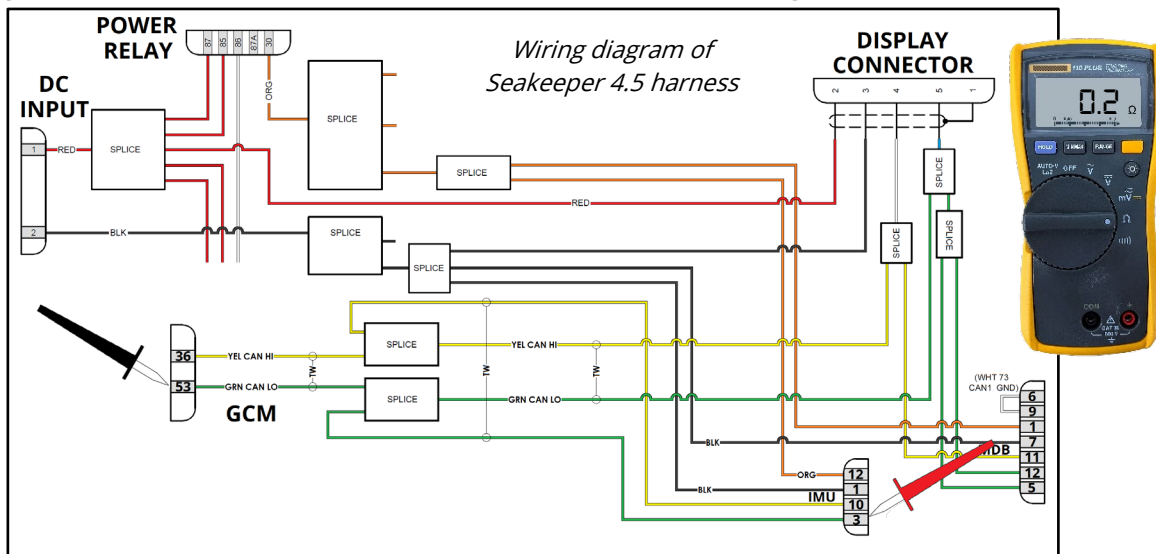
- With power aligned to Seakeeper, **DISCONNECT** IMU.
- CONFIRM** 12/24 VDC at IMU harness connector between pin **12** and pin **1**.
- DISCONNECT** DC low current power supply to Seakeeper **OR OPEN / TURN OFF** DC low current supply breaker for Seakeeper.
- DISCONNECT** wire harness from MDB.
- DISCONNECT** display connection of Seakeeper to helm display cable or ConnectBox.
- DISCONNECT** wire harness from GCM.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 75

Step 5 continued

g. With a multimeter in resistance mode, **PERFORM** following checks:

- i. **CONFIRM** resistance below  $0.3\Omega$  between IMU pin **3** and GCM pin **53**.
- ii. **CONFIRM** resistance below  $0.3\Omega$  between IMU pin **10** and GCM pin **36**.
- iii. **CHECK** for short between IMU pin **3** and **10**.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

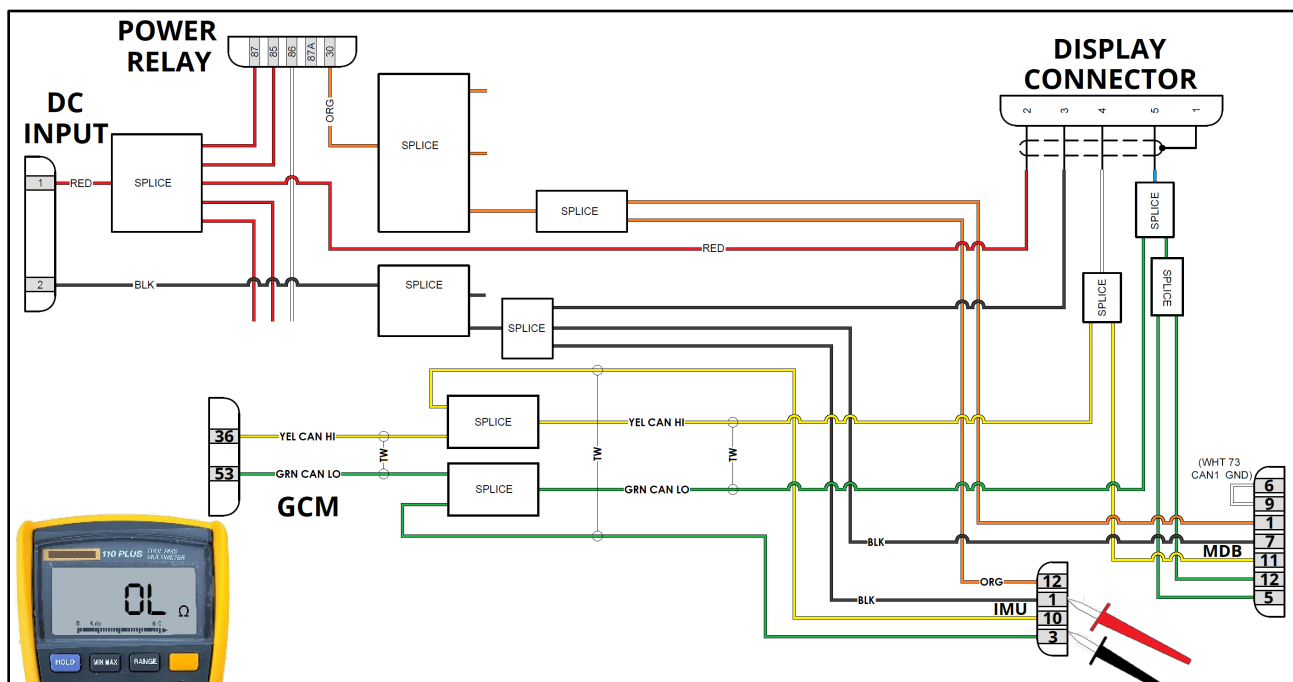
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 75

Step 5.g continued

iv. **VERIFY** NO short (Open Loop) between IMU pin **3** and following pins:

- Pin **1**
- Pin **12**

v. **CHECK** for short between IMU pin **10** and following pins:

1. Pin **1**
2. Pin **12**

vi. **IF** any check in Step 5.g was UNSATISFACTORY,  
**THEN REPLACE** wire harness.

1. **IF** Seakeeper 1,  
**THEN CONTACT** Seakeeper Product Support Team for guidance.

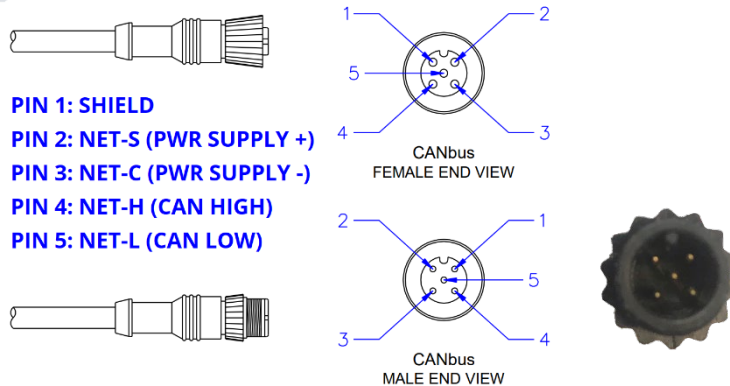
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 75

PRODUCT      SEAKEEPER 1, 4, AND 4.5

6. **IF** other CAN-related alarms are present (i.e., Code 35, 82, 84, 158, 251),  
**THEN PERFORM** following:

- a. **RECONNECT** wire harness connectors to MDB, GCM, and IMU.



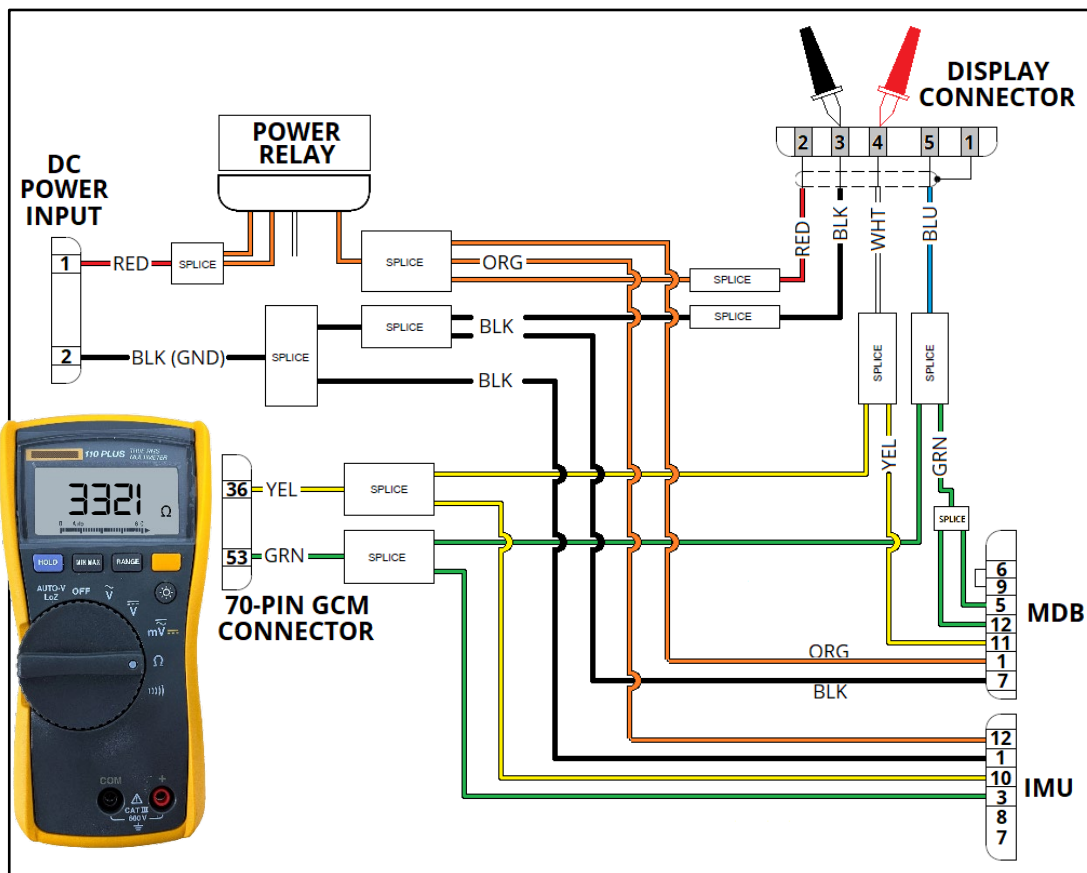


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 75

Step 6 continued

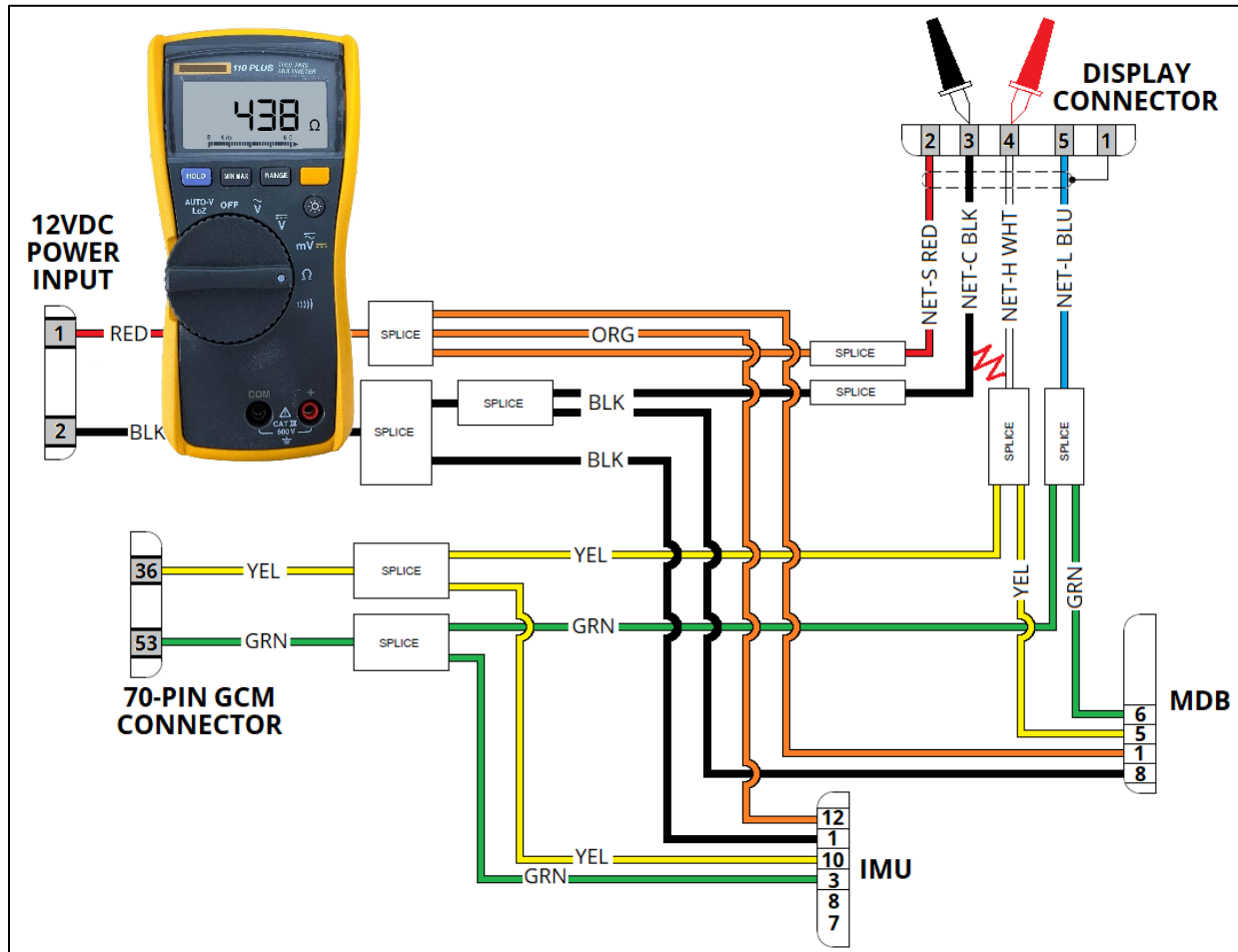
**NOTE:**

- Intermittent opens in a wire may not be seen without manipulating the harness to duplicate movement while operating.
- If terminating resistor attached, this resistance will be about 59-60Ω between pins 4 and 5.

- b. **PERFORM** following on **male** display cable connection of harness:
- VERIFY** resistance of more than 1000Ω exists between pin **5** and pin **2**.
  - VERIFY** resistance of more than 1000Ω exists between pin **5** and pin **3**.
  - VERIFY** resistance of more than 1000Ω exists between pin **4** and pin **2**.
  - VERIFY** resistance of more than 1000Ω exists between pin **4** and pin **3**.

Step 6.b continued

- v. **VERIFY** resistance of 120Ω exists between pin **4** and pin **5**.
- vi. **CONFIRM** OPEN LOOP (OL) between pin **4** and pin **1** **AND** between pin **5** and pin **1**.
- vii. **KEEP** display cable from Seakeeper to helm station (or ConnectBox) disconnected.



- c. **IF** checks of Step 6.b were SATISFACTORY,  
**THEN** **GO TO** helm station and perform following:
  - i. **DISCONNECT** display/ConnectBox from display cable from Seakeeper.
  - ii. **CONFIRM** OPEN LOOP (OL) between any two pins with no terminating resistor attached.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

---



Code 75

PRODUCT        SEAKEEPER 1, 4, AND 4.5

Step 6 continued

- d.    **IF** short **is** found in step 6.c.ii,  
      **THEN REPLACE** display cable from Seakeeper to helm/ConnectBox.
- 7.    **RESTORE** all connections and Seakeeper power.
- 8.    **IF** alarm persists,  
      **THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all test results and any photos of Information screen and alarm history, and any photos of damage for review.

**\*\*\*\*\*END\*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 76/77**

To troubleshoot and repair the “ROLL RATE FAULT” alarm (Code 76) and “YAW RATE FAULT” alarm (Code 77).

**BACKGROUND**

Both motion faults are sensed in the Inertia Measurement Unit (IMU) and will alarm at 70° per second travel rate in roll and yaw motion. Troubleshooting will concentrate on ensuring the IMU is appropriately oriented and mounted. If this alarm occurs with any other alarms diagnose them first.

**REFERENCES**

Applicable model Service Drawing on [Dealer Access](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) of Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

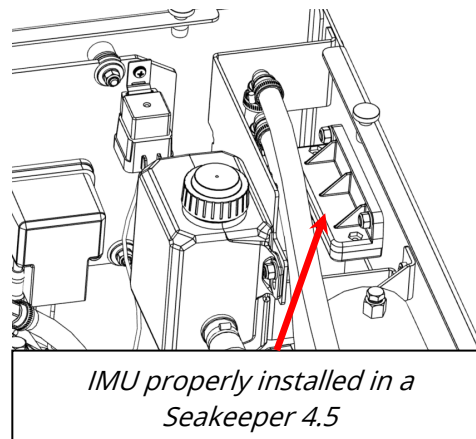
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 76/77

**PROCEDURE****WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

1. **ENSURE** flywheel at zero RPM at MFD app / display.
2. **OPEN / TURN OFF** low current DC breaker to Seakeeper.
3. **PERFORM** following checks:
  - a. **CONFIRM** IMU is secured tightly to mounting panel. [See [Code 5 Attachment 2](#) for accessing Seakeeper 1 IMU]
  - b. **CONFIRM** mounting panel is secure and not vibrating.
4. **IF** not properly installed,  
**THEN SECURELY FASTEN** IMU in proper orientation.
5. **ENSURE** components near Seakeeper are NOT introducing excessive vibration into Seakeeper or vessel structure during their operation.
6. **ENSURE** Seakeeper foundation mounting screws torqued per [torque specifications](#) and cannot move.

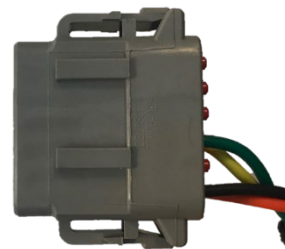
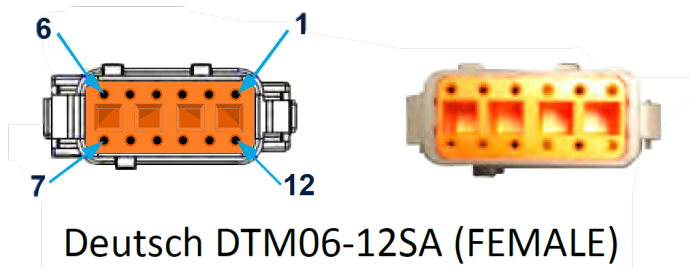


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 76/77

PRODUCT      SEAKEEPER 1, 4, AND 4.5

7. **VERIFY** IMU connector of harness is fully inserted.
8. **REMOVE** harness IMU connector and inspect connector and pins of IMU for damage or corrosion.
  - **IF** connector is corroded or dirty,  
**THEN CLEAN** connector and pins and reinsert connector into IMU.
  - **IF** pins of IMU are damaged,  
**THEN REPLACE** IMU.



9. **INSPECT** wiring of harness around IMU for signs of damage.
10. **IF** wire harness appears damaged,  
**THEN REPLACE** wire harness.
11. **CYCLE** DC power to test alarm clear.
12. **CYCLE** low current DC power to Seakeeper.
13. **IF** alarm persists,  
**THEN REPLACE** IMU **AND CYCLE** DC power afterward.
14. **IF** alarm persists,  
**THEN:**
  - a. **LOG** CAN data using Seakeeper Service Tool app per [SWI-118](#) for no more than 10 minutes to capture issue in CAN traffic.
  - b. **CONTACT** Seakeeper Product Support Team at support@seakeeper.com with results of inspections, tests, and any photos for review.

\*\*\*\*\* **END** \*\*\*\*\*

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 82/84/120**

To troubleshoot and repair:

- "DRIVE AGE COUNT" alarm (Code 82)
- "DRIVE CANBUS FAULT" alarm (Code 84)
- "GCM TO DRIVE COMM LOST" alarm (Code 120)

**BACKGROUND**

The GCM triggers this code when it stops receiving messaging from the MDB within a window that it expected to have received a message. Often it indicates an abrupt loss of communications due to an open wire or MDB fault. Another possible cause is the CAN Hi and Low conductors shorted.

Troubleshooting will direct attention to wiring and the connector at the MDB. The CANbus will be addressed to determine if a short exists on the CAN lines. The CANbus runs from the Seakeeper to the display; the display cable must be eliminated as a possible fault. Because the alarm originates in the GCM, this will be addressed after all other failures eliminated.

Keep in mind that when testing the wire harness, intermittent faults may not be seen by a technician testing a stationary Seakeeper. To eliminate these faults, it is good practice to manipulate the wiring harness while performing electrical checks to catch the intermittent faults that would elude a technician otherwise.

Code 84 is reported to the GCM by the Motor Drive Box (MDB) software reporting it has a CANbus problem internally. One can eliminate hardware issues in this guide to isolate a fault to the MDB. It is more economical to replace a wiring harness than an MDB if it is at fault.

Code 120 alarms only in the Seakeeper 1. It is indicative of a fault in the CANbus where the Curtis drive fails to detect signals from the GCM.

**REFERENCES**

[SWI-093 - Molex Connector](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) of Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 82/84/120

PRODUCT      SEAKEEPER 1, 4, AND 4.5

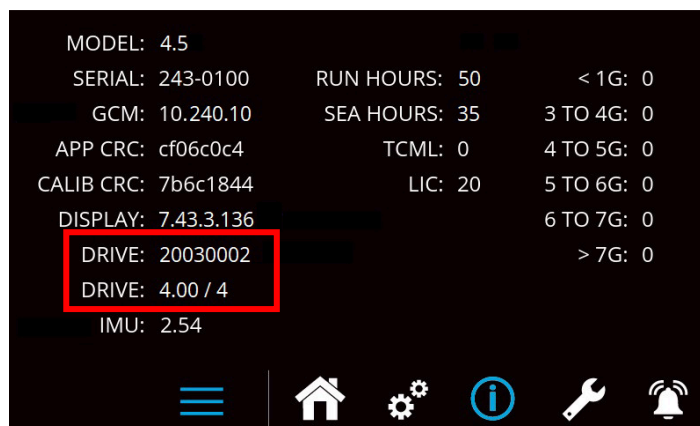
**PROCEDURE****SECTION 1: INITIAL CHECKS**

1. **IF** Seakeeper 1,  
**THEN PROCEED** to [Section 4: Seakeeper 1](#).

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS** when working on live circuitry.  
**Seakeeper may start remotely.**

2. **ENSURE** flywheel at zero RPM at MFD app / 5" display.
  - a. **ENSURE** Service screen NOT displaying 1234 RPM speed indication and unchanging.
  - b. **IF** displaying 1234 RPM,  
**THEN REPLACE** MDB.
3. **CHECK** Information screen for DRIVE software versions populated.



4. **OPEN / TURN OFF** all Seakeeper breakers.

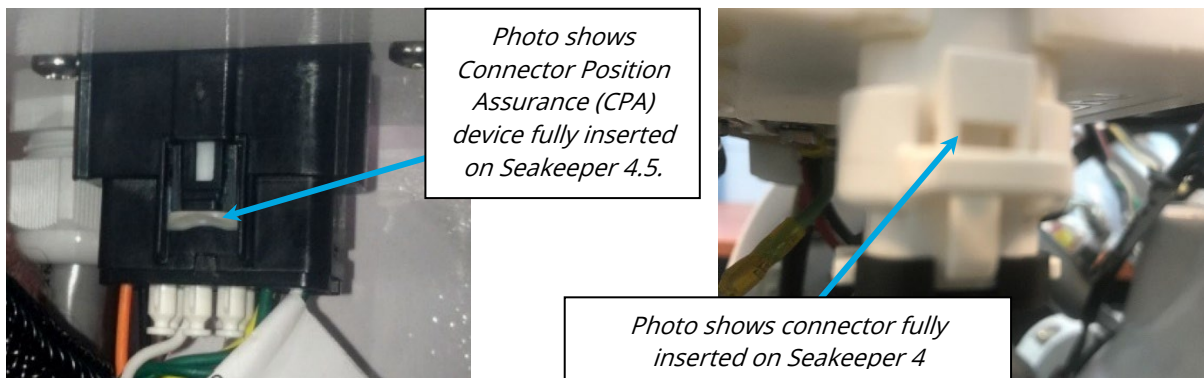


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 82/84/120

PRODUCT      SEAKEEPER 1, 4, AND 4.5

5. **VERIFY** connector at MDB is fully inserted.

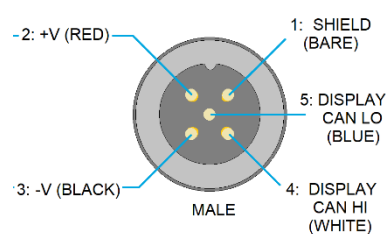


- a. **IF** MDB connector not fully inserted,  
**THEN:**
- INSERT** connector.
  - REPEAT** steps 2 and 3 **AND CHECK** alarm clear.
6. At Seakeeper, **DISCONNECT** display cable to helm/ConnectBox from Seakeeper wire harness.
7. **PERFORM AND RECORD** following tests on male connector from wire harness:

**NOTE:**

Intermittent opens in a wire may not be seen without manipulating the harness to duplicate movement of operation.

- VERIFY** resistance of more than 1000Ω exists between pin 5 and pin 2.
- VERIFY** resistance of more than 1000Ω exists between pin 5 and pin 3.
- VERIFY** resistance of more than 1000Ω exists between pin 4 and pin 2.
- VERIFY** resistance of more than 1000Ω exists between pin 4 and pin 3.



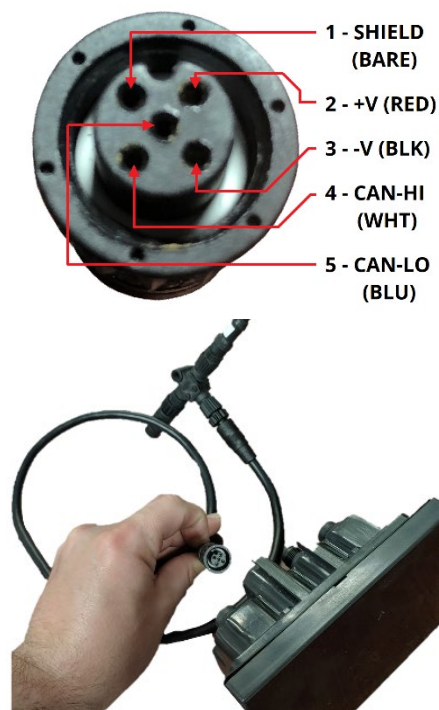
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 82/84/120

PRODUCT SEAKEEPER 1, 4, AND 4.5

Section 1, Step 7 continued

- e. **VERIFY** resistance of 120Ω exists between pin **4** and pin **5**. **[NOTE:** If terminating resistor attached, this resistance will be about 59-60Ω in this measurement.]
- f. **VERIFY** OPEN LOOP (OL) exists between pin **4** and pin **1** **AND** between pin **5** and pin **1**.
8. **RECONNECT** display cable from helm/ConnectBox to Seakeeper wire harness.
9. If applicable, **GO TO** helm station and perform following:
  - a. **DISCONNECT** terminating resistor from Tee adapter at end of Seakeeper CAN cable.
  - b. **DISCONNECT** CAN cable from back of display/ConnectBox.
  - c. **CONFIRM** all Tee adapter and cable junctions are tight and corrosion free.
  - d. **CONFIRM** NO short between any two pins of disconnected display cable with no terminating resistor attached (except between pins 4 and 5).
    - i. **IF** short found (less than 1000 ohms),  
**THEN REPLACE** all display cables and Tee adapter from Seakeeper to helm.
  - e. **REATTACH** terminating resistor to Tee adapter at end of Seakeeper display cable.
  - f. **VERIFY** resistance of approx. 60Ω between pin **4** and **5** of disconnected display cable.
  - g. **IF** no issues found in display CAN wiring,  
**THEN REMAKE** all connections.
10. **PROCEED** to appropriate section per model.


[Section 2: AC Model - Seakeeper 4.5](#)
[Section 3: DC Model - Seakeeper 4](#)
[Section 4: Seakeeper 1](#)

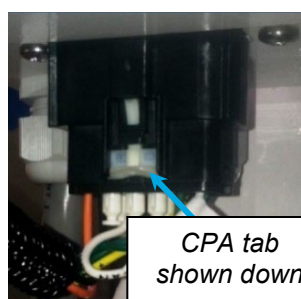
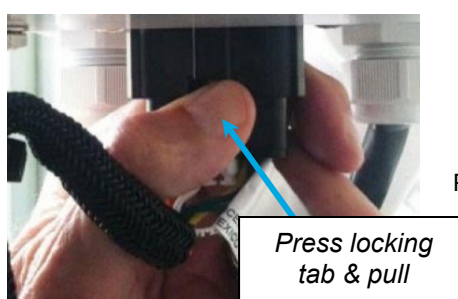
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 82/84/120

PRODUCT SEAKEEPER 1, 4, AND 4.5

**SECTION 2: AC-POWERED MODELS**

1. With all Seakeeper power removed, **REMOVE** MDB connector as follows:
  - a. **PULL** white CPA tab with fingertip to out position.
  - b. With thumb, **PRESS** on locking tab until it releases from connector housing on MDB.
  - c. While continuing to press locking tab, **GRASP** harness connector with index finger **AND PULL AWAY** straight from MDB.



2. **VERIFY** connector wiring per table:

| REARVIEW OF HARNESS CONNECTOR |         |         |                             |
|-------------------------------|---------|---------|-----------------------------|
| Wire Color/Description        | Pin No. | Pin No. | Wire Color/Description      |
| Orange (+12 VDC)              | 1       | 12      | Green (CAN1-)               |
| PLUG                          | 2       | 11      | Yellow (CAN1+)              |
| PLUG                          | 3       | 10      | PLUG                        |
| PLUG                          | 4       | 9       | White (Gnd) jumper w/ pin 6 |
| Green (CAN1-)                 | 5       | 8       | PLUG                        |
| White (Gnd) jumper w/ pin 9   | 6       | 7       | Black (Gnd)                 |

3. **REMOVE** white cover of connector.
4. **CONFIRM** pins are inserted, as shown.
5. **TUG** on wires from back to ensure pin-to-wire crimps are secure **AND** pins locked into connector.
6. **IF** issues found in MDB connector, **THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com for repair guidance.
7. **DISCONNECT** GCM 70-pin connector.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 82/84/120

PRODUCT      SEAKEEPER 1, 4, AND 4.5

8. With multimeter in Resistance mode, **PERFORM AND RECORD** following measurements:

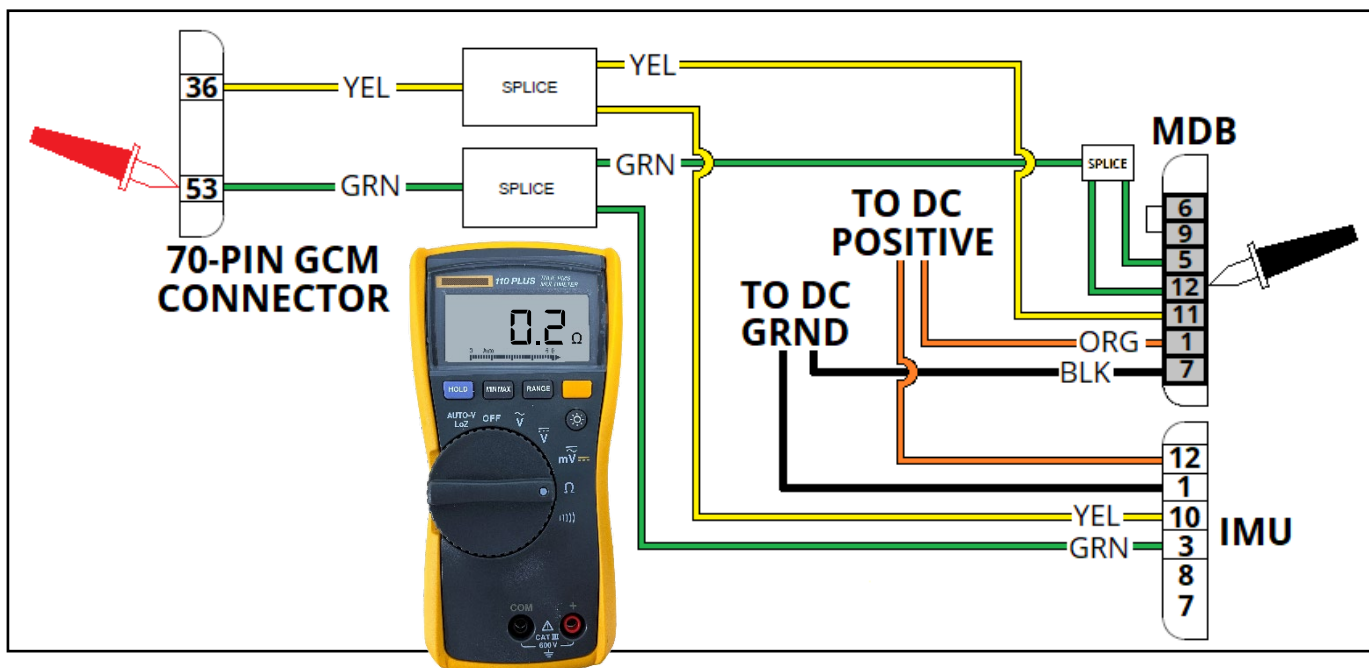
- a. **CONFIRM** below  $0.3\Omega$  between MDB pin **11** and GCM pin **36**.
- b. **CONFIRM** below  $0.3\Omega$  between MDB pin **5** and GCM pin **53**.
- c. **CONFIRM** below  $0.3\Omega$  between MDB pin **12** and GCM pin **53**.



1: 12/24 VDC, ORG  
 2-4, 8 & 10: PLUG  
 5: CAN-, GRN  
 6: Jumper w/ 9, WHT  
 7: GND, BLK  
 9: Jumper w/ 6, WHT  
 11: CAN+, YEL  
 12: CAN-, GRN



AC-powered Seakeeper  
MDB Molex Connector



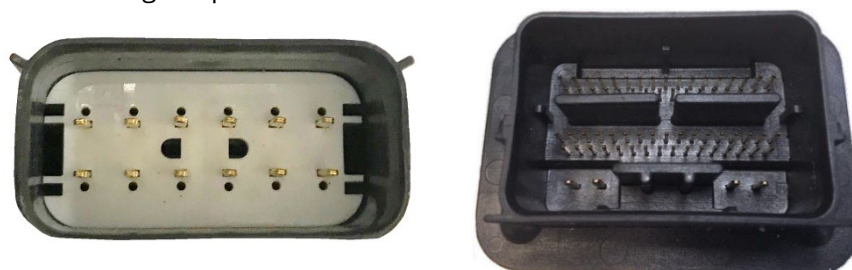
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 82/84/120

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Section 2, Step 8 continued

- d. **IF** any measurement UNSATISFACTORY,  
**THEN REPLACE** wire harness.
- e. **INSPECT** for damage to pins on MDB and GCM.



- 9. **CLOSE / TURN ON** DC control power breaker to Seakeeper.
- 10. **MEASURE** for DC input voltage present between pin **1** and pin **7** of MDB connector.
- 11. **IF** voltage not present and no main power relay code in alarm,  
**THEN REPLACE** wire harness.
- 12. **CHECK** alarms clear.
- 13. **IF** alarm persists,  
**THEN SUBMIT** test results data and any photos to Seakeeper Product Support Team at support@seakeeper.com.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 82/84/120

PRODUCT      SEAKEEPER 1, 4, AND 4.5

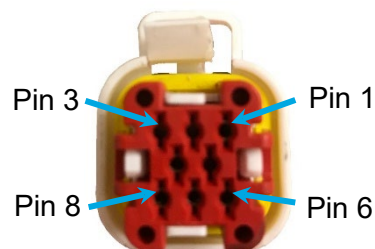
**SECTION 3: DC-POWERED MODELS**

1. With all Seakeeper power removed, **DISCONNECT** MDB connector as follows:



- a. **PULL OUT** locking wedge tab.
  - b. While pulling out on lock wedge tab, **PULL DOWN** on connector from MDB.
2. **VERIFY** connector wiring per table below:

| Wire Description | Pin No. |
|------------------|---------|
| Orange +12VDC    | 1       |
| PLUG             | 2       |
| PLUG             | 3       |
| PLUG             | 4       |
| Yellow CAN1+     | 5       |
| Green CAN1-      | 6       |
| PLUG             | 7       |
| Black -12VDC     | 8       |



3. **TUG** on wires from back of connector to ensure pin-to-wire crimps are secure **AND** pins locked into connector.
4. **IF** issues identified with connector wire(s), **THEN CONTACT** Seakeeper Product Support Team for repair guidance.
5. **DISCONNECT** GCM 70-pin connector.



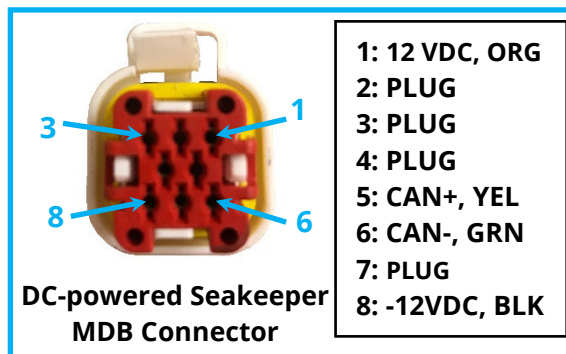
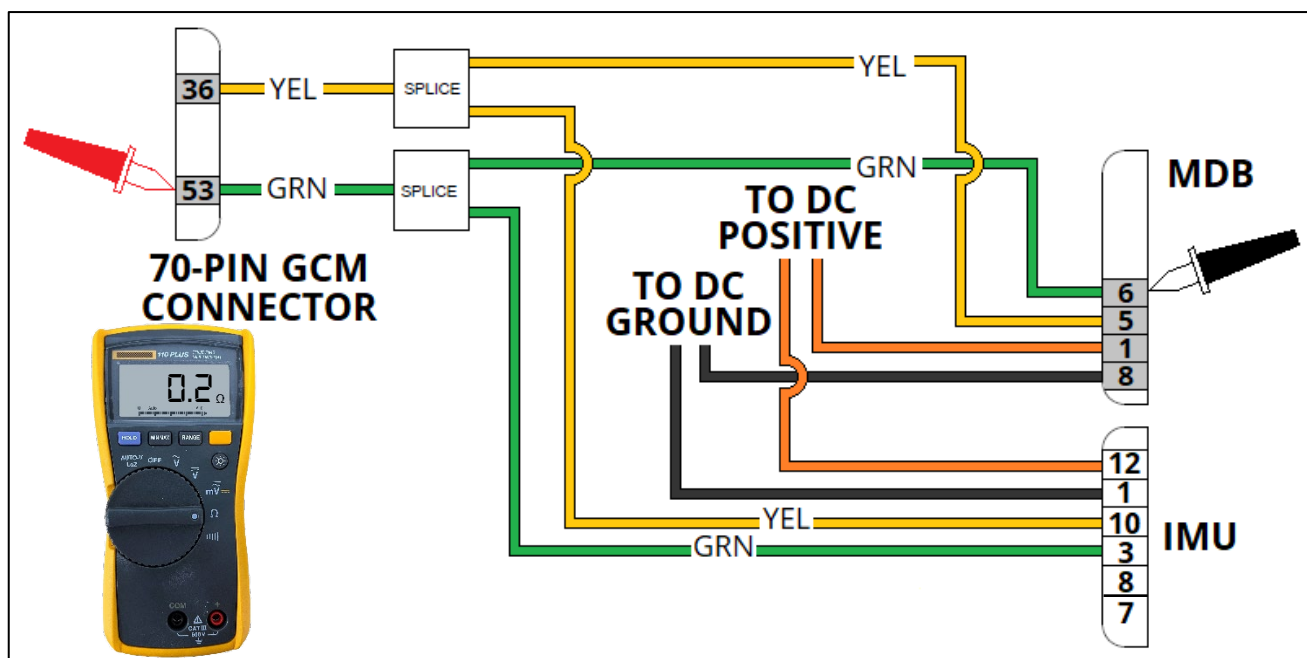
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 82/84/120

6. With multimeter in resistance mode, **PERFORM AND RECORD** following measurements:

- a. **CONFIRM** below  $0.3\Omega$  between MDB pin **5** and GCM pin **36**.
- b. **CONFIRM** below  $0.3\Omega$  between MDB pin **6** and GCM pin **53**.



- c. **IF** any measurement **UNSATISFACTORY**,  
**THEN REPLACE** wire harness.

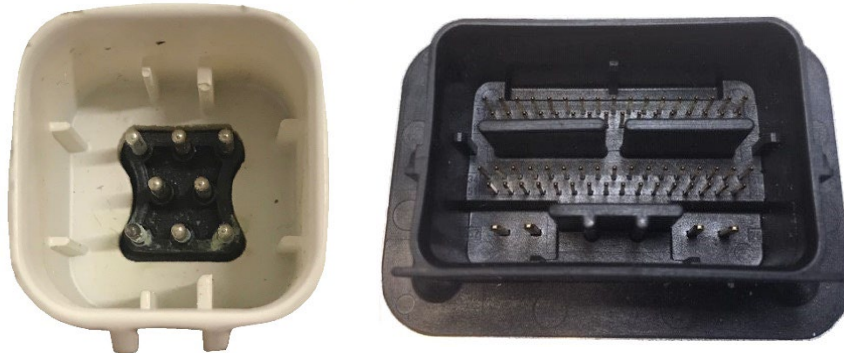
## SEAKEEPER TROUBLESHOOTING GUIDE- 206



Code 82/84/120

PRODUCT      SEAKEEPER 1, 4, AND 4.5

7.     **INSPECT** for damage to pins of MDB and GCM.



8.     **RECONNECT** all connectors of harness.
9.     **CLOSE / TURN ON** all breakers to Seakeeper.
10.    **CHECK** all alarms clear.
11.    **IF** alarm persists,  
         **THEN** **CONTACT** Seakeeper Product Support Team at [support@seakeeper.com](mailto:support@seakeeper.com) with all test results.



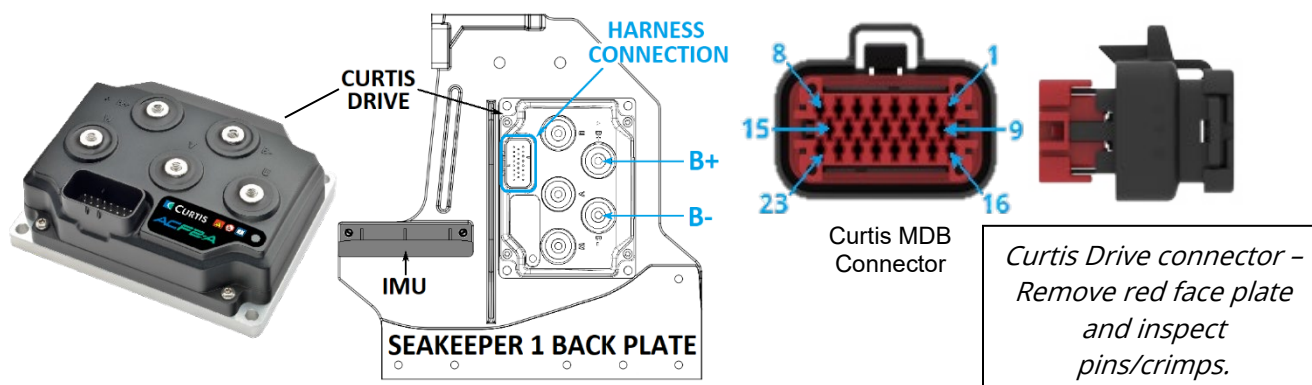
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 82/84/120

**SECTION 4: SEAKEEPER 1**

1. **OPEN / TURN OFF** High current DC power breaker to Seakeeper.
2. **DISCONNECT** Curtis drive connector. [See [Attachment 2](#) of Code 5/40/41 for access]
  - a. **PULL OUT** locking wedge tab.
  - b. While pulling on tab, **PULL** connector from Curtis drive.



3. **VERIFY** connector wiring per table below:

| Wire Description | Pin No. | Wire Description | Pin No. | Wire Description | Pin No. |
|------------------|---------|------------------|---------|------------------|---------|
| Red (+12 VDC)    | 1       | WHT (Temp)       | 9       | WHT (HALL A)     | 17      |
| PLUG             | 2       | PLUG             | 10      | WHT (HALL B)     | 18      |
| PLUG             | 3       | PLUG             | 11      | PLUG             | 19      |
| PLUG             | 4       | BLK (GND)        | 12      | GRN (CAN-)       | 20      |
| PLUG             | 5       | YEL (CAN+)       | 13      | PLUG             | 21      |
| PLUG             | 6       | PLUG             | 14      | PLUG             | 22      |
| PLUG             | 7       | PLUG             | 15      | PLUG             | 23      |
| PLUG             | 8       | ORG (+5 VDC)     | 16      |                  |         |

4. **TUG** on wires from back to ensure pin-to-wire crimps secure and pins locked in connector.
5. **IF** connector issues identified,  
**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com for repair guidance.
6. **DISCONNECT** GCM 70-pin connector.

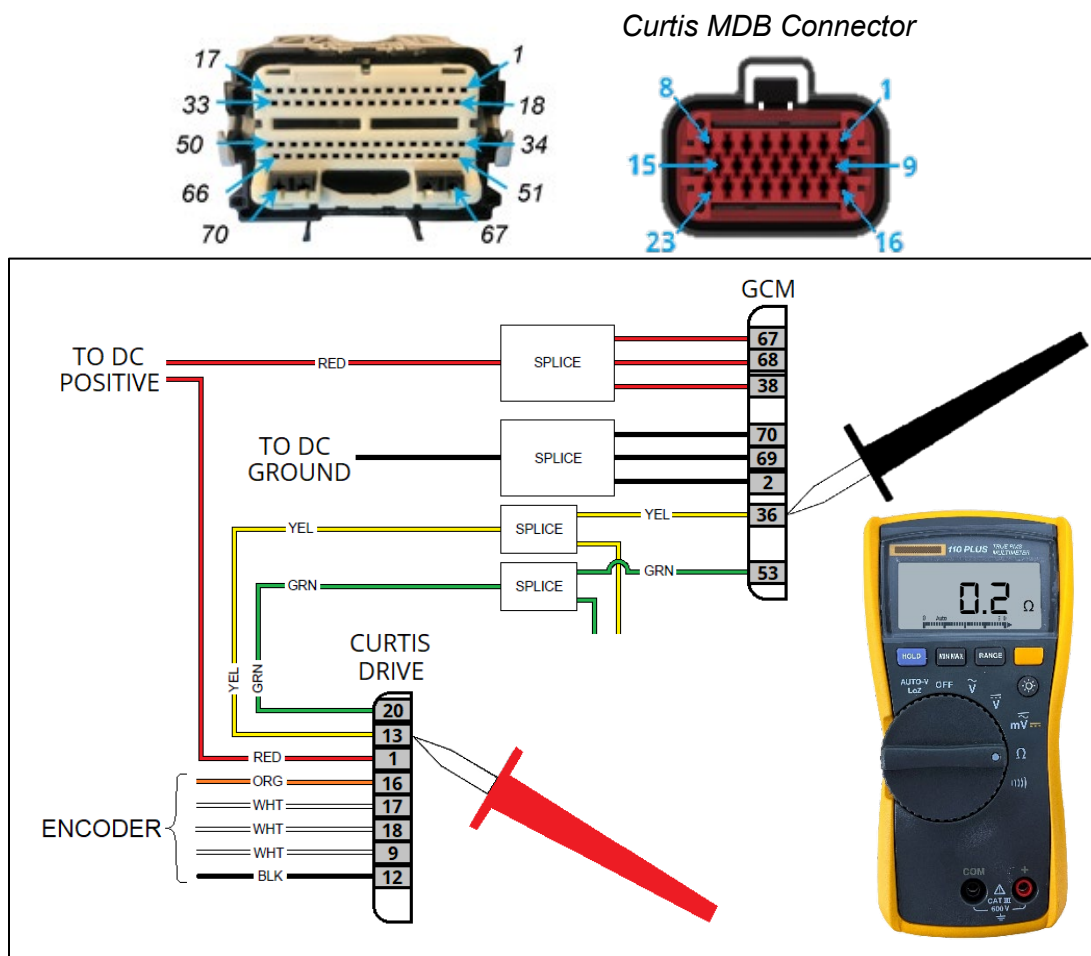
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 82/84/120

7. With multimeter in Resistance mode, **PERFORM AND RECORD** following measurements:

- a. **CONFIRM** below  $0.3\Omega$  between Curtis drive pin **13** and GCM pin **36**.
- b. **CONFIRM** below  $0.3\Omega$  between Curtis drive pin **20** and GCM pin **53**.



- c. **IF** any measurement **UNSATISFACTORY**, **THEN CONTACT** Seakeeper Product Support Team at [support@seakeeper.com](mailto:support@seakeeper.com) with test results for repair guidance.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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Code 82/84/120

PRODUCT      SEAKEEPER 1, 4, AND 4.5

8.     **RECONNECT** all connections of harness.
9.     **CLOSE / TURN ON** all breakers to Seakeeper.
10.   **CHECK** all alarms clear.
11.   **IF** alarm persists,  
      **THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with test and inspection results for review.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 83**

To troubleshoot and repair the “DRIVE VOLTAGE FAULT” alarm (Code 83).

**BACKGROUND**

The MDB reports this code by measuring the output voltage to the motor. It usually indicates issues with the tuning of the motor, shorting within the motor power cables or motor windings or shorting due to cable shielding or an internal fault in the MDB.

A Code 90 (Motor Fault alarm) may accompany code 83. The reason may be a software issue requiring the replacement of the MDB. This will be addressed in this guide.

Megohm testing is performed in this guide to determine the condition of the insulation and potting of the motor drive cable and flywheel motor. Because megohmmeters vary in quality and accuracy, the guide uses a time-resistance test that eliminates some of these variables. A meter that can provide a continuous test voltage for 60 seconds is required.

**REFERENCES**

[SWI-124 - Seakeeper Motor Lead Testing](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 83

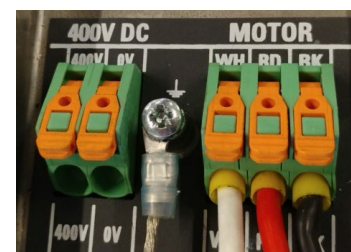
**PROCEDURE****SECTION 1: AC-POWERED MODELS****NOTE:**

Intermittent opens in a wire may not be seen without manipulating the harness to duplicate movement of precession.

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.**  
**Seakeeper may start remotely.**

1. **PERFORM** this procedure in its entirety (Multiple failures may cause a single code) **AND RECORD** results of all inspections and tests.
2. At MFD app / display with flywheel stationary, **VERIFY** RPM indication does not read "1234 RPM" on display service screen.
3. **OPEN / TURN OFF** AC breaker to Seakeeper.
4. **ENSURE** Molex harness connector to MDB securely inserted.
5. **REMOVE** MDB cover to expose "MOTOR" lead connections for following checks:
  - a. **PULL** on crimps at end of each motor cable lead to ensure securely fastened.
  - b. **LOOSEN** MDB feed-through grommet **AND EXAMINE** motor drive cable insulation at grommet.
  - c. **ENSURE** interior of MDB is free of moisture.
6. **CLOSE / TURN ON** AC breaker to Seakeeper.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 83

PRODUCT      SEAKEEPER 1, 4, AND 4.5

7. With a multimeter on AC Volts, **TEST AND RECORD** voltage at “AC INPUT” terminal.
8. **IF** voltage below 99 VAC for a 110 VAC installation, or below 188 VAC for a 230 VAC installation, **THEN TROUBLESHOOT** vessel electrical supply.
9. **OPEN / TURN OFF** AC breaker to Seakeeper.
10. **PERFORM** testing of motor leads per [SWI-124 - Seakeeper Motor Lead Testing](#).
11. With a multimeter in “DC Volts” mode, **TEST** voltage at “400V DC” terminal.
12. **IF** alarm is currently present and does not clear, **THEN:**
  - a. **INSERT** meter probes into 400v bus terminals.
  - b. With AC power aligned to drive, **CYCLE** DC power.
  - c. **ENSURE** meter reads 390 to 400 briefly before alarm triggers and it begins to drop.
13. **DOCUMENT** any visible damage found with a photograph and all test results.

**NOTE:**

It is possible that one fault leads to other faults. These steps assume a series of faults may have occurred from one initial fault.

14. **IF** motor lead testing or 400V voltage check showed UNSATISFACTORY test results, **THEN CONTACT** Seakeeper Product Support Team with test results **AND CONTINUE** as suggested by Seakeeper.
15. **RE-ATTACH** all motor cable leads to respective terminal.
16. **INSTALL** MDB cover.
17. **TORQUE** ten M4 Phillips head screws of cover to **19 in-lbs (2.2Nm)**.
18. **CLOSE / TURN ON** all breakers to Seakeeper.
19. **IF** issue persists, **THEN CONTINUE** to [Section 3](#).

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 83

**SECTION 2: DC-POWERED MODELS****WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

1. **ENSURE** flywheel at zero RPM at MFD app / display.
  2. **OPEN / TURN OFF** high current DC breaker to Seakeeper.
  3. **REMOVE** cover at motor drive cable contact posts and at High DC current input terminals with T15 Torx bit.
  4. **INSPECT** for severe corrosion or heat damage at contacts and on cables.
  5. **CLOSE / TURN ON** high current DC power breaker to Seakeeper.
  6. **MEASURE** High DC voltage at "INPUT" terminals.
- NOTE:** Voltage should be 11.0 to 15.0 VDC.
7. **IF** voltage measured at input was not 11.0 to 15.0 VDC, **THEN TROUBLESHOOT** vessel electrical system.
  8. **PERFORM** testing of motor leads per [SWI-124 - Seakeeper Motor Lead Testing](#).
  9. **DOCUMENT** results of all measurements and photograph any damage.
  10. **IF:**
    - motor drive cable has any phase-to-phase resistance greater than 2.0Ω,
    - any phase resistance is significantly higher than other two, **OR**
    - UNSATISFACTORY megohm results,



**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all data recorded.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

PRODUCT      SEAKEEPER 1, 4, AND 4.5



**WARNING:**

**SHOCK HAZARD EXISTS BECAUSE OF CAPACITANCE FROM MEGOHM TESTING.**

11. **RE-ATTACH** all motor cable leads to respective terminal.
12. **TORQUE** terminal leads per [Torque Specifications](#) section.
13. **INSTALL** cover at motor drive cable contact posts and High DC current input terminals.
14. **CLOSE / TURN ON** all Seakeeper breakers.
15. **IF** issue persists,  
**THEN CONTINUE** to Section 3 (next page).



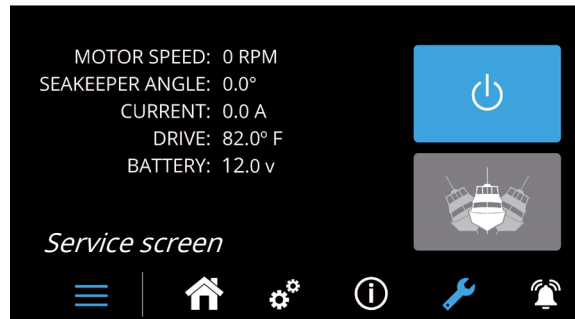
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 83

**SECTION 3: COMPLETION OF TROUBLESHOOTING**

1. **IF** alarm persists after faulty component replacement,  
**THEN:**
  - a. **COMPILE** all data taken from testing and a photo of information and alarm history screens.
  - b. **CYCLE** DC power to Seakeeper to reset code(s).
  - c. While in Service screen of MFD app / display (seen in image), **PRESS** START to spool unit.
  - d. **RECORD** one minute video of display while spooling until alarm activated.
  - e. **SUBMIT** test results data, video and photos to Seakeeper Product Support Team at support@seakeeper.com for review.

**\*\*\*\*\* END \*\*\*\*\***

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 85-93**

To troubleshoot and repair the various internal MDB faults that can occur:

- "DRIVE SOFTWARE FAULT" alarm (Code 85).
- "DRIVE MEMORY FAULT" alarm (Code 86)
- "DRIVE CONFIGURATION INCORRECT" alarm (Code 87)
- "DRIVE WIRING FAULT" alarm (Code 88)
- "DRIVE MOTOR CONTROL FAULT" alarm (Code 89)
- "MOTOR FAULT" alarm (Code 90)
- "DRIVE HARDWARE INCOMPATIBLE" alarm (Code 91)
- "DRIVE MOSFET\* FAULT" alarm (Code 92)
- "DRIVE IGBT\*\* FAULT" alarm (Code 93)

\* MOSFET: Metal-Oxide-Semiconductor Field-Effect Transistor

\*\* IGBT: Insulated Gate Bipolar Transistor

**BACKGROUND**

These codes will be reported by the Gyro Control Module (GCM) on Motor Drive Box (MDB) internal issues on all Seakeeper series models. All will cause the Seakeeper to secure power to the flywheel motor and LOCK the unit and require the resolution of the fault before allowing a start. Each is from the monitoring component for which they are named and alarm at a given time delay of milliseconds of the error not clearing. The outlier is Code 90: Motor Fault. It occurs much more rapidly than the others on the list. It will also be seen to accompany other electrical faults at times.

Codes 85 through 87 address faults within the software programmed into the MDB. If the software fails in any of the start-up programmed self-checks, the appropriate code will come into alarm. This will likely require MDB replacement.

Codes 88 through 93 are also from the MDB self-checks but address a component hardware issue, either within the printed circuit board of the MDB or in the flywheel motor or their associated wiring. Troubleshooting these codes will require inspection of exterior wiring, voltages and continuity are satisfactory.

As mentioned, Code 90 is different from the others in that it is from the system monitoring flywheel motor speed. When it detects an error in speed it will produce the code.

Code 92 and 93 indicate an issue within the circuitry of the MDB: a short circuit or an open has developed on the circuit board. These may require MDB replacement without too much inspection of the Seakeeper, other than verifying connectors and associated wiring.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 85 - 93

Megohm testing is performed in this guide to determine the condition of the insulation and potting of the motor drive cable and flywheel motor. Because megohmmeters vary in quality and accuracy, the guide uses a time-resistance test that eliminates some of these variables. A meter that can provide a continuous test voltage for 60 seconds is required. The tests are also made more valuable by performing temperature corrections; a means to obtain the surface temperature of the enclosure must be available to the technician to provide the most accurate data to Seakeeper. Most multimeters have a temperature sensor packaged with them. HVAC surface thermometers can also be used to obtain the enclosure temperature for the corrections.

**REFERENCES**

[SWI-124 - Seakeeper Motor Lead Testing](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 85 - 93

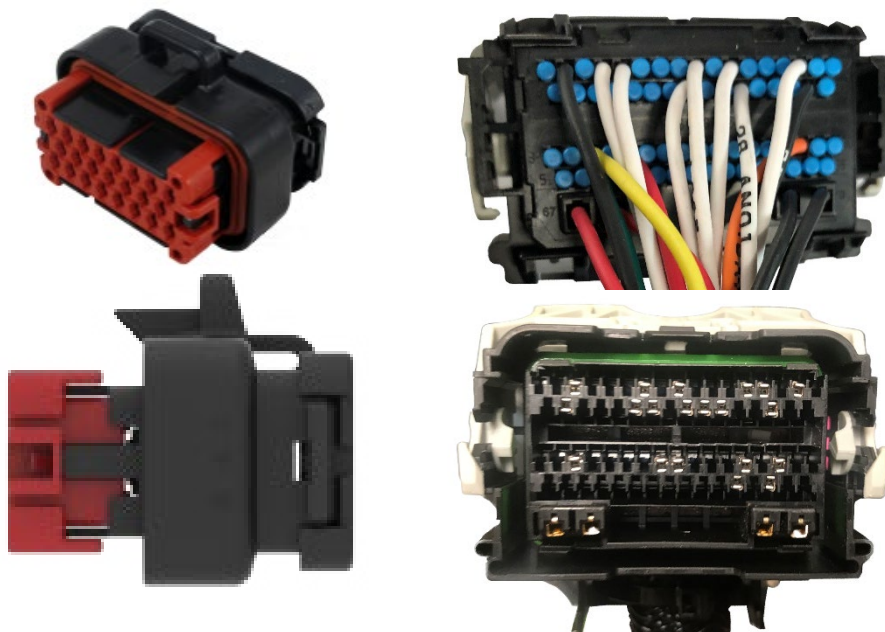
**PROCEDURE****SECTION 1: INITIAL CHECKS**

1. **PERFORM** this procedure in its entirety (Multiple failures may cause a single code) **AND RECORD** results of all inspection and tests.

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS** when working on live circuitry.  
**Seakeeper may start remotely.**

2. **ENSURE** flywheel at zero RPM at MFD app / display.
3. **OPEN / TURN OFF** all Seakeeper power breakers.
4. For Seakeeper 1, **PERFORM** following:
  - a. **ACCESS** Curtis drive and GCM connectors per [ATTACHMENT 1](#).
  - b. **INSPECT** Curtis drive and GCM 70-pin connectors for loose wires or crimps.



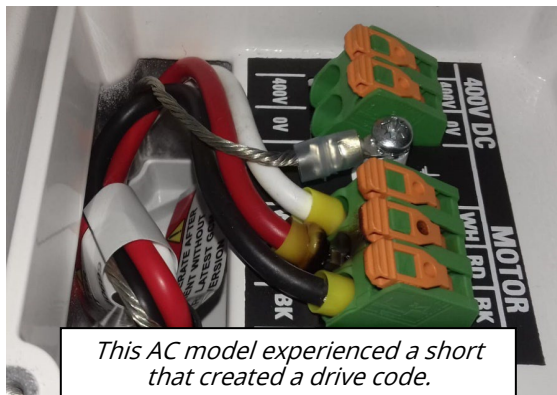
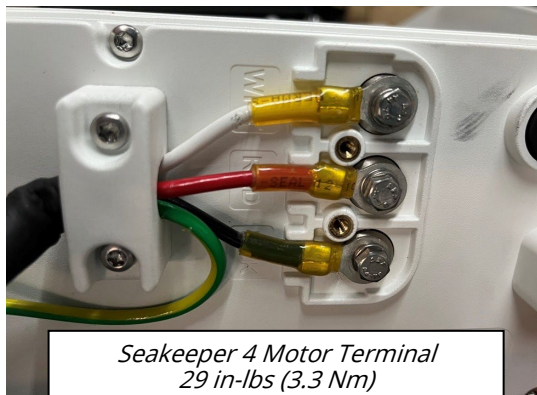
- c. **IF** loose wires or crimps found,  
**THEN REPAIR** connector.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

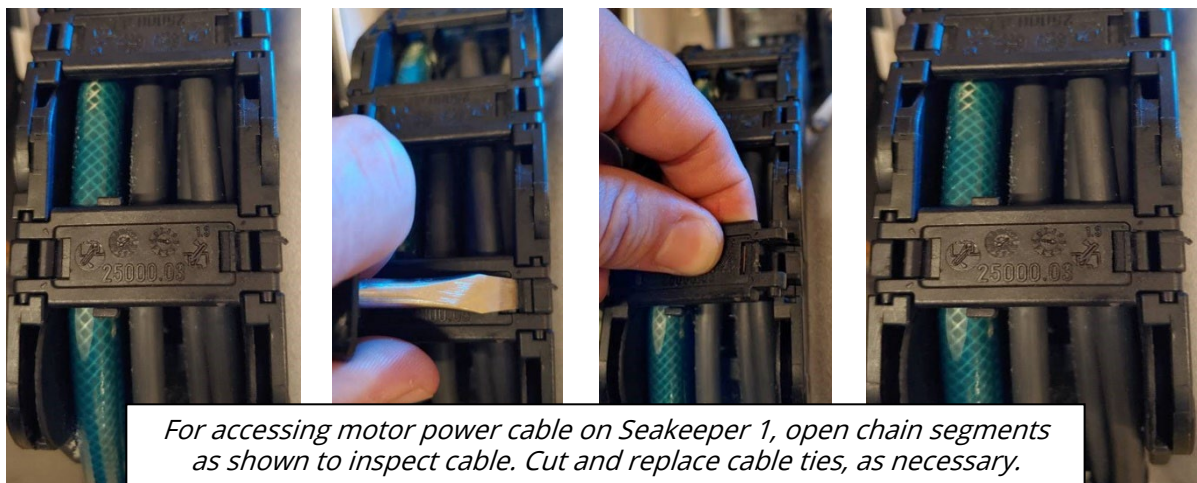
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 85 - 93

5. For all models, **INSPECT** motor terminal connections are tight at MDB and not shorting.



6. **IF** Seakeeper 1,  
**THEN THOROUGHLY INSPECT** length of motor cable (from MDB/Curtis drive connection to enclosure feed-through).
- a. **LOOK** for fraying, signs of burning or break down of insulation along cable at Seakeeper foundation, guide band and on enclosure up to feed-through.



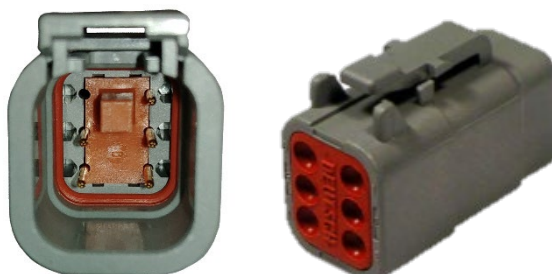
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 85 - 93

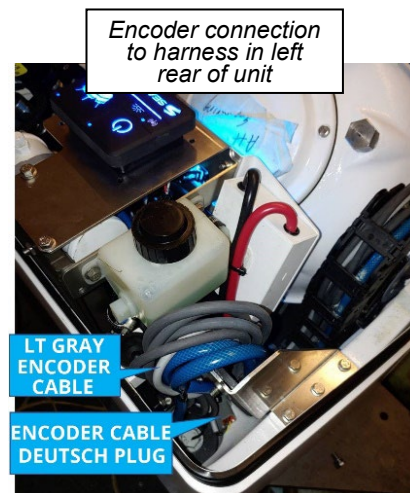
PRODUCT SEAKEEPER 1, 4, AND 4.5

Section 1, Step 6 continued

- b. **INSPECT** encoder Deutsch connector at base of IGUS chain.
  - i. **CHECK** for loose wires and crimps in connector.



*Encoder Male connector (Left)  
and harness Connector (Right)*



- c. **IF** damage found in motor cable or encoder connector,  
**THEN CONTACT** Seakeeper Product Support Team at [support@seakeeper.com](mailto:support@seakeeper.com) with photos of damage.
7. **CONTINUE** to appropriate section below: [Section 2](#) for AC-powered models and [Section 3](#) for DC-powered models.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

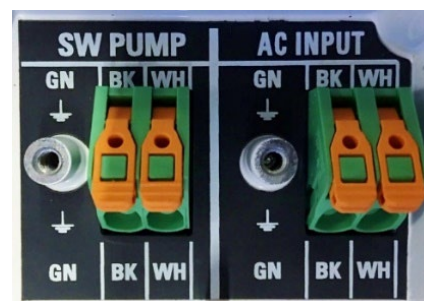
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 85 - 93

**SECTION 2: AC-POWERED MODELS****WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

1. **ENSURE** flywheel at zero RPM at MFD app / display.
2. **OPEN / TURN OFF** AC breaker to Seakeeper.
3. **REMOVE** MDB cover to expose "MOTOR" lead connections for following checks:
  - a. **SAVE** all ten M4 cover screws in safe place.
  - b. **INSPECT** crimps at end of each motor cable lead to ensure they are in good condition.
  - c. **LOOSEN** MDB feed-through grommet **AND EXAMINE** motor drive cable insulation at grommet for damage.
4. **ENSURE** interior of MDB is free of moisture.
5. **CLOSE / TURN ON** AC breaker to Seakeeper.
6. With multimeter on AC Volts, **TEST** voltage at AC INPUT terminal (Seakeeper 4.5 is powered either by 110 or 230 VAC).
7. **IF** AC voltage is not correct,  
**THEN TROUBLESHOOT** vessel electrical system.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

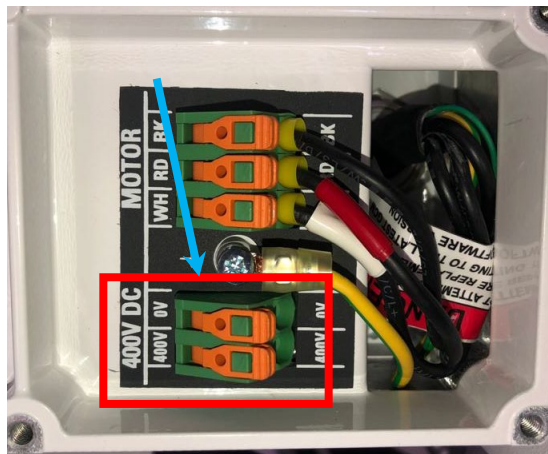
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 85 - 93

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

8. **ENSURE** flywheel at zero RPM at MFD app/ display.
9. **OPEN / TURN OFF** AC breaker to Seakeeper.
10. **PERFORM** testing of motor leads per [SWI-124 - Seakeeper Motor Lead Testing](#).
11. **ENSURE** all power restored to Seakeeper.
12. **TEST** voltage at 400V DC terminal with meter in DC Volts mode.  
**Voltage at 400V DC terminal: \_\_\_\_\_ VDC**





**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 85 - 93

**NOTE:**

It is possible that one fault leads to other faults. These steps assume a series of faults may have occurred from one initial fault.

13. **IF** voltage at 400V DC terminal is NOT between 390 and 400 VDC **OR** motor lead testing UNSATISFACTORY,  
**THEN CONTACT** Seakeeper Product Support Team with all data, and any photos of damage, and what type motor cable sheathing found (foil-type or metal braided) to determine next steps. [Reference [SWI-089 - Seakeeper Motor Cable Splice](#)]
14. **RE-ATTACH** all motor cable leads to their respective terminal.
15. **POSITION** MDB cover with all ten M4 screws.
16. **TORQUE** fasteners to **19 in-lbs (2.2 Nm)** to minimize moisture intrusion into MDB.
17. **CLOSE / TURN ON** all breakers to Seakeeper.
18. **IF** issue persists,  
**THEN CONTINUE** to [Section 4](#).



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 85 - 93

**SECTION 3: DC-POWERED MODELS****WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.**  
**Seakeeper may start remotely.**

1. **ENSURE** flywheel at zero RPM at MFD app / display.
2. **OPEN / TURN OFF** high-current DC breaker to Seakeeper.
3. **REMOVE** cover at MDB cable contact posts and High DC current input terminals with T15 Torx bit.



4. **INSPECT** for corrosion or heat damage to contacts or cables.
5. **CLOSE / TURN ON** high-current DC breaker to Seakeeper.
6. With multimeter, **MEASURE** High current DC voltage at INPUT terminals.

**Input voltage:** \_\_\_\_\_ VDC

7. **IF** voltage measured at input was not between 11 to 15 VDC (Seakeeper 1: 11 to 14.74 VDC), **THEN TROUBLESHOOT** vessel electrical system.
8. **OPEN / TURN OFF** high current DC breaker to Seakeeper.
9. **PERFORM** testing of motor leads per [SWI-124 - Seakeeper Motor Lead Testing](#).
10. **DOCUMENT** any visible damage found with photograph.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 85 - 93

PRODUCT      SEAKEEPER 1, 4, AND 4.5

11. **IF:**

- motor drive cable has any phase-to-phase resistance greater than  $2.0\Omega$ ,
- any phase resistance reading is significantly higher than other two, **OR**
- UNSATISFACTORY megohm results,

**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all data recorded.

12. **RE-ATTACH** all motor cable leads to their respective terminal.

13. **TORQUE** terminal leads per [Torque Specifications](#) section.

14. **CLOSE / TURN ON** all breakers to Seakeeper.

15. **IF** issue persists,

**THEN CONTINUE** to [Section 4](#).

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 85 - 93

**SECTION 4: COMPLETION OF TROUBLESHOOTING****WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

1. **IF:**

- no damage found in wire harness
- no damage found in connectors
- no damage found in motor drive cable
- no noises from enclosure when attempting to spool

**THEN:**

- a. **ENSURE** flywheel at zero RPM at MFD app / display.
- b. **OPEN / TURN OFF** all breakers to Seakeeper.
- c. **REPLACE** MDB / Curtis drive.
- d. **RETURN** faulty MDB.

2. **IF** alarm persists,**THEN:**

- a. **COMPILE** all data from testing.
- b. **TAKE** photo of information screen and alarm history pages.
- c. **RECORD** video of maintenance screen while attempting to spool up Seakeeper to show RPMs and Current.
- d. **IF** noises heard from enclosure,  
**THEN RECORD** video of Seakeeper attempting to spool within 3 feet (1 m) with little or no background noise.
- e. **SUBMIT** data, photos and video to Seakeeper Product Support Team at support@seakeeper.com for review.

**\*\*\*\*\* END \*\*\*\*\***

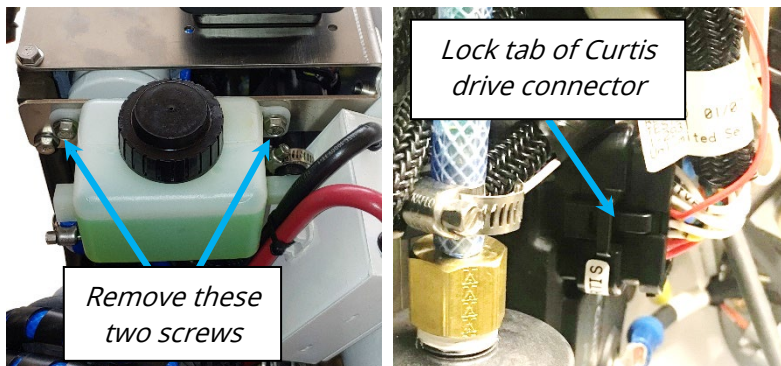
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

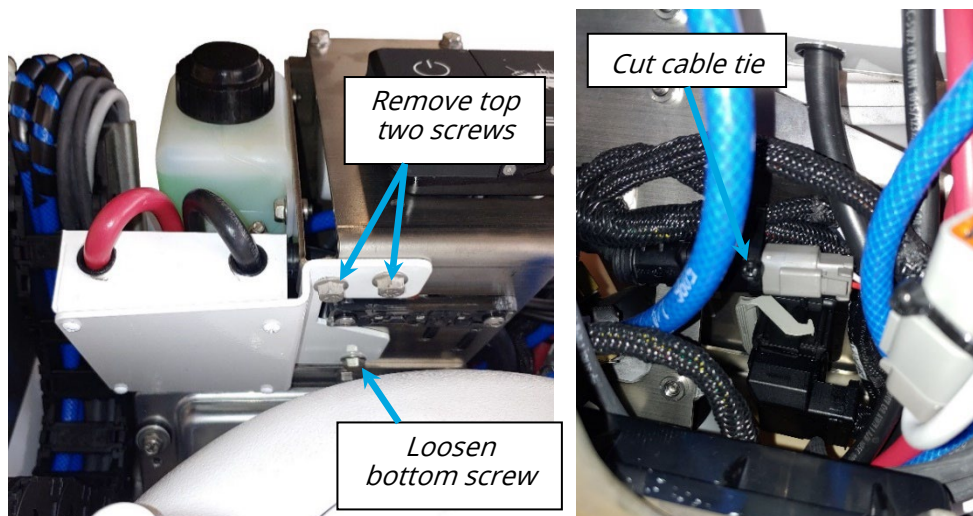
Code 85 - 93

**ATTACHMENT 1: Accessing Seakeeper 1 GCM and Curtis Drive**

1. **REMOVE** two screws securing glycol reservoir to frame.



2. **MOVE** reservoir to side.
3. **DISCONNECT** harness glycol pump connector, if desired.
4. **DISCONNECT** harness Curtis drive connector, if desired.
5. To access GCM, **REMOVE** top two screws of DC Filter.



6. **LOOSEN** third lower screw of DC Filter.
7. **PULL** DC Filter up and away from mounting bracket.
8. **PLACE** DC filter to side.
9. **CUT** cable tie to access GCM 70-pin connector, if desired.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 94**

To troubleshoot and repair the “DRIVE PREOPERATIONAL” alarm (Code 94).

**BACKGROUND**

The “Preoperational” mode is a state in which programming of the motor drive box (MDB) is allowed; the MDB will not communicate with the Seakeeper in this state. It is unexpected for a Seakeeper to display this alarm.

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

**PROCEDURE**

1.     **CYCLE** low current DC power to Seakeeper by opening and then closing breaker.
2.     **ALLOW** up to fifteen (15) minutes for Seakeeper to reset.
3.     **ATTEMPT TO RESET** alarm at MFD app / display.
4.     **IF** alarm fails to reset,  
          **THEN REPLACE** MDB (Curtis drive box if Seakeeper 1).
5.     **RETURN** MDB to Seakeeper by contacting Seakeeper Product Support Team at support@seakeeper.com.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 95/96**

To troubleshoot and repair the “DRIVE HARDWARE FAULT” alarm (Code 95) and the “DRIVE FAULT” alarm (Code 96).

**BACKGROUND**

These codes originate in the Motor Drive Box (MDB). They are reported to the Gyro Control Module (GCM) via the controller area network (CAN) when the MDB experiences an internal fault or a general fault. The general fault is a fault developed by the manufacturer of the MDB. The internal fault is a fault developed by Seakeeper software programming in the MDB.

Code 95 is for all hardware faults; it means internal communication (within the MDB) has been lost. In this event, the microcontroller can no longer control the system.

The Code 96 fault is a power frame ID fault. In this case, the microcontroller does not recognize the internal hardware configuration. The alarm occurs only sporadically; it may only happen if water intrusion occurs inside the MDB printed circuit board (PCB). Another time this may occur is during the programming of the MDB but would be caught quickly before returning to operation.

On the Seakeeper 1, Code 96 commonly occurs due to issues with the Halls cable signal wires to the encoder. For a Seakeeper 1, the technician may need to focus on this circuit and connectors.

Issues that result in this alarm may be in the MDB and require its replacement. Troubleshooting should eliminate any material fault before replacing the MDB.

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

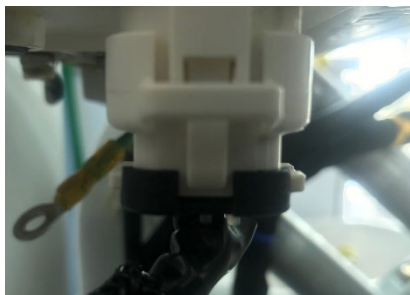
**PROCEDURE**

1. **IF** other codes active,  
**THEN TROUBLESHOOT** other active codes first.

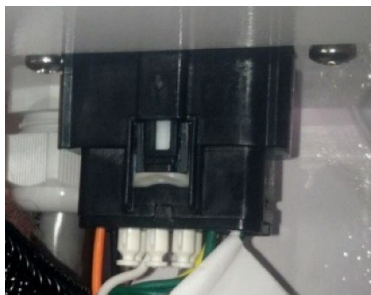
**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

2. **ENSURE** flywheel at zero RPM at MFD app / display **AND OPEN / TURN OFF** all breakers to Seakeeper.
3. **ENSURE** MDB/Curtis drive connector is securely fastened.



*Seakeeper 4 MDB connector  
securely fastened.*



*Seakeeper 4.5 MDB connector  
securely fastened.*



*Seakeeper 1 Curtis drive  
connector securely fastened.*

4. For Seakeeper 1, **PERFORM** [ATTACHMENT 1](#) to obtain access to Curtis drive connector.
5. **ENSURE** no visible damage to wire harness near MDB/Curtis drive.

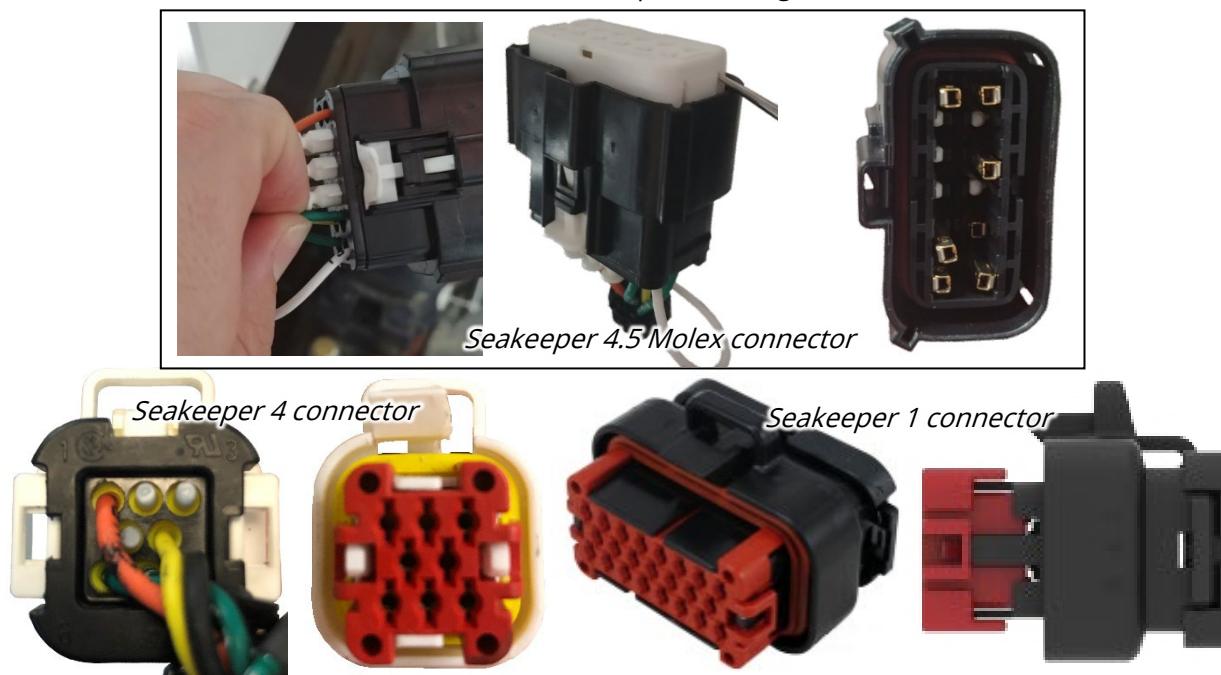


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 95/96

6. **INSPECT** drive connector for loose wires or crimps or damage or corrosion:



- a. **TUG** on wires from back of connector.
  - b. **REMOVE** connector face cover.
  - c. **CONFIRM** sockets and crimps are secure.
7. **IF** loose wires or crimps found in MDB/Curtis drive connector,  
**THEN REPAIR** connector. [**CONTACT** Seakeeper Product Support Team at [support@seakeeper.com](mailto:support@seakeeper.com) for assistance]
8. **VERIFY** no damage to MDB/Curtis drive case.
9. **IF** casing damage found,  
**THEN REPLACE** MDB/Curtis drive.

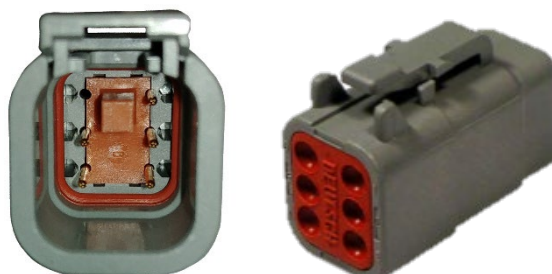
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 95/96

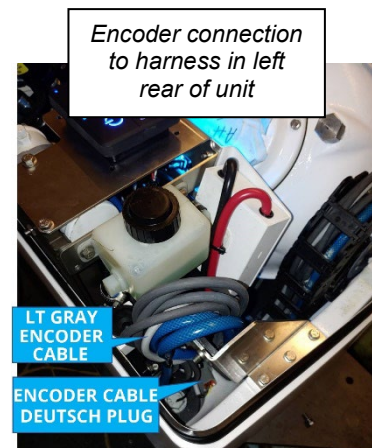
PRODUCT SEAKEEPER 1, 4, AND 4.5

10. **IF** Seakeeper 1,  
**THEN:**

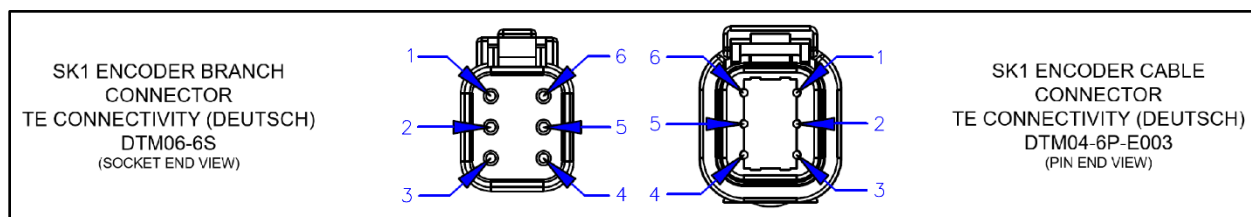
- a. **ENSURE** all electrical connections are made securely at encoder wire harness connection.



Encoder Male connector (Left)  
and harness Connector (Right)



- b. **IF** no connection issue exists,  
**THEN OPEN / TURN OFF** Seakeeper breaker or isolator switch.
- c. **CONFIRM** wires and crimps of Encoder lead and wire harness connectors are secure.



- i. **IF** any issues found with Encoder branch harness connector,  
**THEN CORRECT** harness connector. [**CONTACT** Seakeeper Product Support Team at support@seakeeper.com for assistance]
- d. **DISCONNECT** Curtis Drive harness connector (See [Attachment 1](#) for access).
- e. **INSPECT** Curtis Drive pins and connector pins for damage, loose wires, or crimps.
- i. **IF** any issues in Curtis Drive harness connector,  
**THEN CORRECT** issue(s) in connector. [**CONTACT** Seakeeper Product Support Team at support@seakeeper.com for assistance]
- ii. **IF** any issues found with Curtis Drive pins,  
**THEN CORRECT OR REPLACE** Curtis drive.



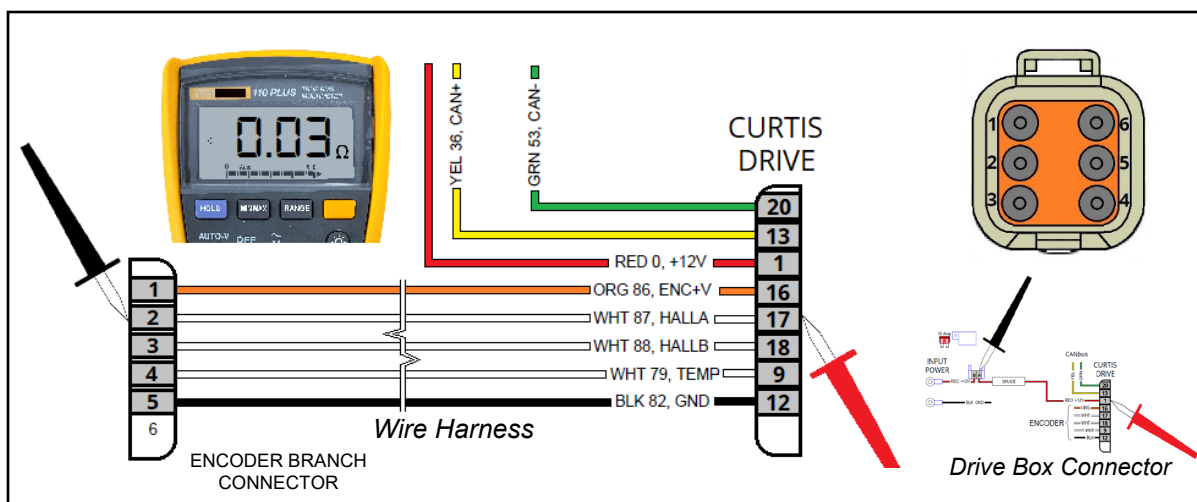
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 95/96

PRODUCT SEAKEEPER 1, 4, AND 4.5

Step 10 (Seakeeper 1) continued

- f. **IF** NO issues in harness or lead connectors of Encoder,  
**THEN:**



- i. With multimeter in Resistance mode, **CONFIRM** continuity in wire harness between harness Encoder branch connector pin **2** and Curtis drive connector pin **17**.
  - ii. **CONFIRM** continuity between harness Encoder branch connector pin **3** and Curtis drive connector pin **18**.
- g. **IF** Step 10.f.i or 10.f.ii show OPEN LOOP,  
**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com.
- h. **CLOSE / TURN ON** Seakeeper breaker or isolator switch.
- i. **ACTIVATE** brake override.
- j. **MANUALLY PRECESS** enclosure fully toward rear latch.

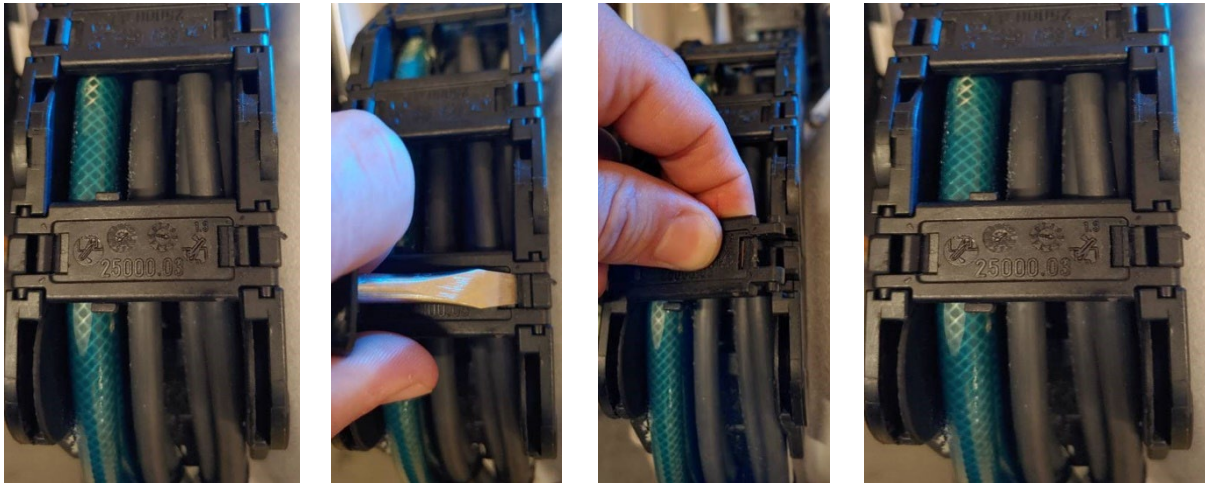
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

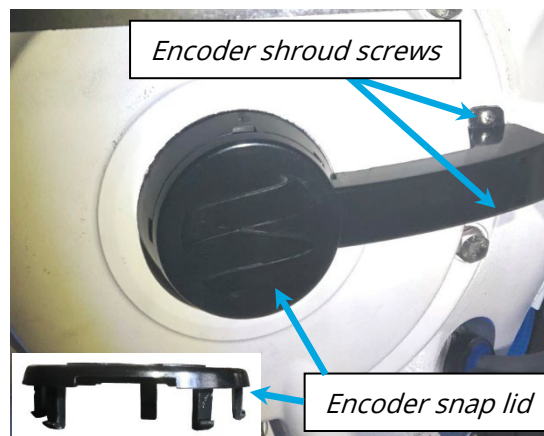
Code 95/96

Step 10 continued

- k.      **REMOVE** light gray Encoder cable from chain around gimbal.



- l.      **REMOVE** Encoder wiring shroud from enclosure by removing two M2.5 Phillips pan head screws where wires enter shroud.



- m.      **REMOVE** Encoder housing snap lid.

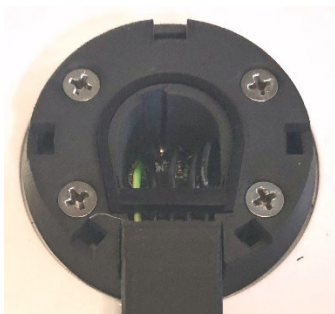
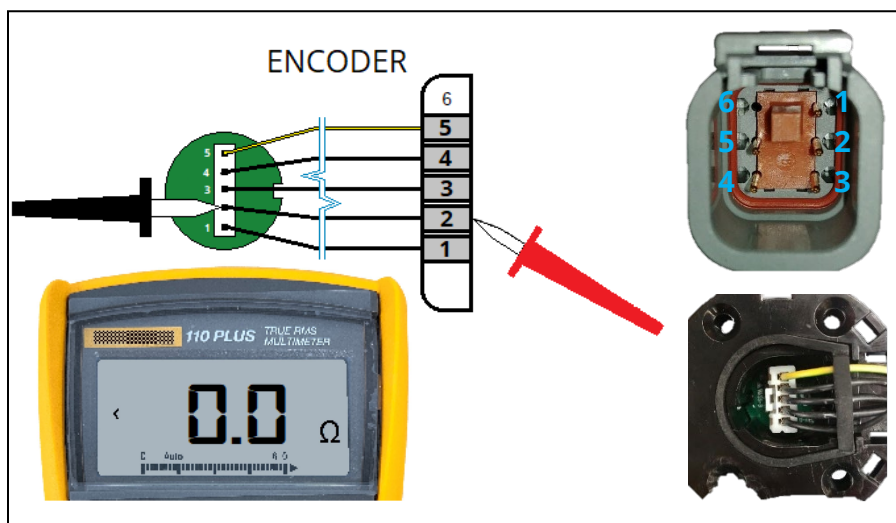
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 95/96

Step 10 continued

- n. **REMOVE** Encoder housing and lead from enclosure by removing four Phillips flat head screws.



- o. **CONFIRM** continuity in Encoder lead from Encoder Pin **2** to lead connector pin **2**.
- p. **CONFIRM** less than 0.3Ω in encoder lead from Encoder pin **3** to lead connector pin **3**.
- q. **IF** Step 10.o or 10.p show OPEN LOOP,  
**THEN REPLACE** encoder.
- r. **INSTALL** Encoder **AND ROUTE** light gray cable through chain.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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Code 95/96

PRODUCT      SEAKEEPER 1, 4, AND 4.5

11.    **CYCLE** low current DC power to Seakeeper.
12.    **WAIT** up to 15 minutes for Seakeeper to reset after power cycling.
13.    **IF** alarm persists,  
         **THEN SUBMIT** results from all checks made to Seakeeper Product Support Team at  
         support@seakeeper.com for review.

**\*\*\*\*\* END \*\*\*\*\***



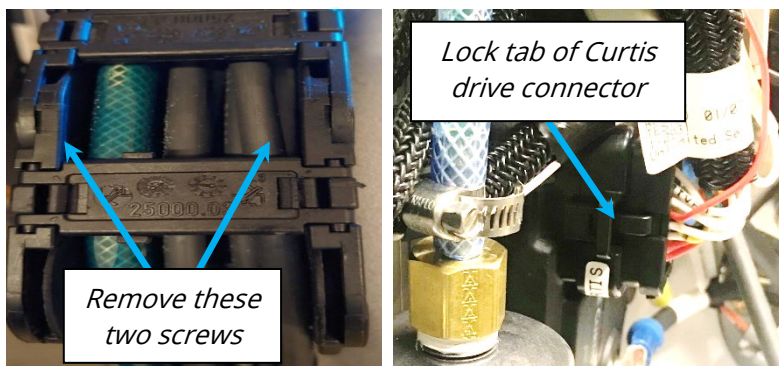
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

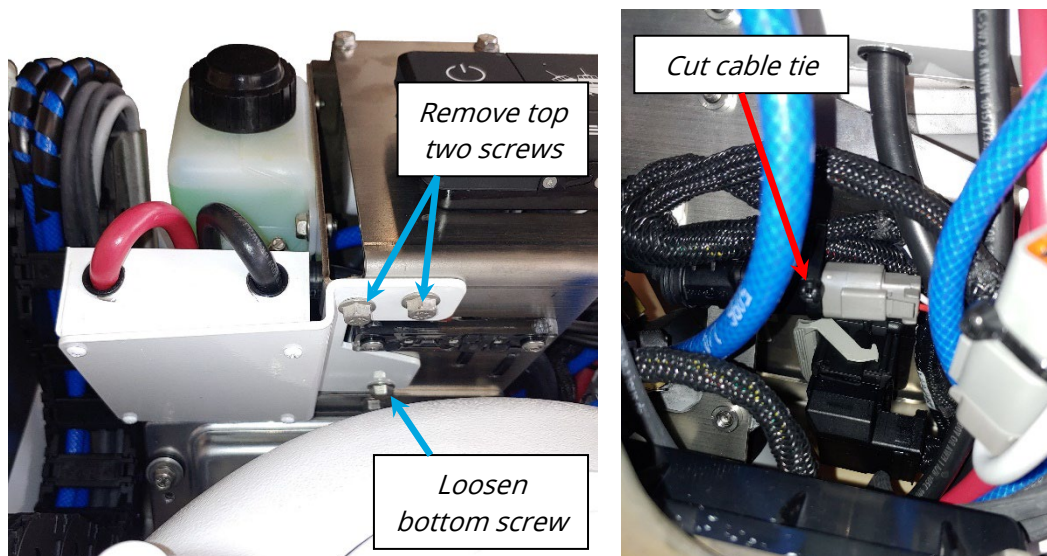
Code 95/96

**ATTACHMENT 1: Gaining Access to Seakeeper 1 Curtis Drive and GCM**

1. **REMOVE** two screws securing glycol reservoir to frame.



2. **MOVE** reservoir to side.
3. **DISCONNECT** harness Curtis drive connector.
4. To access GCM, **REMOVE** top two screws of DC Filter.



5. **LOOSEN** third lower screw of DC Filter.
6. **PULL** DC Filter up and away from mounting bracket.
7. **PLACE** DC filter to side.
8. **CUT** cable tie to access GCM 70-pin connector.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 98**

To troubleshoot and repair the “AC MAINS LOW” alarm (Code 98).

**BACKGROUND**

This condition occurs only on AC-powered Seakeeper models when the Seakeeper senses voltage lower than 80VAC for longer than two consecutive minutes. A “Notice 97 – AC Power Low” will precede this alarm to warn the operator of an abnormal voltage once the voltage immediately drops below 80VAC. When first pressing the power button to spool the Seakeeper, and voltage is below 80VAC, the notice will appear. It will remain for two minutes and then be replaced by the “Alarm 98 – AC Mains Low” alarm. The reason for the time delay is to give the vessel and operator time to switch from shore power to generator, or vice versa.

If attempting to spool up for longer than 10 seconds before voltage drops low, the Seakeeper will wait two minutes before displaying the notice and then another two minutes before displaying the alarm; this gives the vessel four minutes to restore proper AC voltage. At any time during the two minutes of the notice, the voltage is restored to normal voltage range (80 to 300 VAC), the notice will disappear, and no alarm history entry will be made.

Most service calls recorded by Seakeeper for this alarm result in vessel electrical issues. On rare occasions, a Motor Drive Box (MDB) failure is to blame. Because of this, troubleshooting will eliminate the possibility of a vessel electrical issue first and then address the MDB fault.

**REFERENCES**

Applicable Seakeeper Service Drawings on [Dealer Access](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

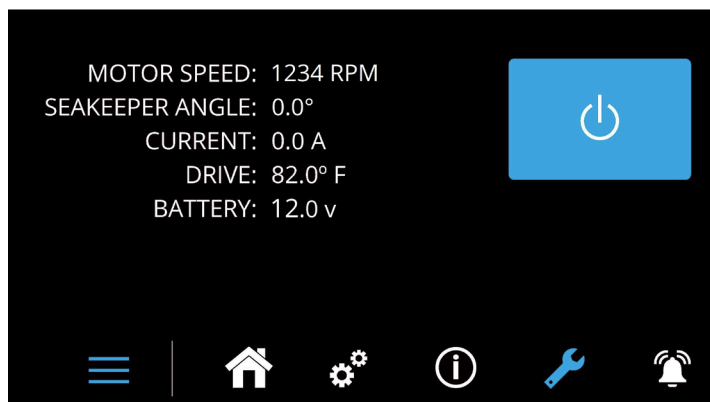
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 98

**PROCEDURE****WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

1.    **CLOSE / TURN ON** Seakeeper AC breaker.
2.    **PERFORM** following inspections:
  - a.    **INSPECT** AC panel breaker terminals for loose or corroded connections.
  - b.    **IF** a relay is in supply power,  
      **THEN VERIFY** relay is wired correctly.
3.    **ENSURE** flywheel at zero RPM at MFD app / display.
4.    **IF** display indicates "1234 RPM,"  
      **THEN:**
  - a.    **CHECK** voltage at output of breaker  
      (80 to 300 VAC).
  - b.    **CHECK** voltage within any junction  
      box in AC power cable run.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

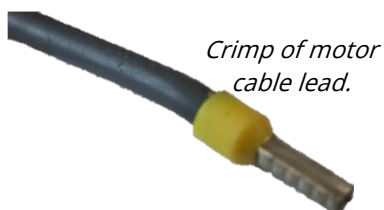
Code 98

**WARNING!**

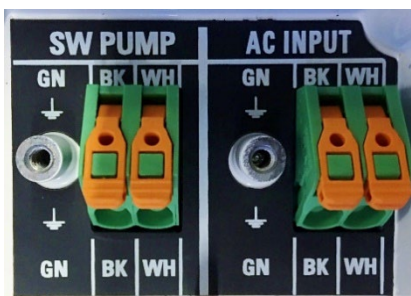
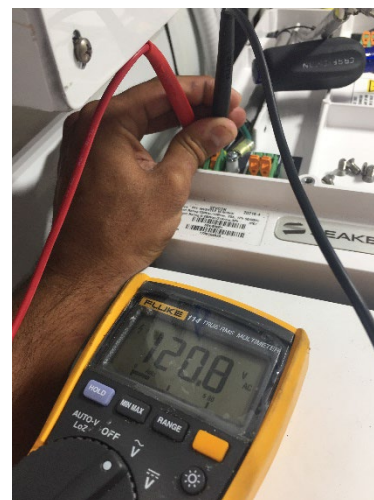
**SHOCK HAZARD EXISTS WHEN FLYWHEEL ROTATING  
OR POWER ALIGNED TO SEAKEEPER.**

5. **OPEN** MDB cover **AND PERFORM** following:

- a. **VERIFY** all cable leads in proper location, crimps are satisfactory, and leads are securely fastened at terminals.



- b. **MEASURE** voltage at "AC INPUT" terminal.



- c. **IF** voltage not between 80 and 300 VAC,  
**THEN TROUBLESHOOT** AC power cable to Seakeeper.
- d. **DOCUMENT** voltage and source.

**For example:** "221.3 VAC on Shore Power." Documentation will be used for comparison later.

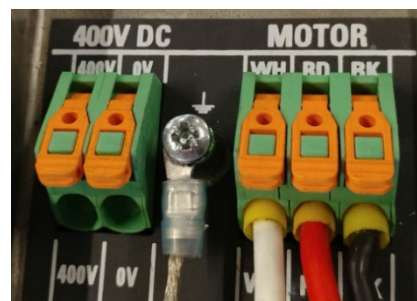
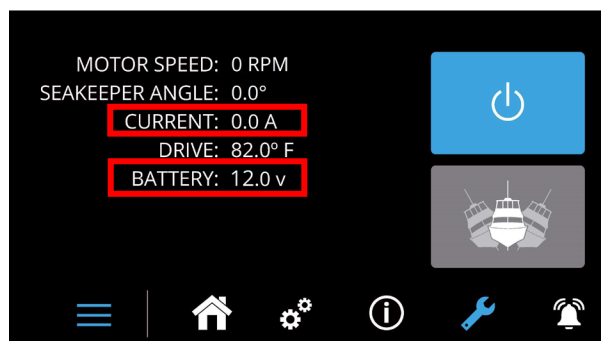
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 98

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Step 5 continued

- e. **CHANGE** to an alternate source customarily used for powering Seakeeper.  
**For example:** If Step 5.d was documented with shore power, shift to a generator that would typically be used underway.
- f. **DOCUMENT** voltage and source.
- g. **START** Seakeeper to spool flywheel.
- h. **MEASURE AND RECORD** voltage at "400V DC" terminal.  
\_\_\_\_\_ VDC
- i. **MONITOR AND RECORD** voltages and current (from display current reading) as flywheel spools.



- j. During spool up, **START** large loads that would possibly lower vessel voltage (for example engines, AC windlass, Air Conditioning) **AND MONITOR** effects on Seakeeper.
- k. **IF** a load creates alarm,  
**THEN DETERMINE** cause for voltage drop from that load.
- l. **IF** step 5.h NOT between 390 and 400 VDC,  
**THEN REPLACE** motor drive.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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Code 98

PRODUCT      SEAKEEPER 1, 4, AND 4.5

6.    **IF** alarm persists,  
      **THEN:**
  - a.    **COMPILE** all data from troubleshooting.
  - b.    **NOTE** source of AC power when alarm is triggered.
  - c.    **PHOTOGRAPH** display information screen.
  - d.    **SUBMIT** test results data, notes, and photos to Seakeeper Product Support Team at support@seakeeper.com for review.

\*\*\*\*\* **END** \*\*\*\*\*

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 99-102**

To troubleshoot and repair:

- "MOTOR FAULT - OVERCURRENT" alarm (Code 99)
- "DRIVE DSPPF\* FAULT" alarm (Code 100)
- "DRIVE PULSING ERROR" alarm (Code 101)
- "DRIVE OP (OUTPUT) CIRCUIT" alarm (Code 102).

\* Digital Signal Processor Power Frame

**BACKGROUND**

Code 99 is reported to the GCM from the drive and is a more generic alarm associated with the Motor Drive circuit. As with the others in this guide, it will alarm if a short exists within the motor drive cable or a fault within the MDB.

Code 100 will alarm when there is an overcurrent to the motor, sensed by the digital signal processor of the flywheel motor controller inside the MDB. Like most alarms, all four will cut power to the flywheel motor and lock the brakes upon activation. The alarm condition(s) must be cleared before resetting the Seakeeper.

Code 101 is reported to the GCM from the MDB. It is the drive's internal alarm concerning the circuitry responsible for developing the DC voltage pulses to mimic AC power (known as pulse width modulation). The issue could lie in the power drive cables, the wire harness, or their respective connections.

Code 102 is often displayed after other faults, like Codes 99 and 100. This fault can occur due to shorting, resulting in the drive's output stage shutting itself down. It can also happen if the motor leads are open due to not being inserted into the drive, a broken wire, or a damaged motor.

These codes could alarm due to a fault in the motor leads, the motor windings, or the processor circuitry. The motor drive cables are shielded (on AC-powered models); wires can be shorted to the shield, which goes to the ground. The harness, too, can short, causing a failure in CAN communication or proper voltages; therefore, it will be tested for electrical integrity.

Megohm testing is performed in this guide to determine the condition of the insulation and potting of the motor drive cable and flywheel motor. Because megohmmeters vary in quality and accuracy, the guide uses a time-resistance test that eliminates some of these variables. A meter that can provide a continuous test voltage for 60 seconds is required.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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PRODUCT      SEAKEEPER 1, 4, AND 4.5



### REFERENCES

[SWI-093 - Molex Harness Connector](#)

[SWI-124 - Seakeeper Motor Lead Testing](#)

### PRECAUTIONS

See [PRECAUTIONS](#) in Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 99 - 102

**PROCEDURE****SECTION 1: INITIAL CHECKS**

1. **PERFORM** this procedure in its entirety (multiple failures may cause a single code) **AND RECORD** results of inspections and tests.

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.**  
**Seakeeper may start remotely.**

2. **ENSURE** flywheel at zero RPM at MFD app / display **AND OPEN / TURN OFF** all Seakeeper power breakers.
3. **VERIFY** wire harness connector at Motor Drive is fully inserted.

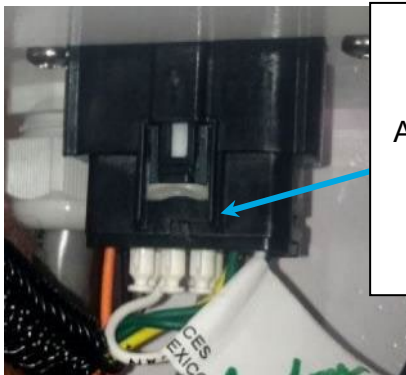
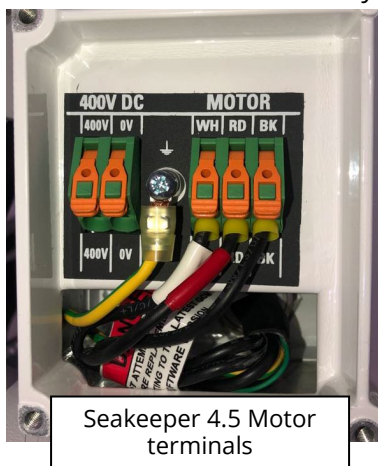
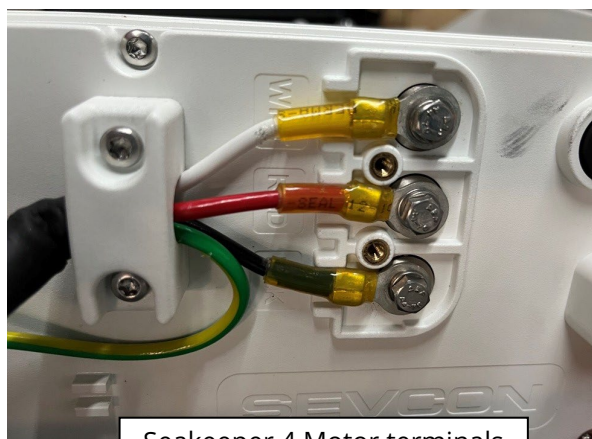


Photo shows  
Connector  
Position  
Assurance (CPA)  
device fully  
inserted on an  
AC-powered  
Seakeeper.

4. **VERIFY** motor terminal leads securely attached.



Seakeeper 4.5 Motor terminals



Seakeeper 4 Motor terminals

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 99 - 102

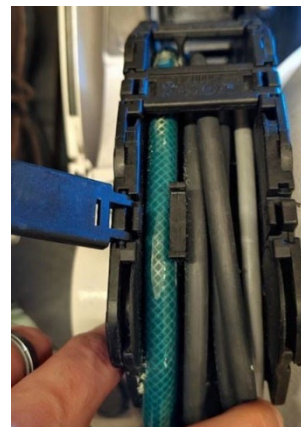
5. **VISUALLY INSPECT** length of motor cable (from MDB connection to enclosure feed-through).
- a. By touch and visual, **INSPECT** for fraying, signs of burning or break down of insulation along Seakeeper foundation, guide band and on enclosure to feed-through.



*view of feed-through at  
bottom of enclosure.*



*Accessing cables within  
Seakeeper 1 flex chain*



- b. **IF** damage found,  
**THEN PHOTOGRAPH** physical damage **AND SUBMIT** photos to Seakeeper Product Support Team at support@seakeeper.com.
6. **IF** Seakeeper 4.5,  
**THEN CONTINUE** to [Section 2](#).
7. **IF** Seakeeper 1 or 4,  
**THEN CONTINUE** to [Section 3](#).



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

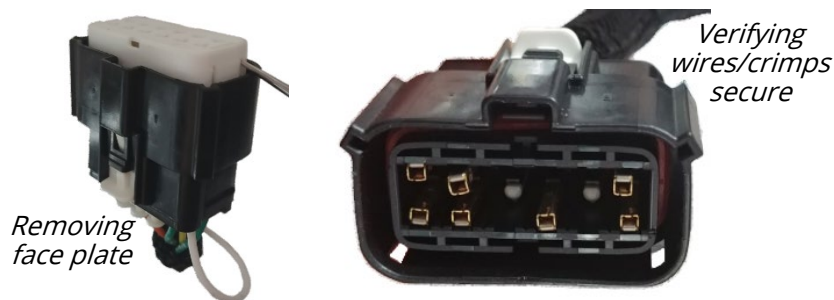
PRODUCT      SEAKEEPER 1, 4, AND 4.5

**NOTE:**

Intermittent opens in a wire may not be seen without manipulating the harness to duplicate movement of precession.

**SECTION 2: AC-POWERED MODELS**

1. With power remaining deenergized, **PERFORM** following checks on Molex connector:
  - a. **DISCONNECT** MDB Molex connector.
  - b. **INSPECT** connector for loose wires and crimps.

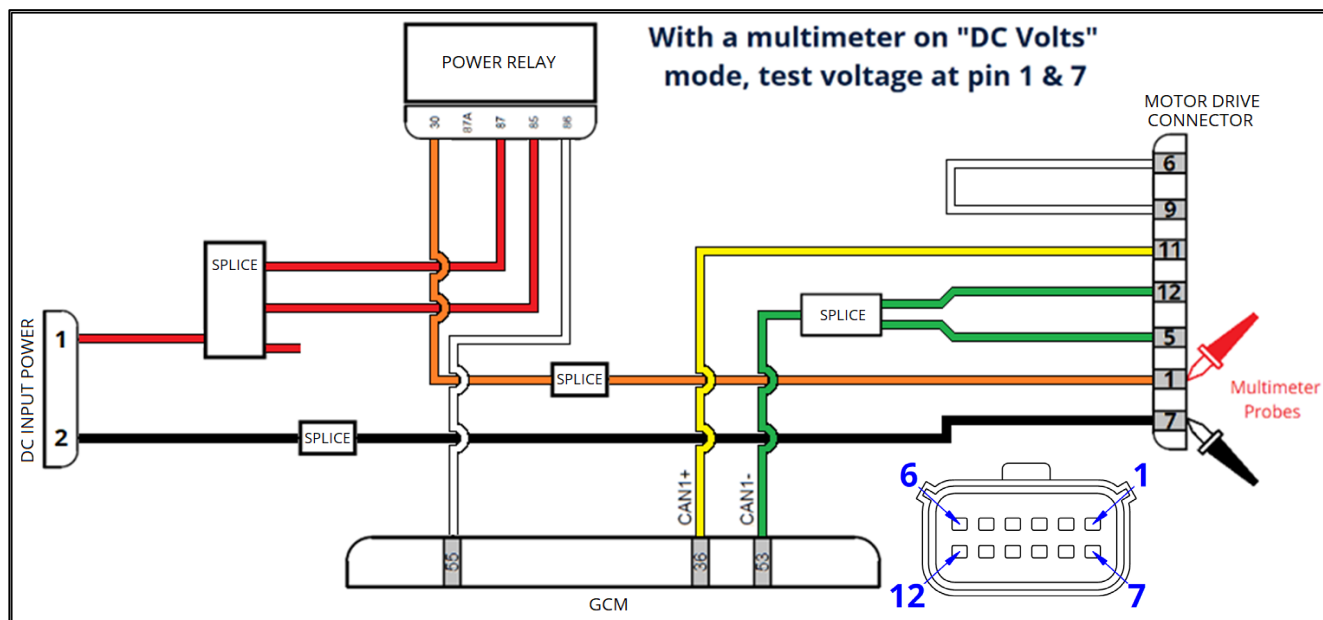


- c. **IF** loose wires or crimps found,  
**THEN REPAIR** connector referencing [SWI-093 - Molex Harness Connector](#). [**CONTACT** Seakeeper Product Support Team at support@seakeeper.com for assistance]
    - d. **IF** any wiring appears damaged/abraded,  
**THEN REPLACE** wire harness.
2. **CLOSE / TURN ON** DC control power breaker to Seakeeper.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

3. With multimeter on DC Volts, **TEST** harness MDB connector for 12 VDC between pin 1 and pin 7.

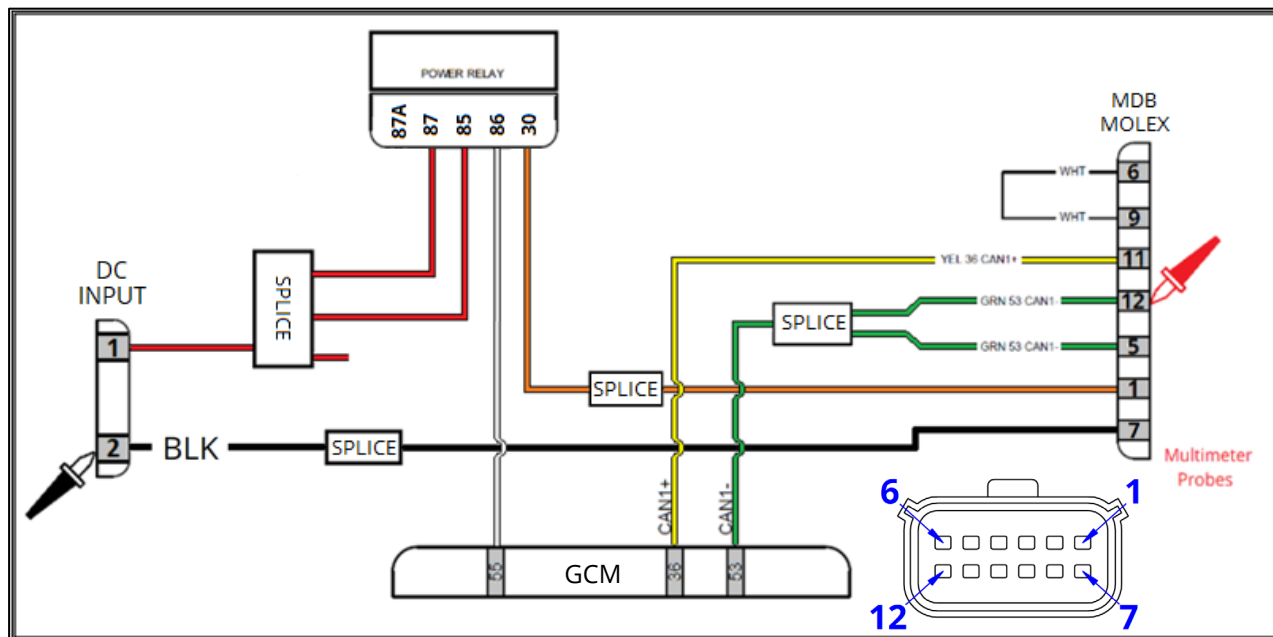


4. **IF** voltage of Step 3 (between pins 1 and 7 of MDB connector) was NOT 12 VDC, **THEN TEST** DC input for 12 VDC.
- IF** input voltage is SATISFACTORY, **THEN REPLACE** main power relay **AND REPEAT** Step 3.
    - IF** Step 4 still shows unsatisfactory voltage after Power Relay replacement, **THEN REPLACE** wire harness.
  - IF** input voltage is UNSATISFACTORY, **THEN TROUBLESHOOT** vessel electrical system.
5. **DISCONNECT** GCM 70-pin connector.
6. **OPEN / TURN OFF** DC power breaker to Seakeeper.

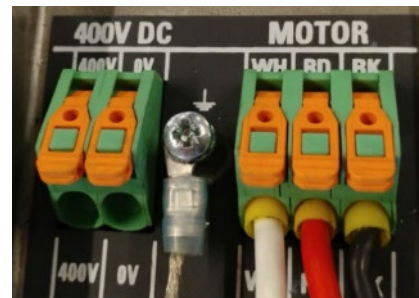
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

7. With multimeter in Resistance mode, **CONFIRM** NO short to ground on Molex pins **1, 5, 11** and **12** to DC Input harness connector pin **2**.
8. **IF** short was detected in **Step 7** (any reading besides "OL"), **THEN REPLACE** wire harness.

**WARNING!****SHOCK HAZARD EXISTS WHEN FLYWHEEL ROTATING.**

9. **ENSURE** flywheel at zero RPM at MFD app / display.
10. **OPEN / TURN OFF** AC and DC breakers to Seakeeper.
11. **REMOVE** MDB cover.
12. **VERIFY** crimps at end of each motor cable lead are securely fastened **AND** making good contact in terminal.

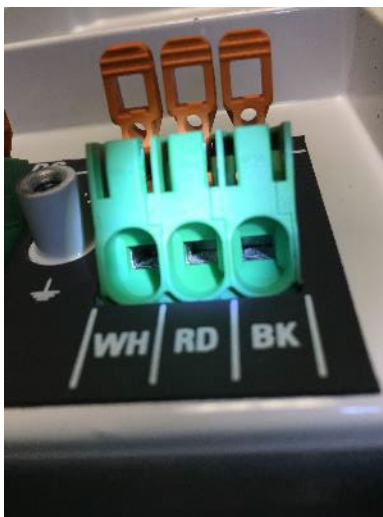
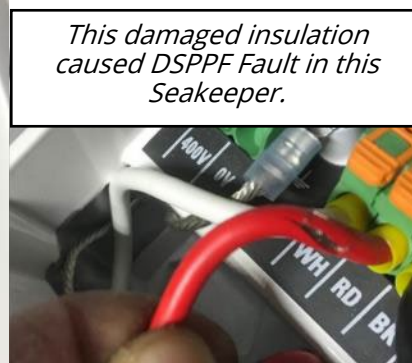


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT SEAKEEPER 1, 4, AND 4.5

Code 99 - 102

13. **LOOSEN** MDB feed-through grommet **AND EXAMINE** motor drive cable insulation at grommet.
14. **ENSURE** interior of MDB is free of moisture.



15. **PERFORM** testing of motor leads per [SWI-124 - Seakeeper Motor Lead Testing](#).
16. **DOCUMENT** any physical damage with photograph.
17. **IF:**
  - motor drive cable has any phase-to-phase resistance greater than  $2.0\Omega$ ,
  - any phase resistance is  $0.5\Omega$  higher than other two, **OR**
  - QUESTIONABLE megohm results,

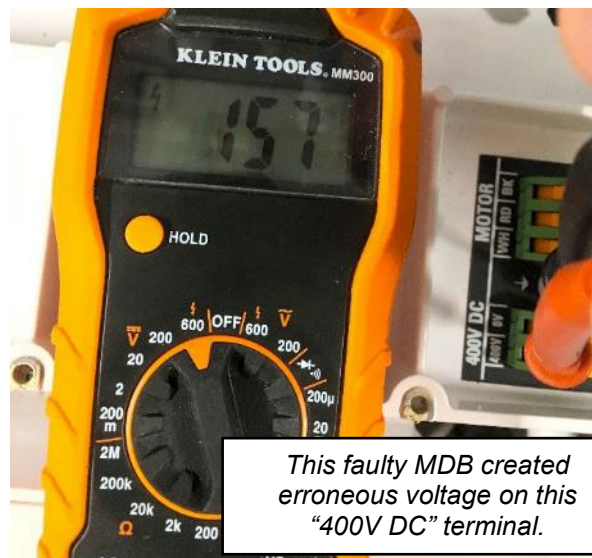
**THEN SUBMIT** all data recorded and type of motor power cable sheathing found (foil-type or braided metal) to [support@seakeeper.com](mailto:support@seakeeper.com).

18. **RE-ATTACH** all motor cable leads to their respective terminal.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

19. **CLOSE / TURN ON** AC and DC power to Seakeeper.
20. **TEST** voltage at 400V DC terminal.
  - a. **IF** voltage at 400V DC terminal is NOT between 390 and 400 VDC,  
**THEN REPLACE** MDB.
21. **INSTALL** MDB cover.
22. **TORQUE** ten M4 screws of cover to **19 in-lbs (2.2 Nm)** to prevent moisture intrusion.



23. **CLOSE / TURN ON** all Seakeeper breakers.
24. **IF** issue persists,  
**THEN PROCEED** to [Section 4](#).

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT SEAKEEPER 1, 4, AND 4.5

Code 99 - 102

**SECTION 3: DC-POWERED MODELS**

1. **IF** Seakeeper 1,  
**THEN PERFORM** troubleshooting per [Code 4/119/126/127/155/170](#).

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

2. **ENSURE** flywheel at zero RPM at MFD app / display.
3. **OPEN / TURN OFF** high current DC breaker to Seakeeper.
4. **REMOVE** cover at motor drive and High DC current input terminals with T15 Torx bit.



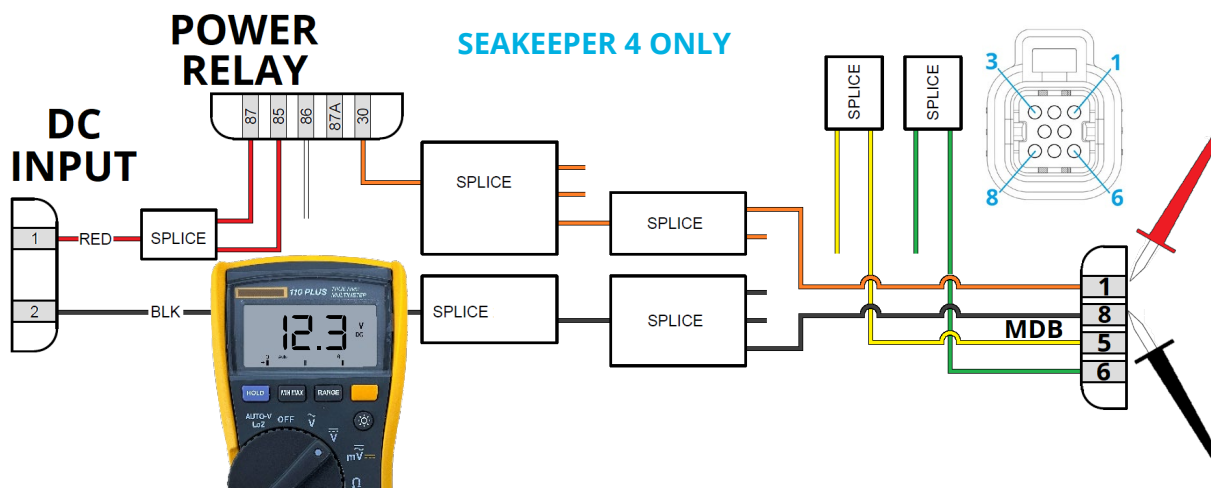
5. **INSPECT** for corrosion or heat damage at contacts **OR** loose or damaged wires or crimps.
6. **DISCONNECT AND ELECTRICALLY ISOLATE** motor drive cable leads and motor frame green ground cable from MDB.
7. **ENSURE** DC low current control power aligned to Seakeeper.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

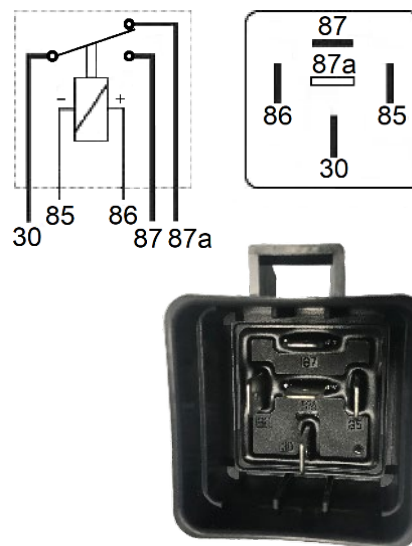
Code 99 - 102

8. With multimeter in "DC Volts," **TEST** for 12 VDC (10.0 – 15.0 VDC) at low-current DC input.
  - a. **IF** voltage outside of 10 – 15 VDC range,  
**THEN TROUBLESHOOT** vessel electrical supply.
9. **TEST** for 12 VDC (10.0 – 15.0 VDC) between sockets **1** and **8** of MDB connector, as shown in illustration below. **[N/A for Seakeeper 1]**



10. **IF** voltage between pins **1** and **8** is NOT between 10.0 and 15.0 VDC **AND** voltage in Step **8** was SATISFACTORY,  
**THEN:**

- a. **TEST** main power relay
  - i. **DISCONNECT** power relay from wire harness.
  - ii. With a multimeter **CHECK** for 0.3Ω or less between pin **30** and pin **87A**.
  - iii. With a multimeter **MEASURE** resistance between pin **85** and pin **86**. **[NOTE: A 12V relay will show about 88 ohms]**
  - iv. **IF** any above resistance UNSATISFACTORY,  
**THEN REPLACE** power relay.
- b. **IF** power relay SATISFACTORY,  
**THEN REPLACE** wire harness.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

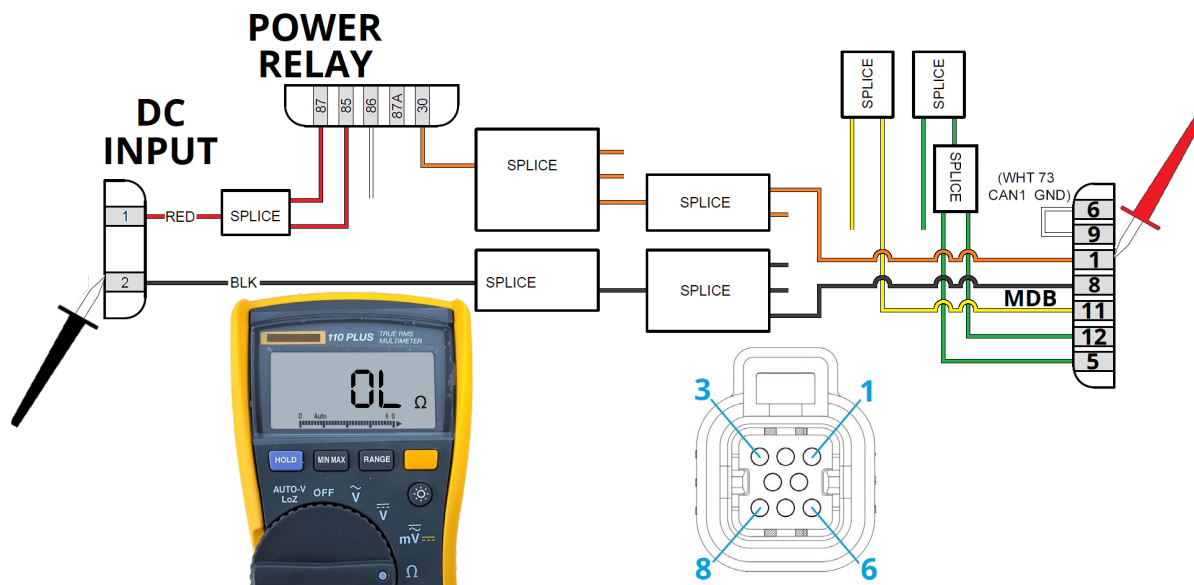
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 99 - 102

**NOTE:**

Intermittent opens in a wire may not be seen without manipulating the harness to duplicate movement of operation.

11. With multimeter in resistance mode, **VERIFY** NO short to ground on MDB pin 1.



12. **IF** short to ground is discovered (Less than OL),  
**THEN REPLACE** wire harness.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 99 - 102

PRODUCT SEAKEEPER 1, 4, AND 4.5

13. **PERFORM** testing of motor leads per [SWI-124 - Seakeeper Motor Lead Testing](#).
14. **DOCUMENT** any visible damage found with photograph.
15. **IF:**
  - motor drive cable has any phase-to-phase resistance greater than  $2.0\Omega$ ,
  - any phase resistance is  $0.5\Omega$  higher than other two, **OR**
  - QUESTIONABLE megohm results,

**THEN SUBMIT** all data recorded to support@seakeeper.com.

**WARNING!****SHOCK HAZARD EXISTS BECAUSE OF CAPACITANCE FROM MEGOHM TESTING**

16. **RE-ATTACH** all motor cable leads to their respective terminal.
17. **TORQUE** terminal leads per [Torque Specifications](#) section.
18. **RE-ATTACH** cover at motor drive cable contact posts and High DC current input terminals.
19. **ENERGIZE** all power to Seakeeper.
20. **IF** issue persists,  
**THEN CONTINUE** to [Section 4](#).

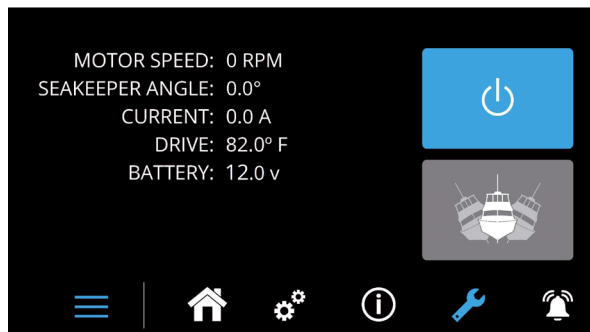
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 99 - 102

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**SECTION 4: COMPLETION OF TROUBLESHOOTING**

1. **IF** no damage found in wire harness, motor drive cable, or connectors,  
**THEN:**
  - a. **RECORD** one minute video at display attempting to spool Seakeeper.
    - i. **SHOW** service screen(s) during video to display RPM and Current.



- b. **RECORD** one minute video within one yard (one meter) of Seakeeper upon start of spool up with minimal background noise.
  - c. **SUBMIT** all test results, data, and recordings to Seakeeper Product Support Team at support@seakeeper.com for review.

**\*\*\*\*\* END \*\*\*\*\***

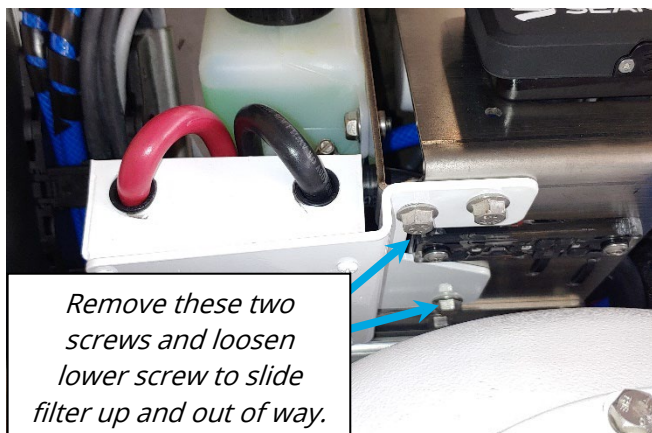
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

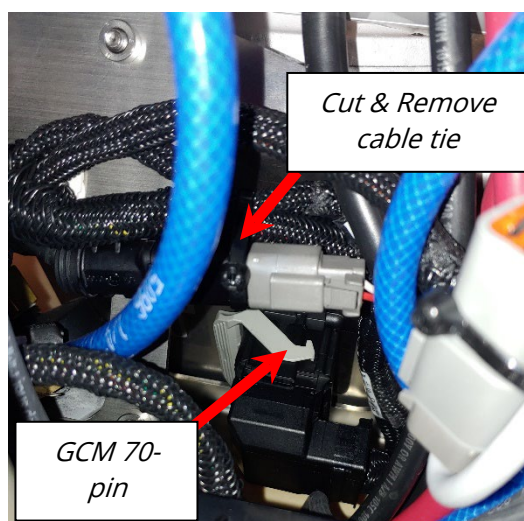
Code 99 - 102

**ATTACHMENT 1: Gaining access to Seakeeper 1 Drive and GCM**

1. **REMOVE** glycol reservoir by removing two screws that hold it to frame, as shown.



2. **REMOVE** two top screws **AND LOOSEN** lower screw holding DC filter to frame, as shown above.
3. **WHEN** accessing GCM 70-pin connector, **THEN:**



- a. **CUT** wire harness cable tie securing GCM 70-pin connector branch to frame, as shown.
- b. **REMOVE** GCM 70-pin connector.
- c. **WHEN** testing complete, **THEN RECONNECT** GCM 70-pin connector **AND INSTALL** new cable tie on harness.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 103**

To troubleshoot and repair the “DRIVE SENSORLESS [Start Fault]” alarm (Code 103).

**BACKGROUND**

This alarm condition is reported to the Gyro Control Module (GCM) by the Motor Drive Box (MDB) when an internal fault signal is generated in the speed sensing circuitry of the MDB. The term “sensorless” indicates that Seakeeper MDBs do not use a Hall Sensor to detect motor speed but use a characteristic in the motor supply cable called “Back EMF” to determine motor speed. When this circuit senses an issue, it creates this fault code to stop the Seakeeper to prevent damage.

In the few cases in which this code has appeared, the fault has been in the enclosure internal components or its vacuum. A close examination of the alarm history can guide a technician in the path to issue resolution; determine preceding and later codes that were posted to the history. In all cases of this alarm there have been other associated codes that had been recorded.

To better determine the correct course of action, record all readings through phone pictures or paper records. When contacting Seakeeper Product Support Team for resolution, these findings will be vital in determining the best steps for the customer.

Megohm testing is performed in this guide to determine the condition of the insulation and potting of the motor drive cable and flywheel motor. Because megohmmeters vary in quality and accuracy, the guide uses a time-resistance test that eliminates some of these variables. A meter that can provide a continuous test voltage for 60 seconds is required.

**REFERENCES**

[SWI-124 - Seakeeper Motor Lead Testing](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 103

**PROCEDURE:****SECTION 1: INITIAL CHECKS**

1. **PERFORM** this procedure in its entirety (multiple failures may cause a single code) **AND RECORD** all inspection and test results.

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS** when working on live circuitry.  
**Seakeeper may start remotely.**

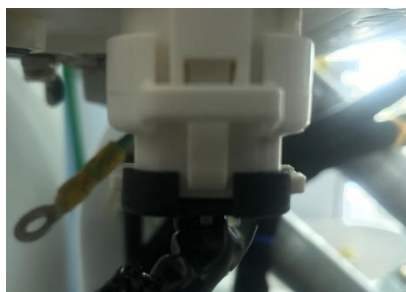
2. **ENSURE** flywheel at zero RPM at MFD app / display.

3. **OPEN / TURN OFF** all breakers to Seakeeper.

4. **VERIFY** MDB connector is securely fastened.

5. **ENSURE** no visible damage to wire harness near MDB.

**IF** damage found,  
**THEN REPLACE** wire harness.



*Seakeeper 4 MDB connector  
 securely fastened.*



*Seakeeper 4.5 MDB connector  
 securely fastened.*

6. **THOROUGHLY INSPECT** length of motor cable (from MDB connection to enclosure feed-through).

- a. **LOOK** for any fraying, signs of burning or break down of insulation of cable along Seakeeper foundation, guide band and on enclosure up to feed-through.

- b. **IF** damage found,  
**THEN SUBMIT** photo of damage to support@seakeeper.com.

7. **IF** Seakeeper 4.5,  
**THEN CONTINUE** to [Section 2](#).

8. **IF** Seakeeper 4,  
**THEN CONTINUE** to [Section 3](#).

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 103

**SECTION 2: AC-POWERED MODELS****WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

1. **ENSURE** AC power breaker to Seakeeper is OFF.
2. **REMOVE** MDB cover to expose MOTOR lead connections.
3. **INSPECT** crimps at end of each motor cable lead are securely fastened in terminal with orange tabs down and locked.
4. **PERFORM** testing of motor leads per [SWI-124 - Seakeeper Motor Lead Testing](#).



5. **IF:**
  - motor drive cable has any phase-to-phase resistance greater than 2.0Ω,
  - any phase resistance is 0.5Ω different from other two, **OR**
  - QUESTIONABLE results from megohm tests,

**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all data recorded and type motor cable sheathing found (foil-type or metal braided).

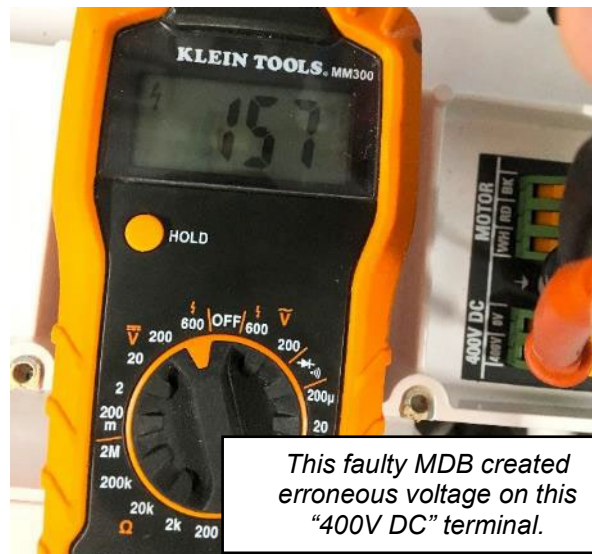
6. **RE-ATTACH** all motor cable leads to their respective terminal.
7. **CLOSE / TURN ON** all breakers to Seakeeper.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 103

8.    **TEST** voltage at 400V DC terminal.
  - a.    **IF** voltage at 400V DC terminal is NOT between 390 and 400 VDC,  
      **THEN REPLACE** MDB per [SWI-094](#).
9.    **DOCUMENT** any visible damage found with a photograph.
10.   **INSTALL** MDB cover.
11.   **TORQUE** ten M4 Phillips head screws to **19 in-lbs (2.2 Nm)**.
12.   **CLOSE / TURN ON** all breakers to Seakeeper.
13.   **IF** issue persists,  
      **THEN CONTINUE** to [Section 4](#).





**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 103

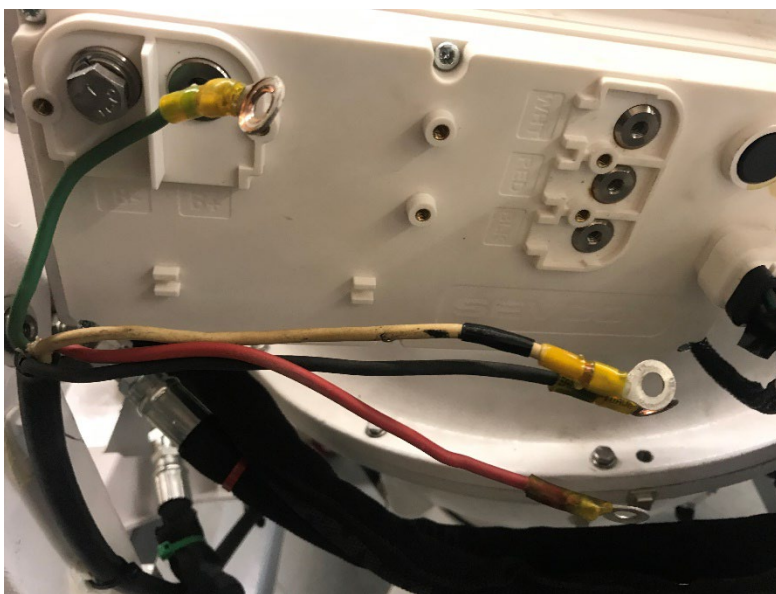
**SECTION 3: DC-POWERED MODELS**

All Seakeepers produce a pulse width modulated 3-phase output to the flywheel motor. The DC-powered models use a much lower voltage (48 VDC nominally versus 400 VDC, in AC-powered models) and it is impractical to measure its voltage with a voltmeter. This check is omitted in the troubleshooting of the Seakeeper 4.

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

1. **ENSURE** flywheel at zero RPM at MFD app / display **AND OPEN / TURN OFF** all power breakers to Seakeeper.
2. **REMOVE** cover at motor drive terminals and High DC current input terminals with T15 Torx bit.



3. **INSPECT** for corrosion or heat damage at terminals and cables.
4. **PERFORM** testing of motor leads per [SWI-124 - Seakeeper Motor Lead Testing](#).
5. **DOCUMENT** any visible damage found with a photograph.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 103

PRODUCT SEAKEEPER 1, 4, AND 4.5

6. **IF**

- motor drive cable has any phase-to-phase resistance greater than  $2.0\Omega$ ,
- any phase resistance is  $0.5\Omega$  higher than other two, **OR**
- QUESTIONABLE megohm results,

**THEN SUBMIT** all data recorded to support@seakeeper.com.**WARNING:****SHOCK HAZARD EXISTS BECAUSE OF CAPACITANCE FROM  
MEGOHM TESTING.**

7. **RE-ATTACH** all motor cable leads to their respective terminal.
8. **TORQUE** terminal leads per [Torque Specifications](#) section.
9. **INSTALL** cover at motor drive cable terminals and High DC current input terminals with T15 Torx bit.
10. **CLOSE / TURN ON** all power breakers to Seakeeper.
11. **IF** issue persists,  
**THEN CONTINUE** to [Section 4](#).

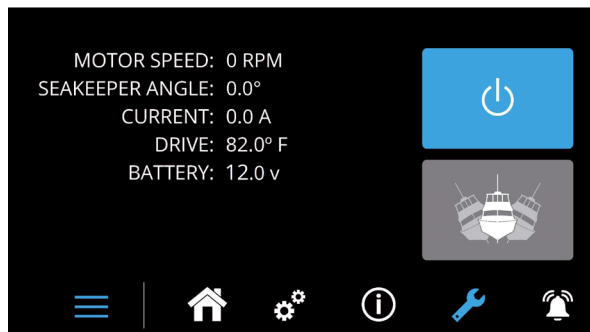
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 103

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**SECTION 4: COMPLETION OF TROUBLESHOOTING**

1. **IF** no damage found in wire harness, motor drive cable, or connectors,  
**THEN:**
  - a. **RECORD** one minute video at display attempting to spool Seakeeper.
    - i. **SHOW** service screen(s) during video to display RPM and Current.



- b. **RECORD** one minute video within one yard (one meter) of Seakeeper upon start of spool up with minimal background noise.
  - c. **SUBMIT** all test results data and recordings to Seakeeper Product Support Team at [support@seakeeper.com](mailto:support@seakeeper.com) for review.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 107-110/132/252**

To troubleshoot and repair:

- "DISPLAY INCOMPATIBLE" alarm (Code 107)
- "DRIVE SOFTWARE INCOMPATIBLE" alarm (Code 108)
- "DRIVE SOFTWARE MODEL INCOMPATIBLE" alarm (Code 109)
- "IMU SOFTWARE INCOMPATIBLE" alarm (Code 110)
- "CONNECTBOX SOFTWARE INCOMPATIBLE" (Code 132)
- "INCOMPATIBLE GCM" alarm (Code 252)

**BACKGROUND**

All incompatibility alarms, except for Code 252, result from the Seakeeper's Gyro Control Module (GCM) receiving CAN messaging from a device identifying itself to have a hardware or software version that will not function with the current GCM software. The issue could be due to incorrect hardware or software of the device or of the GCM itself.

Code 252 is set by the display identifying the GCM as having incorrect software for the display's current software. The issue could be due to incorrect GCM or Display software. This could occur if a display programmed for an "SK-Series" model is connected to an "M-Series" Seakeeper. It could also occur if the GCM software is an older version or if the display is connected to the vessel NMEA backbone.

IMUs (Inertia Measurement Units) cannot be programmed; their program is installed during manufacturing. When replacing an IMU, it must be replaced with the same generation of IMU as the original (See insert photos).

**REFERENCES**

SWI-118 - Service Tool Application

[TB-90555 - Display Software Compatibility](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

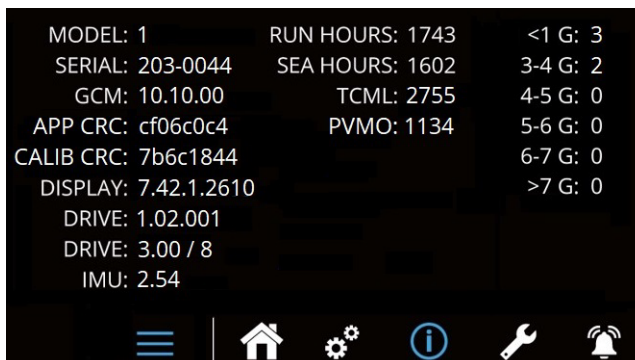
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 107 – 110/132/252

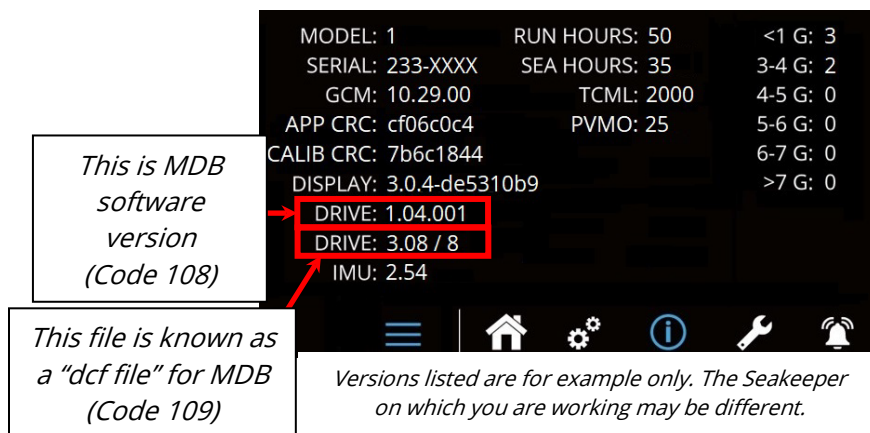
**PROCEDURE**

1. **CHECK** information screen software versions are populated with software numbers.

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

2. **ENSURE** flywheel at zero RPM at MFD app / display.
3. **OPEN / TURN OFF** all breakers to Seakeeper.
4. **CHECK** harness GCM, harness MDB and display/ConnectBox connections are made securely.
5. **IF** ConnectBox / display software version is older than most recent release,  
**THEN UPDATE** display software to clear Code 107, *Display Software Incompatibility*.
6. **IF** Code 107 and all software versions populated and ConnectBox / display software update attempted without clearing alarm,  
**THEN REPLACE** ConnectBox / display with new display.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

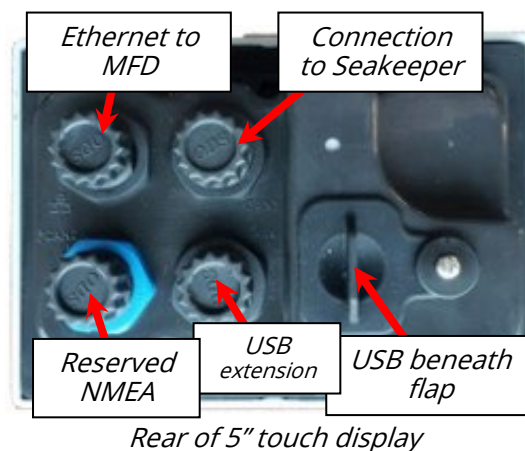
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 107 – 110/132/252

**NOTE:**

Software updating of components is achieved through Seakeeper Service Tool Application.

7. **IF** component software (MDB, IMU or GCM) is found incompatible, **THEN UPDATE OR REPLACE** applicable component as follows:
  - a. **IF** Code 108 or Code 109, **THEN UPDATE OR REPLACE** MDB / Curtis drive.
  - b. **IF** Code 110, **THEN REPLACE** IMU.
  - c. **IF** code 252 (despite alarm clearing by cycling power), **THEN VERIFY** display cable does **NOT** run near other higher current carrying cables or devices.
  - d. **IF** code 252 and 5" Touch Display installed, **THEN PERFORM** following:
    - i. **ENSURE** cable connections are correct according to photo.
    - ii. **CONTACT** Seakeeper Product Support Team to ensure GCM software is correct for current component software setup.
8. **SAVE AND RETURN** replaced hardware component(s).
9. **CLOSE / TURN ON** all power breakers to Seakeeper.
10. **IF** alarm persists, **THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with notes of all actions taken, photos of display information screen and alarm history pages for review.



\*\*\*\*\* **END** \*\*\*\*\*

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 111/112 & 167/168**

To troubleshoot and repair:

- “DC INPUT VOLTAGE LOW [SPEED LOSS DURING OPERATION]” (Code 111)
- “DC INPUT VOLTAGE LOW [SLOW SPOOL UP]” (Code 112)
- “HIGH CURRENT DC VOLTAGE LOW” (Code 167)
- “HIGH CURRENT DC VOLTAGE HIGH” (Code 168)

**BACKGROUND**

The DC-powered Seakeepers have been programmed to adjust power consumption as voltage drops below 11.1 VDC to prevent battery bank from being depleted while supporting Seakeeper operation. The Seakeeper does this by lowering speed until RPMs have reached 67% of target speed. At this lowered RPM, the Seakeeper will produce Code 111 to prevent further depletion of the battery bank. If the Seakeeper was in the process of spooling up, the code produced would be code 112, instead. It is activated when the Gyro Control Module (GCM) senses less than 600 Watts of draw and DC input voltage is low. If incoming DC voltage drops below 10 volts, Notice 167 (DC Mains Voltage Low [2nd Stage]) will be displayed. Code 41 (DC Power In Low) will appear around same voltage. See [Attachment 2, Voltage Alarm Thresholds](#) for more information.

The most likely cause for this alarm is the actual circumstances of a low battery voltage during operation or start-up of the Seakeeper. The DC power supply may need to be checked. Though a battery's voltage and specific gravity is within specification, it may still be incapable of operating correctly due to a severe loss of capacity resulting from sulfation, grid corrosion or shedding of active material. A battery load test could reveal a poor battery capacity in this event.

Should high current voltage rise above normal ranges, a Code 168 is possible. The Seakeeper 1 Curtis drive is less tolerant of over-voltage and will alarm at near 15 VDC.

The Motor Drive Box (MDB) of the Seakeeper may erroneously sense an improper voltage and produce the code. This eventuality is addressed as well.

**REFERENCES**

[90511 - Seakeeper 1 Cable Block Diagram](#)

[90699 - Seakeeper 4 Cable Block Diagram](#)

[90696 - Seakeeper 4.5 Cable Block Diagram](#)

[TB-90603 - DC Seakeeper Electrical Integration Diagrams](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

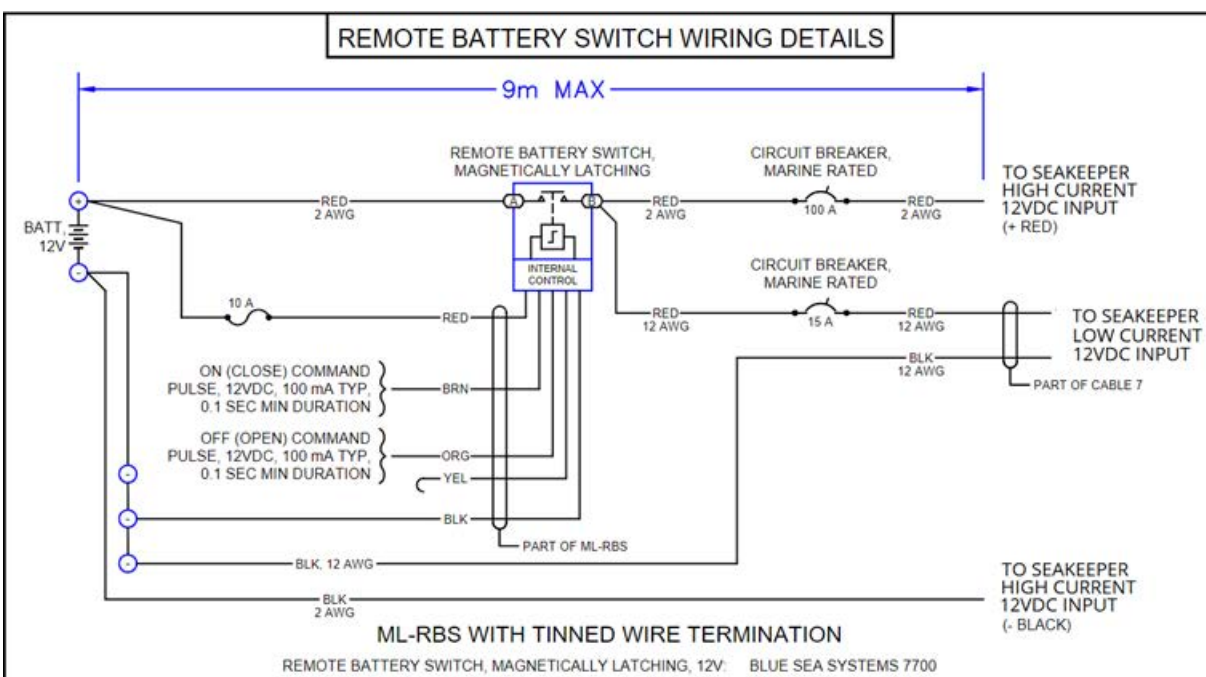
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 111/112/167/168

**PROCEDURE**

1. **THOROUGHLY INSPECT** Seakeeper electrical installation:
  - a. **CONFIRM** supply battery voltage within limits of [Attachment 2](#) table.
  - b. **INSPECT** Seakeeper Battery Isolator and breakers for tight terminal connections, no wire damage, and no excessive corrosion.
    - i. **IF** remote battery switch (RBS) is used in place of isolator switch, **THEN REFER** to diagram below for alignment of RBS.



- ii. **INSPECT** DC breakers for properly closed / ON, tight terminal connections, no wire damage, and no excessive corrosion.
- iii. **COMPARE** voltage readings from battery terminals to output of breakers.
- iv. **IF** any issues found with breakers and wiring in Step 1.b.ii and 1.b.iii, **THEN OPEN / TURN OFF** breaker **AND PERFORM** repairs.
- v. **CLOSE / TURN ON** circuit breaker after repairs completed.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 111/112/167/168

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Step 1 continued

**NOTE:**

Seakeeper recommends three (3) 90 Amp-Hour AGM house batteries OR equivalent for Seakeeper 1 and 4. A few builders provide Seakeeper power only from a generator; in these instances, ensure generator output can provide needed power for Seakeeper and other loads.

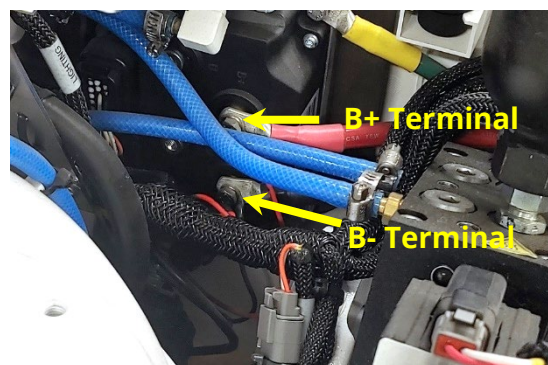
c.    **ENSURE** following:

- i.    **ENSURE** 12 VDC source powering Seakeeper has ampacity to carry all non-associated loads **AND** continuous amps for Seakeeper.
- ii.   **IF** battery bank below 12.0V,  
      **THEN CHARGE** battery above 12.0V.
- iii.   **VERIFY** electrical installation (per [ATTACHMENT 1](#)) ensuring no damage to supply cables.

2.    **ACCESS** Seakeeper battery input terminals as follows:**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

- a.    **ENSURE** flywheel at zero RPM at MFD app / display **AND OPEN / TURN OFF** all power to Seakeeper.
- b.    **IF** Seakeeper 1,  
      **THEN ACCESS** B+ and B- terminals beneath heat exchanger.





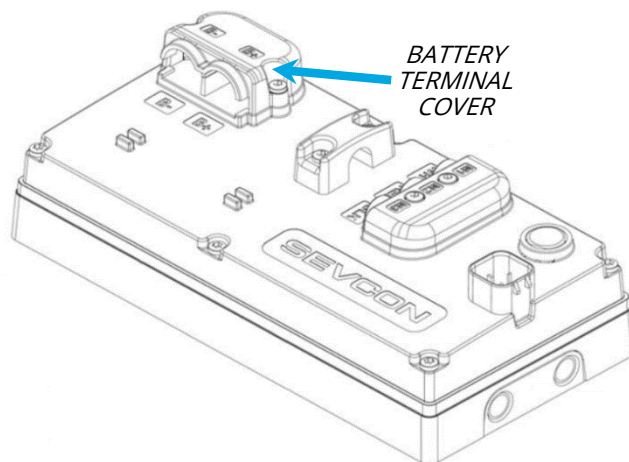
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 111/112/167/168

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Step 2 continued

- c. **IF** Seakeeper 4,  
**THEN REMOVE** battery terminal cover of MDB with T15 Torx bit.

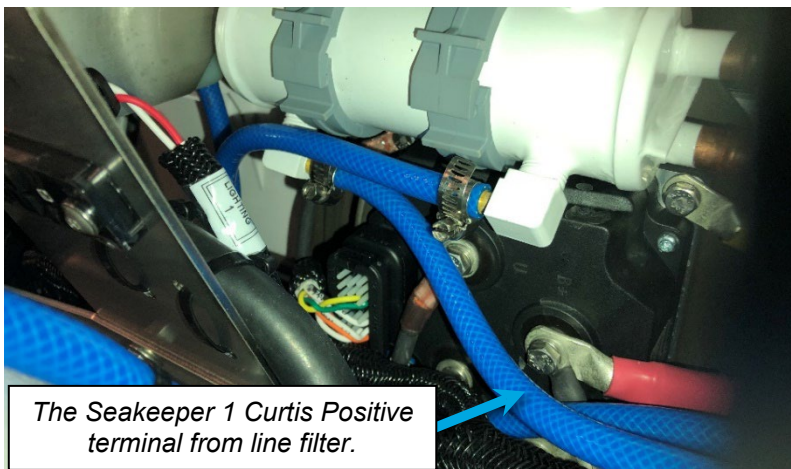


3. **VERIFY** high current input cables are installed in correct location and torqued per [Torque Specification](#) section.
4. **CLOSE / TURN ON** low current DC breaker to Seakeeper.

**NOTE:**

A multimeter, such as a Fluke 269, can capture peak maximum and minimum voltages and is recommended.

5. With multimeter in DC volts mode, **MEASURE AND RECORD** input voltage between 11 and 15 VDC (11.2 to 14.7 VDC for Seakeeper 1).



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 111/112/167/168

PRODUCT      SEAKEEPER 1, 4, AND 4.5

6. **IF** battery terminals of Seakeeper show significantly lower voltage from battery,  
**THEN TROUBLESHOOT** vessel electrical line to Seakeeper.
7. **PERFORM** operational test of Seakeeper (at dock or underway) with normal (underway) electrical source aligned:
  - a. **IF** Seakeeper 1,  
**THEN:**
    - i. **COMPARE** voltage on outlet of Seakeeper supply breaker with battery terminals of Seakeeper.
    - ii. **IF** voltage at Seakeeper terminals is more than 1.0 volt lower than breaker output,  
**THEN REPLACE** supply cables with line filter.
  - b. **OPEN / TURN OFF** all breakers to Seakeeper.
  - c. **ATTACH** probes of multimeter in DC VOLTS mode to **B+ AND B-** terminals of MDB/Curtis drive.
  - d. **STATION** individual at power supply to Seakeeper, if necessary.
  - e. **CLOSE / TURN ON** all breakers to Seakeeper.
  - f. **MONITOR** multimeter for dipping in voltage below **10.0** VDC.
  - g. **REPEAT** this cycling of power and monitoring voltage **for minimum of three times** to ensure repeatability.
  - h. **IF** voltage did NOT dip,  
**THEN CONTINUE** in procedure.
  - i. **IF** voltage dipped,  
**THEN NOTE** any alarm received that will NOT allow reset.
    - i. **TROUBLESHOOT** alarm per applicable code troubleshooting guide.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 111/112/167/168

8. With probes still attached from previous step, **CLOSE / TURN ON** all breakers to Seakeeper.

**NOTE:**

Possible large vessel loads may be any of following depending on vessel's electrical distribution system and equipment loading. Loads vary on each vessel:

|                             |                                      |
|-----------------------------|--------------------------------------|
| Windlass                    | Bow thrusters                        |
| DC Refrigeration compressor | Inverters                            |
| Blowers                     | Refrigeration clutches               |
| Trolling motors             | Engine starter motor (in some cases) |

9. **START** Seakeeper flywheel motor spool-up.
10. **CYCLE** large vessel loads, one by one, **WHILE MONITORING** Seakeeper input voltage.
- IF** voltage seen to drop below **10.0** VDC upon start of load, **THEN INSPECT** that load's positive and negative DC cabling for loose bus connections, cable damage, or distribution cable tap locations.
  - IF** spool-up is aborted during test, **THEN RESTART** Seakeeper spool-up **AND NOTE** stopping of spool-up.
  - IF** voltage seen to spike above **15.0** VDC (**14.7** VDC for Seakeeper 1) upon securing of load, **THEN PERFORM** vessel electrical system evaluation.
  - RECORD** results from tests.
11. **ALLOW** Seakeeper to reach target RPM **AND UNLOCK** Seakeeper.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206



PRODUCT      SEAKEEPER 1, 4, AND 4.5

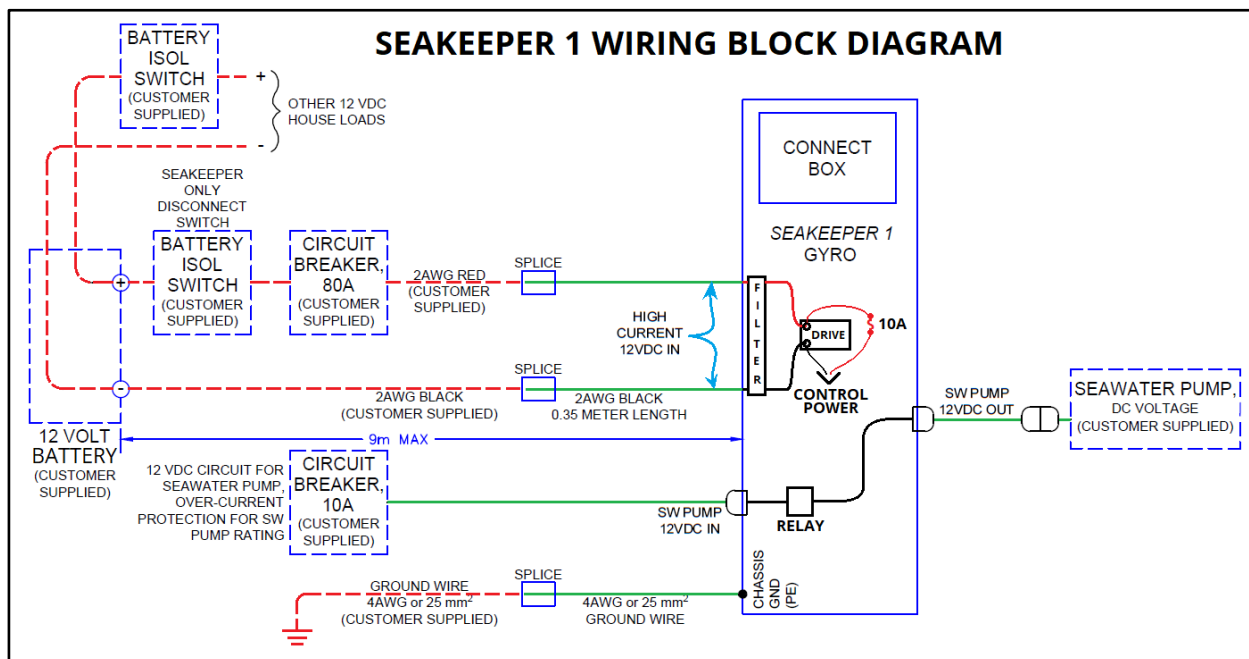
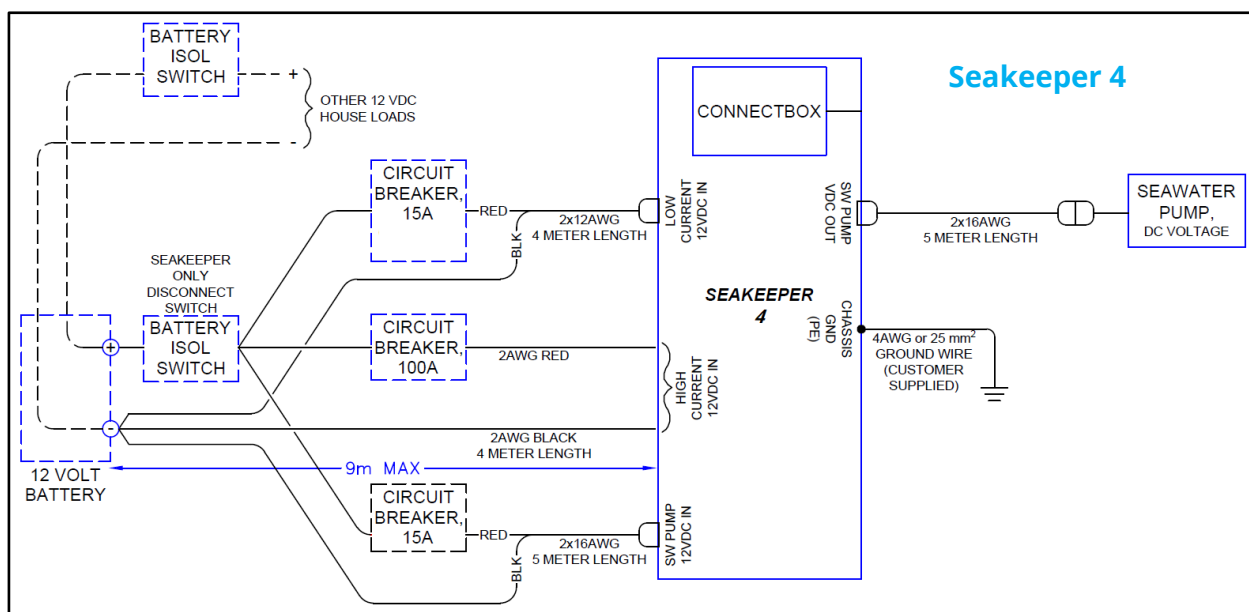
12.    **CYCLE** large vessel loads, one by one, **WHILE MONITORING** Seakeeper input voltage.
  - a.    **IF** voltage seen to drop below **9.0** VDC upon start of load,  
      **THEN INSPECT** that load's positive and negative DC cabling for loose bus connections, cable damage, or distribution cable tap locations.
  - b.    **IF** voltage seen to spike above **15.0** VDC upon securing of load,  
      **THEN PERFORM** vessel electrical system evaluation.
  - c.    **RECORD** results from tests.
13.    **IF** alarm persists,  
      **THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with all test results data and electrical alignment at time of alarm (i.e., on shore power or underway).

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 111/112/167/168

**ATTACHMENT 1**

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 111/112/167/168

**ATTACHMENT 2**

| VOLTAGE CODE THRESHOLDS                                                                                                                                                                      |                                        |                                |                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------------------|-------------------|
| ALARM / WARNING CODE                                                                                                                                                                         | SOURCE                                 | MODELS                         |                   |
|                                                                                                                                                                                              |                                        | 1                              | 4                 |
| 40 – DC INPUT VOLTAGE HIGH                                                                                                                                                                   | GCM                                    | >15                            | >15               |
| 41 – DC INPUT VOLTAGE LOW                                                                                                                                                                    | GCM                                    | <10                            | <10               |
| 111 – DC INPUT VOLTAGE LOW (unlocked)                                                                                                                                                        | GCM <sup>1</sup>                       | <11.2 <sup>2</sup> & <6532 RPM | <11.1 & <6030 RPM |
| 112 – DC INPUT VOLTAGE LOW (spool-up)                                                                                                                                                        | GCM <sup>3</sup>                       | <10.9 <sup>4</sup> & <7312 RPM | <11.1 & <7650 RPM |
| 167 – HIGH CURRENT DC VOLTAGE LOW                                                                                                                                                            | DRIVE<br>At hi-current input terminals | <10                            | <10               |
| 168 – HIGH CURRENT DC VOLTAGE HIGH                                                                                                                                                           | DRIVE<br>At hi-current input terminals | >14.76 <sup>5</sup>            | >16               |
| NOTES                                                                                                                                                                                        |                                        |                                |                   |
| <sup>1</sup> Excessive precession speed loss (loss of .65% of target speed when unlocked) and Battery Manager (battery voltage low) functions minimize power consumption to <600W            |                                        |                                |                   |
| <sup>2</sup> Seakeeper 1 ONLY: Excessive precession speed loss and Battery Manager functions limit output to <20A                                                                            |                                        |                                |                   |
| <sup>3</sup> Slow Spool Up (speed change during spool up of flywheel is < 10rpm in 1 min for 2 consecutive minutes) and Battery Manager (battery voltage low) functions limit power to <600W |                                        |                                |                   |
| <sup>4</sup> Seakeeper 1 derates to less than 20 amps draw at this voltage; the power rating (note 3) does not apply.                                                                        |                                        |                                |                   |
| <sup>5</sup> Seakeeper 1 ONLY: DC Mains Hi Limit = 16 BUT Curtis Drive alarm Code 24 & 83 set at 14.76 VDC                                                                                   |                                        |                                |                   |

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 123**

To troubleshoot and reset the “BATTERY STATE OF CHARGE LOW” warning (Code 123).

**BACKGROUND**

This warning is only expected on DC-powered Seakeepers installed on boats equipped with a lithium battery bank supplying the Seakeeper. The warning code is triggered when the NMEA2000 network State of Charge signal (SOC) reaches the setting on the cut-off threshold slider of the Battery Monitoring Configuration screen. The factory setting for this threshold is 20% but may be selected by the user from 10 to 30% state of charge.

When the threshold of battery charge is reached, indication will be displayed on the MFD app/5” Display Home screen by showing the battery icon in red and empty. The Seakeeper will begin reducing its power draw from the battery by lowering flywheel RPM. The ramp-down of Seakeeper power continues until 67% of flywheel target speed is reached. Any further reduction in battery charge will result in the Seakeeper locking the enclosure and coasting the flywheel.

To reset the warning, one must recharge the lithium battery bank supplying the Seakeeper. If actual battery voltage is above 11.5 VDC, the battery monitor may be faulty.

**REFERENCES**

[TB-90621 – Battery Sizing Recommendations](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) section of Introduction.

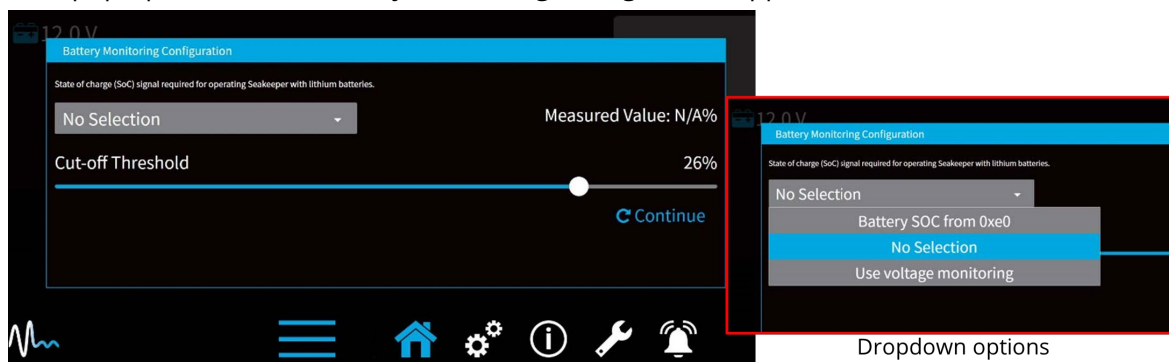
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 123

**PROCEDURE**

1. With power aligned to Seakeeper, **CHECK** Seakeeper DC voltage reading on Service screen of MFD app / 5" display.
2. **IF** voltage is below 11.4 VDC, **THEN CHARGE** lithium battery supplying Seakeeper.
3. **IF** voltage 11.4 VDC or higher, **THEN PERFORM** following:
  - a. **CHECK** boat's battery monitoring display for valid State of Charge (SOC) signal.
  - b. **IF** no valid SOC signal from battery monitor equipment, **THEN TROUBLESHOOT** battery monitor equipment.
  - c. **IF** valid SOC signal exists from battery monitor equipment, **THEN TROUBLESHOOT** NMEA2000 backbone and drop cable to Seakeeper.
4. To view Seakeeper Battery Monitoring Configuration, **PRESS AND HOLD** battery icon on Home screen until pop-up window for Battery Monitoring Configuration appears.



Dropdown options

**\*\*\*\*\* END \*\*\*\*\***



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 129/130**

To troubleshoot and repair the cause of the “INCORRECT SERIAL NUMBER” alarm (Code 129) and the “MODEL CHANGE DETECTED” alarm (Code 130).

**BACKGROUND**

These codes are not expected in installed Seakeeper models under normal circumstances. The alarms may arise during or immediately after programming with the Seakeeper Service Tool application or a programming computer software. If an erroneous model number or serial number is entered, the GCM should recognize the error and trigger this alarm to notify the technician.

**REFERENCES**

SWI-118 - Seakeeper Service Tool User Guide

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

**PROCEDURE**

1. **IF** alarm received during or after GCM programming,  
**THEN:**
  - a. **VERIFY** correct serial or model number from associated Seakeeper enclosure label.
  - b. **RE-PROGRAM** GCM with correct data.
2. **IF** alarm received after installing GCM,  
**THEN:**
  - a. **REPLACE** GCM **OR** **PROGRAM** GCM using Seakeeper Service Tool application.
  - b. **RETURN** replaced GCM to Seakeeper.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

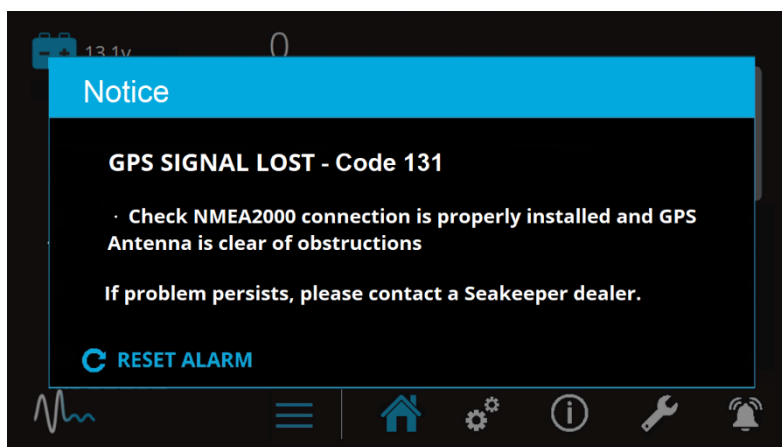
PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 131**

Troubleshoot and repair the "GPS SIGNAL LOST" notice: Code 131.

**BACKGROUND**

This notice is received when there is an absence or loss of GPS speed (speed over ground/SOG) signal from the NMEA backbone connection of the ConnectBox. Per the installation manual, a GPS device is required for the SOG signal. This notice applies to any Seakeeper model equipped with the ConnectBox.



When the SOG signal is available, the input power will remain the same, the Seakeeper will spool, and the Seakeeper regulates the sphere's precession limiting it to a more upright position at higher boat speeds. As soon as boat speed is reduced, the sphere begins to precess normally again. When SOG signal lost, the Seakeeper will allow spooling and SEA Mode, but there will be no precession/stabilization available.

**REFERENCES**

Applicable model Cable Block Diagram on [Dealer Access](#)

Applicable model Installation Manual at [Seakeeper Manuals Website](#)

[TB-90640 – ConnectBox Connection Requirements](#)

[TB-90555 – Seakeeper Display Software Compatibility](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 131

**PROCEDURE****CAUTION:**

**ConnectBox damage may occur if NMEA cable  
tightened with excessive force.**

**WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS when working on live circuitry.  
Seakeeper may start remotely.**

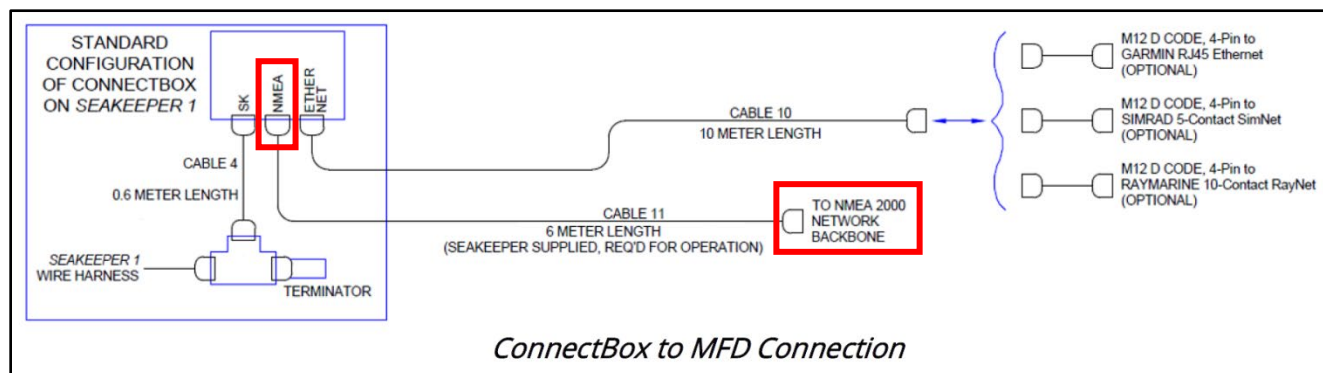
1. **ENSURE** flywheel at zero RPM at MFD app / display.
2. **OPEN / TURN OFF** all power breakers to Seakeeper.
3. **ENSURE** NMEA2000 drop cable connection to ConnectBox controller **AND** NMEA2000 backbone is secure and in correct location (see ConnectBox installation schematics below).
4. **ENSURE** vessel GPS receiver is operating by viewing output at appropriate display onboard.
5. **CLOSE / TURN ON** all power to Seakeeper.
6. At vessel's 5" Display/MFD:
  - a. **OPEN** Seakeeper app.
  - b. **NAVIGATE** to INFO screen.
  - c. **UPDATE** ConnectBox software with latest software version.



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 131

7. **VERIFY** integrity of NMEA2000 drop cable from NMEA Backbone to ConnectBox.

- a. **INSPECT** for sharp bends in cable routing.
  - b. **INSPECT** for fraying or abraded insulation.
  - c. **ENSURE** cable no longer than 20 ft. (6 m).
8. **INSPECT** connectors of NMEA2000 drop cable at ConnectBox **AND** NMEA Backbone for corrosion or moisture intrusion.
9. **CHECK** GPS antenna and NMEA2000 backbone for following:
- a. **ENSURE** antenna has clear view of sky.
  - b. **ENSURE** antenna is outside any Radar Beam, either above or below.
  - c. **ENSURE** antenna is below SATCOM Antenna Beam if installed.
  - d. **ENSURE** total length of drop cable from backbone to GPS is NOT longer than 20 ft. (6 m).
  - e. **ENSURE** total length of drop cable from backbone to ConnectBox is NOT longer than 20 ft. (6 m).
  - f. **ENSURE** NMEA2000 backbone power is at 12 VDC.

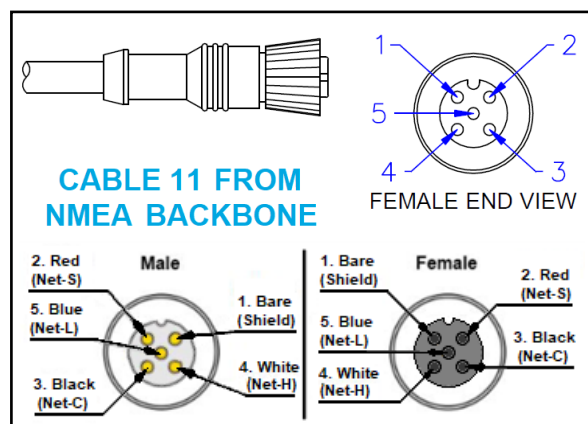
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 131

10. **PERFORM** following electrical checks of NMEA drop cable:

- a. **OPEN / TURN OFF** all power to Seakeeper.
- b. **DISCONNECT** NMEA drop cable from ConnectBox **AND** vessel NMEA Backbone.
- c. With multimeter in resistance mode, **VERIFY** no electrical short exists between any two pins.
- d. **CHECK** continuity of each lead in NMEA drop cable.
- e. **IF** Step 10.c or 10.d **UNSATISFACTORY**, **THEN REPLACE** NMEA drop cable.
- f. With NMEA drop cable connected to NMEA backbone, **CHECK** voltage, at ConnectBox end of NMEA drop cable, between 11 – 13 VDC (between pins **2** and **3**).
- g. **IF** voltage is below 11 VDC, **THEN REEVALUATE** estimated voltage drop on NMEA backbone given number of devices and placement of power supply.

11. **PERFORM** following:

- a. **DISCONNECT** all cables from ConnectBox.
- b. **REMOVE** ConnectBox from bracket by removing thumbscrews.

**NOTE:**

If cables overtightened, connectors could rotate and break off from underlying circuit board. Connector may feel loose, or their locating key would be obviously rotated into new orientation (versus 12 o'clock position).

- c. **EXAMINE** connector ports and pins on ConnectBox for damage.
- d. **RESTORE** all connections.

12. **CLOSE / TURN ON** all power to Seakeeper.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 131

**NOTE:**

Following step is only applicable for Seakeepers with  
GCM software versions older than **11.110** and ConnectBox software **3.1.5x**.

13. **IF** Seakeeper equipped with ConnectBox, **AND** multiple GPS signals are available on the NMEA2000 CAN, **AND** no stabilization performance is noted due to loss of SOG signal,  
**THEN:**
  - a. **PERFORM** sea trial at less than 10 knots.
  - b. **DISCONNECT** GPS sources one at a time to evaluate Seakeeper performance.
  - c. **IF** stabilization improves upon removal of a transmitter,  
**THEN UPDATE** GCM and ConnectBox software.
14. **IF** alarm persists,  
**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with results of all tests and inspections.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 163**

To troubleshoot and repair the "Slow Spool Up" alarm (Code 163).

**BACKGROUND**

"Slow Spool Up" is reported by the GCM when it senses a speed rise of less than 10 RPM in 1 minute for two consecutive minutes during spool up after the operator presses start. Code 72 (Motor Underspeed) is similar but is triggered when the Seakeeper is in SEA MODE.

Code 163 is the report of an adverse condition preventing the spool up of the flywheel. If any other drive-related recent alarms in history, they should be addressed first.

If this alarm is accompanied by Code 98 (AC Mains Low alarm), in AC-powered models, or by a Code 166 (DC Mains Low alarm), in DC-powered models, the input power supply to the MDB is likely the cause and should be pursued first.

Another alarm of which to be aware is Code 128 (Vacuum Leak warning) accompanying this alarm. If a vacuum leak occurs, air resistance to the flywheel spinning may overcome the motor's ability to raise the speed to operational levels.

Motor lead testing is referenced in this guide to determine the condition of the insulation and potting of the motor drive cable and flywheel motor. See [SWI-124 for Seakeeper Motor Lead Testing](#).

| TABLE 1: SEAKEEPER MODEL VOLTAGES |          |           |            |               |
|-----------------------------------|----------|-----------|------------|---------------|
| MODEL                             | DC MAINS | AC MAINS  | DC CONTROL | MOTOR VOLTAGE |
| Seakeeper 1                       | 12       | -         | 12         | 12 VDC        |
| Seakeeper 4                       | 12       | -         | 12         | 48 VDC        |
| Seakeeper 4.5                     | -        | 110 / 230 | 12         | 400 VDC       |

**REFERENCES**

[SWI-124 - Seakeeper Motor Lead Testing](#)

[SWI-129 - Seakeeper Vacuum Gauge Operation](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) in Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT SEAKEEPER 1, 4, AND 4.5

Code 163

**PROCEDURE****SECTION 1, INITIAL FINDINGS**

1. **IF** recent drive-related alarm(s) present in alarm history,  
**THEN ADDRESS** those alarms first (identified by 'DRIVE' in description).
2. Due to potential for sphere replacement, **RECORD** all interview answers and testing results.
3. **INTERVIEW** owner/operator by asking:
  - a. When did issue first appear (conditions in which alarm occurred)?  
\_\_\_\_\_
  - b. Has the Seakeeper achieved full speed since? \_\_\_\_\_ YES/NO
  - c. If no, what was maximum speed noted? \_\_\_\_\_ RPM
  - d. Did alarm occur at the dock or underway? \_\_\_\_\_
    - i. If at dock AND DC-powered model, was battery charged overnight? \_\_\_\_\_ YES/NO
    - ii. If DC-powered, what is battery voltage at time of alarm? \_\_\_\_\_ VDC
    - iii. If underway, how long after leaving dock did alarm occur? \_\_\_\_\_
4. **VISUALLY INSPECT** motor power cable from MDB to feed-through in enclosure. (Cracked/damaged insulation, kinked cable)
  - a. **DOCUMENT** issues with photo(s).
5. **IF** speed 200+ RPM in Step 3.c,  
**THEN PROCEED** to [SWI-129 - Vacuum Gauge Operation](#) to determine enclosure pressure.
  - a. **IF** enclosure pressure satisfactory (less than 85 Torr),  
**THEN PROCEED** to [Section 2](#) for AC models or [Section 3](#) for DC models.
  - b. **IF** enclosure pressure unsatisfactory (above 85 Torr),  
**THEN PERFORM** vacuum service per [SWI-116 - Seakeeper Vacuum Service](#).





**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 163

PRODUCT      SEAKEEPER 1, 4, AND 4.5

6. **IF** speed less than 200 RPM or unknown in Step 3.c,  
**THEN START** Seakeeper spooling to at least 200 RPM:
  - a. **IF** speed does not achieve 200 RPM,  
**THEN:**
    - i. **RECORD** 30 second video of MFD app / display service screen during following steps:
    - ii. **NOTE** maximum RPM obtained. \_\_\_\_\_ RPM
    - iii. **NOTE** time to reach maximum RPM. \_\_\_\_\_ Min : Sec
    - iv. **NOTE** current at maximum RPM. \_\_\_\_\_ Amps
    - v. **PROCEED** to [Section 2](#) for AC models or [Section 3](#) for DC models.
  - b. **IF** speed exceeds 200 RPM,  
**THEN RETURN** to step 5 of this section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

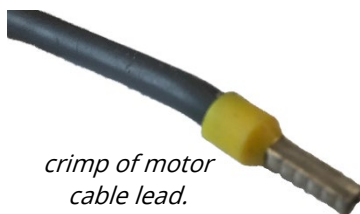
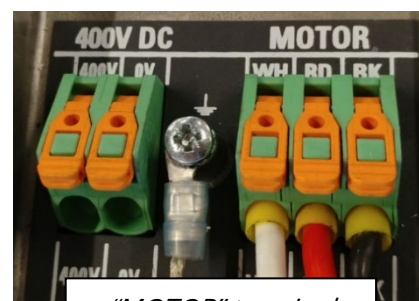
Code 163

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**SECTION 2, AC-POWERED MODELS****WARNING!**

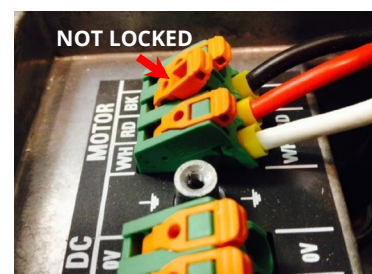
**PERSONNEL SHOCK HAZARD EXISTS** when working on live circuitry.  
**Seakeeper may start remotely.**

1. **ENSURE** flywheel at zero RPM at MFD app / display.
2. **OPEN / TURN OFF** all power to Seakeeper.
3. **REMOVE** MDB cover.
4. **ENSURE** interior of MDB is free of moisture.
5. **VERIFY** leads at "MOTOR" terminal are in proper position by color and ground cable attached
  - a. **IF** issues found with motor leads,  
**THEN CORRECT** motor lead issues.
6. **VERIFY** leads are crimped properly, fully inserted into terminal,  
**AND** locked firmly.



"MOTOR" terminal

- a. **IF** terminal block orange tab will not lock (as shown to right),  
**THEN ROTATE** crimp **AND RELOCK** crimped lead.
7. **IF** any issues found with leads,  
**THEN CORRECT** issues with motor leads.

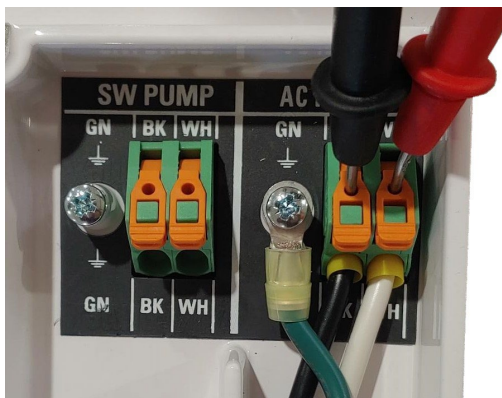


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 163

PRODUCT      SEAKEEPER 1, 4, AND 4.5

8.    **LOOSEN** MDB feed-through grommet **AND EXAMINE** motor drive cable insulation at grommet.
  - a.    **IF** insulation damage found  
      **THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com.
9.    **CLOSE / TURN ON** AC power supply breaker to Seakeeper.
10. With multimeter in AC Volts mode, **MEASURE** voltage at "AC INPUT" terminal between black and white terminals.



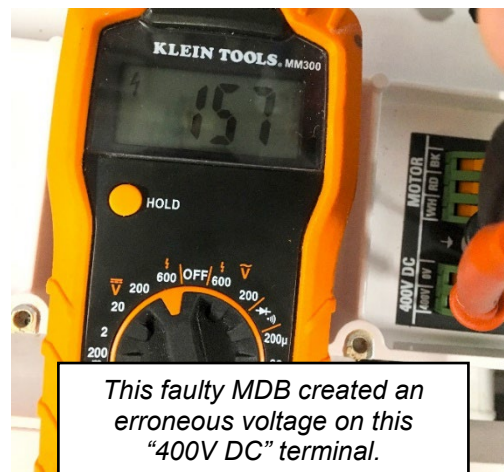
11. **IF** voltage below 187 VAC for 230V service (99 VAC for 110V service) or above 253 VAC for 230V service (132 VAC for 110V service),  
      **THEN TROUBLESHOOT** vessel electrical supply.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 163

12. **TEST AND RECORD** voltage at "400V DC" terminal.
13. **OPEN / TURN OFF** AC power breaker to Seakeeper.
14. **IF** checks above satisfactory  
**THEN PERFORM** motor lead testing per [SWI-124](#).
15. **IF** any megohm test results are 100 Mohms or less,  
**THEN CONSIDER** reading(s) **UNSATISFACTORY AND CONTINUE** in this procedure.
16. **IF** voltage Step 12 is NOT between 390 and 400 VDC,  
**THEN REPLACE** MDB.
17. **TORQUE** MDB cover M4 screws to **19 in-lbs (2.2 Nm)**.
18. **PERFORM** following:
  - a. **TAKE** photo of information screen and all alarm history pages.
  - b. **RECORD** 30 second video within one yard (one meter) of Seakeeper upon start of spool up with minimal background noise.
  - c. **CONTACT** Seakeeper Product Support Team at support@seakeeper.com with following:
    - i. Summary of owner/operator interview
    - ii. Troubleshooting test result values
    - iii. Digital images & video recordings collected (may use DropBox, or similar, if excessive file size).



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

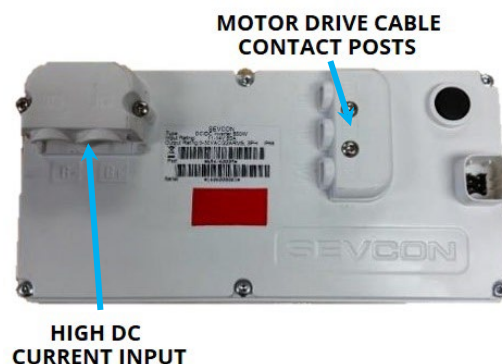
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 163

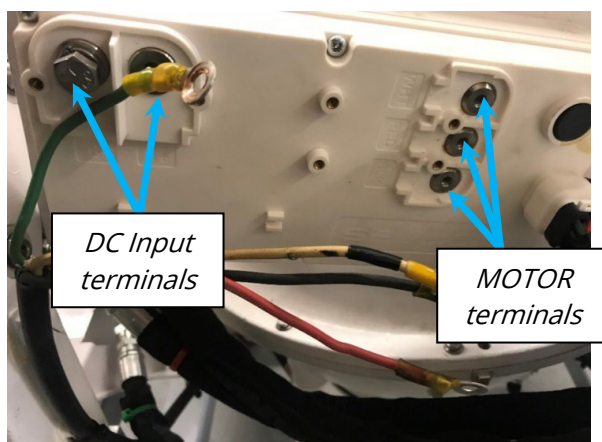
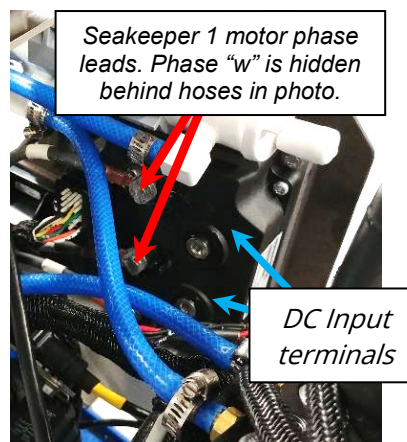
**SECTION 3, DC-POWERED MODELS****WARNING!**

**PERSONNEL SHOCK HAZARD EXISTS** when working on live circuitry.  
Seakeeper may start remotely.

1. **ENSURE** flywheel at zero RPM at MFD app / display **AND** **OPEN / TURN OFF** all power to Seakeeper.
2. **REMOVE** cover at motor drive contact posts and High DC input terminals. [N/A for Seakeeper 1]
3. **INSPECT** for severe corrosion at contacts or damage to cables.



4. **VERIFY** terminal leads torqued per [Torque Specifications](#) section **AND** motor cable leads in correct color (or "U", "V", or "W" on Seakeeper 1) location.
5. **CLOSE / TURN ON** high-current DC power breaker to Seakeeper.
6. **MEASURE** high DC voltage at INPUT terminals. [NOTE: Voltage should be 11.2 to 15.0 VDC.]



**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

Code 163

PRODUCT SEAKEEPER 1, 4, AND 4.5

7. **IF** not at proper voltage (11.2 to 15.0V),  
**THEN TROUBLESHOOT** vessel's electrical system.
8. **OPEN / TURN OFF** high current DC power to Seakeeper.

**NOTE:**

Intermittent opens in a wire may not be seen without manipulating the harness to duplicate movement of precession.

9. **PERFORM** motor lead testing per [SWI-124](#).
10. **IF** any temperature-corrected resistance is less than 100 Mohms,  
**THEN CONSIDER** those readings UNSATISFACTORY.
11. **DOCUMENT** results of all measurements and photograph any physical damage found.
12. **PERFORM** following:
  - a. **TAKE** photo of information screen and all alarm history pages.
  - b. **RECORD** 30 second video within one yard (one meter) of Seakeeper upon start of spool up with minimal background noise.
  - c. **CONTACT** Seakeeper Product Support Team at support@seakeeper.com with following:
    - i. Summary of owner/operator interview
    - ii. Troubleshooting test result values
    - iii. Digital images & video recordings collected (may use DropBox, or similar, if excessive file size).

**\*\*\*\*\* END \*\*\*\*\***

## SEAKEEPER TROUBLESHOOTING GUIDE- 206



PRODUCT      SEAKEEPER 1, 4, AND 4.5

### MFD INTEGRATION



To troubleshoot non-code compatibility issues between the Seakeeper 5" Touch Display (P/N 30298) or ConnectBox (P/N 20415) to compatible MFD systems.

### BACKGROUND

Seakeeper has MFD-specific Technical Bulletins that cover the integration requirements of Seakeeper 5" Touch Display and ConnectBox to compatible MFDs. Compatible MFD manufacturers include Garmin, Raymarine, Navico / Simrad, and Furuno. Available Technical Bulletins are linked in the following section. Compatibility between the Seakeeper and MFD may be negatively impacted by Seakeeper or MFD software update, power-up sequence, and sensitive connections through ethernet expansion hubs. Additionally, not all MFDs available from these manufactures are compatible; one must ensure the specific device supports Seakeeper per the Seakeeper or MFD compatibility documentation.

The [attachment](#) contains operating experience with MFD compatibility issues. Before contacting Seakeeper Product Support Team, it may be helpful to look over the lessons learned to see if an issue experienced is covered.

### REFERENCES

[TB-90478 - Garmin and Seakeeper Compatibility](#)

[TB-90479 - Raymarine and Seakeeper Compatibility](#)

[TB-90480 - NAVICO and Seakeeper Compatibility](#)

[TB-90598 - Furuno and Seakeeper Compatibility](#)

[TB-90555 - Seakeeper Display Software Compatibility](#)

[TB-90640 - ConnectBox Connection requirements](#)

Applicable Seakeeper model [Cable Block Diagram](#)

### PRECAUTIONS

See [PRECAUTIONS](#) in Introduction section.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

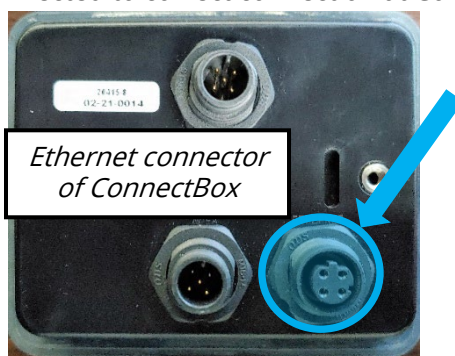
**PROCEDURE**

1.    **VERIFY** Seakeeper display software is most up-to-date version per TB-90555:
  - a.    On MFD app / Display, **VERIFY** current ConnectBox software version loaded on Information page.

**NOTE:**

Seakeeper is not responsible for updating MFD manufacturer software.

2.    **VERIFY** appropriate and latest MFD manufacturer's software version loaded on MFD per relevant MFD Compatibility Technical Bulletin, listed in references section.
3.    **ENSURE** ethernet cable is connected to correct connection at ConnectBox, as shown.



- a.    Compatibility cable part numbers are as follows:
  - i.    Garmin Ethernet Wire Harness Cable Assembly – P/N 20373
  - ii.   Raymarine Ethernet Cable Assembly – P/N 20380
  - iii.   NAVICO / Simrad Ethernet Wire Harness Cable Assembly – P/N 20346
  - iv.   Furuno Ethernet Wire Harness Cable Assembly – P/N 20506

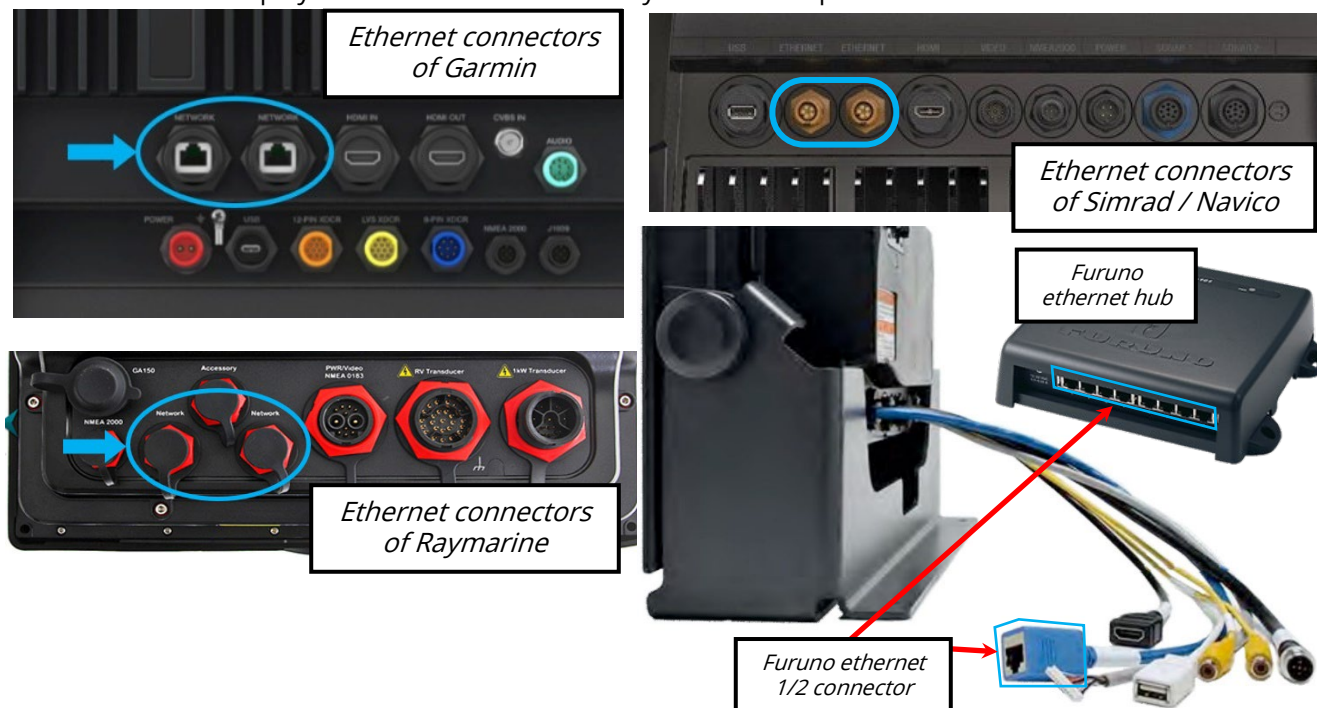


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

MFD Integration

PRODUCT      SEAKEEPER 1, 4, AND 4.5

4. **VERIFY** all display connections made securely from Seakeeper ethernet connection to MFD.

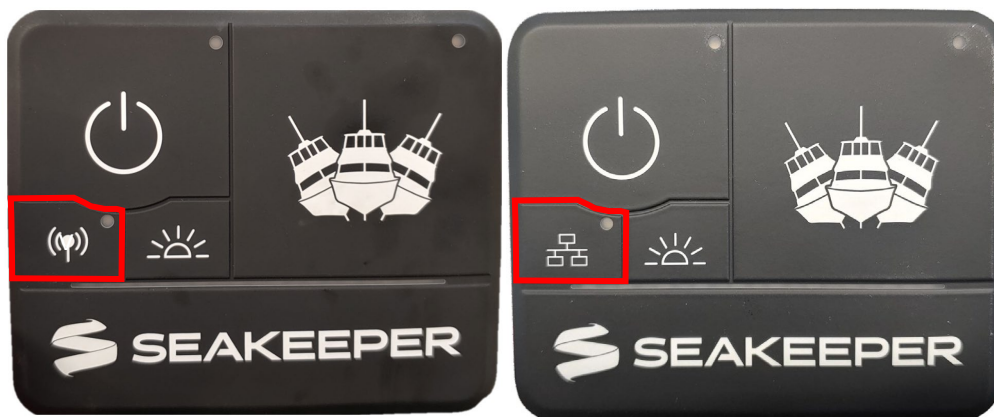


**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

MFD Integration

PRODUCT      SEAKEEPER 1, 4, AND 4.5

5. Using appropriate MFD Compatibility Technical Bulletin referenced, **ENSURE** ConnectBox is correctly synchronized with MFD device.
  - a. On ConnectBox, **CYCLE** between DHCP modes by holding down Ethernet/Connectivity button for 10 seconds or until spool bar LEDs strobe right to left or left to right.
  - b. **IF** mode fails to switch, **THEN REPEAT** Step 5.a.



ConnectBox software **3.0.4-de5310b9**, and **after**, has only two synchronization modes for MFD connectivity:

- 1) DHCP server function OFF (for Garmin, Raymarine, and Furuno MFDs) indicated by spool bar LEDs strobing right to left.
- 2) DHCP server function ON (for NAVICO brand MFDs) indicated by spool bar strobing left to right.

**NOTE:**

- It is recommended that MFD be powered before cycling Seakeeper power.
- Multiple power cycles may be required before Seakeeper icon populates on MFD list of connected components.

6. **CYCLE** DC control power to Seakeeper.

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

MFD Integration

PRODUCT      SEAKEEPER 1, 4, AND 4.5

7. Except for ConnectBox NMEA backbone connection, **ENSURE** Seakeeper CAN is not connected to a NMEA2000 backbone.



*ConnectBox requires a SOG signal  
from NMEA network*

8. **IF** ConnectBox connected to MFD via network expansion hub,  
**THEN BYPASS** network hub **AND CONNECT** compatibility cable from Seakeeper ConnectBox to MFD.
  - a. **IF** bypassing network hub resolves compatibility issues,  
**THEN DIRECTLY CONNECT** Seakeeper to MFD if possible.

**NOTE:**

Seakeeper is not responsible for supporting network hub troubleshooting.

- b. **IF** network hub is required by MFD,  
**THEN CONTACT** network installer or MFD manufacturer for additional support.
9. **ENSURE** Seakeeper app appears on MFD list of connected ethernet / HTML devices.
10. **IF** equipped with optional 5" display,  
**THEN CHECK** flywheel speed is same RPM at 5" Display and on MFD app.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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PRODUCT      SEAKEEPER 1, 4, AND 4.5

11. **IF** MFD integration issues persist,  
**THEN CONTACT** Seakeeper Product Support Team at [support@seakeeper.com](mailto:support@seakeeper.com) with following:
- a.     Make and model of MFD and software version
  - b.     Any error messages on MFD
  - c.     Seakeeper interface installed (5" Display or ConnectBox) and software version
  - d.     Notes of all actions taken
  - e.     Whether Seakeeper app appears on MFD and how it appears (icon visible or not?)

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**ATTACHMENT**

The attachment is intended to provide a summary of example cases and lessons learned for MFD troubleshooting.

1. General rules of thumb for MFD compatibility:
  - a. Garmin OneHelm™ is required to support Seakeeper compatibility. [OneHelm™ is a software feature available on certain Garmin models]
  - b. All Raymarine Axiom® models support Seakeeper compatibility.
  - c. Furuno NavNet™ is required for Seakeeper compatibility.
2. Furuno and ConnectBox compatibility
  - a. Furuno MFDs do not support Seakeeper ConnectBox until NavNet™ TZT3, version 3.5, released in October 2022.
3. Garmin power-up sequence:
  - a. When operating with Garmin MFD, MFD should be powered up before powering Seakeeper to ensure the two systems communicate correctly.
  - b. For Garmin compatibility, Seakeeper 5" Display or ConnectBox rely on Garmin MFD to act as DHCP Server, which provides an IP address to Seakeeper device.
  - c. If Seakeeper powered up first, it would look for IP Address from Garmin MFD; however, if there is a significant delay between when Seakeeper and Garmin power up, Seakeeper can fail to secure an IP address resulting in a OneHelm error. If this occurs, cycle Seakeeper power and app should load on Garmin MFD.
4. Raymarine and ConnectBox compatibility:
  - a. Early Seakeeper ConnectBox software versions were found to be incompatible with Raymarine MFDs. Incompatibility in these cases can be remedied by updating ConnectBox software.
5. NAVICO and multiple Seakeepers with ConnectBox:
  - a. If Seakeeper with ID #1 is not available, other Seakeepers may not be available in app. Re-designate another Seakeeper as ID #1 in this case.

## SEAKEEPER TROUBLESHOOTING GUIDE- 206

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PRODUCT      SEAKEEPER 1, 4, AND 4.5

### WIRE HARNESS SCHEMATICS

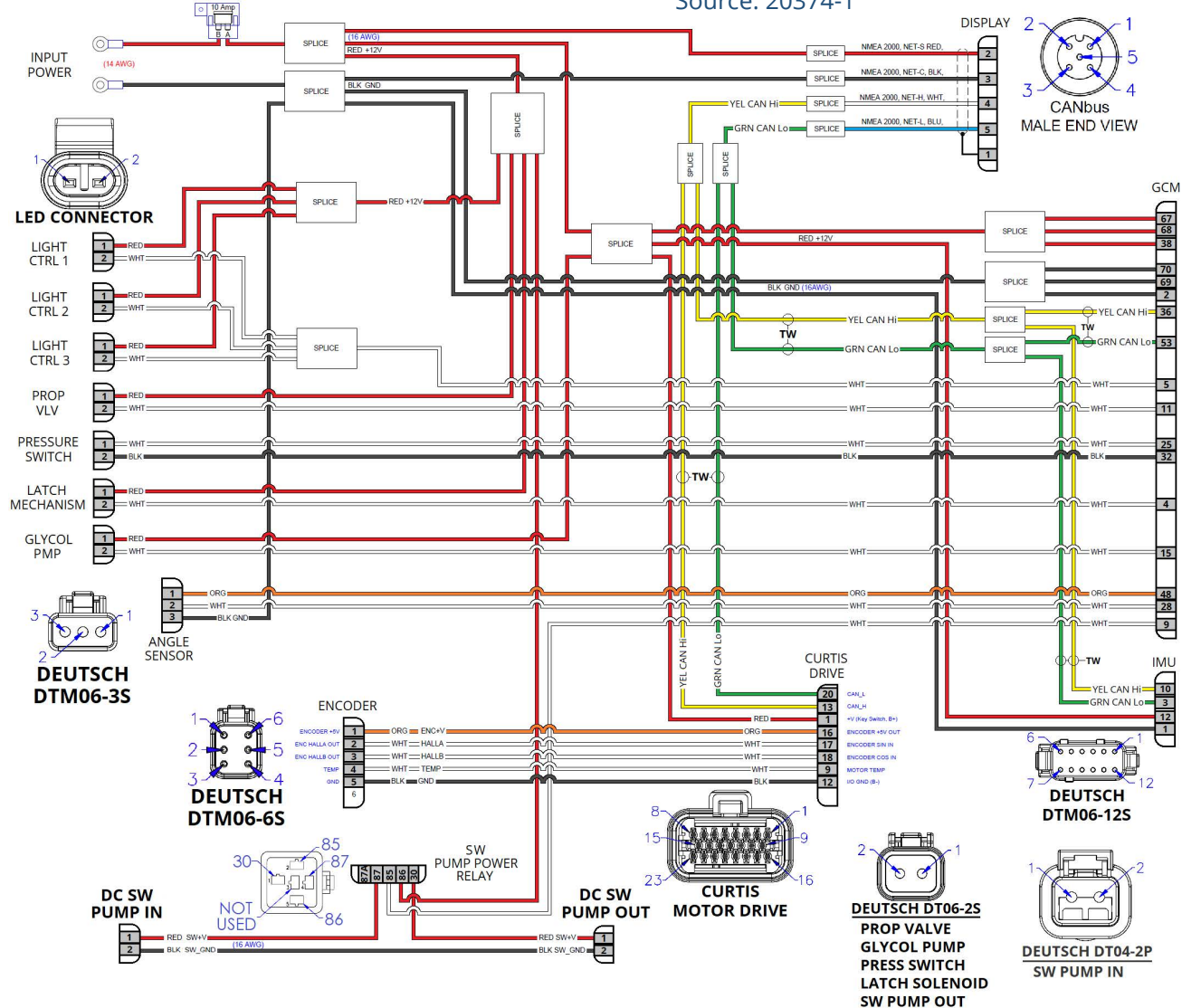


Seakeeper Series model simplified wire harness schematics are in numeric order by model number. One model line may have several iterations; note the serial range applicable for the model being serviced.

HARNESS CONNECTORS with associated pin numbers are available on [SB-90330](#)

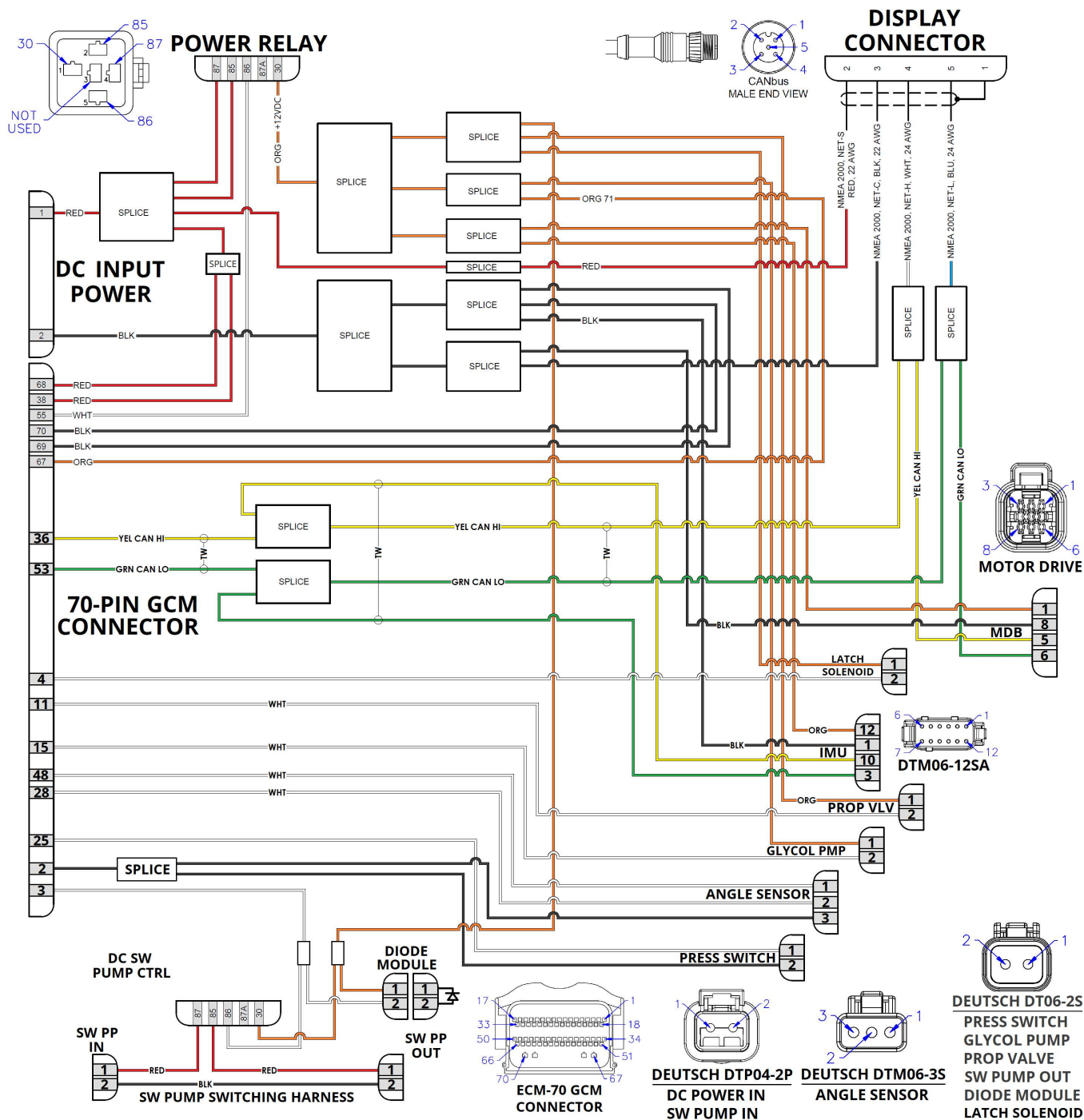
**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**SEAKEEPER 1**Seakeeper 1 (ALL MODELS)  
Source: 20374-1

|         |                         |
|---------|-------------------------|
| PRODUCT | SEAKEEPER 1, 4, AND 4.5 |
|---------|-------------------------|

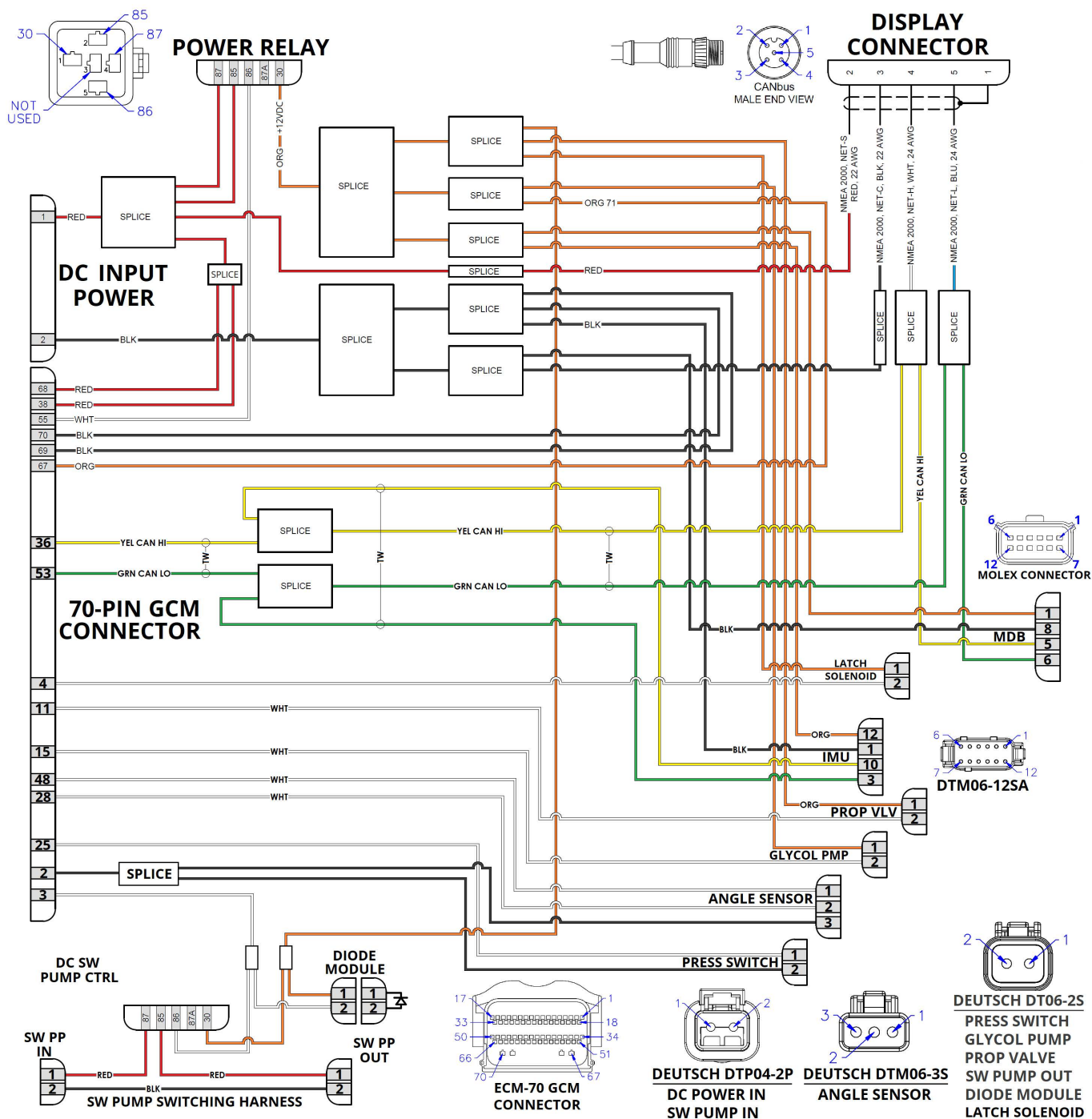
## SEAKEEPER 4





**SEAKEEPER TROUBLESHOOTING GUIDE- 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**SEAKEEPER 4.5**

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 1/19/50/55/56/106**

To troubleshoot and repair the

- "ANGLE SENSOR CALIBRATION REQUIRED" (Code 1)
- "ANGLE SENSOR FAULT – ACTIVE RANGE HIGH" (Code 19)
- "ANGLE SENSOR FAULT – ACTIVE RANGE LOW" (Code 55)
- "ANGLE SENSOR FAULT" (Code 50)
- "ANGLE SENSOR FAULT – UNRESPONSIVE" alarms (Code 56)
- "ANGLE SENSOR FAULT" (Code 106)

**BACKGROUND**

Continued operation with any of these codes may damage equipment or cause injury. **Power to the Seakeeper must be cycled to reset any of these alarms** (except Code 1).

The Angle Sensor Fault – Active Range High or Low (Codes 19 & 55) occurs if the angle sensor's output voltage signal goes higher or lower than expected. The expected voltage range is 0.5 to 4.5VDC between the angle sensor's signal output and ground. Less than 0.5VDC corresponds to an angle less than -60° (much further than physically possible by the enclosure). Likely causes are a loose or incorrectly mounted sensor, a Sensor Power High or Low alarm condition (Codes 44 & 45, respectively), an unplugged, damaged, or mis-wired sensor, or a wire harness issue from the controller to the sensor. A brake issue that causes the enclosure to hit the end stop may cause this fault (if it jars hard enough) but would also likely trigger motion/travel or pressure faults to indicate a brake issue.

If a Code 44 or 45 accompanies a Code 19 or 55, troubleshoot the sensor voltage per the Code 44/45 Troubleshooting Guide first. Correcting the sensor voltage issue should correct the Angle Sensor Fault – Active Range High or Low.

The Angle Sensor Fault [Out of Range] (Code 50) occurs when the gimbal angle sensor transmits a signal corresponding to greater than the specific model's programmed precession angle limit ( $\pm 59^\circ$  for Seakeeper 4 & 4.5). It could also mean a brake issue causing the Seakeeper to hit the end stops, which would throw other motion or brake low-pressure alarms.

The Angle Sensor Fault – Unresponsive alarm (Code 56) occurs when the sensor ground wire is opened in Seakeeper 1 and 4 models. The probable cause is an open line on the ground wire, either in the sensor leads or in the wire harness.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

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PRODUCT      SEAKEEPER 1, 4, AND 4.5



Code 1/19/50/55/56/106

Code 1 simply informs the operator that the Seakeeper programming detects the need for a simplified calibration procedure explained in SWI-108A. This software logic may not appear on models built before autumn 2023 unless the GCM software has been updated.

**REFERENCES**

Applicable Seakeeper Service Drawings on [Dealer Access](#)  
[SWI-108A - Seakeeper Angle Sensor Calibration instruction](#)

**PRECAUTIONS**

See [PRECAUTIONS](#) section of Introduction.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

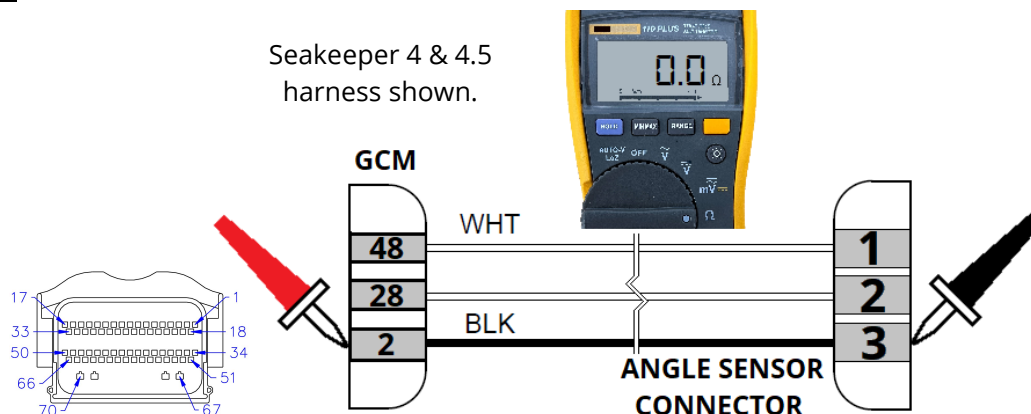
PRODUCT      SEAKEEPER 1, 4, AND 4.5



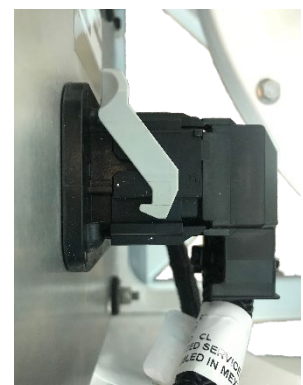
Code 1/19/50/55/56/106

**PROCEDURE**

1. **IF** Code 1,  
**THEN:**
  - a. **PERFORM** [SWI-108A, Seakeeper Angle Sensor Calibration](#).
  - b. **IF** angle sensor calibration fails to clear Code 1,  
**THEN PERFORM** [steps 19 through 21](#) to check wiring and connectors of angle sensor and wire harness.
2. **IF** Code 56,  
**THEN:**



- a. **TEST** resistance below  $0.3\Omega$  exists between pin **3** of sensor connector and GCM pin **2** on Seakeeper 4 and 4.5 (**DC Input Negative** for Seakeeper 1).
  - b. **IF** resistance test is UNSATISFACTORY,  
**THEN:**
    - i. **INSPECT** connectors for loose wires or crimps.
    - ii. **IF** connectors SATISFACTORY,  
**THEN REPLACE** harness.
  - c. **IF** resistance SATISFACTORY,  
**THEN UPDATE** ConnectBox software.
3. **VERIFY** angle sensor connector and GCM 70-pin connectors are made securely.
  4. **VERIFY** Seakeeper electrical connections made correctly and securely at angle sensor, manifold solenoids and manifold proportional valve.



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

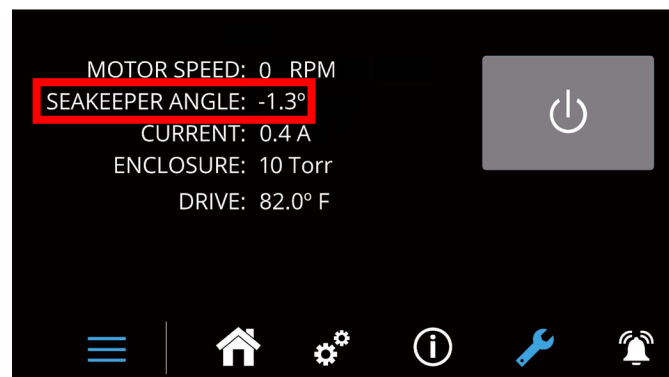
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 1/19/50/55/56/106

5. **VERIFY** angle sensor installation is flat against foundation and securely fastened.
6. **VERIFY** angle sensor mounted with silver manufacturer's label facing away from Seakeeper.
7. **VERIFY** angle sensor leads are at top of angle sensor.
8. **IF** installation or electrical connection issue is found,  
**THEN CORRECT** issue **AND PERFORM** angle sensor calibration per [SWI-108A](#), Seakeeper Angle Sensor Calibration instruction.
9. **ACTIVATE** brake override.



10. **MANUALLY PRECESS** enclosure fully one direction and then in opposite direction.
11. **NOTE** angle readings at full travel in each direction.



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 1/19/50/55/56/106

12. **IF** two angles are **NOT** in alignment per table below,  
**THEN PERFORM** gimbal angle sensor calibration per [SWI-108A](#), Seakeeper Angle Sensor Calibration instruction.

**NOTE:** The maximum angles displayed should be  $\pm 3.0^\circ$  from end stops. The two extremes (full forward and full aft) should be within  $1.0^\circ$  of each other, absolute value.

**For example,** Seakeeper 1 enclosure reads  $+60.1^\circ$  and  $-59.8^\circ$ . The two readings are within  $0.1^\circ$  and  $0.2^\circ$  from  $60^\circ$  and are  $0.3^\circ$  from each other, absolute (within  $1.0^\circ$  from each other); this angle sensor is in calibration.

| MODEL               | PRECESSION<br>RANGE ( $\pm$ ) |
|---------------------|-------------------------------|
| Seakeeper 1         | $60^\circ$                    |
| Seakeeper 4 and 4.5 | $60^\circ$                    |

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

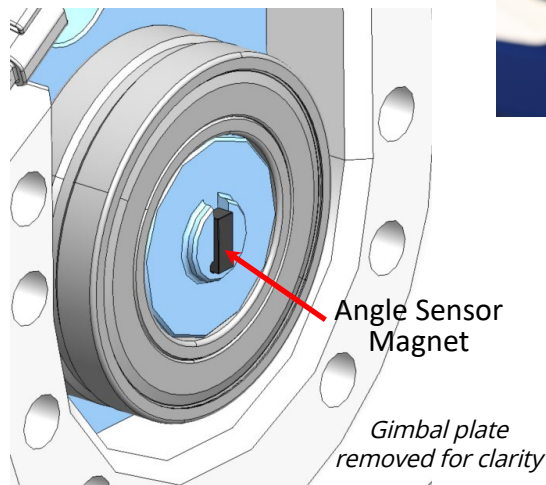
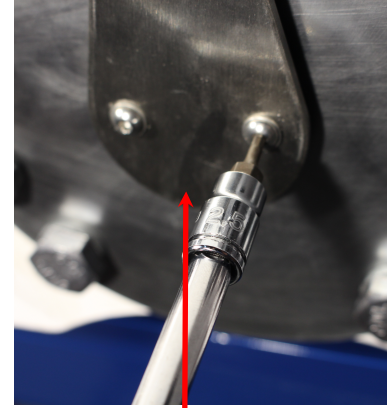
PRODUCT      SEAKEEPER 1, 4, AND 4.5



Code 1/19/50/55/56/106

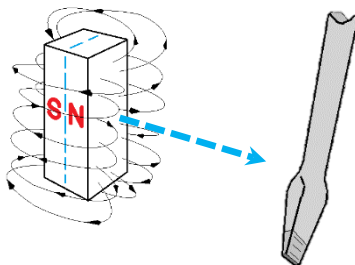
13. **IF** unable to calibrate angle sensor,  
**THEN:**

- a. **REMOVE** two screws holding angle sensor plate with 2.5 mm Allen hex.
- b. **ENSURE** magnet is unable to move by hand.
- c. **IF** magnet can be moved **AND** is still in shaft groove, **THEN RE-ATTACH** magnet with drop of 2-part epoxy.



Angle Sensor Plate

- d. **IF** magnet has come loose from shaft,  
**THEN PERFORM** following:
  - i. With screwdriver (or similar ferrous metal object), **DETERMINE** North pole of magnet by observing which face follows metal object. **NOTE:** Side that faces ferrous metal object is North pole of magnet.



North pole is attracted to screwdriver when near magnet.



An example of pole detection device in operation with magnet.

- ii. **MARK** north pole side of magnet with permanent marker.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5



Code 1/19/50/55/56/106

Step 13.d continued

- iii. **INSTALL** magnet into shaft with North facing **front** of model using small amount of two-part epoxy.
- iv. **REPEAT** step 12 to calibrate angle sensor.

**NOTE:**

Negative precession angle is precession of enclosure in forward direction.  
 Settings screen orientation button should indicate  
 blue arc on right side of button if Seakeeper facing aft.

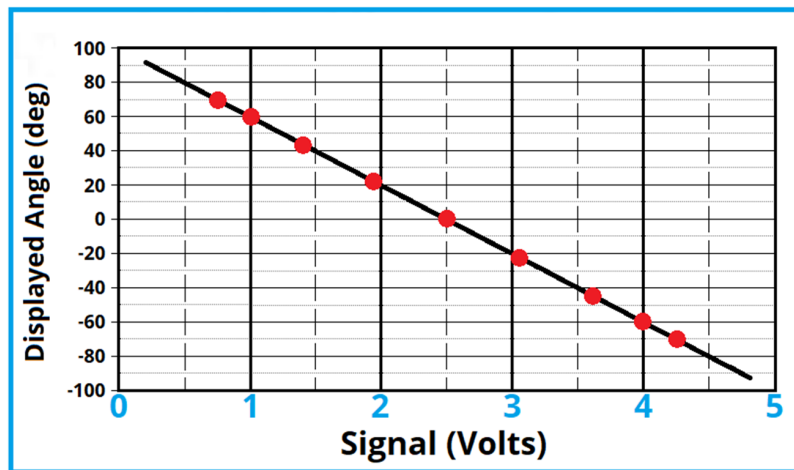
14. **PERFORM** following electrical checks of angle sensor:

- a. **CONNECT** angle sensor to wire harness.
- b. **ENSURE** low current DC power available to Seakeeper.
- c. **ENSURE** brake override activated.

**TYPICAL GIMBAL ANGLE SENSOR RESPONSE**

| Signal (volts) | Displayed Angle (deg) |
|----------------|-----------------------|
| 0.25           | 90                    |
| 0.75           | 70                    |
| 1              | 60                    |
| 1.375          | 45                    |
| 1.95           | 22                    |
| 2.5            | 0                     |
| 3.05           | -22                   |
| 3.625          | -45                   |
| 4              | -60                   |
| 4.25           | -70                   |
| 4.75           | -90                   |

deg/V -40.0  
 V/deg -0.025



From the graph, we can determine that:  
 $Angle = (-40) \times (signal\ voltage) + 100$



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5



Code 1/19/50/55/56/106

Step 14 continued

- d. With multimeter in DC Volts mode **AND** back-probe attachment, **MEASURE** voltage between pins **2** and **3** **WHILE MANUALLY PRECESSING** enclosure.
  - e. **COMPARE** voltages read at given angles, in table above, to graph.
  - f. **IF** voltages do not match graph at given angles, **THEN REPLACE** angle sensor.
15. **IF** angle sensor does not calibrate in Step 12, **THEN REPLACE** angle sensor.
    - a. After replacement of sensor, **CYCLE** low current DC power to Seakeeper.
    - b. **REPEAT** angle sensor calibration per [SWI-108A](#).
    - c. **CHECK** alarm clear.
  16. **ENSURE** GCM 70-pin connector is connected to GCM.
  17. **UNPLUG** angle sensor from harness.

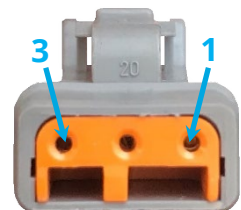


*Angle sensor  
harness  
connector with  
back probes  
installed*

**NOTE:**

Manipulate harness in manner to recreate slight movement during operation in event open is not seen when cable is stationary.

18. With multimeter in DC Volts mode, **MEASURE** for 5.0 VDC between pin **1** and **3** on wire harness angle sensor connector.
19. **REMOVE** low current DC power from Seakeeper.
20. **UNPLUG** GCM 70-pin connector.

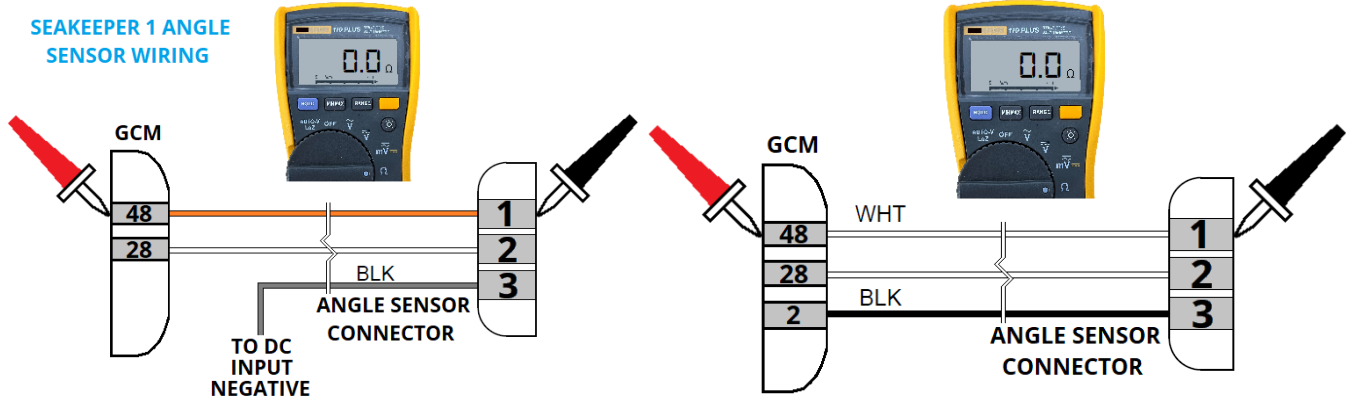


**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

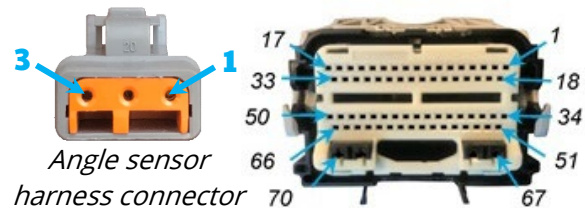
PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 1/19/50/55/56/106

21. With multimeter in Resistance mode, **MEASURE** resistance from angle sensor harness connector to GCM 70-pin connector as follows:



- a. **CONFIRM** resistance below  $0.3\Omega$  exists between pin **1** of sensor connector and GCM pin **48**.
- b. **CONFIRM** resistance below  $0.3\Omega$  exists between pin **2** of sensor connector and GCM pin **28**.
- c. **CONFIRM** resistance below  $0.3\Omega$  exists between pin **3** of sensor connector and GCM pin **2** on Seakeeper 4 and 4.5 (DC Input Negative for Seakeeper 1).
- d. **IF** any resistance test of Steps 21.a through 21.c showed resistance higher than 0.3 ohms,  
**THEN:**
  - i. **VERIFY** wires of GCM and angle sensor connectors are secure and NOT loose.
    1. **REPAIR** pins that have loose crimps.
  - ii. **IF** wires of connectors are satisfactory,  
**THEN REPLACE** wire harness.

**Angle Sensor GCM Pinout**

Pin 1: GCM Pin 48 +5VDC supply  
 Pin 2: GCM Pin 28 signal voltage  
 Pin 3: GCM Pin 2 (Seakeeper 4 and up)  
 DC Input Negative (Seakeeper 1)

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

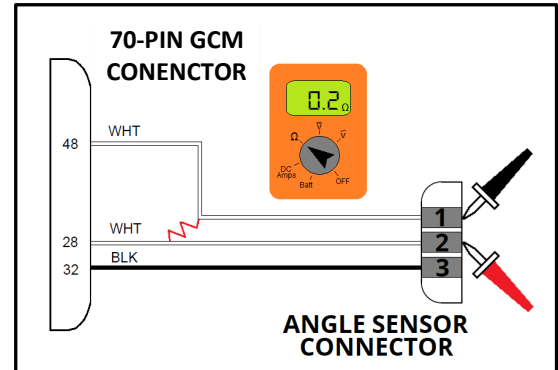
PRODUCT      SEAKEEPER 1, 4, AND 4.5



Code 1/19/50/55/56/106

Step 21 continued

- e. **MEASURE** resistance between each lead of angle sensor harness connector for low resistance (short) as follows:
- VERIFY** greater than  $1000\Omega$  between pin **1** and pin **2**.
  - VERIFY** greater than  $1000\Omega$  between pin **1** and pin **3**.
  - VERIFY** greater than  $1000\Omega$  between pin **2** and pin **3**.



- f. **IF** any test in Step 21.e did **not** show resistance greater than  $1000\Omega$  (short), **THEN REPLACE** wire harness.

22. **IF** 4.85 to 5.15 VDC is not seen between pins **1** and **3** in Step 18, **THEN REPLACE** GCM.

23. **IF** above steps have failed to identify cause of alarm(s), **THEN PERFORM** following:

- INSPECT** all brake cylinder rod end for potential backing-out of threads.
- IF** rod end clevis threads are visible, **THEN PERFORM** following:
  - REMOVE** rod end from clevis.
  - CLEAN** threads with wire brush.
  - APPLY** red thread locker on threads.
  - INSTALL** rod end into clevis.
  - PERFORM** sea trial to verify no alarms.

## SEAKEEPER TROUBLESHOOTING GUIDE - 206

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PRODUCT      SEAKEEPER 1, 4, AND 4.5



24. **IF** alarm persists,  
**THEN:**

- a. **RECORD** all readings (gimbal angles, resistances, voltages) taken during troubleshooting and photo of information screen.
- b. **SUBMIT** readings to Seakeeper Product Support Team at support@seakeeper.com.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CODE 32**

To troubleshoot and repair the "Vertical Acceleration High" alarm (Code 32).

**BACKGROUND**

Vertical acceleration is hard on the internal components of the Seakeeper enclosure. This fault is displayed when the Inertia Measurement Unit (IMU) detects vertical motion above +3g or below -1g to secure the Seakeeper and alert the operator.

The vertical acceleration is never anticipated to be as high as the level at which the code alarms; proper installation location in the hull should preclude a high vertical acceleration event, even in smaller craft. In service cases, the alarm is usually due to water intrusion, loose mounting bolts, loose electrical panels, or loose mounting of the IMU itself. In addition, anything that might create abnormal 'vertical' motion or vibration induced into or on the IMU may be at fault. For example, it may be erroneously caused by severe sea conditions or running the vessel fixed directly into the seas.

Finally, an internal fault in the IMU is also possible. In most service cases, the IMU is replaced. IMU replacements should be the same design as that removed; never replace a first-generation IMU with a second-generation IMU unless advised by a Seakeeper Product Support Team Representative.

**REFERENCES**

Applicable Seakeeper Service Drawings on Dealer Access

Applicable [Seakeeper Installation Manual](#), Mechanical Installation Section

**PRECAUTIONS**

See [PRECAUTIONS](#) section of Introduction.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

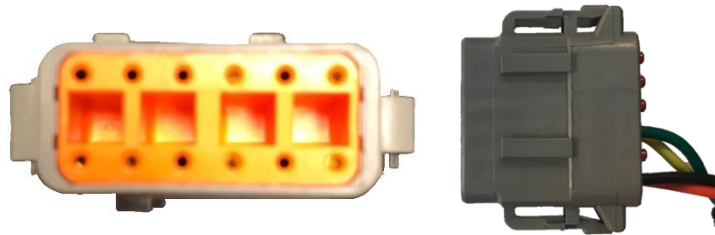
PRODUCT      SEAKEEPER 1, 4, AND 4.5



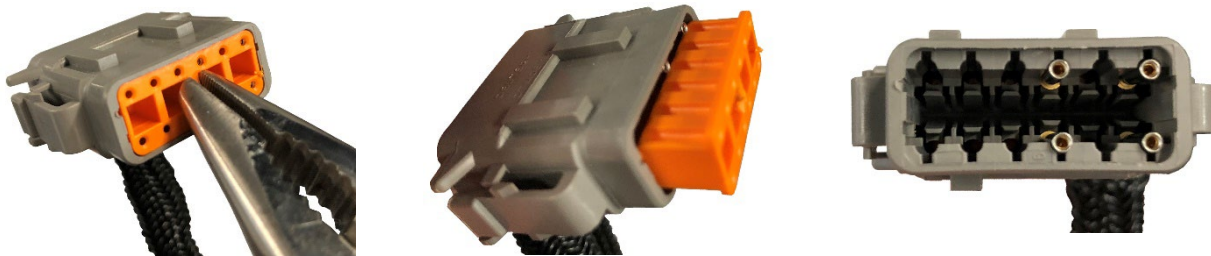
Code 32

**PROCEDURE**

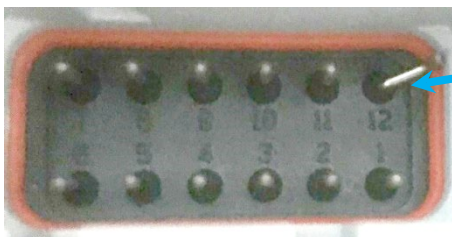
1. **DISCONNECT** wire harness connector at IMU.



2. **INSPECT** IMU connector for loose pins or crimps.



3. **IF** any loose wires or crimps found,  
**THEN REPAIR** IMU connector.
4. **IF** IMU found loose,  
**THEN FASTEN** IMU securely.



*This damaged IMU pin prevented proper seating of harness connector.*

*This damaged IMU housing allowed water intrusion.*



5. **IF** water intrusion found,  
**THEN INSPECT** other connectors (GCM 70-pin connector, MDB harness connector, etc.) of Seakeeper for water.
6. **IF** water intrusion found,  
**THEN REPLACE** wire harness.

## SEAKEEPER TROUBLESHOOTING GUIDE - 206

---

PRODUCT      SEAKEEPER 1, 4, AND 4.5



Code 32

7.    **ENSURE** torque specifications are met on Seakeeper mounting bolts **AND** Cylinder Braces (per [Torque Specifications](#)).
8.    **CYCLE** low current DC power to Seakeeper.
9.    **PERFORM** sea trial to ensure alarm does not return.

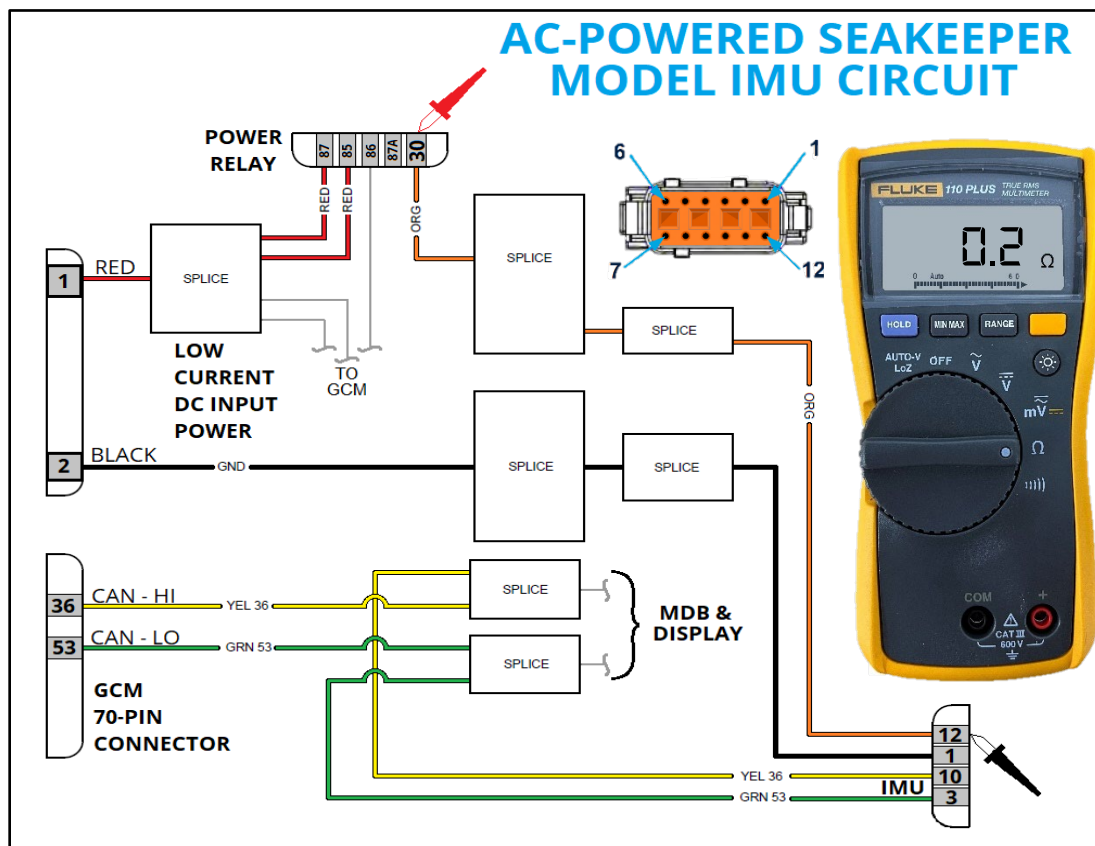
**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 32

**NOTE:**

- Manipulate harness in a manner to recreate slight movement during operation in event an open is not seen when cable is stationary.
- Disconnecting IMU, power relay, and GCM will produce alarms at display/MFD app.

10. **CHECK** resistances of wire harness as follows:

- a. **DISCONNECT** IMU, power relay (for AC-powered models), and GCM from wire harness.
- b. **TEST AND RECORD** AC-powered Seakeeper readings as follows:
  - i. **TEST** resistance below  $0.3\ \Omega$  from IMU pin **12** to power relay pin **30**.
  - ii. **TEST** resistance below  $0.3\ \Omega$  from IMU pin **1** to Low Current DC input connector pin **2**.
  - iii. **TEST** resistance below  $0.3\ \Omega$  from IMU pin **3** to GCM 70-pin connector pin **53**.
  - iv. **TEST** resistance below  $0.3\ \Omega$  from IMU pin **10** to GCM 70-pin connector pin **36**.



## SEAKEEPER TROUBLESHOOTING GUIDE - 206

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Code 32

Step 10.b continued

- v. **IF** any resistance test was UNSATISFACTORY,  
**THEN:**

1. **VERIFY** wires and crimps of GCM connector are secure.



2. **IF** wires and crimps secure,  
**THEN REPAIR/REPLACE** wire harness.

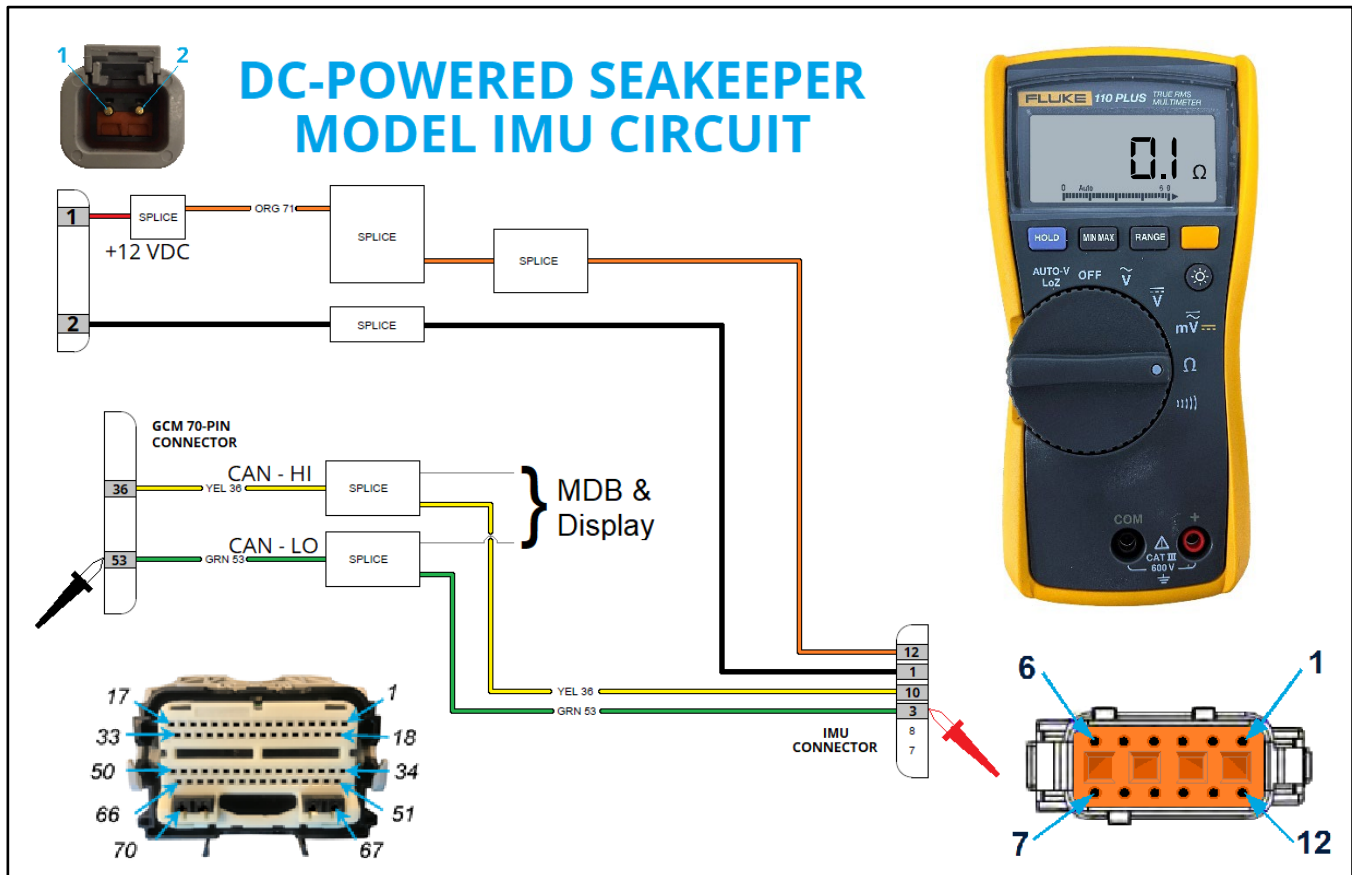
**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5



Code 32

Step 10 continued

c. **TEST AND RECORD** DC-powered Seakeeper readings as follows:

- TEST** resistance below 0.3  $\Omega$  from IMU pin 12 to Low Current DC Input pin 1.
- TEST** resistance below 0.3  $\Omega$  from IMU pin 1 to Low Current DC Input pin 2.
- TEST** resistance below 0.3  $\Omega$  from IMU pin 10 to GCM pin 36.
- TEST** resistance below 0.3  $\Omega$  from IMU pin 3 to GCM pin 53.
- IF** any resistance test was UNSATISFACTORY, **THEN:**
  - CONFIRM** wires and crimps of associated connectors secure.
  - REPAIR/REPLACE** wire harness.

## SEAKEEPER TROUBLESHOOTING GUIDE - 206

---

PRODUCT      SEAKEEPER 1, 4, AND 4.5



Code 32

11. **IF** alarm persists **AND** IMU was not replaced previously,  
**THEN REPLACE** IMU.
12. **IF** alarm does not clear,  
**THEN:**
  - a. **RECORD** all resistances taken during troubleshooting and photo of information screen.
  - b. **SUBMIT** all data to Seakeeper Product Support Team at [support@seakeeper.com](mailto:support@seakeeper.com).

**\*\*\*\*\* END \*\*\*\*\***

## SEAKEEPER TROUBLESHOOTING GUIDE - 206



PRODUCT      SEAKEEPER 1, 4, AND 4.5

### NOISE & VIBRATION



This guide is to diagnose the cause of noise, vibrations, or clunking in a Seakeeper. There is often no associated alarm code.

### BACKGROUND

Noise or vibration can result from different issues:

- loose mounting screws
- brake cylinder misalignment
- poor deck mounting installation on smaller craft
- isolation bushing deterioration on larger models
- GCM software issues
- faulted bearings
- motor issues

Certain noises from the Seakeeper have been identified as acceptable during certain operations; these noises may be only a temporary inconvenience for occupants during the spool-up and spool-down of the flywheel.

Because of the possibility of internal enclosure components causing noise and vibration, this guide may not provide a complete repair. Instead, it will guide the technician in isolating noise from the enclosure and how to document the noise for engineering analysis.

Noises from the enclosure during spool-up or spool-down can be linked to a phenomenon called 'cage rattle.' Cage rattle is sometimes emitted from the Seakeeper during spool up or coast down. Cage rattle typically occurs in various speed ranges as the Seakeeper is spooling up or coasting down. At normal operating speed, the cage rattle dissipates and is no longer noticeable. Therefore, the cage rattle does not indicate any imminent failure and is a normal occurrence that does not affect regular operation or performance.

### REFERENCES

[SWI-108A - Seakeeper Angle Sensor Calibration](#)

[SWI-209 - Seakeeper Brake Bushing Service](#)

[Seakeeper Installation Drawings](#)

### PRECAUTIONS

See [PRECAUTIONS](#) section of Introduction.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

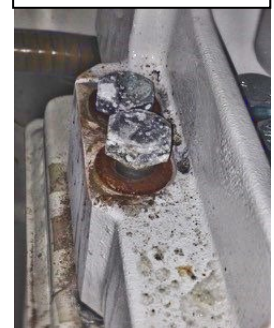


Noise &amp; Vibration

**PROCEDURE****SECTION 1: Source Identification**

1. **OBTAIN AND DOCUMENT** as much information about symptoms from owner/operator and/or observation:
  - a. **WHEN** does noise occur? During spool-up when unit is cold? After unlocking sphere? When rolling to starboard or port?
  - b. **WHAT** symptoms are present? High-pitched noise? Low-pitched noise through hull? Is it a clunking or slamming noise?
  - c. **WHERE** on Seakeeper does noise appear to originate?
2. **REVIEW** alarm history on display/MFD app. (Codes that correspond to noise may have been ignored if immediately reset.)
3. Based on interview with vessel personnel, **PROCEED** to appropriate section:
  - a. Vibrations in hull, **PROCEED** to [Section 2: Installation Issues](#).
  - b. Constant-pitched noises consistent with flywheel speed, **PROCEED** to [Section 3: Internal Enclosure Issues](#).
  - c. Definite slamming, banging, or clunking with precession, **PROCEED** to [Section 4: Slamming/Clunking/Banging](#).
4. **IF** no benefit of interview with vessel personnel, **THEN CONTINUE** in this section.
5. **ENSURE** flywheel at zero RPM, **AND DEENERGIZE** AC or High current DC power to Seakeeper.
6. **ACTIVATE** brake override **AND PERFORM** following inspections:
  - a. **LOOK** for corrosion around brake pins and trunnions.
    - i. **IF** corrosion found, **THEN PERFORM** brake bushing replacement per [SWI-209](#) **AND REPLACE** brake hardware (pins, retaining rings, and spacers).
  - b. **INSPECT** mounting fasteners for corrosion.
    - i. **IF** mounting fastener corrosion found, **THEN PROCEED** to [Section 2: Installation Issues](#).

*Corroded  
mounting bolts  
found loose.*



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Noise &amp; Vibration

7.    **DEACTIVATE** brake override.
8.    **DOCUMENT** data from information screen with photo.
9.    **START** Seakeeper:
  - a.    **MONITOR** spool-up for noises and note RPMs at which noise occurs.
  - b.    **IF** noises heard from enclosure,  
       **THEN PROCEED** to [Section 3: Enclosure Issues](#).
10.   **PERFORM** sea trial.
11.   From sea trial inspections, **PROCEED** to appropriate section listed in [Step 3](#).



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5



Noise &amp; Vibration

**SECTION 2: Installation Issues****NOTE:**

- Seakeeper Standard Warranty does not cover installation of a Seakeeper on a vessel, or design of any installation, including foundation.
- Correcting issues may involve lifting/removal of Seakeeper to correct stringer issues (glass, backing plates, etc.).

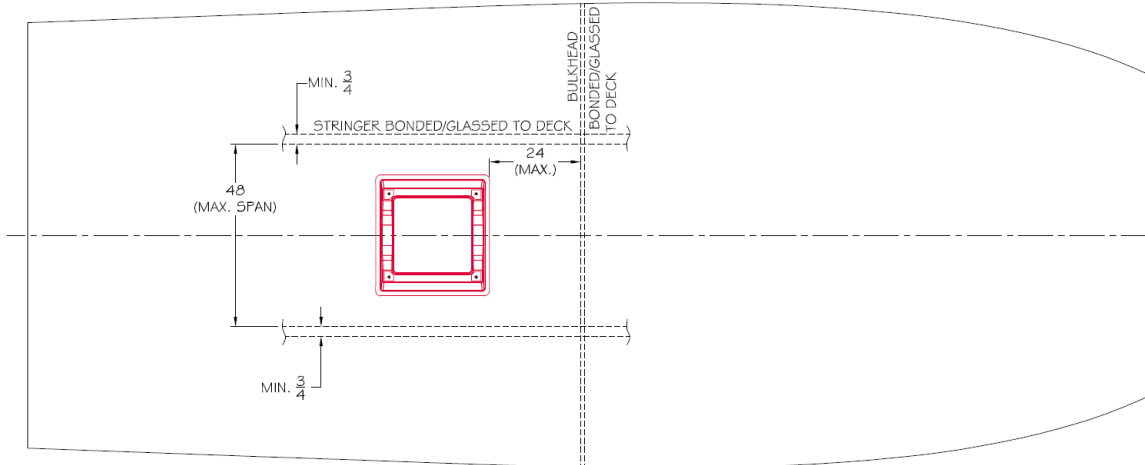
1. **INSPECT** mounting screws as follows:
  - a. **CHECK** torque of mounting screws per [Torque Specifications](#).
  - b. **IF** one or more mounting screws are loose or significantly corroded, **THEN:**
    - i. **REMOVE** a minimum of two mounting screws.
    - ii. **INSPECT** threads for damage/stripping.
      1. **IF** threads damaged, **THEN INSPECT** fastener length for sufficient thread engagement. [**NOTE:** Thread engagement should be 1.5X fastener diameter for blind hole installations.]
    - iii. **IF** thru-bolt installation, **THEN ENSURE** nut is captured when torquing. [**NOTE:** Thru-bolt thread engagement should be two threads beyond nut]
  - c. With bright flashlight, **INSPECT** threads of mounting holes of removed screws.
  - d. With aluminum tapping plates, for bolt-in installations, **ENSURE** helicoil or solidwall threaded insert is used at each fastener.
  - e. **CHECK** bolt threads for proper thread lubricant. [For flat or split-lock washers blue thread locker should be used. For wedge lock washers, nickel-based anti-seize should be used]
  - f. **IF** threaded inserts or tapping plate threads are satisfactory, **THEN REPLACE** removed mounting fasteners with new fasteners matching installed length and specification (diameter & thread pitch).
2. **TORQUE** all mounting fasteners to appropriate torque value.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

Noise &amp; Vibration

3. **IF** installation is leaning post or deck-mount and deck deflection observed,  
**THEN VERIFY** following:

**DECK INSTALLATION MINIMUM CONDITION (REFIT)**

(NOT TO SCALE)

- a. Table below outlines recommended maximum stringer spacing (deck panel size) and minimum deck build for a deck mount installation of Seakeepers. These specifications are recommendations and can vary with deck strength and panel size. Regardless of deck specifications, deck should be fully bonded or tabbed to stringers along entire length of panel and transverse bulkhead for deck mount installations with Polybond B39 (1000 psi) or equivalent adhesive.

| Seakeeper Model     | Longitudinal Stringer Spacing (in / mm) | Distance to Transverse Bulkhead (in / mm) | Deck Laminate & Core Specifications                                                 |
|---------------------|-----------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------|
| Seakeeper 1         | 40 / 1016                               | 17 / 432                                  | 1.5 OZ CSNM / E-LTM 1208 / 1.5 OZ CSM / DIVINYCELL H60 ¾" / 1.5 OZ CSM / E-BXM 1708 |
| Seakeeper 4 and 4.5 | 48 / 1220                               | 24 / 610                                  |                                                                                     |

4. **IF** verifications in Step 3 were unsatisfactory or deflection of deck observed,  
**THEN SUBMIT** findings and photos/videos to support@seakeeper.com for review.



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5



Noise &amp; Vibration

**SECTION 3: Internal Enclosure Issues**

Most enclosure issues cannot be field serviced. Matters within the enclosure will require replacement with a refurbished enclosure assembly. Before warranty replacement can be accomplished, video documentation of the noise for frequency analysis will be necessary. If the issue is determined to exist in bearings and the Seakeeper model is engineered for field-replaceable bearings, Seakeeper will contact a dealership with appropriate steps.

**CAGE RATTLE** – Cage rattle is sometimes emitted from the Seakeeper during spool up or coast down. Cage rattle typically occurs in various speed ranges as the Seakeeper is spooling up or coasting down. At normal operating speed, the 'cage rattle' dissipates and is no longer noticeable. Therefore, the cage rattle does not indicate any imminent failure and is a normal occurrence that does not affect regular operation or performance.

1. **IF** noise internal to sphere and still a concern,  
**THEN RECORD VIDEO** of Seakeeper with smartphone in following manner:
  - a. **MINIMIZE** background noise as much as possible (e.g., no talking, secure engines, and fans).  
(**NOTE:** If engines cannot be secured on sea trial, it is acceptable to wait until at pier.)
  - b. **ENSURE** Seakeeper at full RPM when recording video.
  - c. **POSITION** camera 1 yard (1 meter) from Seakeeper.
  - d. **MAINTAIN** camera focused on enclosure.
  - e. **RECORD** minimum of 30 seconds of noise.

**NOTE:****COMPRESSED VIDEO FILES CAN LOSE IMPORTANT AUDIO DATA.**

- f. **SAVE** recording **AND EMAIL** uncompressed video to support@seakeeper.com **OR POST** to DropBox for engineering analysis.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5



Noise &amp; Vibration

**SECTION 4: Slamming/Clunking/Banging**

Slamming/Clunking can be identified by erratic sphere precession. Sometimes, conditions cause the enclosure to knock hard against mechanical or cylinder end stops. Slamming/Clunking can create a harshness transmitted through the hull. The cause of such precession varies. Known causes will be covered.

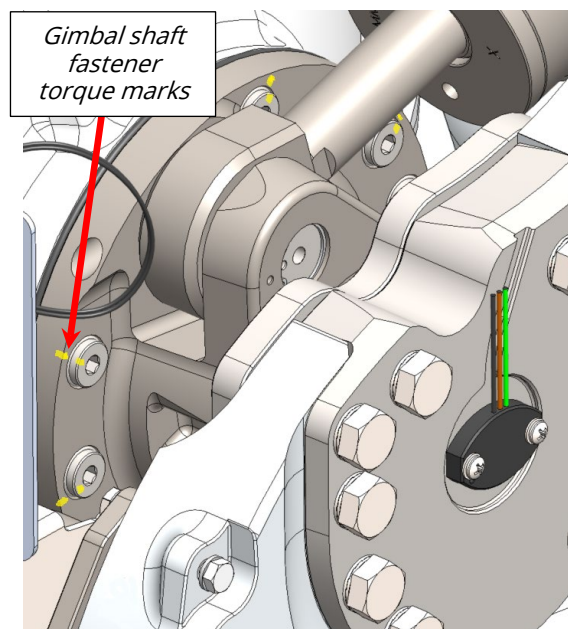
1. **ENSURE** all checks of Section 1 are complete.
2. **VERIFY** angle sensor calibration per [SWI-108A - Seakeeper Angle Sensor Calibration](#).
3. **INSPECT** brake cylinder rod ends at gimbals for threads showing at clevis.

- a. **IF** threads of rod end have backed out,  
**THEN REPLACE** affected brake cylinder(s).

4. **VERIFY** IMU mounted securely and in correct orientation per applicable model Electrical Sub-system drawing or Upper Foundation Assembly drawing on [Dealer Access](#).

5. **INSPECT** gimbal shaft mounting screw yellow torque marks are aligned.

- a. **IF** gimbal fasteners are loose or torque marks not aligned,  
**THEN CONTACT** Seakeeper Product Support Team at support@seakeeper.com with photos of gimbal shaft and Seakeeper installation in vessel for resolution.



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

Noise &amp; Vibration

PRODUCT      SEAKEEPER 1, 4, AND 4.5

6. **PERFORM** sea trial [using Seakeeper Service Tool app, if available].
7. **IF** slamming/clunking persists through sea trial,  
**THEN VIDEO** Seakeeper with smartphone in following manner:
  - a. **PERFORM** sea trial.
  - b. **MINIMIZE** background noise as much as possible.
  - c. **ENSURE** Seakeeper at full RPM and in SEA MODE when recording video.
  - d. **MAINTAIN** camera focused on enclosure.
  - e. **RECORD** minimum of 30 seconds of sphere precession.
  - f. **PHOTOGRAPH** display/MFD app Information screen of Seakeeper.

**NOTE:**

COMPRESSED VIDEO FILES CAN LOSE IMPORTANT AUDIO DATA.

- g. **SAVE** recording **AND EMAIL** uncompressed video, Service Tool data, and photo(s) to support@seakeeper.com for engineering analysis.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**CORROSION**

To provide guidance in diagnosing cause(s) and refurbishment of corrosion on Seakeeper models.

**BACKGROUND**

Corrosion is rarely the cause of a service call. Still, it can cause code alarms (loss of angle sensor operation, loss of brake pressure, banging from corroded mounting fasteners, or some electrical codes). Several factors can be at work in a case of heavy corrosion on a Seakeeper: environmental issues such as poor ventilation in the space, seawater spray during boating operations, galvanic problems, and chemical or mechanical disruption of painted surfaces that exposes susceptible metals.

Correcting environmental issues is beyond the scope of this guide. It will be up to the dealer technician and boat owner to correct the issues that caused the corrosion. Educate vessel operator of Seakeeper prescribed occasional freshwater rinse (SB-90106) as a vital part of corrosion prevention.

**REFERENCES**

[SB-90026 - Paint Touch-up](#)

[SB-90106 - Fresh Water Rinse](#)

[SWI-098 - Ground Connections Various Configurations](#)

Applicable model Installation Manual (See [manuals.seakeeper.com](http://manuals.seakeeper.com))

**PRECAUTIONS**

See [\*\*PRECAUTIONS\*\*](#) section of Introduction.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**PROCEDURE****SECTION 1: Inspection & Identification**

1. **ENSURE** flywheel at zero RPM at display/MFD app.
2. **OPEN/TURN OFF** AC or DC high current breaker to Seakeeper.
3. **INSPECT** Seakeeper for severity of corrosion.
  - a. **IF** necessary,  
**THEN ACTIVATE** brake override to manually precess enclosure.
  - b. **RECORD AND PHOTOGRAPH** corrosion found at critical components for submission with case service report.
    - i. Critical components are those whose failure would create a safety hazard for personnel near Seakeeper.
      1. Gimbal bearings, gimbal caps and shafts
      2. Brake cylinder rear clevises
      3. Brake cylinder rod end pins and clevises
  - c. **ASSESS** area ventilation/humidity where Seakeeper installed.
    - i. **IF** Seakeeper installed in engine compartment,  
**THEN ASSUME** ventilation is adequate due to regulatory compliance.
    - ii. **IF** Seakeeper installed in a lazarette or other dropdown space,  
**THEN ENSURE** natural ventilation is available, at a minimum.
    - iii. **IF** mildew or lack of ventilation exists in space,  
**THEN INFORM** vessel operator of ventilation appliances available for space.



*Seakeeper with severe corrosion at rod end clevises, pins, and gimbal shafts*

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

Corrosion

PRODUCT SEAKEEPER 1, 4, AND 4.5

Section 1, Step 3 continued

- d. **EVALUATE** source of any liquids seen, or evidence of, dripping onto Seakeeper.
  - i. **INSPECT** overhead hatch seals for deterioration.
  - ii. **INSPECT** overhead pipes for condensation or leakage.
  - iii. **INSPECT** space for high bilge levels.
- e. **INSPECT** for evidence of submersion on Seakeeper.



- 4. **INSPECT** electrical connections of wire harness for corrosion and moisture intrusion.
- 5. **REMOVE** angle sensor mounting plates **AND CHECK** for excessive corrosion on gimbal shaft.
- 6. **VERIFY** following ground cable ends are securely fastened:
  - a. Heat exchanger to foundation ground.
  - b. Motor drive to frame/foundation ground.
  - c. AC-powered models enclosure to foundation ground.
  - d. Foundation to vessel negative ground or bonding system.
- 7. **IF** DC-powered model,  
**THEN VERIFY** motor drive terminals not corroded.
  - a. **IF** corrosion found,  
**THEN CLEAN** terminals and cable ends **AND APPLY** dielectric grease to terminal fasteners and cable ends.



**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

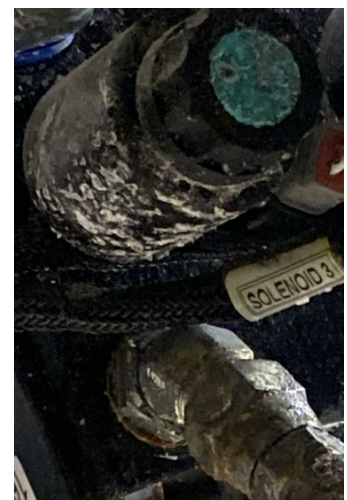


Corrosion

**SECTION 2: Restoration**

In severe cases of corrosion, such as when a unit has been submerged, it will be necessary to replace the Seakeeper. Additionally, if severe corrosion is due to environmental issues in the space, the Seakeeper may require removal for a complete restoration in a shop area. Reinstallation should always follow guidelines outlined in the applicable model's Installation Manual. Installation manuals can be found at [manuals.seakeeper.com](http://manuals.seakeeper.com).

1. **ENSURE** flywheel at zero RPM at display/MFD app.
2. **DEENERGIZE** all power to Seakeeper.
3. **REMOVE** top cover panels from Seakeeper.
4. **REPLACE** components that are corroded beyond reasonable restoration.
  - a. **IF** multiple components corroded beyond restoration, **THEN CONTACT** Seakeeper Product Support Team at [support@seakeeper.com](mailto:support@seakeeper.com) to consider other options.
  - b. **IF** brake pin hardware is corroded (pin retaining rings) or severe corrosion around brake pins, **THEN REPLACE** brake pin hardware and all bushings per [SWI-209](#).
  - c. **IF** indication of corrosion at an AC-powered Seakeeper Motor Drive, **THEN REMOVE** Motor Drive cover **AND INSPECT** drive internal surfaces.
    - i. **IF** any evidence of corrosion or moisture intrusion present, **THEN REPLACE** motor drive per [SWI-094](#).
  - d. **IF** electronic components discovered with severe corrosion, **THEN REPLACE** affected components, as needed.
  - e. **REPLACE** other components with excessive corrosion as necessary.





**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

Corrosion

PRODUCT      SEAKEEPER 1, 4, AND 4.5

5. **IF** corrosion excessive at gimbal bearings,  
**THEN REMOVE** gimbal angle mounting plate **AND INSPECT** ends of gimbal shaft for corrosion at sensor magnet.
6. **REMOVE** as much rust possible with wire brush and scraper at affected areas.
7. **CLEAN** Seakeeper surfaces and electrical connectors
8. **SAND** surfaces to be painted with 220 grit sandpaper.
9. Using lint-free rags and acetone, **CLEAN** all surfaces to be painted.
10. Once all surfaces clean, **APPLY** mixture of Awlgrip® S9001 primer and Awlgrip® S3001 converter to exposed metal surfaces.
11. **WHEN** primer has dried,  
**THEN APPLY** approved topcoat mixture:
 

|                                                   |                                                                           |
|---------------------------------------------------|---------------------------------------------------------------------------|
| <b>TOPCOAT:</b> Awlgrip® F8063 (Snow white)       | <b>TOPCOAT:</b> Alexseal® Topcoat 501 (snow white GL)<br>(P/N: AYCT9134G) |
| <b>CATALYST:</b> Awlgrip® Topcoat Converter G3010 | <b>CATALYST:</b> Alexseal® Topcoat Converter spray GL<br>(P/N: AYCC5051G) |
12. **ENSURE** all Seakeeper grounds are secured per [SWI-098](#).
13. **EDUCATE** vessel operator of benefits of freshwater rinse per [SB-90106](#).

\*\*\*\*\* **END** \*\*\*\*\*



## PERFORMANCE ISSUES



To address issues associated with an installed Seakeeper configuration's inability to meet roll reduction expectations based on Performance Prediction (PP) Report or customer expectations in a representative sea condition and corresponding uncontrolled roll angle.

## BACKGROUND

Troubleshooting for all performance-related issues should start with reviewing a PP Report for the vessel in question and confirming that the vessel characteristics accurately reflect the complete load condition for the boat. The PP Report will estimate the expected performance for various Seakeeper configurations based on uncontrolled angle, which must meet a minimum criterion for Coastal or Offshore performance standards per the report. For example, for Coastal Operation, Seakeeper recommends 80% roll reduction at 10 deg of uncontrolled roll with a minimum of 80% roll reduction at 6 deg. For Offshore Operation, the recommended roll reduction is 80% at 15° of uncontrolled roll with a minimum of 80% at 10 deg. Uncontrolled roll motion is a function of the vessel's sea state and resonant roll period.

Each report will have a Recommended Configuration and might provide additional configurations between the minimum and recommended performance levels. Customer expectations should be set based on the PP Report results for the installed Seakeeper configuration.

When the Seakeeper configuration is below the recommended level, the roll reduction will be adversely affected and reduced as the sea state (uncontrolled roll angle) increases. Seakeeper encourages all installers to select a configuration that meets or exceeds our recommendation for a vessel's operating profile. These recommendations may be ignored for several reasons: economy, space availability, weight allowance, or an owner's acceptance of lowered roll-reduction performance.

In instances where the installed configuration meets or exceeds the Seakeeper recommendation per PP Report, the vessel characteristics should be confirmed for accuracy, as the report is only as good as the information provided. If vessel specifications are confirmed to be accurate, performance issues could be caused by numerous factors. There could be an issue with the Seakeeper electronics or software, such as how the GCM software interprets the IMU input or what data the IMU transmits to the GCM could be at fault.

A Seakeeper unit may have installation issues, be inappropriately connected to an NMEA network, or may have had vessel modifications that changed the original vessel configuration.

## SEAKEEPER TROUBLESHOOTING GUIDE - 206

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PRODUCT      SEAKEEPER 1, 4, AND 4.5



### REFERENCES

[Sea Trial App Users Guide](#)

[SWI-118 - Seakeeper Service Tool App User Guide](#)

Applicable model Electrical Sub-system or Upper Foundation Assembly drawing on  
[Dealer Access](#)

### PRECAUTIONS

See [PRECAUTIONS](#) section of Introduction.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**PROCEDURE**

1. **INTERVIEW AND RECORD** vessel owner/captain responses to following questions:

**NOTE:**

Addition of 10% of vessel weight can adversely affect performance.

- a. Were any modifications made to vessel before performance issue noted? If so, what modifications were performed?  
(i.e., add weight, changes to primary machinery, or hull modifications)  
\_\_\_\_\_
  - b. Was vessel recently purchased? If so, was it new?  
\_\_\_\_\_  
If new: Make: \_\_\_\_\_, Model: \_\_\_\_\_
  - c. When did performance first appear degraded? What else changed at that time?  
\_\_\_\_\_
  - d. What sea and operating conditions were experienced when performance first appeared degraded?  
\_\_\_\_\_
  - e. Was flywheel at target RPM when performance seen degraded? \_\_\_\_\_
2. **CALCULATE** boat Seakeeper sizing using Small Boat Sizing Guide or Sizing Program to create a PP Report. Contact Sales Rep for published reports on OEM Seakeeper installations.
  3. **OPEN/TURN OFF** AC or high current DC power breaker.
  4. **ENSURE** flywheel at zero RPM at display/MFD app.

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

Performance

PRODUCT SEAKEEPER 1, 4, AND 4.5

5. **INSPECT** Seakeeper:

- a. **REVIEW AND PHOTO** alarm history at display/MFD app.
  - i. **ADDRESS** motion-related alarm codes per applicable troubleshooting guide (Codes 19, 37, 38, 39, 50, 55, 56, 72, 76, 78, 111, or 115).
- b. **REVIEW AND PHOTO** display information screen.
- c. **CHECK** for proper mounting screw torques per [Torque Specifications](#) section.
- d. **ENSURE** IMU mounted securely to panel by two bolts and nuts.
- e. **ENSURE** IMU housing is intact and no cracks present.
- f. **ENSURE** panel to which IMU mounted is securely fastened to foundation.
- g. **ENSURE** IMU mounted in correct orientation per applicable model Electrical Subsystem drawing.



6. At ConnectBox, **ENSURE** NMEA2000 connection at correct location.



*ConnectBox requires a SOG signal from NMEA network*

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5



Performance

7. **PERFORM** sea trial:
  - a. **SET-UP** Seakeeper Service Tool app to run data log for sea trial per SWI-118 if available.
  - b. **IF** dealership does not have Seakeeper Service Tool app,  
**THEN RUN** Seakeeper Sea Trial App on a smartphone during sea trial.
    - i. Seakeeper Sea Trial App is available on [Apple App](#) or [Google Play](#) stores.
    - ii. **USE** Seakeeper [Sea Trial App Users Guide](#) for installation and use of app.
  - c. **COMPLETE** sea trial recordings, 10 min. with Seakeeper(s) unlocked (on) and 10 min. with Seakeeper(s) locked (off).
  - d. **SUBMIT** Sea Trial Report by linking recordings and completing required information in app.
  - e. **EVALUATE** Seakeeper performance based on app results.
  - f. **OBSERVE** sphere enclosure precession while in Sea Mode.
    - i. **IF** precession is abnormal (erratic or enclosure remains to one side),  
**THEN VIDEO RECORD** Seakeeper while precessing.
8. **IF** issue not found or assistance needed,  
**THEN SUBMIT** all images, recordings, data log file(s), and interview responses to Seakeeper Product Support Team at support@seakeeper.com for review.

**\*\*\*\*\* END \*\*\*\*\***

**SEAKEEPER TROUBLESHOOTING GUIDE - 206**

PRODUCT      SEAKEEPER 1, 4, AND 4.5

**TORQUE SPECIFICATIONS**

| <b>TORQUE SPECIFICATIONS</b> |                            |                            |                            |                              |                            |                            |                                                           |
|------------------------------|----------------------------|----------------------------|----------------------------|------------------------------|----------------------------|----------------------------|-----------------------------------------------------------|
| Seakeeper Model              | Gimbal Bearing Caps        | Gimbal Shafts              | Trunnion Plates            | Mounting Screws <sup>1</sup> | Water Jackets              | Bump Stop Screws           | Motor Drive                                               |
|                              | ft-lbs (Nm)<br>Socket Size | ft-lbs (Nm)<br>Socket Size | ft-lbs (Nm)<br>Socket Size | ft-lbs (Nm)<br>Socket Size   | in-lbs (Nm)<br>Socket Size | ft-lbs (Nm)<br>Socket Size | in-lbs (Nm)                                               |
| 1                            | 40 (54)<br>17 mm           | 40 (54)<br>6 mm Allen      | 40 (54)<br>17 mm           | 115 (156)<br>22 mm           | 240 (27)<br>10 mm          | N/A                        | All Terminals<br>90 (10.2)                                |
| 4                            | 80 (108)<br>19 mm          | 50 (68)<br>8 mm Allen      | 40 (54)<br>17 mm           | 155 (210)<br>24 mm           | 72 (8)<br>10 mm            | 80 (108)<br>19 mm          | Battery Terminal<br>97 (11)<br>Motor Terminal<br>29 (3.3) |
| 4.5                          | 80 (108)<br>19 mm          | 50 (68)<br>8 mm Allen      | 40 (54)<br>17 mm           | 155 (210)<br>24 mm           | 72 (8)<br>10 mm            | 80 (108)<br>19 mm          | Cover Screws<br>19 (2.2)                                  |