



DPS Troubleshooting Guide

Evinrude® E-TEC® G2

Dynamic Power Steering (DPS)



CALIFORNIA PROPOSITION 65 WARNING

WARNING

This product contains or emits chemicals known to the state of California to cause cancer and birth defects or other reproductive harm.

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Hydraulic Steering Fluid
P/N 770891
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DPS System Overview

The Dynamic Power Steering (DPS) system is integrated into the midsection of the specific Evinrude® E-TEC® G2® models. Boats that are rigged with the DPS system deliver superior handling and more control in tight turns and large bodies of water.

Older designs of hydraulic steering used a separate hydraulic cylinder mounted to the front of the outboard.

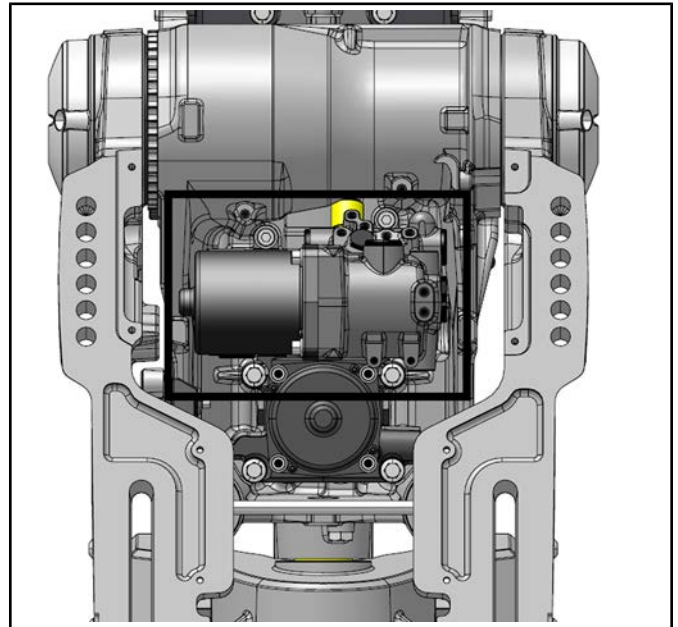
The DPS system was developed from a ground up initiative. It is its own unique design with 3 levels of adjustment.

The DPS system simplifies rigging in the boat as well as opens up space within the boat for the customer's unique needs.



All Evinrude® E-TEC® G2® models have fully Integrated Hydraulic Steering (IHS).

The DPS system is a model specific feature on G2 engines.

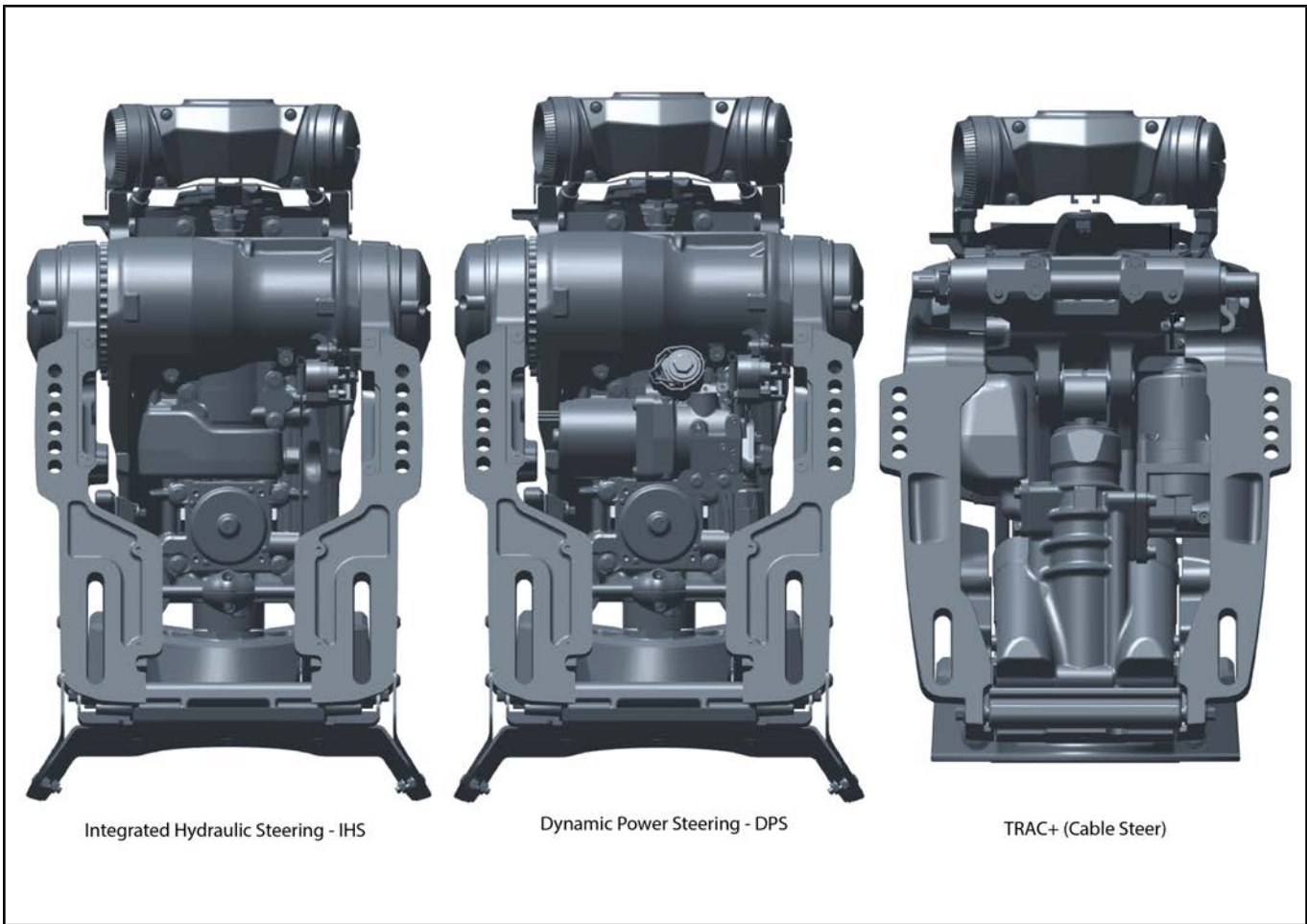


It is the duty of the technician to identify a DPS model prior to servicing. A DPS model will have the DPS pump included in the stern and swivel assembly as shown.

In the case of multiple outboard installations, be sure to reference the ***Installation Predelivery Guide*** for your exact model outboards and situation.

Midsection Identification

This is to identify what style midsection you are about to work on.



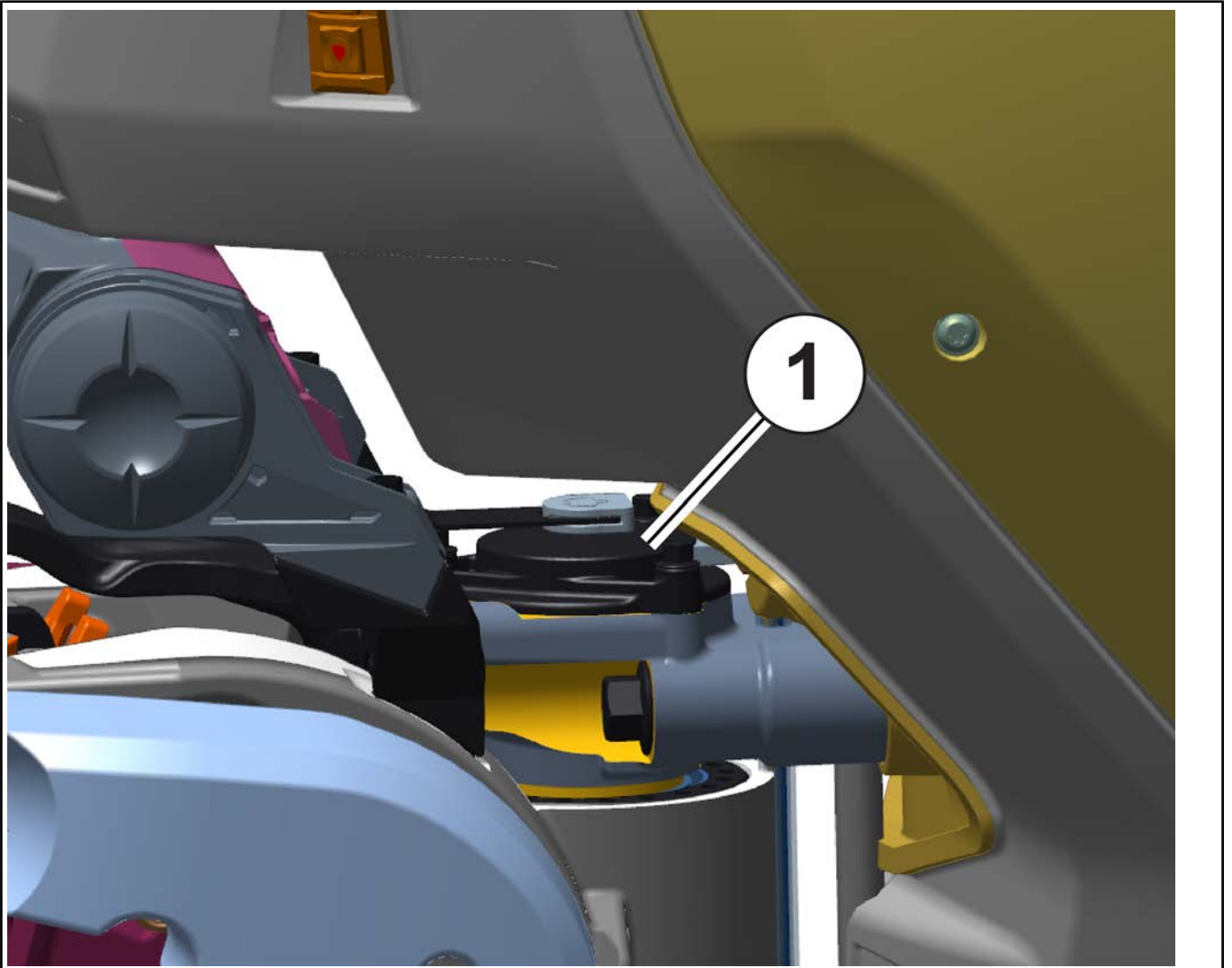
System Identification view of midsection

DPS Version Identification

There are two ways to identify whether the DPS system is a DPS1 or a DPS2.

The easiest and quickest option is to visually inspect if the system is using a steering position sensor.

If the system is utilizing a steering position sensor then the system is a DPS2. DPS1 does NOT use a steering position sensor.



1. Steering Position Sensor

The second option for checking the DPS version is to connect the engine to *EvDiag6* and check for the steering position sensor.

Notes

Technician's Notes

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Related Documents

Bulletins

[illegible]

Instruction Sheets

[illegible]

Other

[illegible]

Dynamic Power Steering (DPS)

2

Dynamic Power Steering (DPS) - Theory of Operation

Description of how the Dynamic Power Steering (DPS) system operates.

The Dynamic Power Steering (DPS) system is an optionally ordered, integrated system within the stern and swivel assembly. The system uses hydraulic pressure, a control module, a pump assembly, and sensors to control the system. The system simplifies rigging (by allowing a single rigging entry-point), and allows for better space allocation within the boat. The system can be tailored to individual needs with three levels of adjustment. All power steering assist levels offer the same rate of assistance at engine speeds below 4500 RPM. As the engine RPM increases above 4500 RPM, assist levels progressively decrease according to the individuals setting. The factory default assist level is "Minimum". The assist level can be adjusted using the *Evinrude® ICON-Touch* or *ICON CS* digital display to change the power steering assist level to "Medium" or "Maximum".

WARNING

Selection of power steering assist level is a matter of operator preference. Be aware that changing the power steering assist level can affect boat handling. After changing the level of power steering assist, operate the boat with care to become familiar with any changes in boat handling characteristics.

If your boat is not equipped with an *ICON™* digital display, you must use *EvDiag6* software to change the power steering assist level.

Module Power and Ground

DPS module power

- The DPS module power is supplied by the power lead which fastens to the rear of the positive battery stud in the top frame.

DPS module ground

- The DPS module ground is supplied by the individual lead which secures to the port side of the engine block. All grounds should have good continuity to one another (less than 1 ohm resistance)

Turning the DPS module ON

- Upon EMM power up: The switched 12V supplied on the Purple/White wire in the DPS module to the EMM connector.
- 5V is supplied to both the pressure sensors, and the steering position sensor on the Red wires.

Dynamic Power Steering (DPS)

Dynamic Power Steering (DPS) - Theory of Operation

DPS-2 Circuits

DPS Motor Power and Ground

- 12 volt (battery voltage) is supplied to module through the 3-pin (round black) DPS Motor connector from the back of the positive battery cable stud at the front of the engine. DPS module controls the output of this voltage to the DPS motor while also stepping up the current.
- DPS Motor ground is supplied from the module to the cylinder block.

DPS Motor Power and Ground

- Key on power is supplied to the DPS module via purple/white wire at pin # 3 of the flat 4-pin connector at DPS module.
- DPS module ground is supplied via black wire at pin # 4 of the flat 4-pin connector at DPS module.

DPS Module Communication to EMM

- The module communicates faults and DPS data to the EMM via the two CAN wires (orange/black and brown/orange) at pin #s 1 and 2 of the flat 4-pin connector at DPS module.

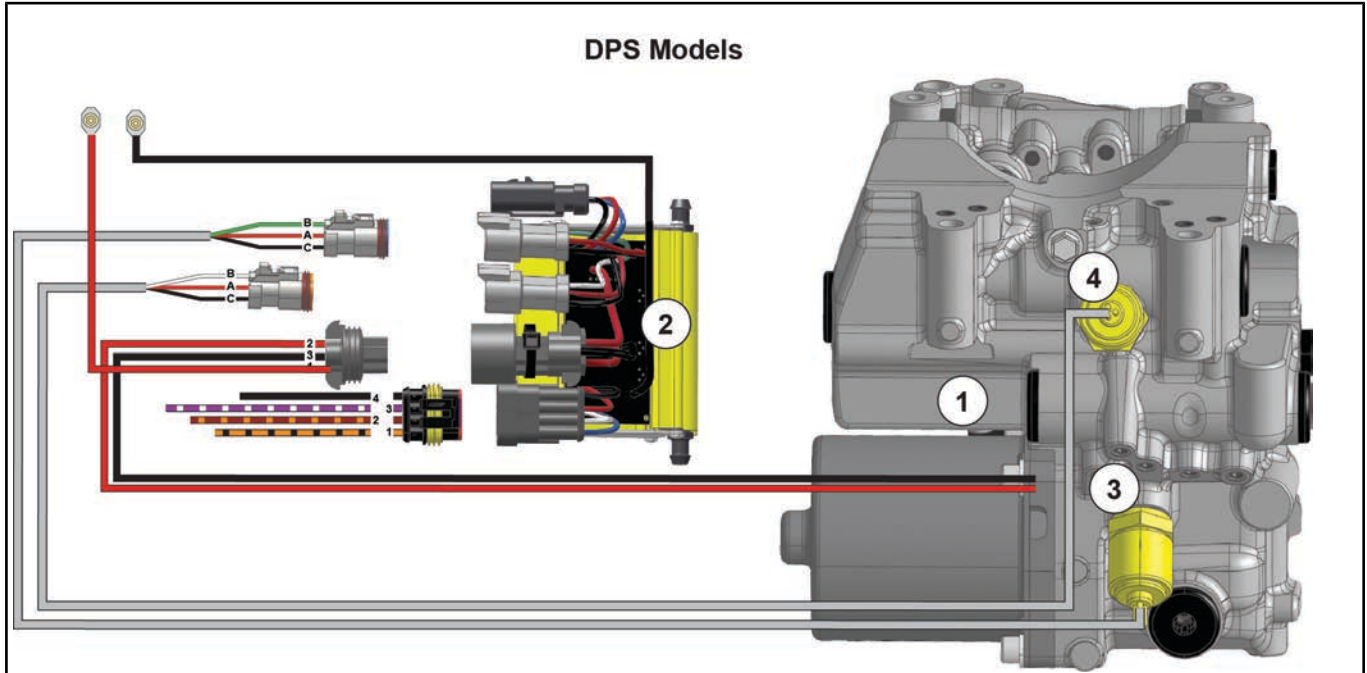
External DPS Sensors (PORT/STARBOARD Pressure and Steering Angle)

- Analog sensors use 5v power supplied by DPS Module (red wire)
- DPS Module also contains the ground circuit for these sensors (black wire)
- Signal wire color is unique to each sensor – green = starboard, white = port, blue = steering position. The module reads and interprets the voltage returning on these signal wires as inputs.

Dynamic Power Steering (DPS-1) - "Early Production"

200 HO - 300 HP V6 74° "ABA Models"

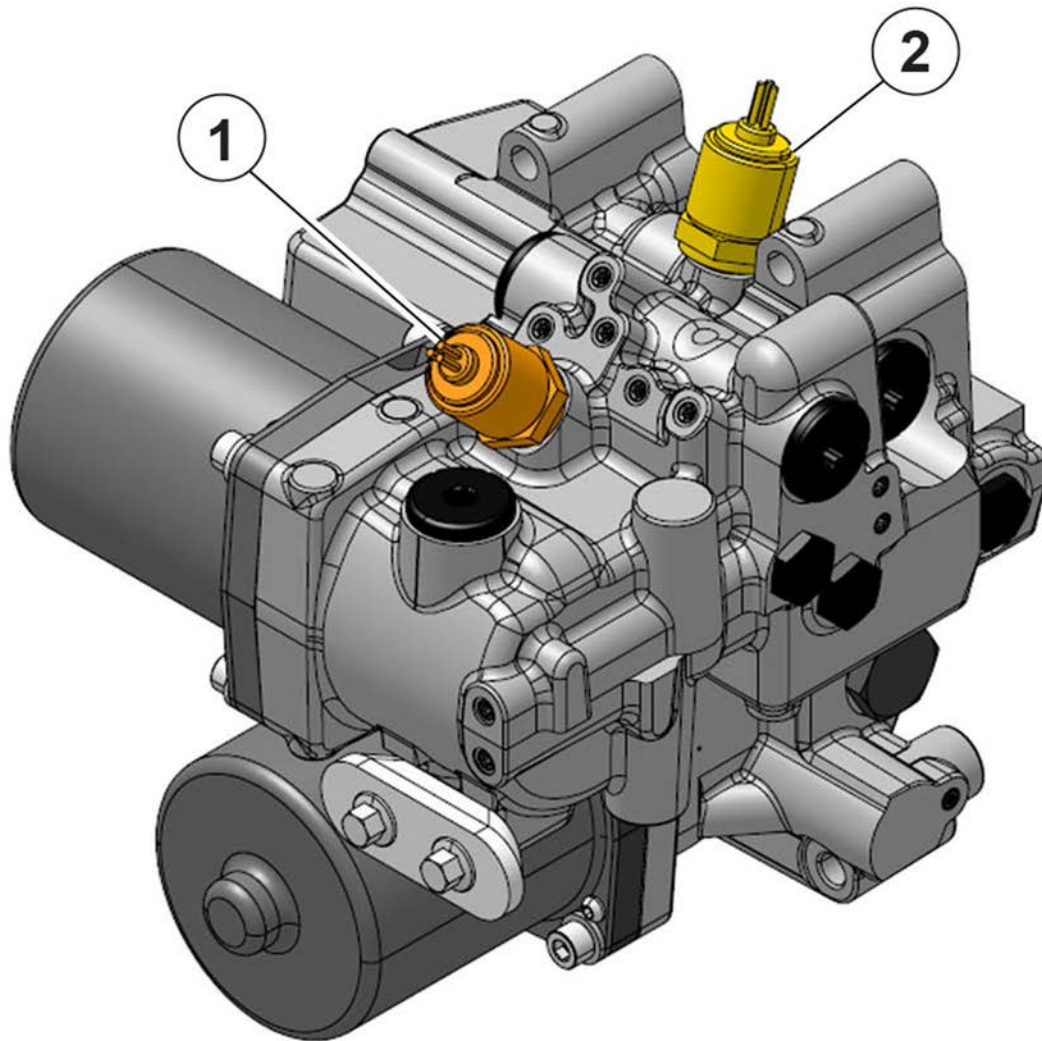
The first DPS system was introduced with the 3.4L 74° V6 "ABA" models. The system is controlled by helm pressure and helm pressure sensors. Hydraulic fluid supplied by the helm, shifts the shuttle in the manifold. Once the helm supply pressure reaches 12psi (83 kPa), the motor/pump turns ON. The system follows a "map" that relates the helm pressure and how much assist is provided by the DPS system (Pulse-Width Modulation (PWM) control of the motor not just an on or off). At the end of the stroke, the pressure in the steering cylinder rises very quickly. The pump pressure sensor detects the rise in pressure and turns the pump OFF. The DPS-1 system uses one 500psi (3447 kPa) helm pressure sensor and one 2000 psi (13790 kPa) pump pressure sensor.



1. DPS Pump Assembly
2. DPS Control Module
3. Pump Pressure Sensor
4. Helm Pressure Sensor

Dynamic Power Steering (DPS)

Dynamic Power Steering (DPS) - Theory of Operation



DPS1 is not compatible with Ultraflex SVS or SeaStar Pro Series helms

1. Pump PSI Sensor
2. Helm PSI Sensor

Dynamic Power Steering (DPS-2) - “Current Production”

150 HP - 200 HP V6 66° ALL / 200 HO - 300 HP V6 74° “AFA Models”

The current Dynamic Power Steering (DPS-2) system was introduced with the “AFA” models. The system is controlled by port helm pressure, starboard helm pressure, and steering position. When the difference between the port and starboard helm pressure rises above 12psi (83 kPa), the DPS motor/pump turns ON. The steering position sensor monitors the angular position of the steering actuator and shuts OFF the assist when the system hits the end of its travel. The end points of travel are calibrated in the factory and tell the DPS module when the steering is near the end of its stroke. This control strategy prevents high torque, high pressure, and wasted energy at the end of the stroke. For multiple engine applications, turn limits are needed to be set to prevent the master motor from overpowering the slave motor. The turn limits work like the individual engines’ endpoints and keep the DPS system from pushing on the slave steering systems at the end of the stroke. The DPS-2 system uses 1500psi (10342 kPa) port and starboard helm pressure sensors.

The DPS-2 system on AFA and newer engine models includes three external sensors - 1500 psi (10342 kPa) port and starboard helm pressure sensors, a steering position sensor; and two sensors internal in the DPS module - a thermistor to monitor DPS motor circuit temperature, and a module temperature sensor. As the steering wheel is turned, hydraulic fluid in the helm begins moving through the steering system. The pressure sensor in the direction of the turn, signals the DPS module of an increase in hydraulic pressure. The DPS module then gathers information from all the DPS sensors to determine whether to activate the DPS motor or not.

DPS Motor Activation

- Pressure differential between pressure sensors is greater than 12 psi (83 kPa)
- Steering angle less than 2° of where the end points were set
- Thermistor temp is below 150°F (66°C) – see *DPS Troubleshooting for limited assist symptoms*.
- Module temp is below 216° F (80°C)

Multi-Engine Applications

- Refer to the information from *Multiple Outboard Transom* in the Installation and Predelivery guide.
- Turn Limit calibration is necessary to prevent damage to the tie bar or transom of the boat due to overloading pressure on the slave engine. Turn limits work like the individual engine’s end points.
- A “Pro Series Helm” CANNOT be used in multi-engine applications regardless of DPS/IHS model.

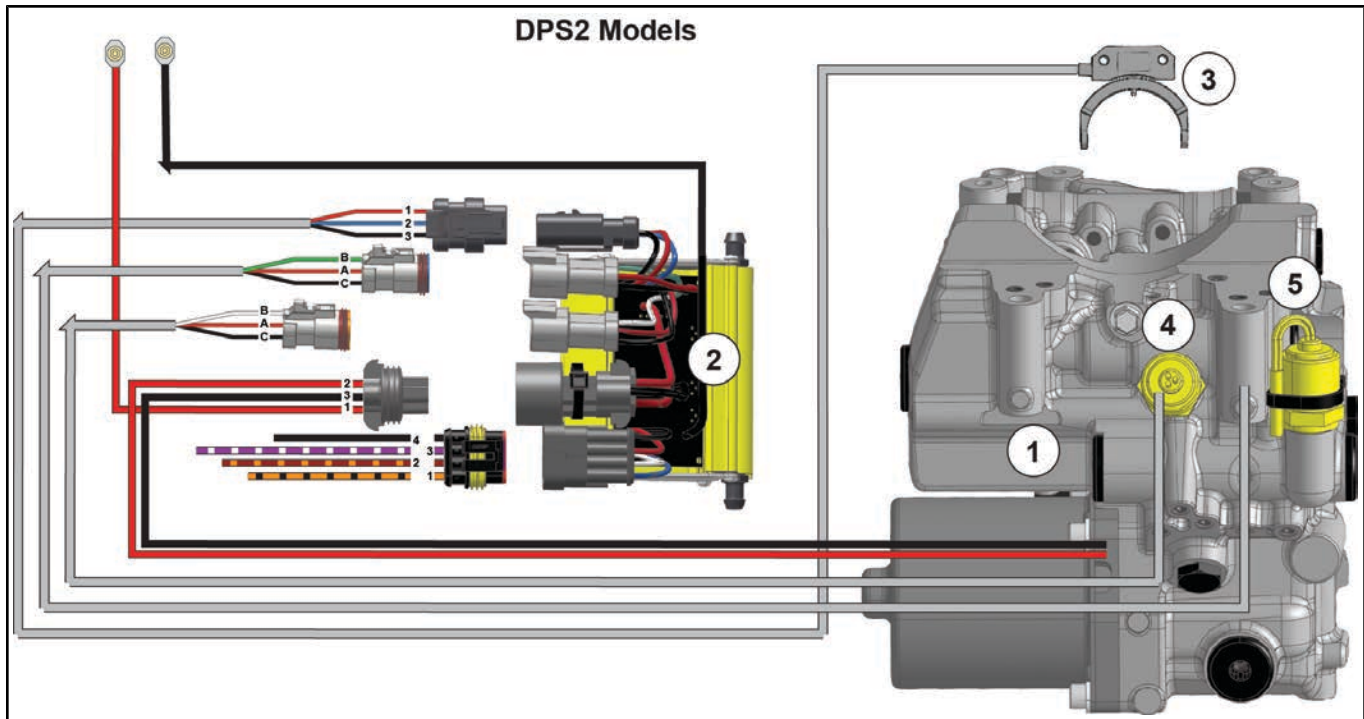
DPS Compatibility

– i-Dock/Jostick Controlled Applications

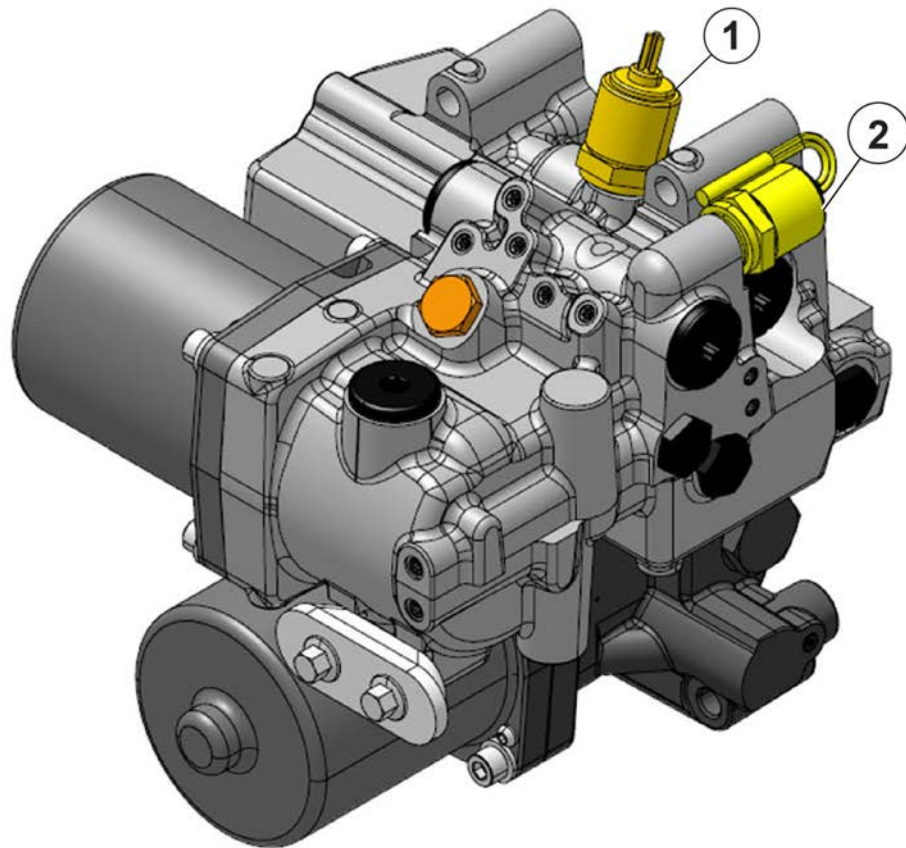
- Evinrude® i-Dock engines are model specific and NOT compatible with DPS model engines.
*Please see *I-Dock Installation and User Guide for Evinrude i-Dock engines*.
- SeaStar Optimus 360 “I-Dock” systems are NOT compatible with DPS model engines. A DPS model must be converted to an IHS model before SeaStar Optimus 360 system installation.
*Please see *2016-03(W) Bulletin*

Dynamic Power Steering (DPS)

Dynamic Power Steering (DPS) - Theory of Operation



1. *DPS Pump Assembly*
2. *DPS Control Module*
3. *Steering Pressure Sensor*
4. *Port Pressure Sensor*
5. *Starboard Pressure Sensor*



1. STARBOARD pressure sensor (psi)
2. PORT pressure sensor (psi)

Notes

Technician's Notes

Related Documents

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Related Documents

Bulletins

[illegible]

Instruction Sheets

[illegible]

Other	
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DPS Troubleshooting Charts

3

DPS-1 Troubleshooting Chart

DPS-1 Troubleshooting Chart

Start in this column to select the description that best fits the symptom	Then	Perform the checks or tests in this column to determine the issue.	And	Take the action in this column to resolve the issue.
Symptom		Perform this Check		Take this Action
1. DPS-1 No assist	YES	Enough fluid in the helm?	NO	Fill Helm and check for leaks.
		YES		
		Is this a DPS model?	NO	This is a manual hydraulic midsection, inspect for kinked hose and/or teach driver to use trim.
		YES		
		Use EvDiag6 to check: Is the correct DPS software installed?	NO	Follow directions to update software.
		YES		
		Use EvDiag6 to check: Is there a Fault Code?	YES	Troubleshoot using the Fault Code Chart
		NO		
		Use EvDiag6 to check: Is the "Power Steering" tab visible in EvDiag6?	NO	Investigate 4 pin connector to DPS module (supplies power and CAN)
		YES		
		Use EvDiag6 to check: Is the DPS Thermistor Temperature <66°C (150.8°F)?	NO	Short in Module - Replace the Module
		YES		
		Use EvDiag6 to check: Steer to center. Is helm pressure below 10psi?	NO	Is helm pressure sensor functional (Use EVD6 to view helm pressure, should be less than 10 psi)? Pro Helm? Kinked or Twisted hose (check hoses for damage or kinks)? Auto Pilot? SPA?
		YES		

DPS Troubleshooting Charts

DPS-1 Troubleshooting Chart

Start in this column to select the description that best fits the symptom	Then	Perform the checks or tests in this column to determine the issue.	And	Take the action in this column to resolve the issue.
Symptom		Perform this Check		Take this Action
		Use EvDiag6 to check: Does helm pressure sensor rise when steering to PORT and STARBOARD?	NO	Check helm pressure sensor / wire / terminals / connection with DPS module
		YES		
		Use EvDiag6 to check: Steer from lock to lock in 5 seconds. Do you see duty cycle while turning?	NO	Check to see if DPS is turned off? (Engine report?)
		YES		
		Use EvDiag6 to check: Do you see current while turning?	NO	Fault Code 211 should be present. Use the Fault Code Chart
		YES		
		Can you hear the DPS motor run?	NO	Replace the electric motor
		YES		
		Use EvDiag6 to check: Is pump pressure at least 100psi (689 kPa) above helm pressure while turning?	NO	Replace the pump/motor coupler
			YES	Internal leak, replace the stern and swivel assembly

DPS Troubleshooting Charts

DPS-1 Troubleshooting Chart

3

Start in this column to select the description that best fits the symptom	Then	Perform the checks or tests in this column to determine the issue.	And	Take the action in this column to resolve the issue.
Symptom		Perform this Check		Take this Action
2. DPS-1 pump runs when not steering	YES	Is the boat rigged with a Pro Series helm?	YES	Switch to DPS-2 or replace Pro Series helm with standard model. Use EVD6 to watch sensor voltages before replacing sensors.
		NO		
		Inspect the installation for a kink in the steering lines.	YES	Replace steering hoses.
			NO	Inspect pressure sensor wires, terminals, and connection with DPS module. Replace sensor if necessary.
Start in this column to select the description that best fits the symptom	Then	Perform the checks or tests in this column to determine the issue.	And	Take the action in this column to resolve the issue.
Symptom		Perform this Check		Take this Action
3. Significant initial resistance felt when changing direction	YES	Steer PORT to STARBOARD, then STARBOARD to PORT. Is significant resistance felt at initial change of steering direction?	YES	Replace the DPS hydraulic manifold. (Spool in DPS manifold is sticking in the bore)

DPS-2 Troubleshooting Chart

DPS-2 Troubleshooting Chart

IMPORTANT: Before proceeding with any sort of troubleshooting, be sure to verify that the DPS firmware is up to date.

Start in this column to select the description that best fits the symptom	Then	Perform the checks or tests in this column to determine the issue.	And	Take the action in this column to resolve the issue.
Symptom		Perform this Check		Take this Action
1. DPS-2 No assist	YES	Enough fluid in the helm?	NO	Fill Helm and check for leaks.
	YES	Is this a DPS model? (Remove PORT side panel and locate DPS module. No module = non-DPS model)	NO	This is a manual hydraulic midsection, inspect for kinked hose and/or teach driver to use trim.
	YES	Use EvDiag6 to check: Is the correct DPS software installed?	NO	Follow directions to update software. Check for any known software issues. Verify that the latest firmware is installed, update and re-test
	YES	Use EvDiag6 to check: Is there a Fault Code?	YES	Troubleshoot using the Fault Code Chart
	NO	Use EvDiag6 to check: Is the "Power Steering" tab visible in EvDiag6?	NO	Investigate 4 pin connector to DPS module (supplies power and CAN)
	YES	Use EvDiag6 to check: Is the DPS Thermistor Temperature <66°C (150.8°F)?	NO	Short in Module - Replace the Module
	YES	Use EvDiag6 to check: Steer to center. Are PORT and STARBOARD Helm pressures within 13 psi (90 kPa) of each other?	NO	Follow procedure to calibrate helm pressure sensors. If offset is greater than 25 psi (172 kPa), replace the sensor.
	YES			

DPS Troubleshooting Charts

DPS-2 Troubleshooting Chart

3

Start in this column to select the description that best fits the symptom	Then	Perform the checks or tests in this column to determine the issue.	And	Take the action in this column to resolve the issue.
Symptom		Perform this Check		Take this Action
		Use EvDiag6 to check: Does PORT sensor rise when steering to PORT and STARBOARD sensor rise when steering STARBOARD?	NO	Replace bad helm pressure sensor.
	YES	Use EvDiag6 to check: Is steering position -32 degree at PORT lock, and 32 degree at STARBOARD lock, and changes smoothly throughout the range?	NO	Follow procedure to calibrate steering endpoints (and turn limits, if applicable). Replace the sensor if steering position does not work after the calibration.
	YES	Use EvDiag6 to check: Steer from lock to lock in 5 seconds. Do you see duty cycle while turning?	NO	Check to see if DPS is turned off (Engine report) Engine report shows DPS voltage = 0 volts? Check wiring/connections for damage. Bad module?
	YES	Use EvDiag6 to check: Do you see current while turning?	NO	Fault Code 211 should be present. Use the Fault Code Chart
	YES	Can you hear the DPS motor run?	NO	Replace the electric motor
			YES	Broken pump/motor coupler or internal leak
2. Significant initial resistance felt when changing direction	YES	Steer PORT to STARBOARD, then STARBOARD to PORT. Is significant resistance felt at initial change of steering direction?	YES	Replace the DPS hydraulic manifold. (Spool in DPS manifold is sticking in the bore)

Notes

Technician's Notes

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Related Documents

Bulletins

[illegible]

Instruction Sheets

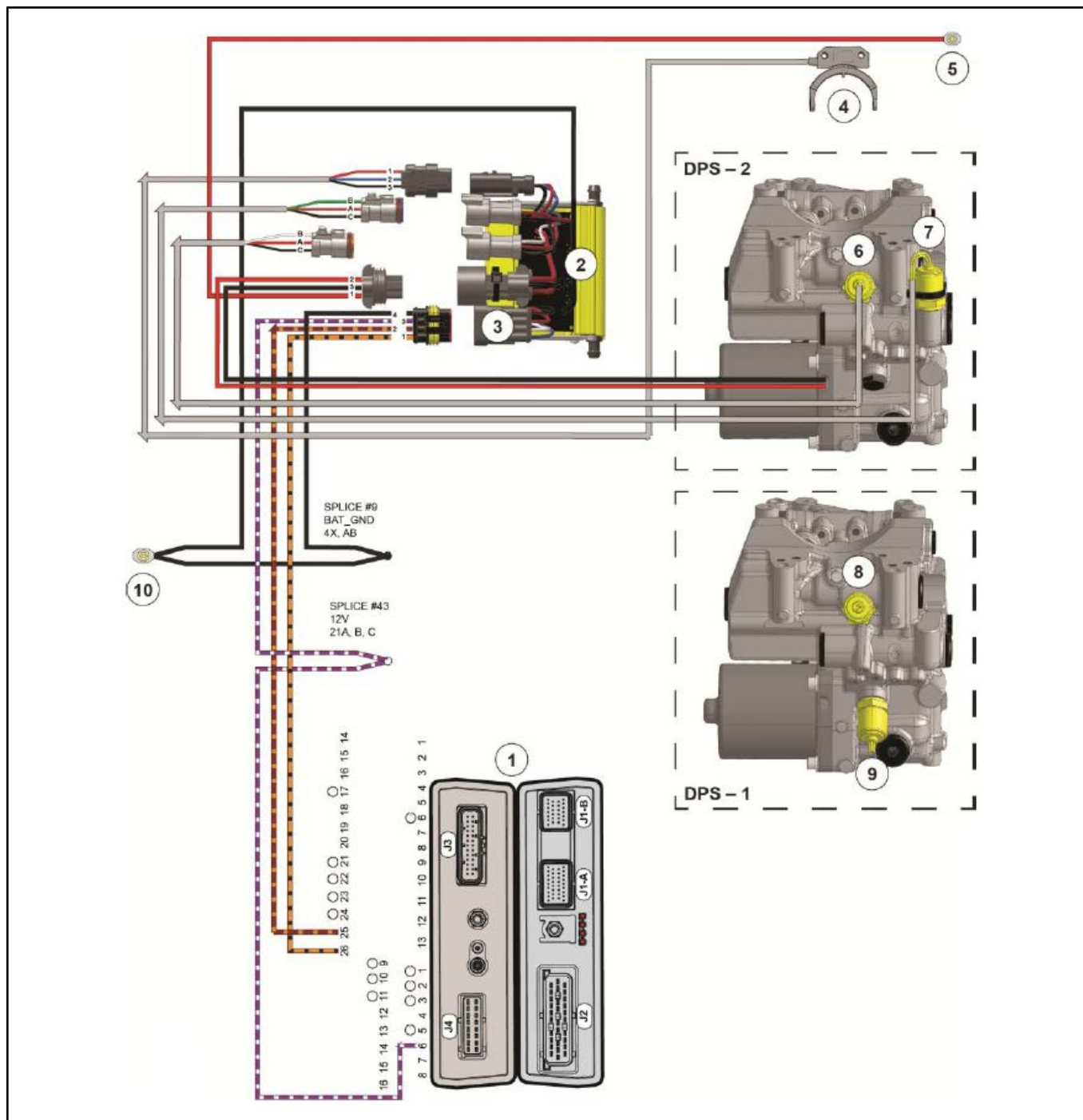
[illegible]

Other

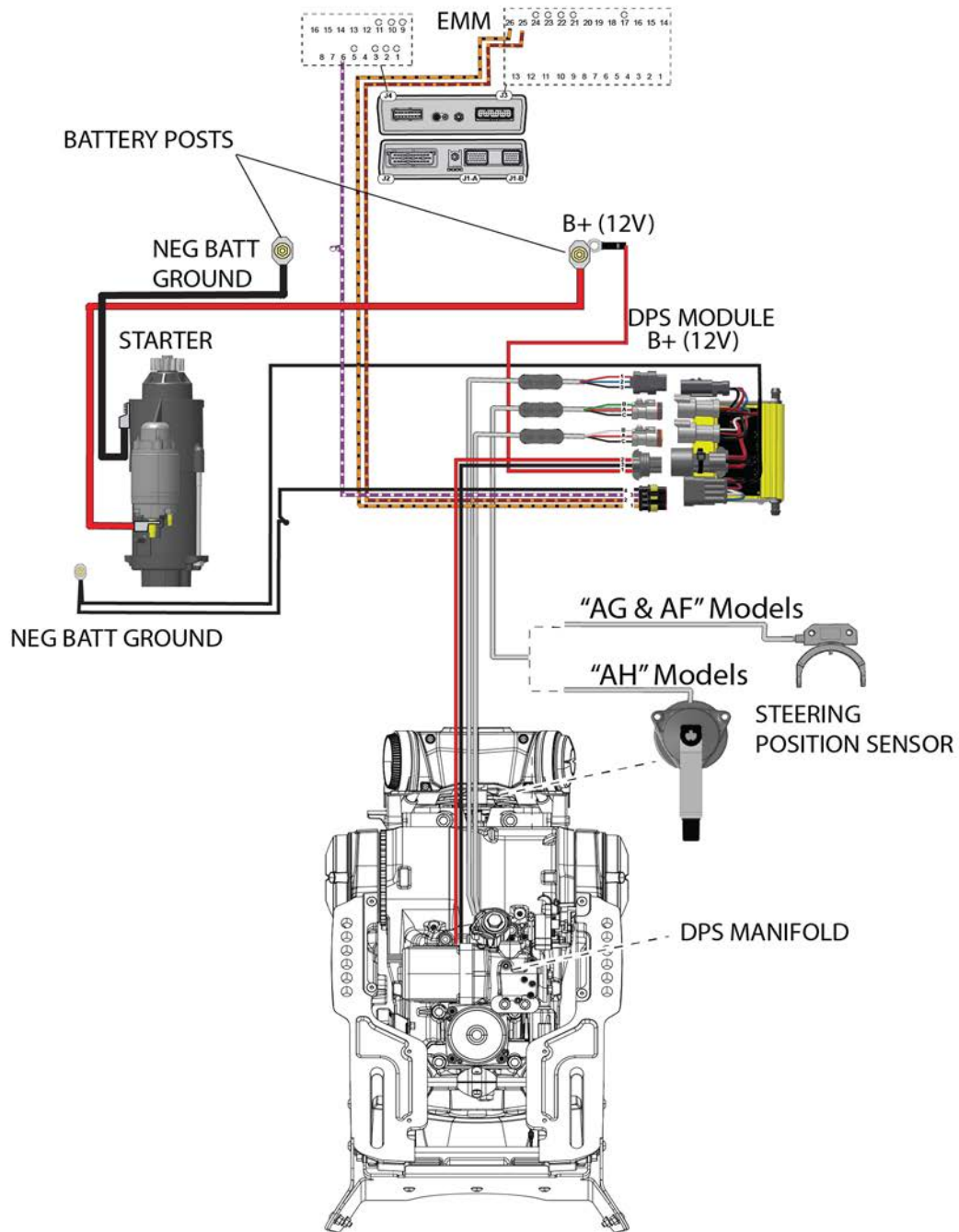
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DPS Wiring Diagrams

DPS1 / DPS2 Wiring



1. EMM
2. DPS Control Module
3. DPS Control Module to EMM Connections
4. Steering Position Sensor (DPS 2 models only)
5. Battery Post (B+ supply to DPS Module)
6. Port Steering Pressure Sensor (DPS 2 models only)
7. Starboard Steering Pressure Sensor (DPS 2 models only)
8. Helm Pressure Sensor (DPS 1 models only)
9. Pump Pressure Sensor (DPS 1 models only)
10. Ground (to port engine ground screw)



Steering Position Sensor Revision

DPS Wiring Diagrams

DPS2 Control Module

DPS2 Control Module

Black – ground

Port Steering Pressure Sensor (DPS - 2)

Red – Power B+

Blue – Steering Position

Black – Ground

Starboard Steering Pressure Sensor (DPS - 2)

Green – Pressure Sensor 2 (Starboard)

Red – Power B+ (5 Volts)

Black – Ground

Steering Position Sensor (DPS - 2)

White – Pressure Sensor 1 (Port)

Red – Power B+ (5 Volts)

Black – Ground

Power Connector

Red – Power B+ (12 Volts)

Black – ground

Red – Power B+

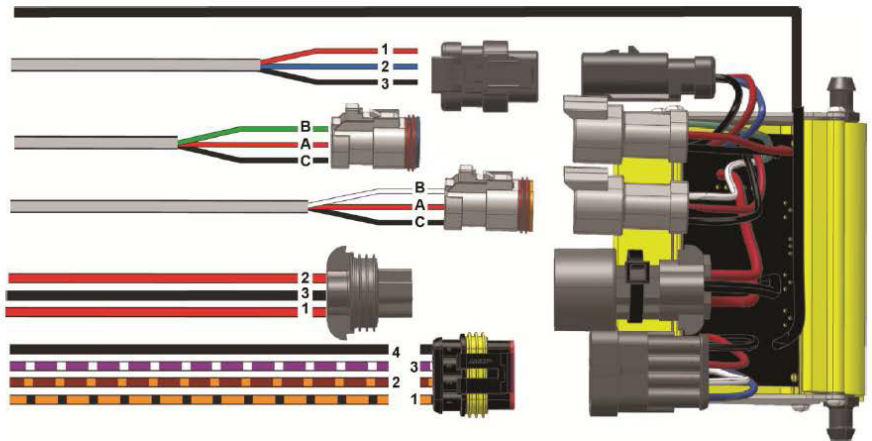
DPS Module (CAN)

Black – Ground

Purple / White – Power (Switched B+)

Brown / Orange – CAN

Orange / Black – CAN



DPS Module

DPS-1 System Tests

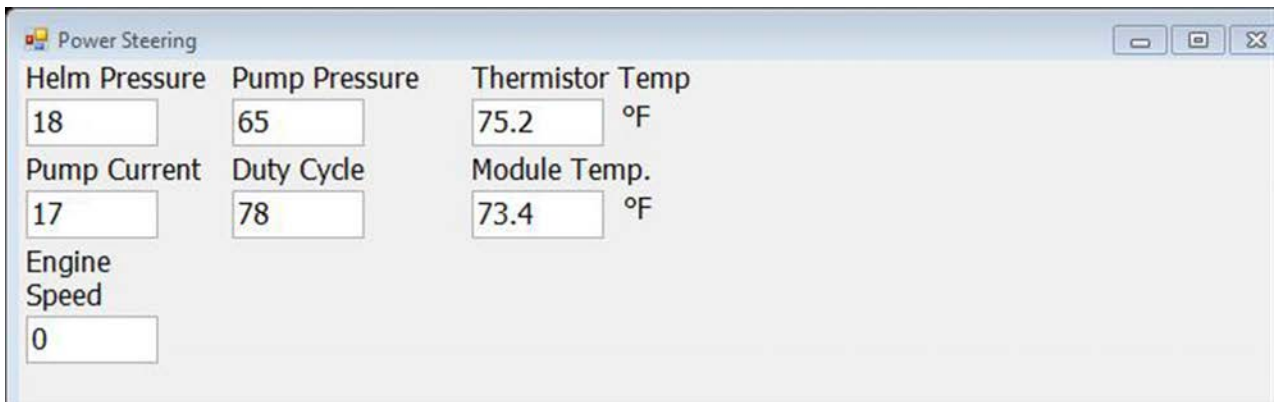
Use the *Power Steering* screen of *Evinrude® Diagnostics 6* software to observe DPS system reactions while turning the steering wheel.

Pressure values should go up and down based on the helm's turn.

The expected Pump Current range is >20 amps.

If less than 20 amps is seen, this could be an indicator of a failed DPS coupler as the motor is operating with no load on it. If less than 20 amps with duty cycle at 100%, inspect the DPS coupler.

5



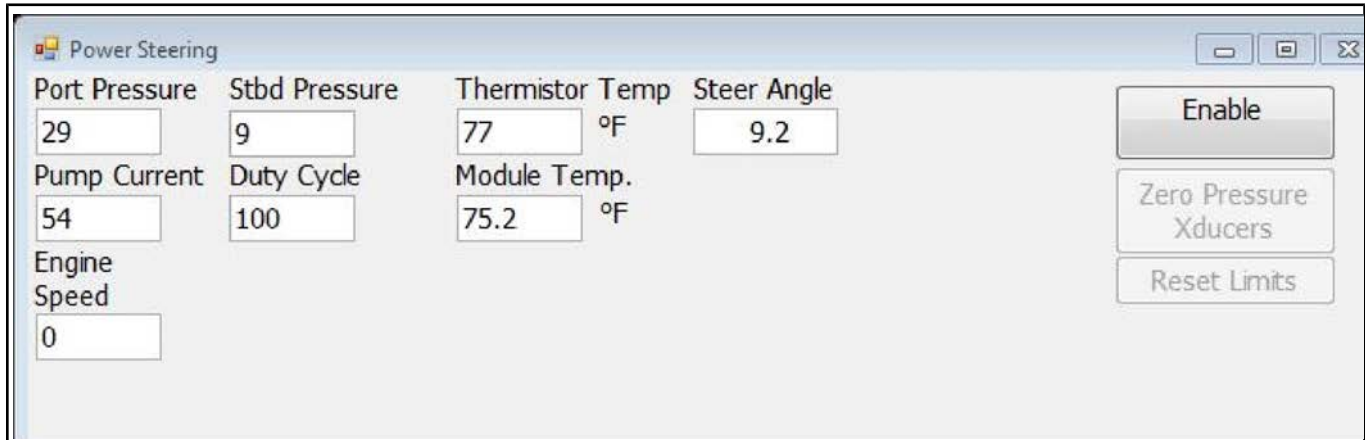
Helm Pressure	Pump Pressure	Thermistor Temp
18	65	75.2 °F
Pump Current	Duty Cycle	Module Temp.
17	78	73.4 °F
Engine Speed		
0		

DPS1 Helm Pressure and Pump Pressure

DPS-2 System Tests

Use the *Power Steering* screen of *Evinrude® Diagnostics 6* software to observe DPS system reactions while turning the steering wheel.

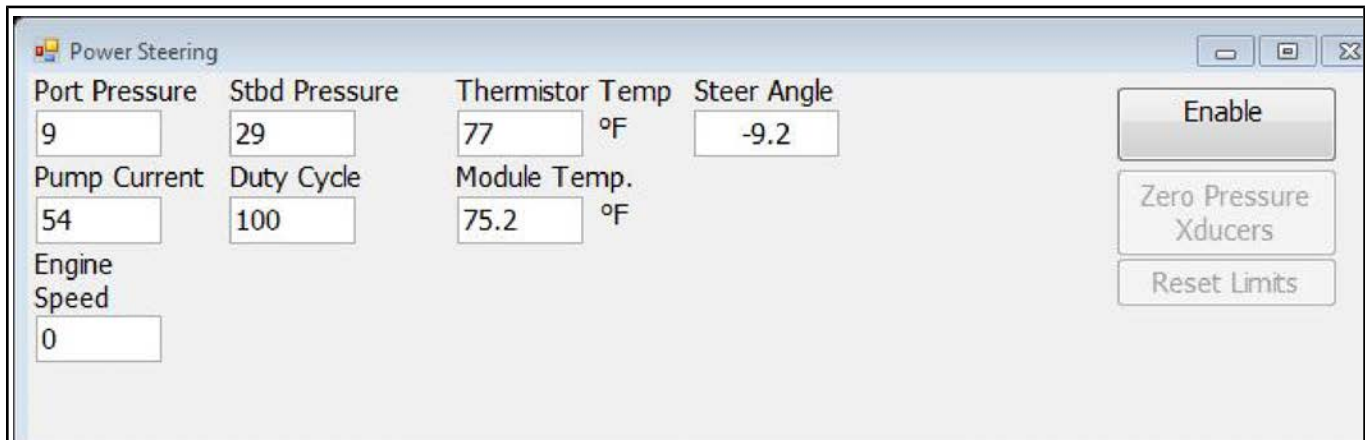
Pressure values should go up and down based on the helm's turn.



Port Pressure	Stbd Pressure	Thermistor Temp	Steer Angle
29	9	77 °F	9.2
Pump Current	Duty Cycle	Module Temp.	
54	100	75.2 °F	
Engine Speed			
0			

Buttons: Enable, Zero Pressure Xducers, Reset Limits

DPS2 - Turn to Port Pressure



Port Pressure	Stbd Pressure	Thermistor Temp	Steer Angle
9	29	77 °F	-9.2
Pump Current	Duty Cycle	Module Temp.	
54	100	75.2 °F	
Engine Speed			
0			

Buttons: Enable, Zero Pressure Xducers, Reset Limits

DPS2 - Turn to Starboard Pressure

Load Steering Firmware

DPS Module - Steering firmware load

Use the *Evinrude® Diagnostics 6* software (v 6.4.10032.0 or higher) to update the firmware.

All replacement DPS modules are shipped from the Parts and Accessories Catalog (PAC) without firmware installed. Select the correct software for the replacement DPS module.

NOTICE

Installing incorrect DPS software will cause:

- Fault codes 220 and 221 on ABA models
- DPS pump to run non-stop on AFA models

“ABA” models use a different firmware than the “AFA” and newer models. Refer to the table below. DPS firmware for “ABA” models is NOT compatible with “AFA” models.

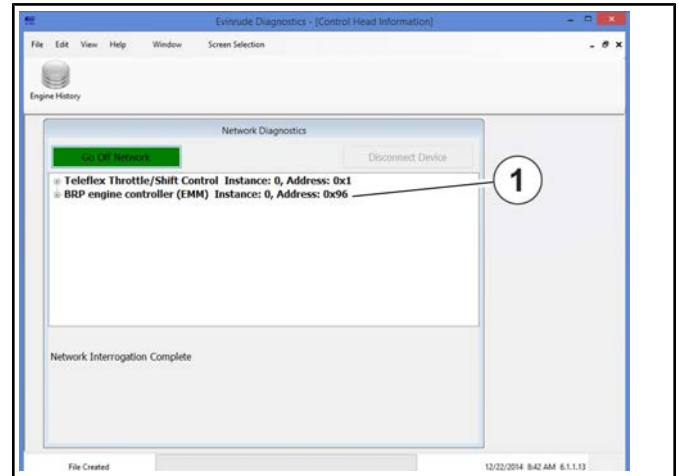
Engine Model	Version	Revision
66° V6 2.7L AAA and newer	3030559	2024546 or higher
74° V6 3.4L G2 ABA	3030541 (DPS1)	34025
74° V6 3.4 L AFA & Newer	3030559 (DPS2)	2024546 or higher

Connect the MPI-2 and adapter cable to the laptop and to the *NMEA 2000* network. Turn the key switch to the ON position, then start the diagnostic program.

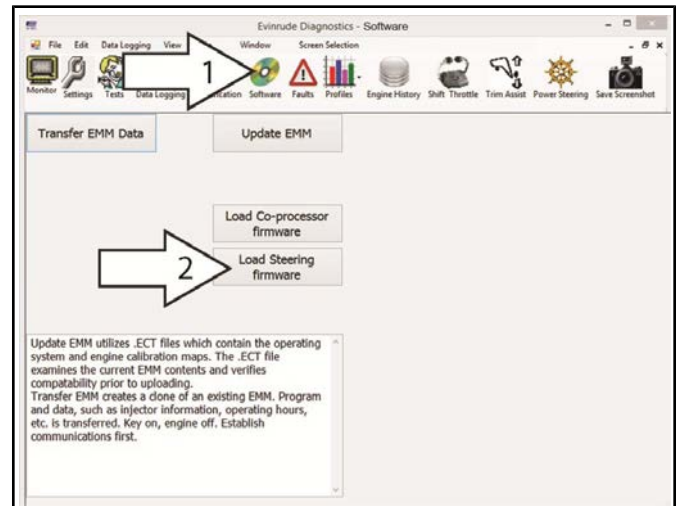
After the program connects to the network, select from the device list the *Engine Controller (EMM)*.

NOTICE

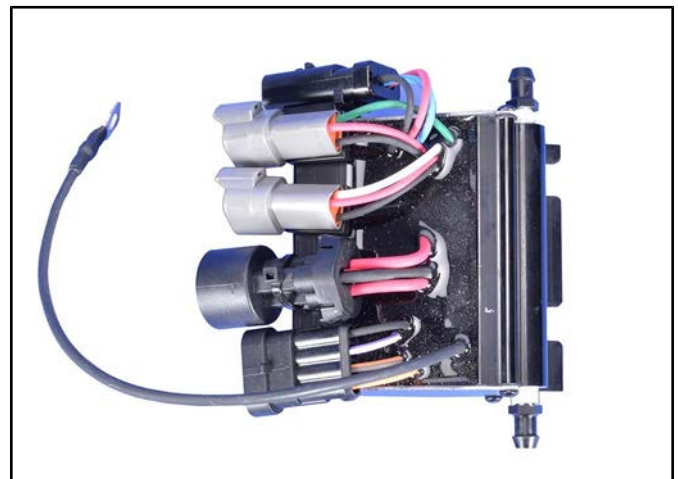
This software updates the engine model number stored in the *EMM*. Install this *EMM* software in ALL outboards of multiple outboard installations. Firmware of ABA and AFA models is NOT compatible. Outboards which are not updated will not run.



1. Engine controller



1. Select Software
2. Next, Select Firmware for application



DPS Module

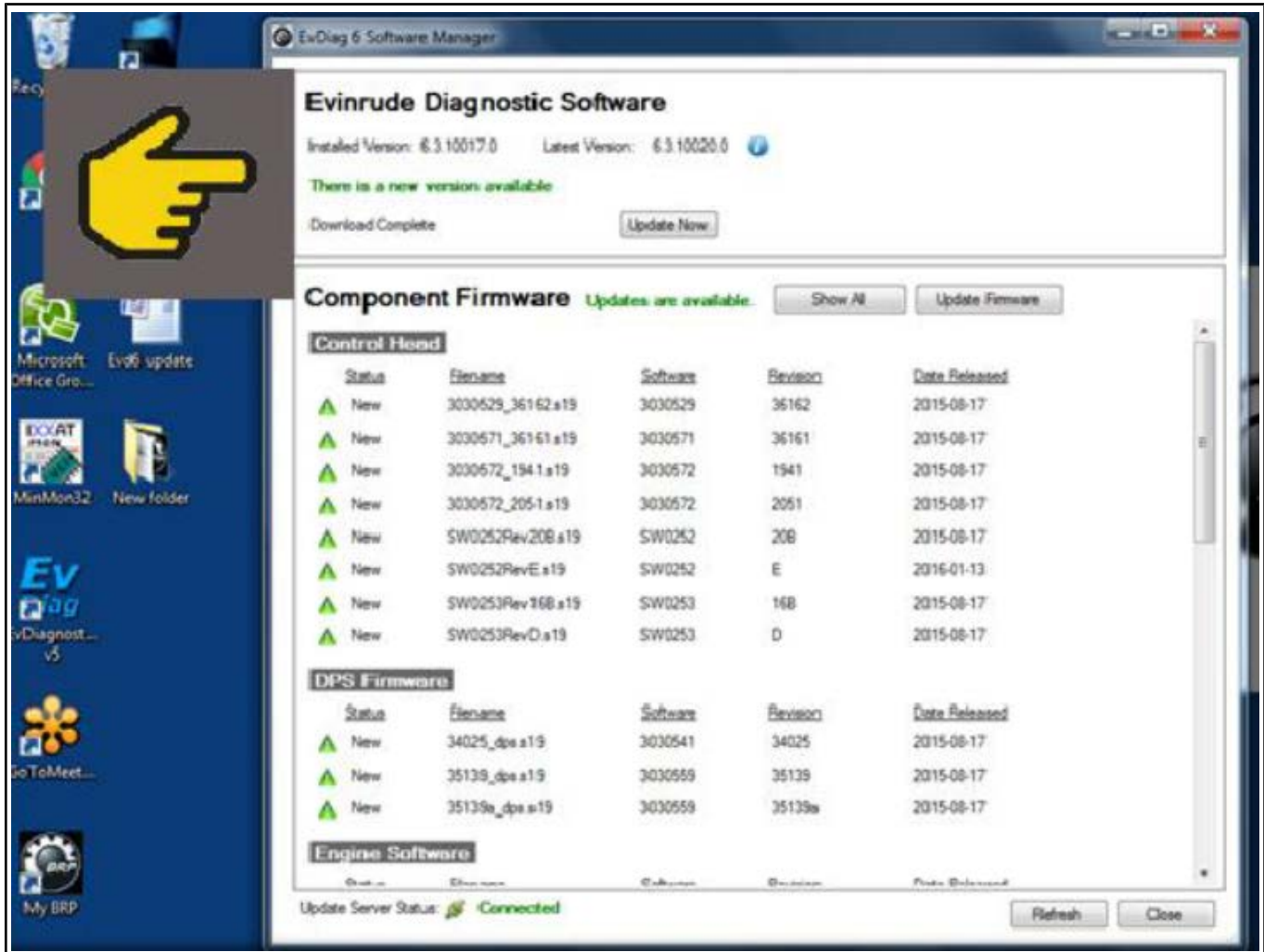
DPS System Updates

There have been instances in which extensive time was taken to troubleshoot a G2 outboard for a suspected power steering issue only to find that the Dynamic Power Steering Control Module software was incorrect. Check the Module software version.

If the unit is suspected of a power steering issue, use *Evinrude® Diagnostics 6* to verify that the DPS Control Module software version is correct.

Select “BRP engine controller (EMM)” in the Network Diagnostic box and then select “Identification”.

Verify that the engine controller is updated with the latest software revision for the application.



EvDiag6 - DPS Assist Adjustment

Use EvDiag6, Engine Option Configuration menu to change the level of DPS assistance from “Min”, “Med”, and “Max” assistance to the operator.

The screenshot shows the 'Evinrude Diagnostics - [Configuration]' window. The 'Engine Option Configuration' section is active, displaying various settings. The 'Water Pressure Transducer' is set to 'No Transducer'. The 'Engine Selection' section shows 'Port or Single' selected, with 'Total Engines' set to 1. The 'Current Engine Identification' is 0. The 'DPS Assist' section shows 'Max' selected. The 'Trim Assist' section shows 'Off' selected. The 'Set Tilt Limit' section shows 'Set Upper Tilt Limit' and 'Clear Tilt Limit' buttons. The 'Calibrate Trim Sender' section shows 'Set Trim Up', 'Set Trim Down', and 'Clear Trim Up/Down' buttons. A progress bar indicates 10% completion.

Engine Option Configuration

Water Pressure Transducer

- ☒ No Transducer
- ☐ Installed 50 psi

Engine Selection

- ☐ Port or Single
- ☐ Port Center
- ☐ Center
- ☐ Starboard Center
- ☐ Starboard

Total Engines

1
2
3
4

Current Engine Identification

0

DPS Assist

- ☐ Min
- ☐ Med
- ☒ Max

Set Tilt Limit

Calibrate Trim Sender

10%

Trim Assist

- ☒ Off
- ☐ On

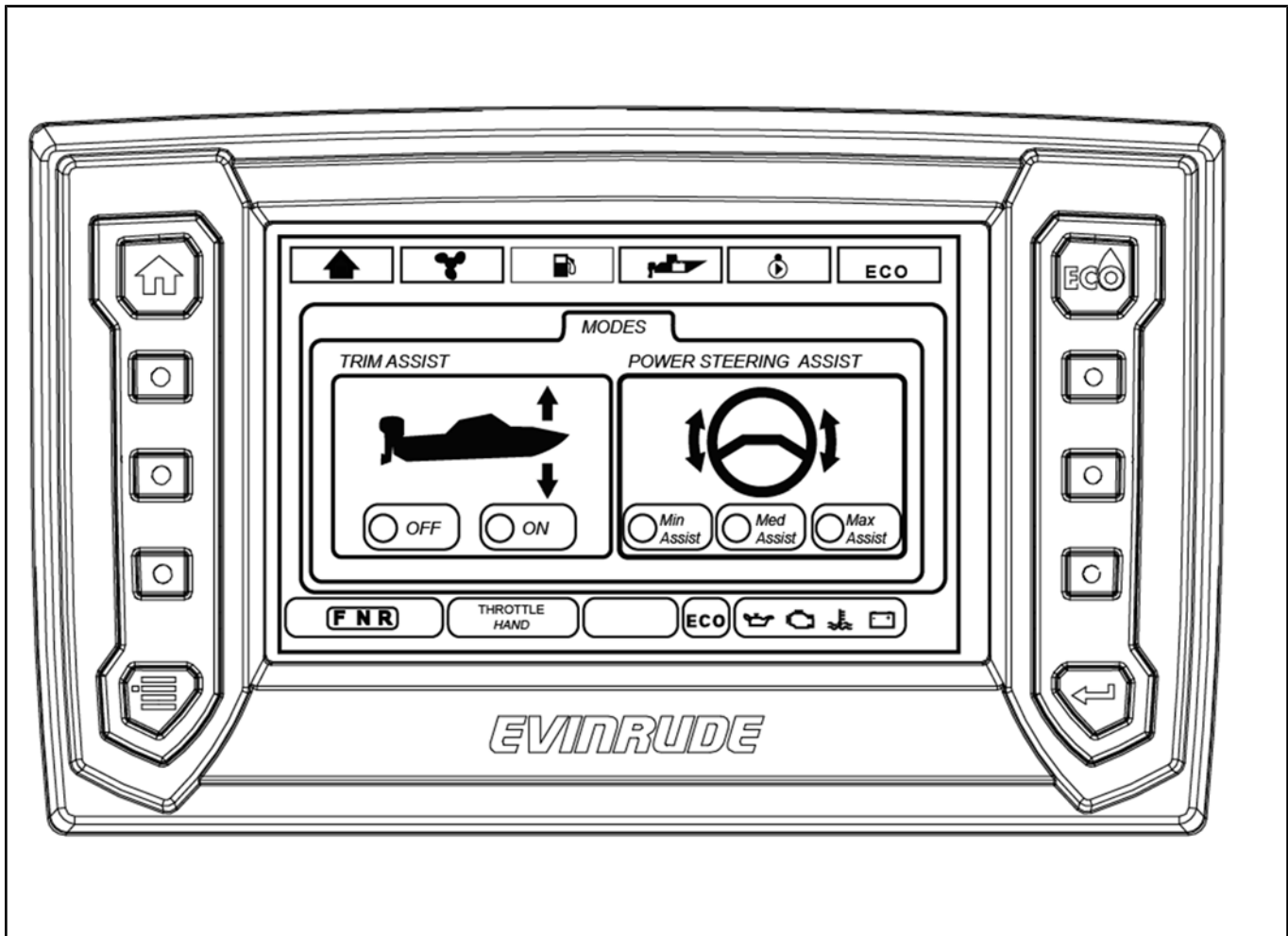
Color Touch Screen - DPS Assist Adjustment

Use the touchscreen and go to “Mode” to adjust and change the level of power steering assistance from “Min Assist”, “Med Assist”, and “Max Assist” to the operator.

The higher the setting, the more responsive/effortless the steering is.

- “Min Assist” is minimal assistance from the DPS system to the operator.
- “Med Assist” is medium assistance from the DPS system to the operator.
- “Max Assist” is highest assistance from the DPS system to the operator.

All assist levels are the same below 4500 RPM



7.0 inch Gauge

Nautilus 3.5 Color Screen - DPS Assist Adjustment

Press the “Mode Select” button to access the Mode Select screen.

Use the up and down arrow buttons to select the Power Steering Assist option.

Press the right facing arrow button to toggle the selection between “Minimum”, “Medium”, or “Maximum” assistance to the operator.

Use the gauge set to Port/Single to set the power steering assist for single engine configurations and both port and starboard engines on twin engine applications.

NOTE: The DPS assistance is set to “Minimum” from the factory.



Notes

Technician's Notes

[illegible]

Related Documents

Bulletins

[illegible]

Instruction Sheets

[illegible]

Other

[illegible]

DPS Electric Motor

Motor Derating

To prevent damage occurring due to overheating, the DPS electric motor is controlled by a thermistor (thermal switch) which is located in the DPS Control Module.

The thermistor heats up as the electric current flows through the motor.

If an excessive amount of current flows through the thermistor in a short amount of time, the thermistor opens the circuit and the motor will not operate until components cool down.

In the DPS system, the temperature of the thermistor is monitored, and in extreme applications, limits the amount of the steering assist to prevent the thermistor from opening.

The limiting of the steering assistance is referred to as “Derating”.

The derating is accomplished by limiting the assist level gradually as the thermistor temperature goes over 134°F (57°C).

If the temperature of the thermistor continues to rise, the assist continues to decrease until the DPS turns off at 150°F (66°C).

This control strategy ensures that the steering effort does not change rapidly so the operator can feel the gradual changes in the steering.

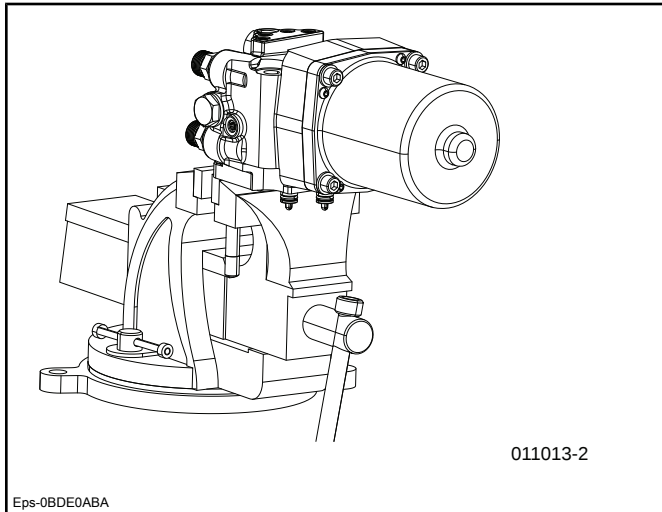
6



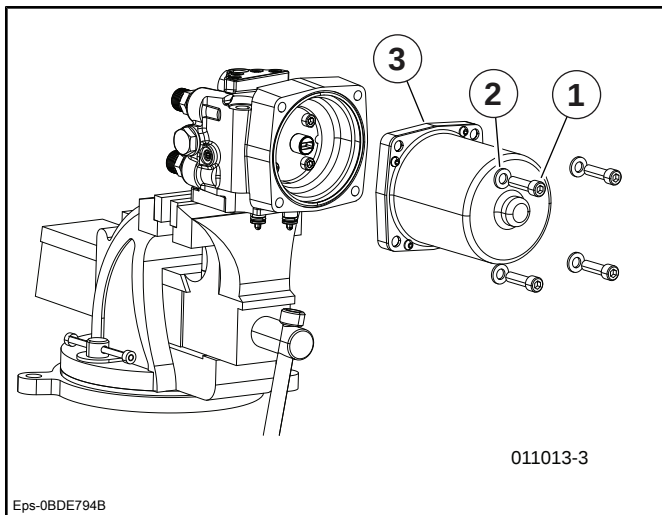
DPS Module

Electric Motor

1. Use two scrap screws to secure the DPS Manifold to a bench vise.

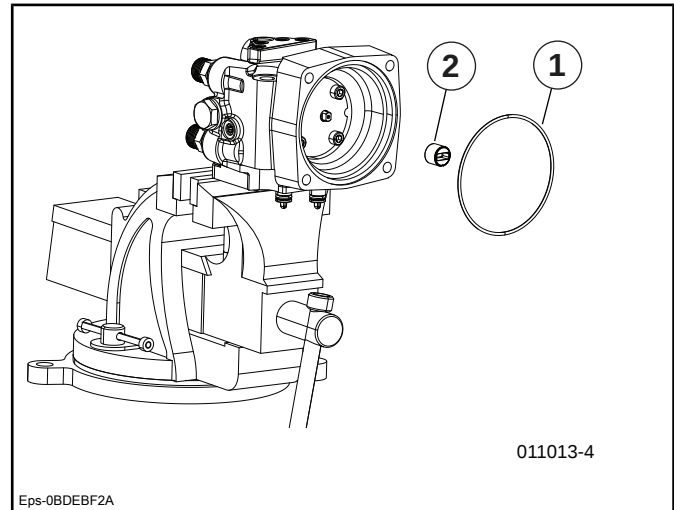


2. Remove the four screws and washers retaining the electric motor. Then remove the motor from the manifold housing.



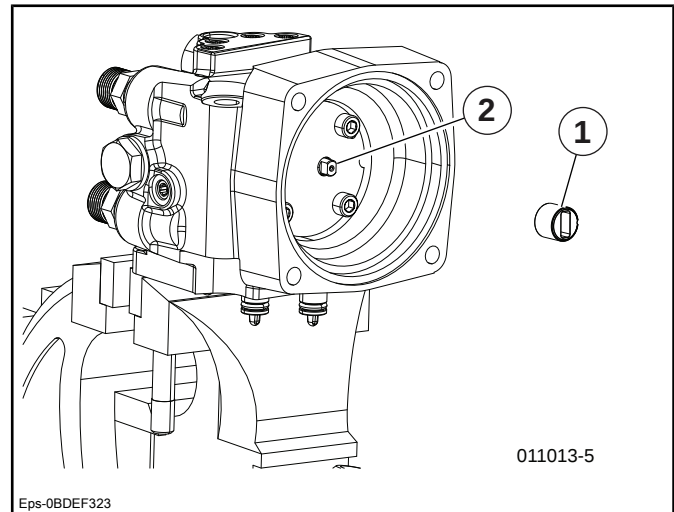
1. Screws
2. Washers
3. Electric motor

3. Remove the O-ring and coupler from the manifold housing, or electric motor.



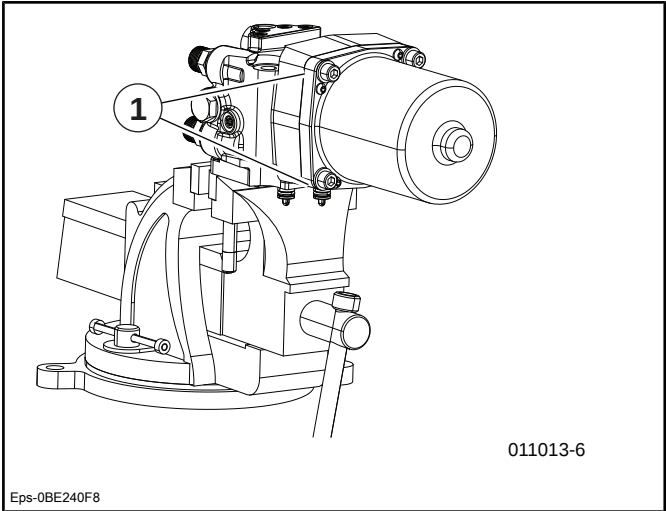
1. O-ring
2. Coupler

4. Clean and dry all parts thoroughly.
5. Align the slot in the coupler with the shaft on the pump (shown) and with the shaft on the electric motor.



1. Couplet
2. Shaft

6. Install the electric motor on the manifold assembly. Install four screws and washers.
7. Tighten screws to a torque of 60 to 84 In. lbs.(7 to 10 N·m).



1. Screws

Notes

Technician's Notes

[illegible]

Related Documents

Bulletins

[illegible]

Instruction Sheets

[illegible]

Other

[illegible]

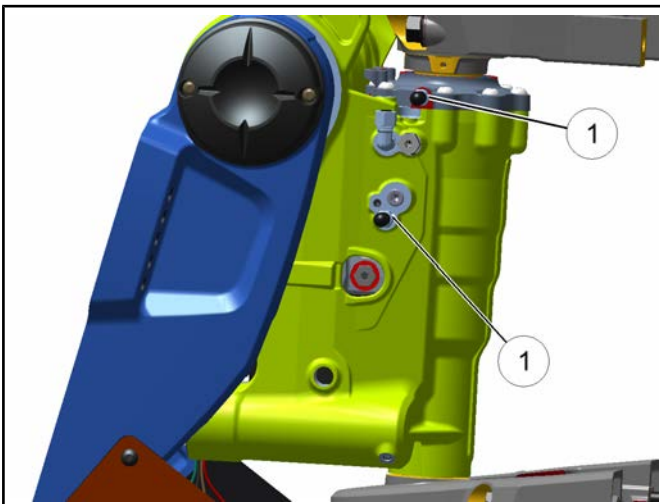
Stern/ Swivel System Overview

Steering Pressure Sensor Calibration (AFA and Newer Models Only)

IMPORTANT: Calibrate the pressure sensor when:

- replacing a DPS module
- replacing a DPS manifold
- replacing a steering pressure sensor

1. Connect a piece of tubing to each bleed valve.
2. Insert the open end of the tubing into a container appropriate for collecting hydraulic steering fluid.



1. Bleed valves

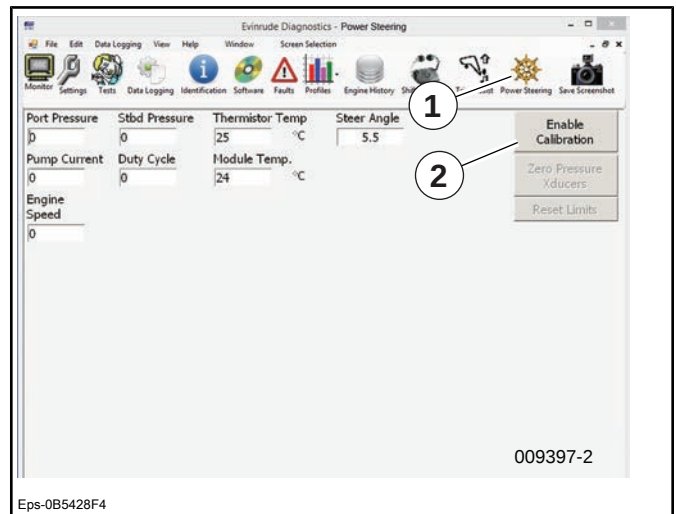
3. Open the both bleed valves at least one-half turn to relieve pressure on the hydraulic steering system.
4. Wipe up any spilled steering fluid with shop towels.

ENVIRONMENTAL NOTE

Dispose of contaminated shop towels according to local environmental regulations.

5. Use *Evinrude Diagnostics* software v 6.1 or higher to calibrate steering pressure sensors.
6. Connect the MPI-2 and adapter cable to the laptop and the *NMEA 2000* network.
7. Turn the key switch to the ON position and start the diagnostic program.

8. After the program connects to the network, select *Engine Controller (EMM)* from the device list.
9. Then select the *Power Steering* button.
10. Select *Enable Calibration*. The power steering pump is disabled while in calibration mode.

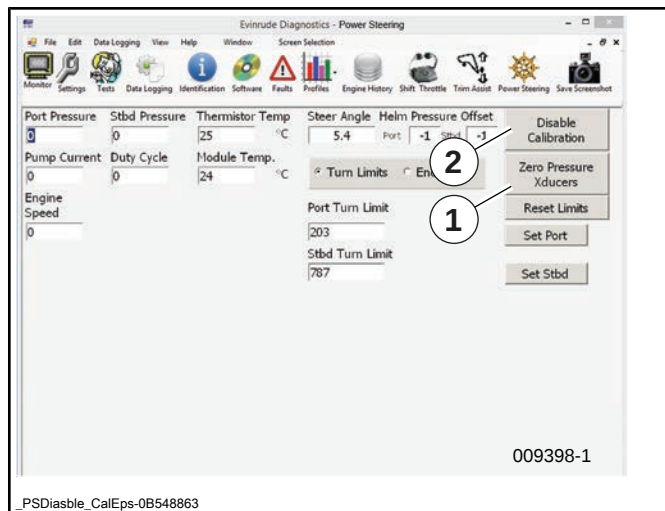


1. Power Steering
2. Enable Calibration

11. Select *Zero Pressure Sensors*. The button will deactivate while setting the ZERO point. Wait for the button to activate BEFORE continuing.
12. Select *Disable Calibration* to save the setting and re-enable the power steering pump.

Stern/ Swivel System Overview

Steering Pressure Sensor Calibration (AFA and Newer Models Only)



13. Fill and bleed the steering system of air. Refer to **Filling and Bleeding the Hydraulic Steering System**.

1. Zero Pressure Sensors
2. Disable Calibration

Steering Position Sensor Calibration

IMPORTANT: Calibrate the steering position sensor when:

- replacing a DPS module
- replacing a steering position sensor

Use *Evinrude Diagnostics* software v 6.4 or higher to calibrate the steering position sensor.

Dual Outboard Installations

NOTICE

Failure to complete steering sensor calibration on dual engine applications can result in damage to the tie bar(s) and/or the transom of the boat due to overloading.

- The power steering pump must NOT run during the calibration procedure.
- The diagnostics software will disable the pump for outboard being calibrated.

IMPORTANT: Calibrate the steering position sensors on dual outboard installations when:

- installing outboards for the first time
- replacing a DPS module
- replacing a steering position sensor

Dual outboard installations REQUIRE calibration of the DPS equipped outboard. Calibrate the **End Point** of the DPS outboard FIRST. Then calibrate the **Turn Limit**.

Calibrate End Points

NOTICE

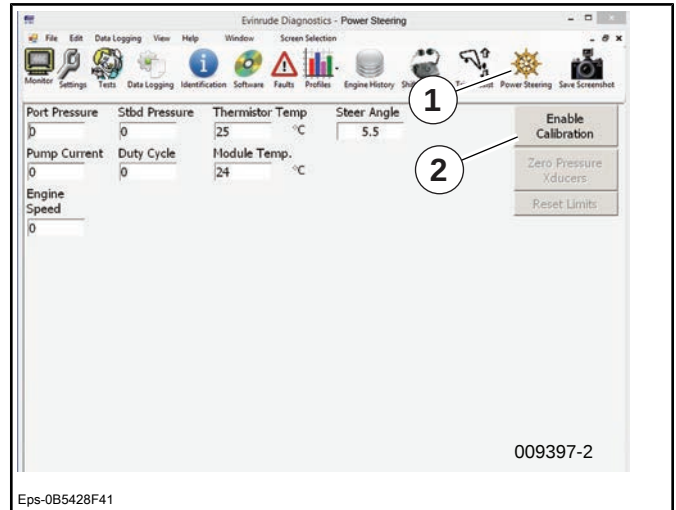
Calibrating end points requires disconnecting the tie bar. During this procedure outboards could contact, resulting in damage to the engine covers. Have an assistant manually move outboards to prevent damage.

Before calibrating End Points:

- disconnect the tie bar from the outboards

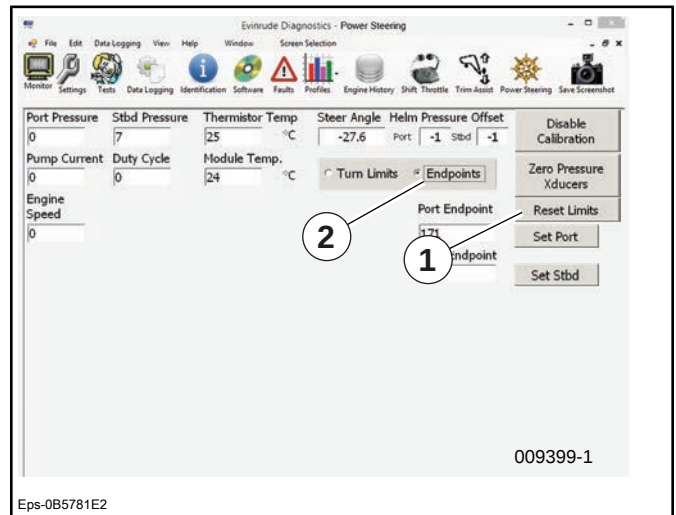
After the program connects to the network, select the *Engine Controller (EMM)* from the device list for the DPS outboard. Then select the *Power Steering* button.

1. Select *Enable Calibration*. The power steering pump is disabled while in calibration mode.



1. Power Steering
2. Enable Calibration

2. Press *Reset Limits*. Then be SURE to select **End Points**.



1. Reset Limits
2. End Points

3. Slowly turn the steering wheel until the outboard is turned fully to PORT.

IMPORTANT: Make sure outboards do not contact. Slowly turn the steering wheel, while an assistant manually moves the disconnected outboards.

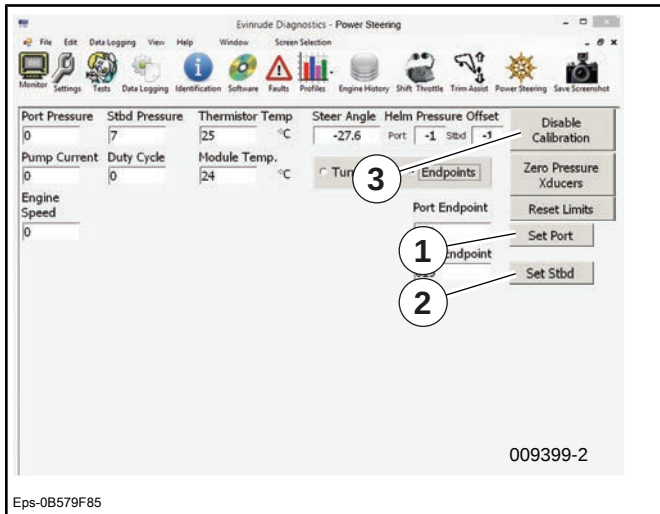
4. Then press the *Set Port* button. The button will deactivate while saving the PORT end point. Wait for the button to activate BEFORE continuing.
5. Slowly turn the steering wheel until the outboard is turned fully to STARBOARD.

Stern/ Swivel System Overview

Steering Position Sensor Calibration

IMPORTANT: Make sure outboards do not contact. Slowly turn the steering wheel, while an assistant manually moves the disconnected outboards.

- Then press the *Set Starboard* button. The button will deactivate while saving the STARBOARD end point. Wait for the button to activate BEFORE continuing.
- Select *Disable Calibration* to save the setting and re-enable the power steering pump.



- Set Port
- Set Starboard
- Disable Calibration

Before continuing:

- turn the key switch to the OFF position
- Turn the key switch to the ON position

- After completing end points calibration, calibrate the turn limits. See **Calibrate Turn Limits**.

Calibrate Turn Limits

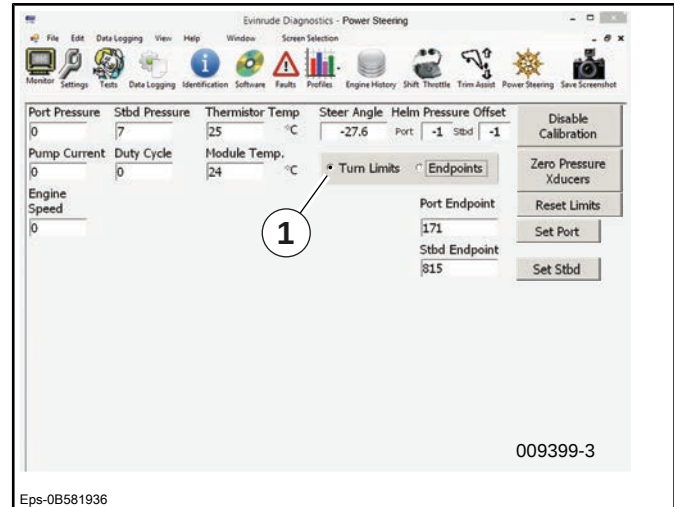
Before calibrating Turn Limits:

- connect tie bar to the outboards
- adjust outboard alignment

Turn the key switch to the ON position, then start the diagnostic program.

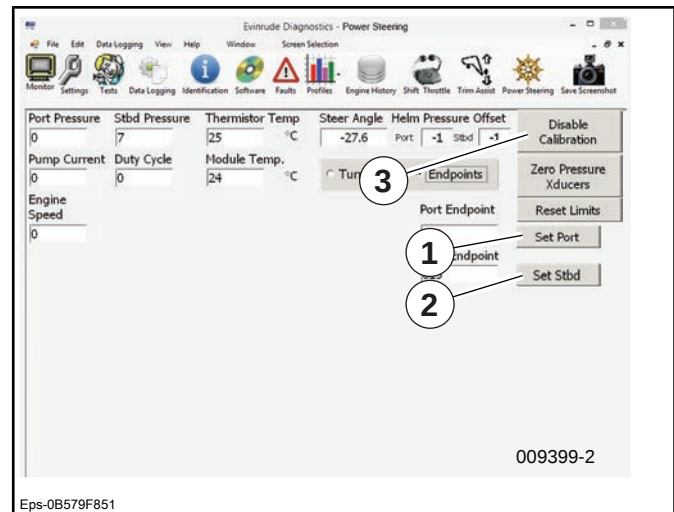
After the program connects to the network, select from the device list for the *Engine Controller (EMM)* the DPS outboard. Then select the *Power Steering* button.

- Select *Enable Calibration*. The power steering pump is disabled while in calibration mode.
- Then be SURE to select **Turn Limits**.



- Turn limits

- Turn the steering wheel until the outboards are turned fully to PORT. Then press the *Set Port* button. The button will deactivate while setting the PORT turn limit. Wait for the button to activate BEFORE continuing.
- Turn the steering wheel until the outboards are turned fully to STARBOARD. Then press the *Set Starboard* button. The button will deactivate while setting the STARBOARD turn limit. Wait for the button to activate BEFORE continuing.
- Select *Disable Calibration* to save the settings and re-enable the power steering pump.



- Set Port
- Set Starboard
- Disable Calibration

Before continuing:

- turn the key switch to the OFF position.
- Turn the key switch to the ON position

- Test the steering system. See **Steering System Test**.

Filling and Bleeding the Hydraulic Steering System

SERVICE PRODUCTS

Description	Part Number	Page
HYDRAULIC STEERING FLUID	P/N 770891	39

Hydraulic Steering Fluid

⚠ WARNING

Use **ONLY** approved hydraulic fluids. Non-approved fluids can cause steering system damage, or reduced steering control. This can result in loss of boat control and injury to the occupants.

1. Use SeaStar Hydraulic fluid HA5430, P/N 770891, or Hydraulic fluid meeting MIL SPEC: Mil-H-5606.

Required Product

Hydraulic Steering Fluid
P/N 770891

Single Station / Dual Engine Installations

Filling and bleeding dual engine installations is the same as single engine installations.

Follow the instructions found in Manual Method or the Power Purge Method.

Single Station Steering Installations

The following instructions describe the fill and bleed procedure for a single and dual outboard installation.

Manual Method

Also refer to the instructions provided with the hydraulic steering helm pump.

IMPORTANT: Turn the key switch to the ON position for models with DPS.

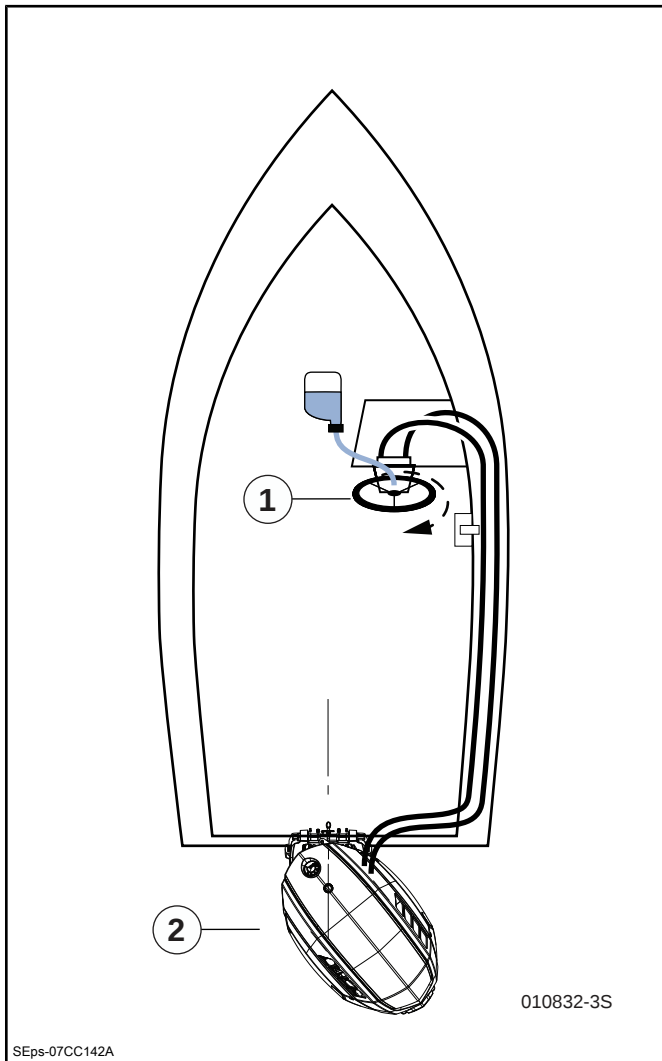
IMPORTANT: Make sure the outboard is trimmed to the full DOWN position before beginning this procedure. Air will NOT bleed completely from the steering system if the engine is even slightly trimmed up.

1. Remove the filler cap from the helm.
2. Install the threaded end of the filler tube (supplied with helm) into the helm.
3. Fill the helm with the recommended fluid. Fluid should always be visible in the filler tube. Use additional bottles of fluid as needed. Do NOT proceed with the next step until the helm is full of fluid.

Stern/ Swivel System Overview

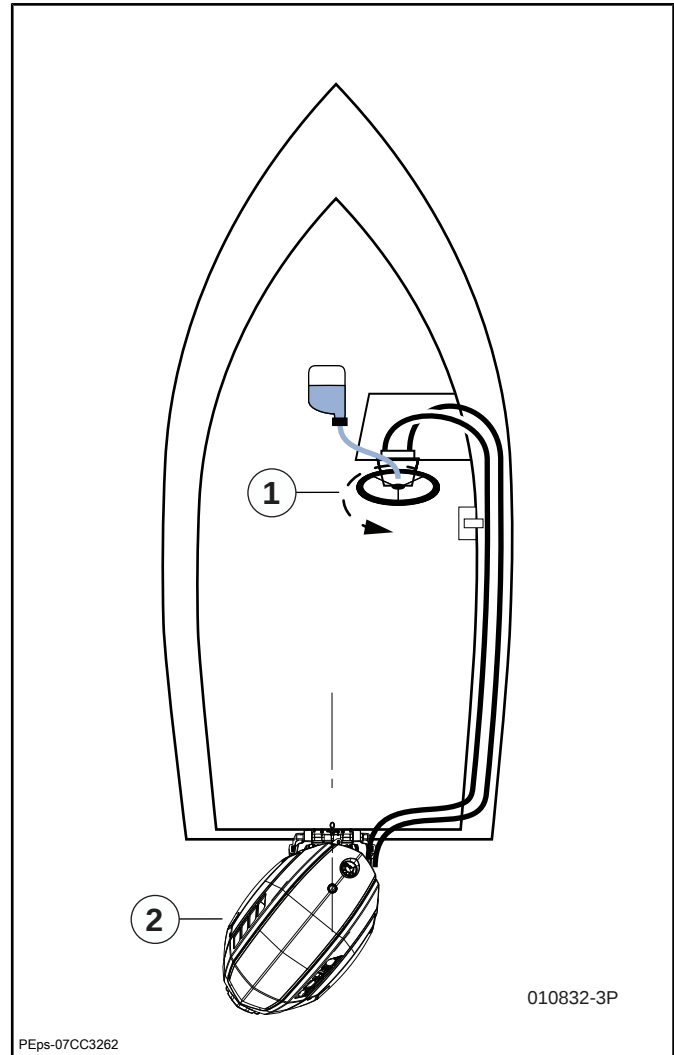
Filling and Bleeding the Hydraulic Steering System

4. Turn the steering wheel clockwise until the outboard is turned fully to STARBOARD and resistance is felt. Be sure to maintain fluid level at the helm/reservoir.



1. Turn the steering wheel clockwise
2. Outboard turned to STARBOARD

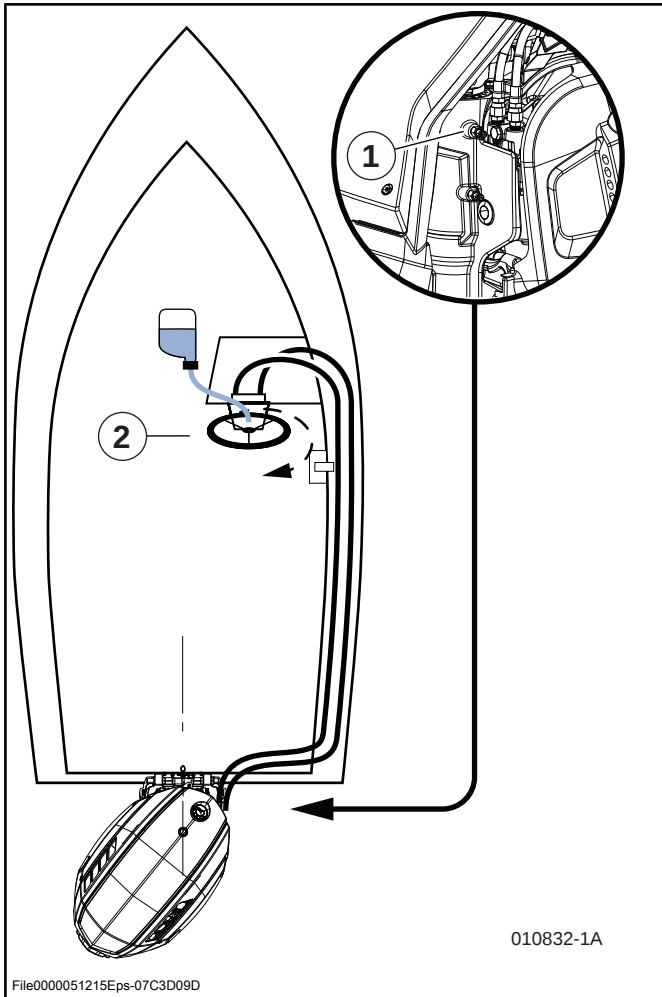
5. Turn the steering wheel counter-clockwise until the outboard is turned fully to PORT and resistance is felt. Be sure to maintain fluid level at the helm/reservoir.



1. Turn the steering wheel counter-clockwise
2. Outboard turned to PORT

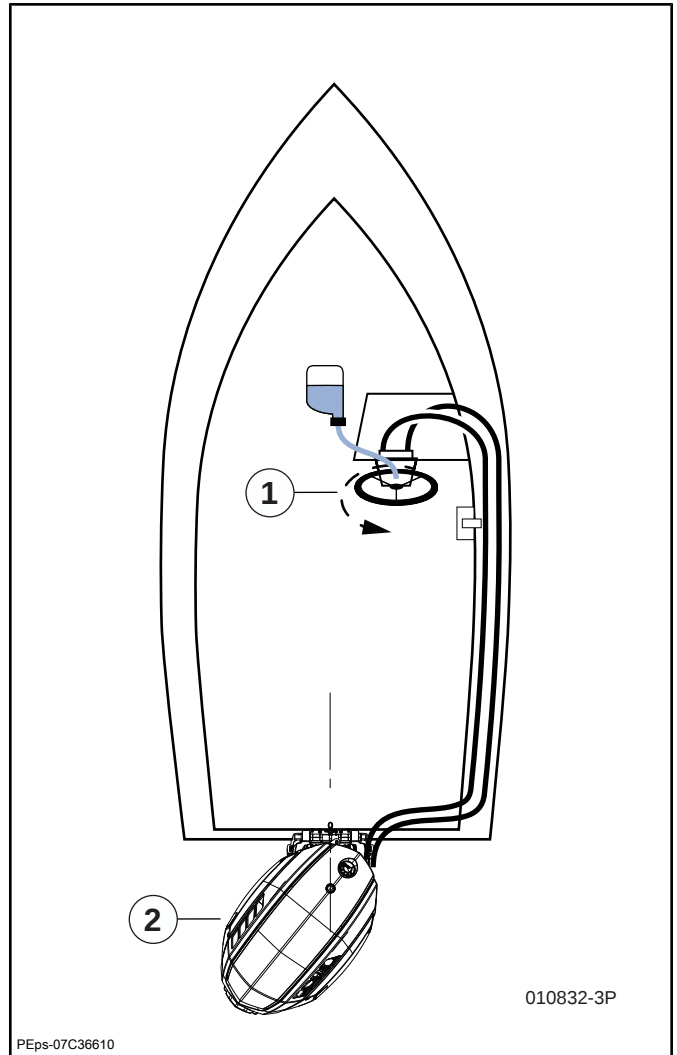
Have an assistant open and close the bleed valves and hold the outboard in position as directed:

6. Attach a length of clear hose to the UPPER bleed valve. Use an appropriate container to catch fluid flowing from the bleed valve.
7. Open the UPPER bleed valve **one-half** turn.
8. **Hold** the outboard in a PORT turn.
9. Then turn the steering wheel clockwise. Continue turning the steering wheel clockwise until there are no air bubbles present in the flow of fluid coming out of the bleed valve. Be sure to maintain fluid level at the helm/reservoir.



1. UPPER bleed valve
2. Turn the steering wheel clockwise

10. **Hold** the outboard in a **PORT** turn.
 11. Then turn the steering wheel counter-clockwise. Continue turning the steering wheel counter-clockwise until there are no air bubbles present in the flow of fluid coming out of the bleed valve. Be sure to maintain fluid level at the helm/reservoir.

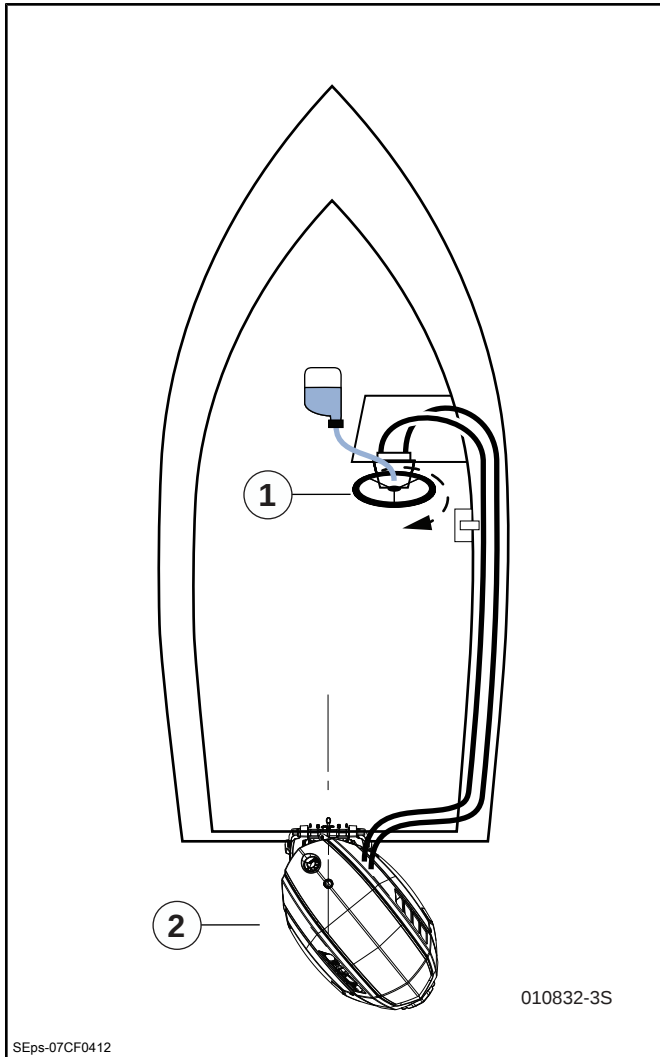


1. Turn the steering wheel counter-clockwise
2. Hold outboard in PORT turn

12. Have the assistant release the outboard. Close the UPPER bleed valve.
 13. Turn the steering wheel clockwise until engine is turned fully to **STARBOARD** and resistance is felt. Be sure to maintain fluid level at the helm/reservoir.

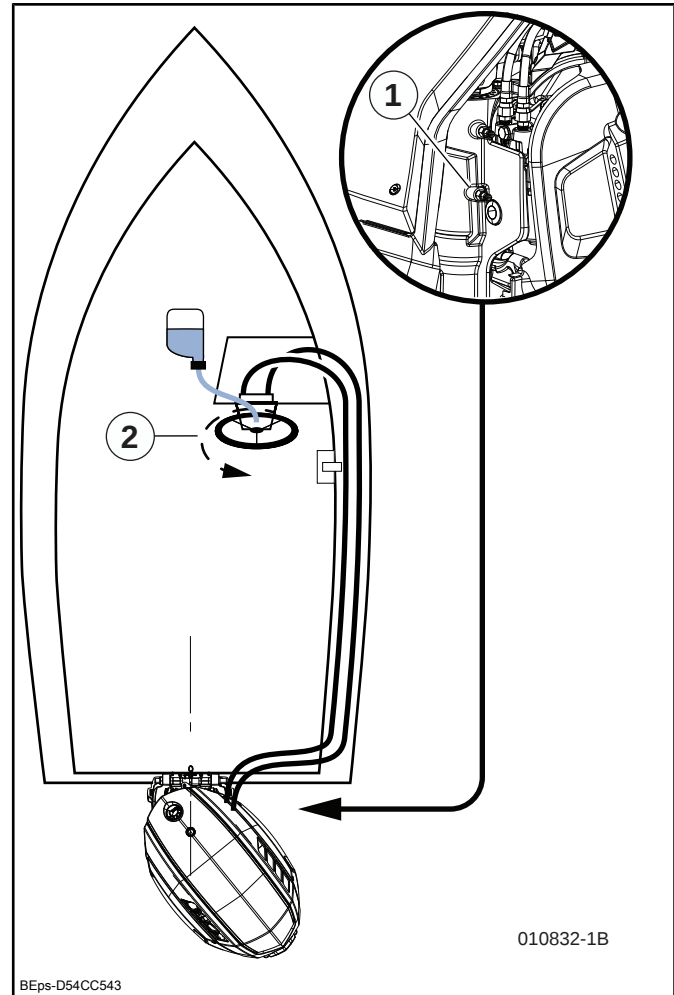
Stern/ Swivel System Overview

Filling and Bleeding the Hydraulic Steering System



1. Turn the steering wheel clockwise
2. Outboard turned to STARBOARD

14. Attach the length of clear hose to the LOWER bleed valve.
15. Open the LOWER bleed valve **one-half** turn.
16. **Hold** the outboard in a STARBOARD turn.
17. Then turn the steering wheel counter-clockwise. Continue turning the steering wheel counter-clockwise until there are no air bubbles present in the flow of fluid coming out of the bleed valve. Be sure to maintain fluid level at the helm/reservoir.

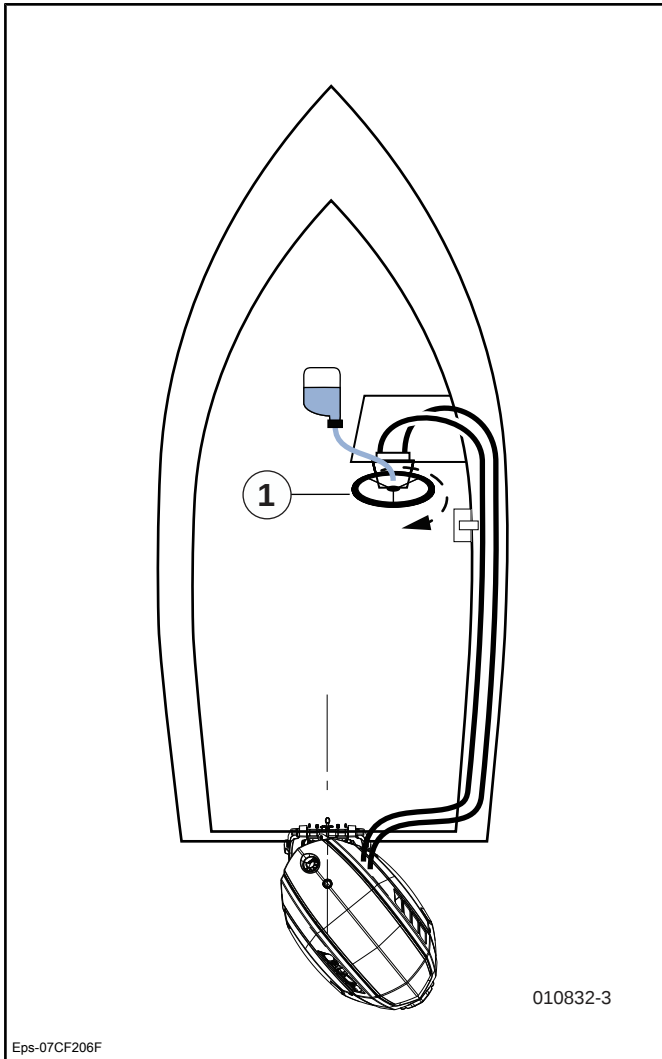


1. LOWER bleed valve
2. Turn the steering wheel counter-clockwise

18. **Hold** the outboard in a STARBOARD turn.
19. Then turn the steering wheel clockwise. Continue turning the steering wheel clockwise until there are no air bubbles present in the flow of fluid coming out of the bleed valve. Be sure to maintain fluid level at the helm/reservoir.

Stern/ Swivel System Overview

Filling and Bleeding the Hydraulic Steering System



1. Turn the steering wheel clockwise

20. Have the assistant release the outboard. Close the LOWER bleed valve.
21. Tighten both bleed valves to a torque of 84 to 120 in.lb. (9.5 to 13.5 N·m).
22. Remove the filler tube from the helm. Install the fill cap on the helm, tighten securely.
23. Proceed to **Steering System Checks**.

Power Purge Method

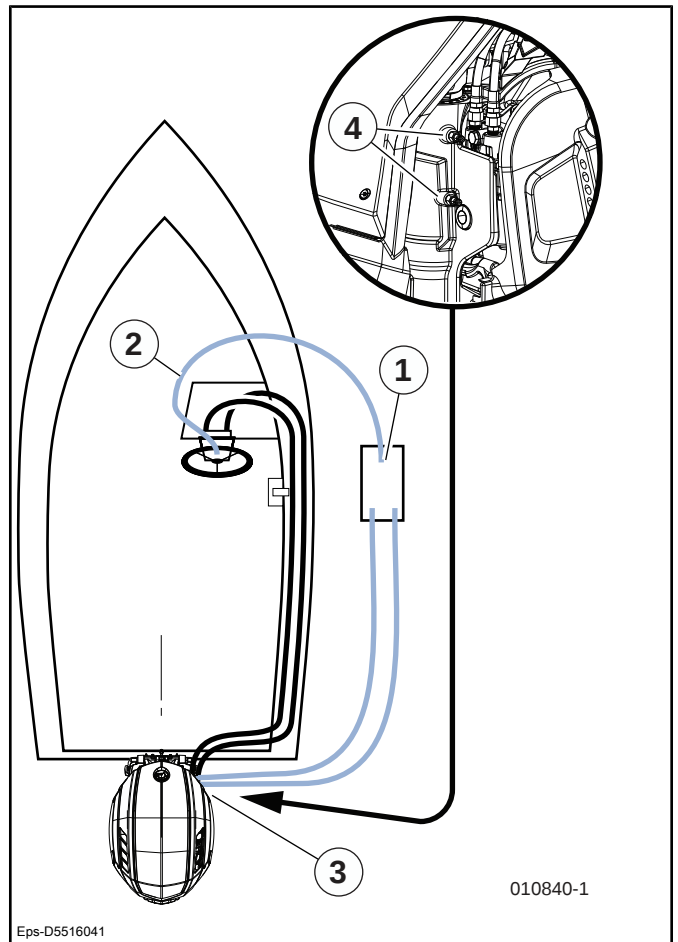
A Teleflex Power Purge system, P/N 768014, can be used to bleed the steering system. Make sure the purging unit has the correct hydraulic fluid. Purge the steering system manually if the fluid in the purging unit is a non-approved or unknown type.

IMPORTANT: Turn the key switch to the ON position for models with DPS.



TELEFLEX POWER PURGE JR.

1. Remove the fill cap from the helm. Connect the hydraulic fluid supply line of the purging unit to the helm.
2. Connect the hydraulic fluid return lines of the purging unit to the two bleed valves of the steering system.

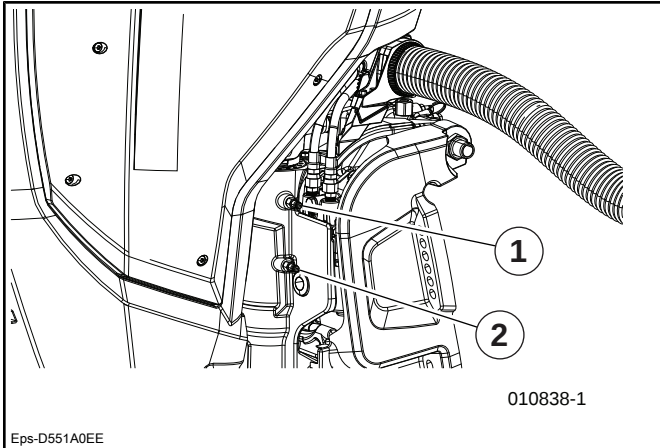


1. Power Purge unit
2. Hydraulic fluid supply lines
3. Hydraulic fluid return lines
4. Bleed valves

3. Loosen both bleed valves **one-half** turn. Then turn the purge unit ON.

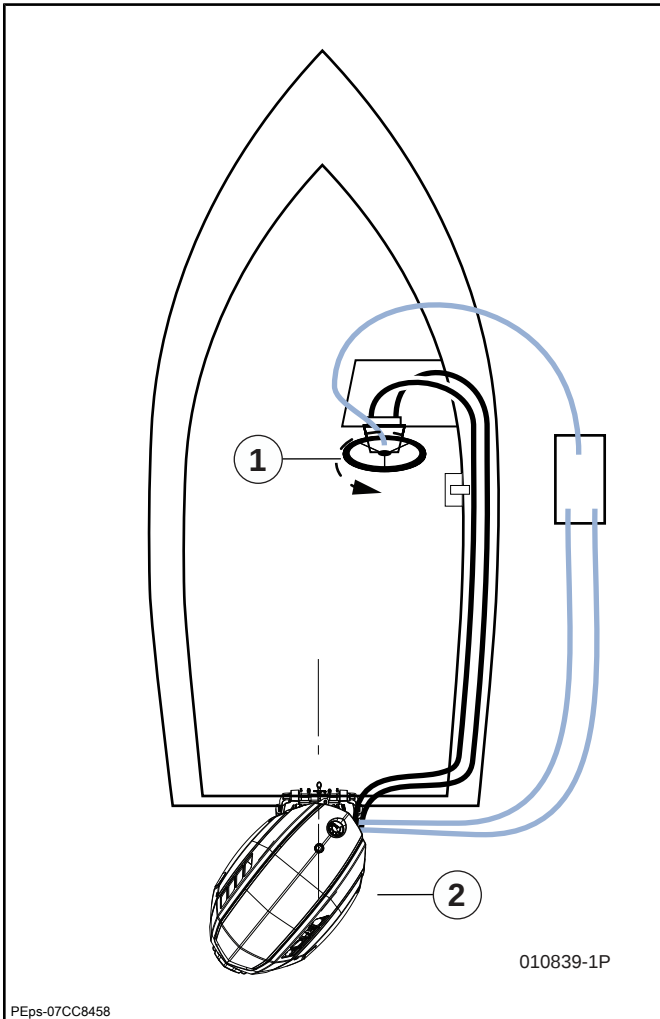
Stern/ Swivel System Overview

Filling and Bleeding the Hydraulic Steering System



1. Upper bleed valve
2. Lower bleed valve

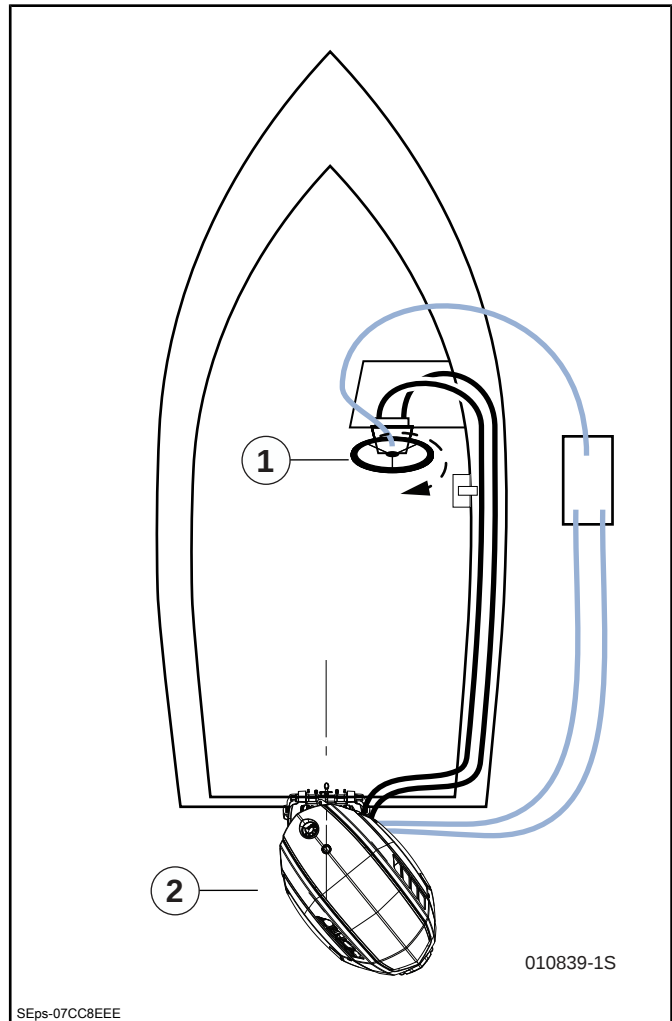
4. After air bubbles are no longer visible, turn the steering wheel counterclockwise until engine is turned fully to PORT and resistance is felt.



1. Turn the steering wheel counterclockwise
2. Outboard turned to PORT

Have an assistant hold the outboard in position as directed:

5. **Hold** the outboard in a PORT turn.
6. Turn the steering wheel counter-clockwise. Continue turning the steering wheel counter-clockwise until there are no air bubbles present in the flow of fluid coming out of the bleed valve.
7. Next turn the steering wheel clockwise. – Continue turning the steering wheel clockwise until there are no air bubbles present in the flow of fluid coming out of the bleed valve.
8. Have the assistant release the outboard. Turn the steering wheel clockwise until engine is turned fully to STARBOARD and resistance is felt.



1. Turn the steering wheel clockwise
2. Outboard turned to STARBOARD

9. **Hold** the outboard in a STARBOARD turn.
10. Turn the steering wheel clockwise. – Continue turning the steering wheel clockwise until there are no air bubbles present in the flow of fluid coming out of the bleed valve.
11. Next turn the steering wheel counter-clockwise. – Continue turning the steering wheel

counter- clockwise until there are no air bubbles present in the flow of fluid coming out of the bleed valve.

12. Have the assistant release the outboard. Tighten both bleed valves to a torque of 84 to 120 in. lb. (9.5 to 13.5 N·m). Then turn the purge unit OFF.
13. Disconnect the return lines of the power purge from the two bleed valves of the steering system.
14. Disconnect the hydraulic fluid supply line of the power purge from the helm.
15. Install the covers on the bleed valves. Install the fill cap on the helm, tighten securely.
16. Perform **Steering System Checks**.

Steering System Checks

1. Turn steering wheel to PORT. After engine is turned fully to PORT, apply enough force to the steering wheel to exceed the pressure relief valve pressure of the helm.
2. While pressure is maintained on helm, check all PORT lines and fittings for leaks.
3. Turn steering wheel to STARBOARD. After engine is turned fully to STARBOARD, apply enough force to the steering wheel to exceed the pressure relief valve pressure of the helm.
4. While pressure is maintained on helm, check all STARBOARD lines and fittings for leaks.
5. Repair all leaks. Repeat steps 1 through 4 before continuing.
6. Cycle the steering system from full PORT turn to full STARBOARD turn several times. Definite resistance should be felt when the steering wheel is turned full PORT or full STARBOARD.

IMPORTANT: If definite resistance is NOT felt, or if steering feels loose or “soft” wait 15 minutes and repeat the bleeding process.

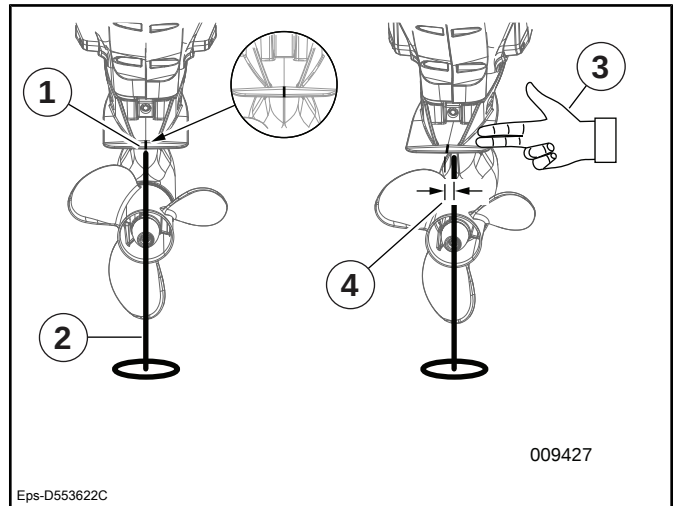
7. Check the fluid level of the helm pump and fill per the manufacturers recommendation.
8. Check mechanical free play.

NOTE: Some free play movement of the steering system is normal.

Check mechanical free play:

- Make sure the anti-ventilation plate of the gearcase is approximately level.
- Make a mark in the center/rear of the anti-ventilation plate of the gearcase.
- Center a stationary object, such as a length of threaded rod attached to a plate, behind the mark on the gearcase to serve as a reference point.

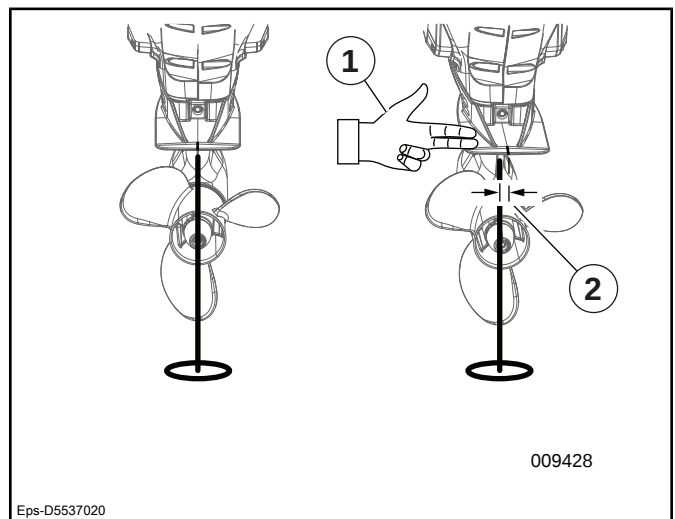
- Use two fingers to push the gearcase to port.
- Measure and record the distance between the mark and the reference point.



MECHANICAL FREE PLAY MEASUREMENT

1. Mark
2. Reference point object
3. Push against gearcase
4. Measurement

- Use two fingers to push the gearcase to starboard.



MECHANICAL FREE PLAY MEASUREMENT

1. Push against gearcase
2. Measurement

- Measure and record the distance between the mark and the reference point.

Add the measurements. The result should not exceed approximately 0.59 in. (15 mm).

If the result exceeds this dimension, additional bleeding may be required. Push the gearcase to port, until the steering mechanism bumps the mechanical stop. Then push steadily with increasing force. Repeat to starboard. Definite resistance

Stern/ Swivel System Overview

Filling and Bleeding the Hydraulic Steering System

should be felt in both directions. If after bumping the mechanical stop the gearcase continues to

move in the direction it is being pushed, or it feels loose or “soft” repeat the bleeding process.

G2 66°V6 and 74°V6 Full Featured Stern/ Swivel Steering Shaft Vertical Movement

NOTE: Steering shaft vertical movement in all stern/ swivel assemblies is normal. By design, when steering from port lock to starboard lock, the steering shaft will move vertically .010" (.254mm) to .030" (.762mm). If excessive vertical movement greater than .030" (.762mm) is suspected, a measurement of the vertical shaft movement should be performed.

Reference the TST (OE G2 66° and 74° Full Featured Stern/Swivel Steering Shaft Vertical Movement_000134676_TST84Y018S00_en) for the below information.

1. Attach the lifting hook to the engine.
2. Remove the two upper stern/ swivel nuts.
3. Remove the four lower engine mount bolts.
4. Separate the stern/swivel from the engine midsection. Do not remove the steering hoses.
5. Attach a dial indicator assembly to the stern/ swivel, and secure dial indicator on the top of the swivel cap.
6. Turn the stern/ swivel to the full port position. This will ensure the steering piston is at the bottom of its travel.
7. Set the dial indicator to zero.

NOTE: Make sure that the dial indicator has a preload, zeroed, and in the center of the cap.

8. Steer to the full starboard position. This will ensure that the steering piston moves to the top of its travel. Observe the movement of the dial indicator.
9. If the measurement is >.030" (.762 mm), replace the steering shaft top cap, P/N 5009971. The new steering shaft top cap kit now utilizes washer under the retention bolts and an increased bolt torque. This will reduce vertical play by .010 - .015" (.254 - .381 mm).

Notes

Technician's Notes

[illegible]

Related Documents

Bulletins

[illegible]

Instruction Sheets

[illegible]

Other

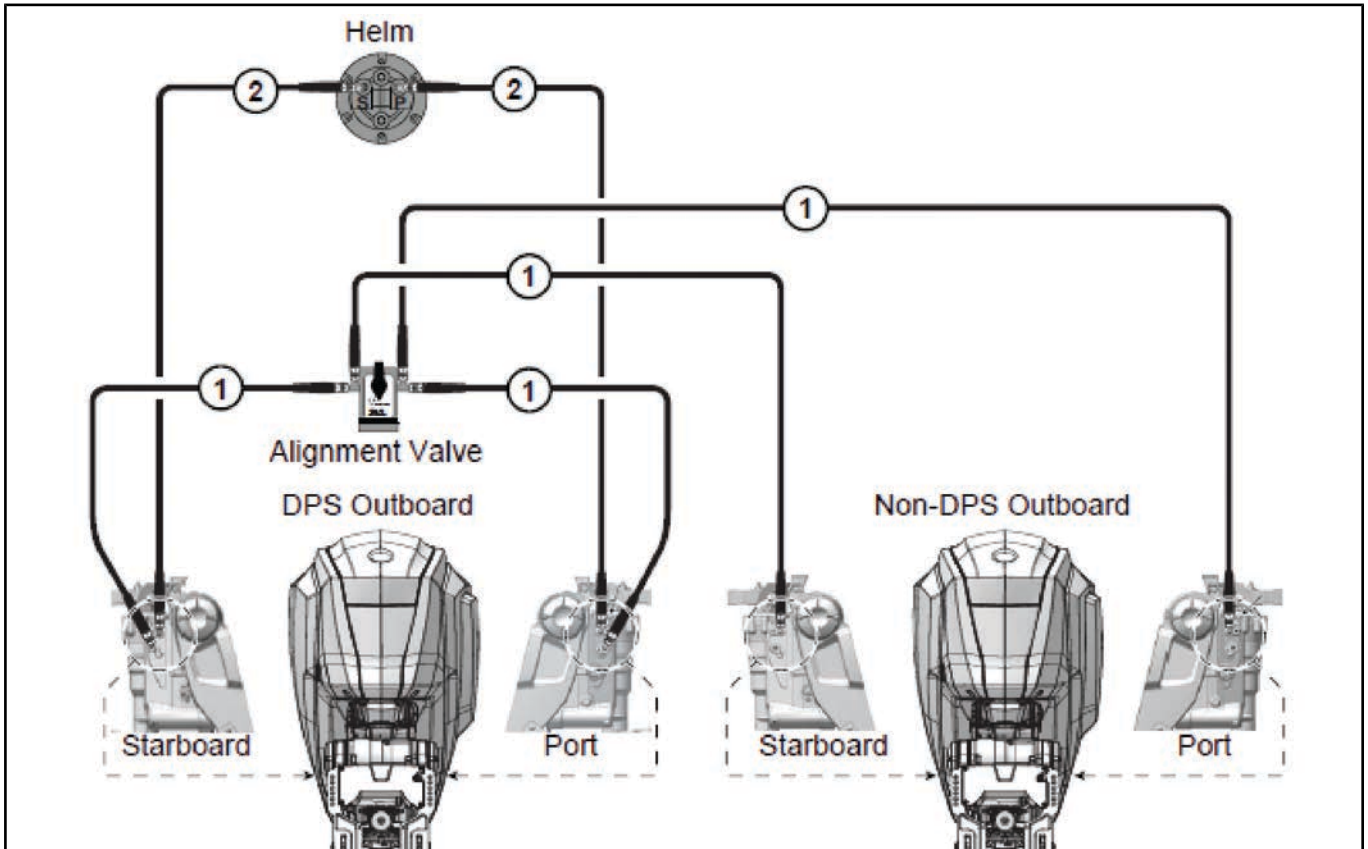
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Accessory Kits

Hydraulic Tie Bar Kit (Twin G2 Engine Installation)

Installation of Hydraulic Tie Bar Kit, P/N 5009622, requires one DPS outboard and one non-DPS outboard.

Follow to instruction sheet, P/N 358194, which is included in the kit.



1. Hoses labeled "1" are rated at 3000 psi minimum and must be supplied by BRP. See PAC catalog and instruction sheet, P/N 358194.
2. Hoses labeled "2" can be any hose approved by the helm manufacturer (1500 psi rating).

Accessory Kits

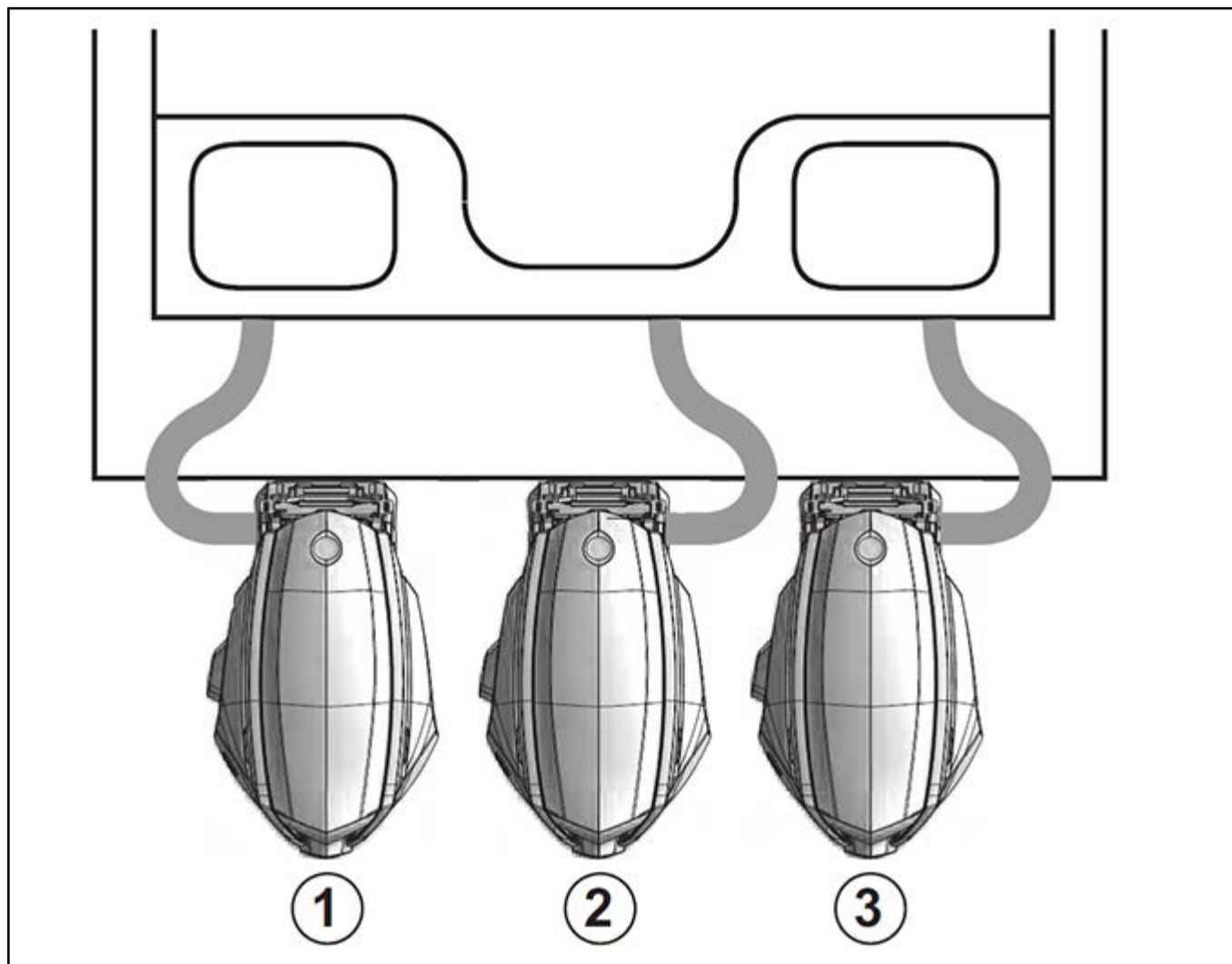
Hydraulic Tie Bar Kit (Twin G2 Engine Installation)

Multiple Outboard Transom

A three outboard installation REQUIRES 2 DPS outboard models.

Install the DPS outboards in the following transom positions:

- 1 and 2, or
- 2 and 3, or
- 1 and 3



Transom Positions - Three Outboards

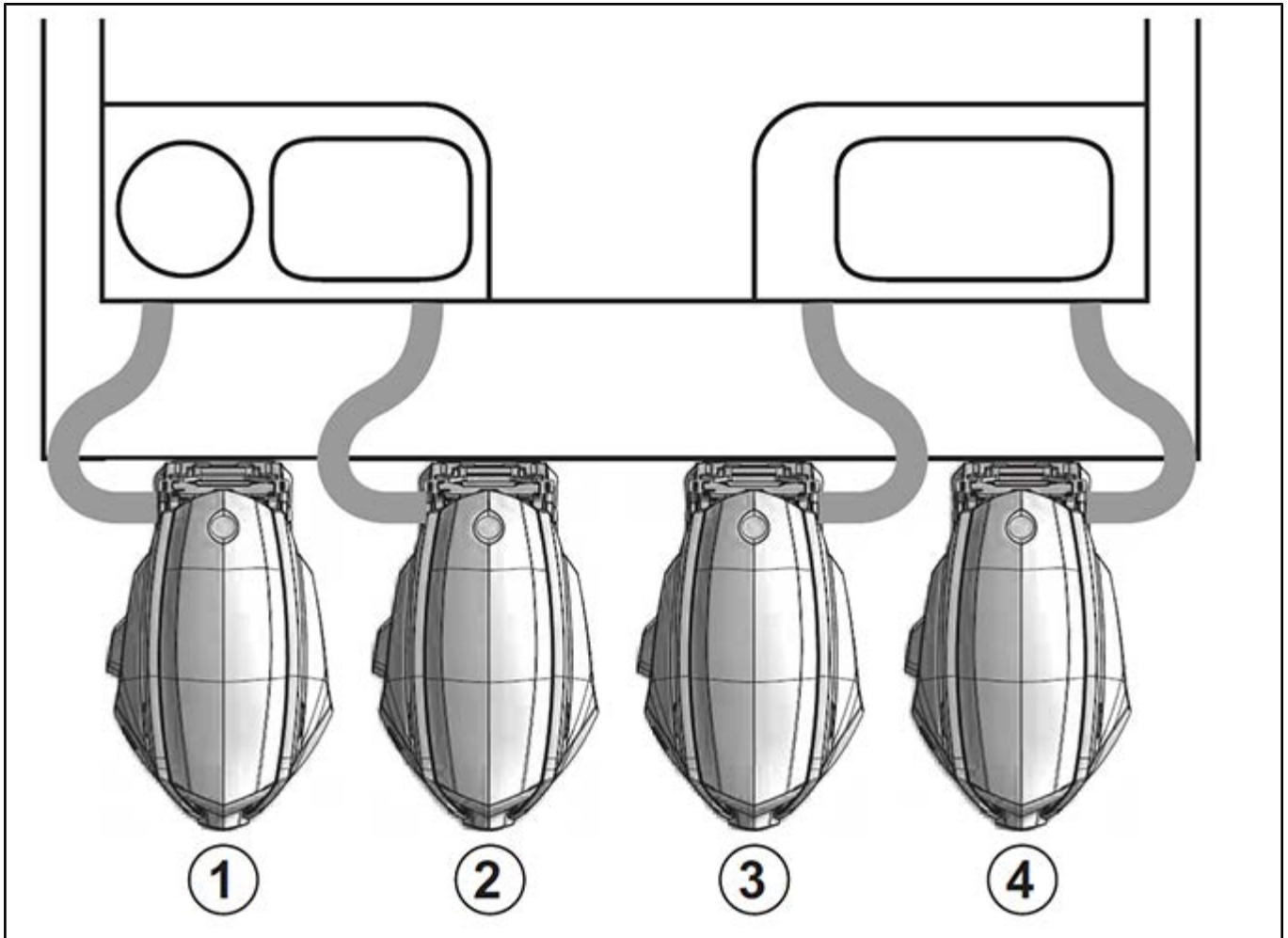
A four outboard installation REQUIRES 2 DPS outboard models.

One DPS outboard MUST be mounted on the port side of the boat and the other mounted on the starboard side of the boat.

Install the DPS outboards in the following transom positions:

- 1 and 3, or
- 2 and 3, or
- 2 and 4

Do NOT install the DPS outboards together in transom positions 1 and 2, or 3 and 4.



Transom Positions - Four Outboards

Notes

Technician's Notes

[illegible]

Related Documents

Bulletins

[illegible]

Instruction Sheets

[illegible]

Other	
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DPS Troubleshooting

Diagnostic Software Inspections

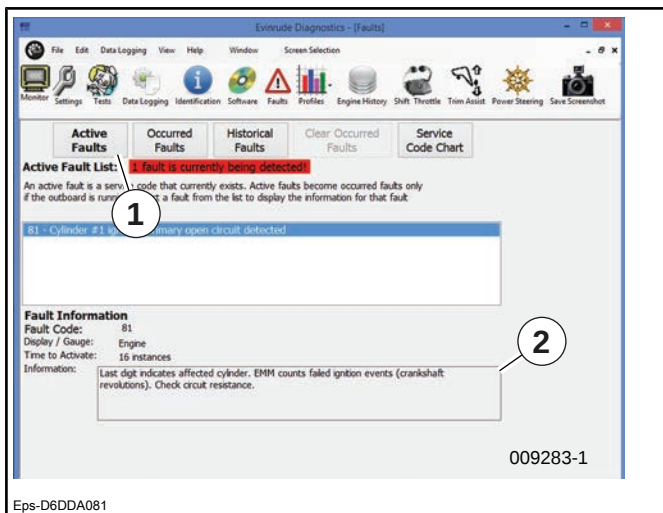
Before running the outboard, use *Evinrude Diagnostics* software v 6.4 or higher to review information saved in the *EMM*.

Correct any problems and clear any fault codes before further troubleshooting.

Faults

Check the Faults Screen. Press the Active Faults button to view existing faults.

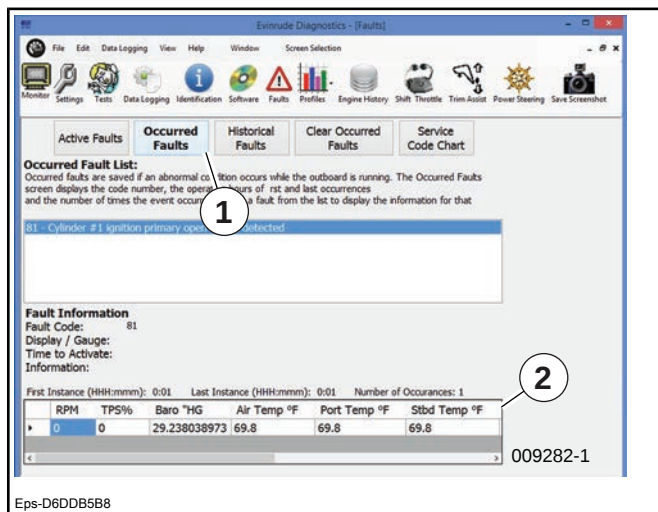
The Active Faults screen displays fault codes that currently exist. An active fault becomes an occurred fault only if the outboard is running.



ACTIVE FAULTS SCREEN

1. Active Faults button
2. Information

Press the *Occurred Faults* button to view detailed information about the operating conditions of the engine at the time the fault code was set.



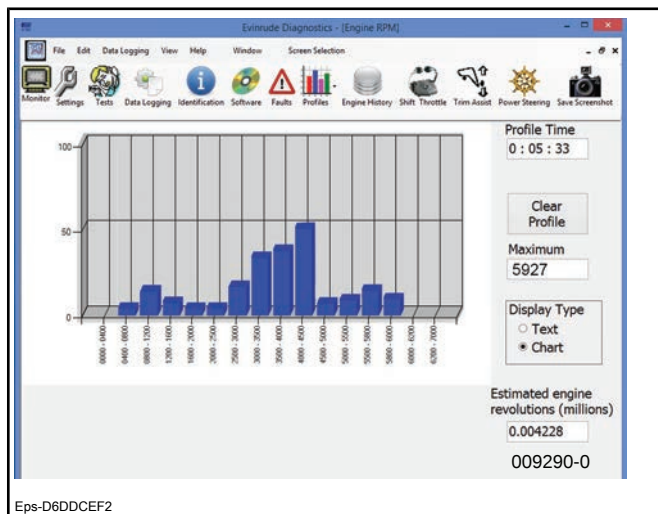
OCCURRED FAULTS SCREEN

1. Occurred Faults button
2. Detailed Information

Profiles

Review information about how the outboard has been operated using the *Profiles* screens.

- Check the *RPM Profile* for long periods of low speed operation or periods of over-revving RPM.

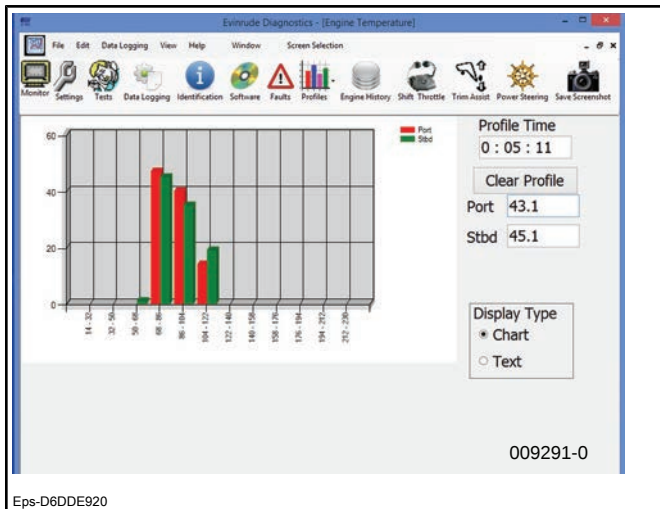


RPM PROFILE

- Check the *Engine Temperature Profile* for evidence of cold running or overheating.

DPS Troubleshooting

Diagnostic Software Inspections



Eps-D6DDE920

ENGINE TEMPERATURE PROFILE

History and Reports

View engine history and save reports from the History screen. Reports save a snapshot of current engine and sensor conditions.

From the *History* screen:

- Press the *Create EDF* button to create an engine data file. Engine data files are required when replacing an *EMM*.
- Press the *Running History* button to view the *Last Two Minutes* of engine run history.
- Press the *Create Report* button to create a new report (must be connected to/communicating with the engine *EMM*).
- Press *Open Exports Folder* to view saved reports.
- Press *Show Selected Report* to view a report selected from the Engine History Records List.



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HISTORY SCREEN

- The *Last Two Minutes* report is generated and saved as part of the Engine Report. Engine run-time values during the last two minutes of operation above 1500 rpm is collected once per second. The newest record is first on the list. As each new record is added, the oldest record is removed.

Last 2 Minutes History													
Time	RPM	TPS	Temp°F	Volts	Knock	OIL	Time	RPM	TPS	Temp°F	Volts	Knock	OIL
0	3000	8	91.4	55	000000	0	-60	0	10	32	<30	000000	0
-1	3100	8	91.4	55	000000	0	-61	0	10	32	<30	000000	0
-2	3000	8	91.4	55	000000	0	-62	0	10	32	<30	000000	0
-3	2900	8	91.4	55	000000	0	-63	0	10	32	<30	000000	0
-4	2500	8	91.4	55	000000	0	-64	0	10	32	<30	000000	0
-5	2100	7	89.6	55	000000	0	-65	0	10	32	<30	000000	0
-6	2000	7	89.6	55	000000	0	-66	0	10	32	<30	000000	0
-7	1600	7	89.6	55	000000	0	-67	0	10	32	<30	000000	0
-8	2800	8	89.6	55	000000	0	-68	0	10	32	<30	000000	0
-9	2700	8	89.6	55	000000	0	-69	0	10	32	<30	000000	0
-10	2600	8	89.6	55	000000	0	-70	0	10	32	<30	000000	0
-11	2300	8	89.6	55	000000	0	-71	0	10	32	<30	000000	0
-12	2100	7	89.6	55	000000	0	-72	0	10	32	<30	000000	0
-13	2000	7	87.8	55	000000	0	-73	0	10	32	<30	000000	0
-14	1900	7	87.8	55	000000	0	-74	0	10	32	<30	000000	0
-15	1900	6	89.6	55	000000	0	-75	0	10	32	<30	000000	0
-16	1900	6	87.8	55	000000	0	-76	0	10	32	<30	000000	0
-17	1900	6	87.8	55	000000	0	-77	0	10	32	<30	000000	0
-18	1900	6	87.8	55	000000	0	-78	0	10	32	<30	000000	0
-19	1900	6	87.8	55	000000	0	-79	0	10	32	<30	000000	0
-20	1700	7	87.8	55	000000	0	-80	0	10	32	<30	000000	0
-21	1900	7	89.6	55	000000	0	-81	0	10	32	<30	000000	0
-22	2200	7	87.8	55	000000	0	-82	0	10	32	<30	000000	0
-23	2200	7	87.8	55	000000	0	-83	0	10	32	<30	000000	0
-24	2200	7	87.8	55	000000	0	-84	0	10	32	<30	000000	0

009295-0

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LAST TWO MINUTES

Data Logging

Run the outboard in the water at all speeds. Be sure to run at any report problem engine speeds to confirm actual symptoms. Inspection should include the following:

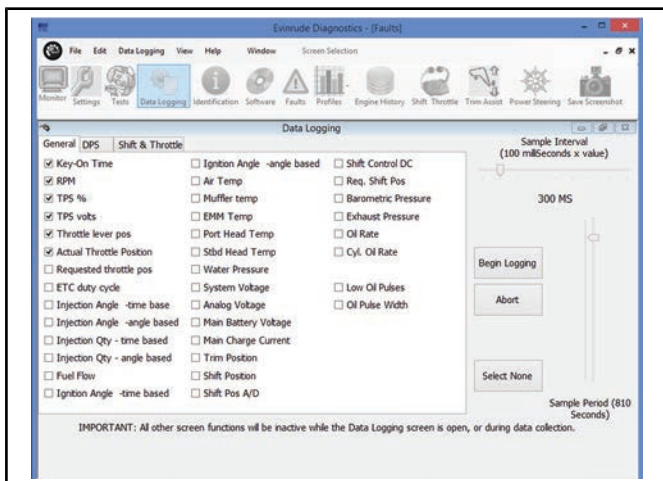
- Use the diagnostics software *Logging* function to record engine data as a problem is occurring.

NOTE: The engine should have sufficient cooling water provided to keep the DPS Module cool prior to proceeding with any logging.

IMPORTANT: The Data Log should be set to 300 ms and include the Port and Starboard Pressures, Thermistor Temperature, DPS Duty Cycle, DPS Module Temp, Pump Current, and Steering Angle. This will give a complete and accurate data log for further troubleshooting.

When initiating the data log, do not turn the engine immediately. Allow the engine to sit static for a couple seconds so that a baseline can be logged.

With a baseline log, it will allow the technician to see any irregularities with any of the sensor readings when compared to the baseline readings. The engine should then be turned smoothly from full lock port to full lock starboard a couple times each way with the helm input to provide a good data log.



LOGGING SCREEN

DPS Troubleshooting

DPS2 - Steering System Test (AFA and newer models)

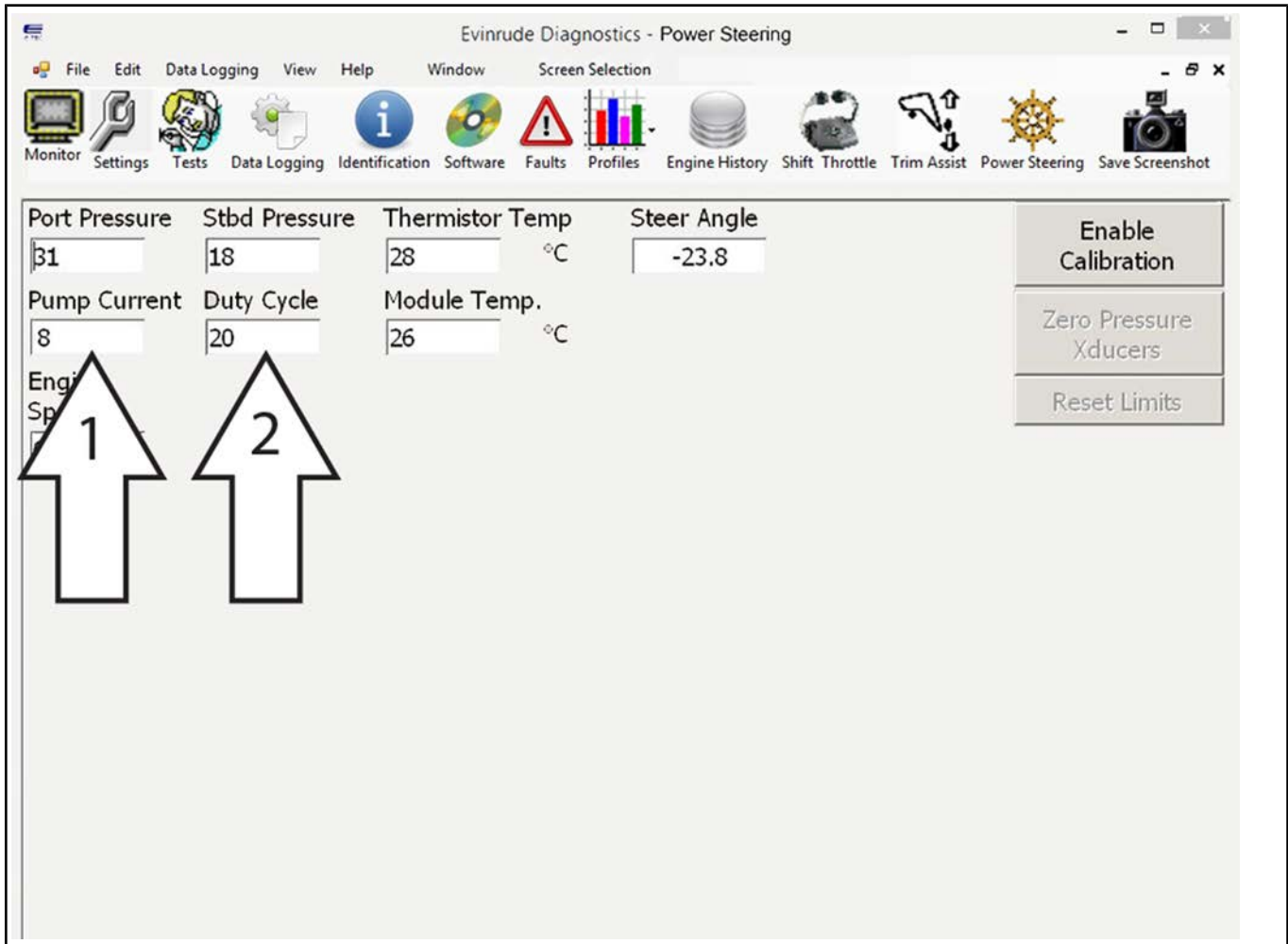
DPS2 - Steering System Test (AFA and newer models)

Steering System Test:

Turn the steering wheel fully to PORT. The power steering pump should run, and then shut OFF when the engine is fully to PORT.

Turn the steering wheel fully to STARBOARD. The power steering pump should run, and then shut OFF when the engine is fully to STARBOARD.

In some installations it may be difficult to hear the power steering pump cycle ON/OFF. Use the Power Steering screen of EvDiag6 to monitor **Pump Current** and **Duty Cycle**.



1. Pump Current
2. Duty Cycle

DPS motor does not run / Code 211

DPS motor does not run / Code 211

- Is this a DPS model engine?
 - Remove the port side panel and locate a DPS module. No module = non-DPS model.
- Is the "Power Steering" icon visible at the top of EvDiag6?
 - OR- Is there a "Steering Firmware" number in the software section at the bottom of the "Identification" screen?
 - NO
 - ◆ Test the DPS module 4-pin CAN connector
 - ◆

Scale	Red Meter Lead	Black Meter Lead	Reading
Volts	Purple/White (pin 1)	Engine ground	12v (battery voltage)
Volts	Orange/Black (pin 2)	Engine ground	2.0v $\pm$ 0.1
Volts	Brown/Orange (pin 3)	Engine ground	3.0v $\pm$ 0.1
Ohms	Black wire (pin 4)	Engine ground	< 2 Ω

- ◇ Unplug all three external DPS sensors (port, starboard, and steering angle sensor)
 - ⇒ *One of these sensors may be shorted internally or on their wire harness (red wire); plug them in one by one until the symptom returns. Replace the failed sensor.*
- Do the pressure sensor readings rise when turning to each respective side (Port rises when turning to port, starboard rises when turning to starboard)?
 - NO
 - ◆ Test DPS module pressure sensor circuits using "DPS Quick Test TST" to determine if problem is in the module – DPS monitor screen should read 0 psi with the sensor unplugged, and 1500psi when the red and green (or white) wires are momentarily jumped.
 - ◇ *If the module passes these tests, the sensor is causing the issue. Replace the pressure sensor.*
- Is the steering angle reading a constant -32°/+32°?
 - YES
 - ◆ Unplug the steering position sensor from the module, does it now read N/A?
 - ◇ If yes, replace the steering position sensor.
- Does the steering angle sweep smoothly through the full range (-32° port / +32° starboard)?
 - Test the DPS module steering position sensor circuits
 - ◆ If the module passes these tests, replace the steering position sensor

Scale	Red Meter Lead	Black Meter Lead	Reading
Volts	Red wire	Engine ground	5v
Volts	Red wire	Blue wire	1.5v $\pm$ 0.1
Ohms	Black wire	Engine ground	< 2 Ω

DPS Troubleshooting

DPS motor does not run / Code 211

- Does Duty cycle / Pump Current rise when turning the engine?
 - NO (only one, the other or neither rise)
 - ◆ Check 12v supply to 3-pin DPS motor plug (battery voltage)
 - ◆ Check DPS motor ground connection on cylinder block from module
 - ◆ Check DPS Module output using 5010720 test lead, per 2018-05(S) Service Bulletin
 - ◆ Test DPS motor resistance = around 5 Ω

DPS Motor continues to run / runs constantly

Does the DPS motor run when the key is off?

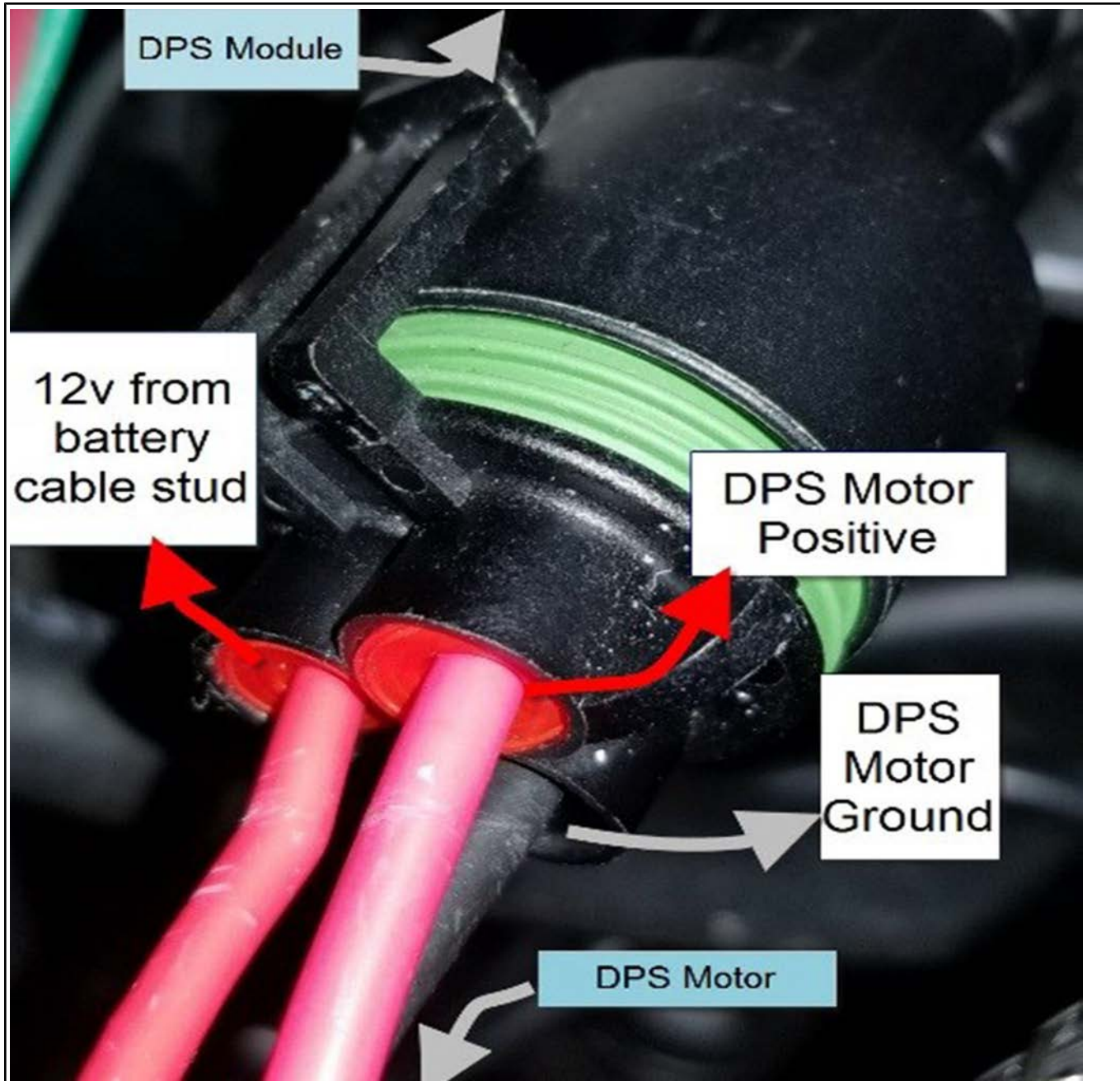
- “Only when the trim or control head is activated or moved”
 - The systems “wakes up” when the key is turned on or the trim switch or remote control are activated. Key on power is supplied from the helm to the EMM.

Unplug the 3-pin DPS motor plug to prevent the motor from constantly running.

- Verify that the two red wires on the DPS motor 3-pin connector have not been accidentally switched in the plug. This would give the DPS motor a constant 12v from the battery cable stud. See below image.

DPS Troubleshooting

DPS Motor continues to run / runs constantly



- Open EvDiag6, Power Steering Monitor screen. Verify that the pressure sensors are reading zero psi with the engine(s) and helm not turning.
 - ◆ If either or both pressure sensors are reading pressure here, perform the pressure sensor / module tests as outlined earlier. Replace the failed pressure sensor.
- If neither pressure sensor is reading pressure when the helm and engine are static, but the DPS motor still runs, and the wires are in their correct pin locations, the issue may be internal in the DPS module.

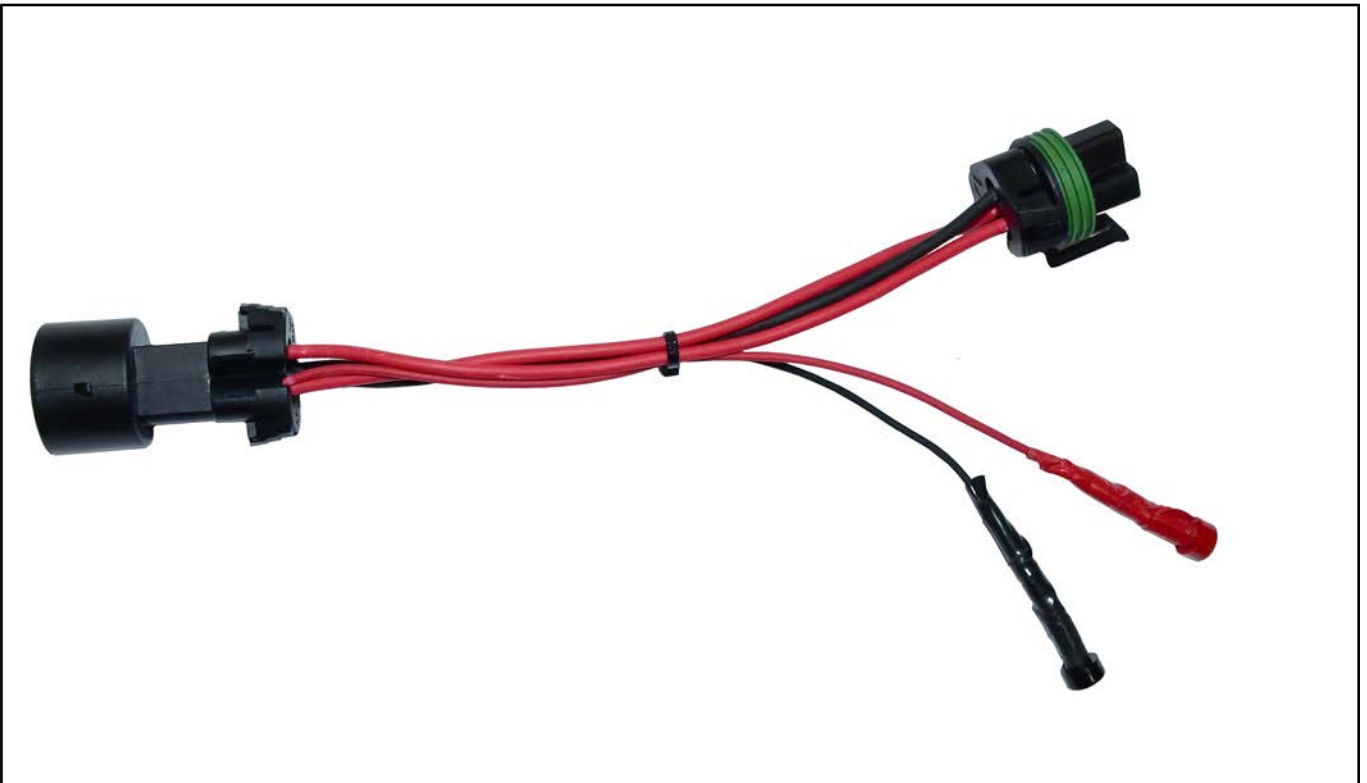
Unresponsive and/or Sluggish Steering

Problem:

The DPS steering is sluggish, slow to respond, or the DPS motor is not running as the steering wheel is turned.

Solution:

Use DPS Test Lead, P/N 5010720, with a Peak-Reading Voltmeter or Digital Multimeter and DVA adapter to test the output of the DPS module.



9

1. DPS Test Lead, P/N 5010720

Test Procedure

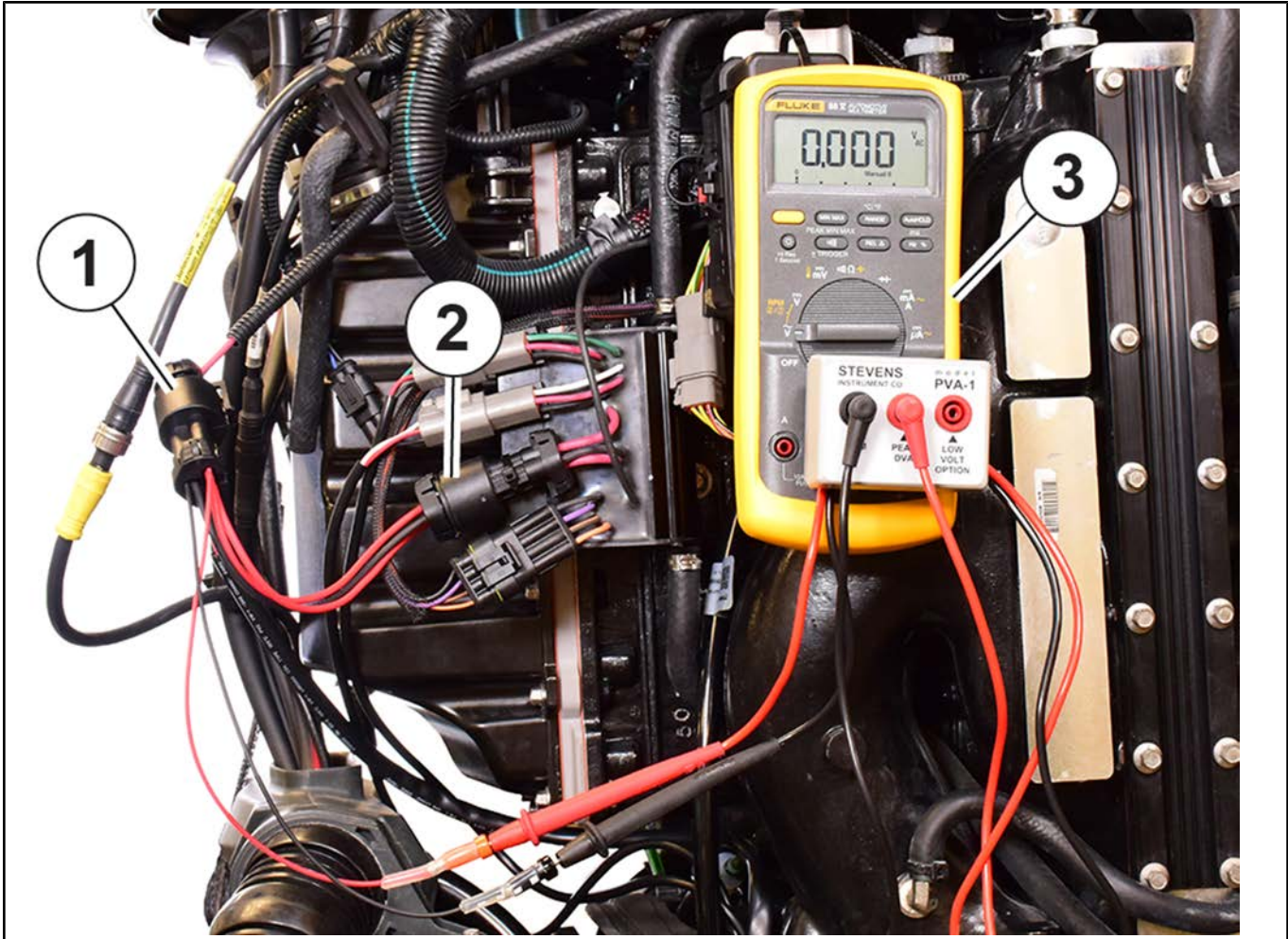
The output of the DPS module is Pulse-width Modulation (PWM). Use the DPS Test Lead, P/N 5010720, and a Peak Reading Voltmeter such as a Stevens CD-77, or a Digital Multimeter with a DVA adapter, such as a Stevens PVA-1, to check the DPS module output.

1. Install the test adapter between the DPS module and the DPS motor cable.
2. Connect the meter leads to the DPS Test Lead, P/N 5010720. Connect the positive meter lead to the red lead. Connect the negative meter lead to the black lead.
3. If using the Stevens CD-77, set to "POS" and "50".
4. If using a digital multimeter, turn the multimeter on. Set as recommended by the instructions for the DVA adapter. Select a voltage range that will read a minimum of 12 volts.
5. If using a Stevens PVA-1, set the multimeter to "DC Volts". Select a voltage range that will read a minimum of 12 volts.
6. Turn the key switch to the ON position.
7. Turn the steering wheel in a smooth even motion and observe the voltage reading.

IMPORTANT: Turning the steering wheel erratically will result in erratic voltage readings. Any result ABOVE 0.0 volts indicates output from the module.

DPS Troubleshooting

Unresponsive and/or Sluggish Steering



1. DPS Module Test Adapter, P/N 5010720
2. DPS motor cable
3. Digital Multimeter with DVA adapter

If the test results indicate output from the DPS module (12 volts approximately), the DPS module is good. Check wiring and test the DPS steering motor.

If the test results indicate no output (0.0 volts) from the DPS module, additional troubleshooting is required.

For DPS1 models, refer to the correct **Service Manual**.

For DPS2 models, continue to **DPS2 Module Troubleshooting**.

Only get steering assist in one direction, not the other

Confirm that this is a DPS-2 system and DPS-2 firmware is installed in the module.

Proceed with the DPS pressure sensor monitoring to confirm that each pressure sensor rises in pressure when turning to that respective side. (Port reading rises when turning to port, Starboard reading rises when turning to starboard)

Verify that the steering position sensor is not reading erratically or flip flopping rapidly between positive and negative readings.

- If the engine has the new digital style steering position sensor (P/N 5010945), please verify that the latest DPS module, P/N 587430, is installed.
 - **This new style steering position sensor is not compatible with the P/N 587389 or earlier DPS modules.**

Steering is stiff in one direction or the other

Verify that the steering is still stiff even with the key in the OFF position and the DPS motor is not running. This will isolate the DPS system from the hydraulic system. The steering should feel the same one way or the other, even with the key OFF.

- If the steering is still stiff in one direction, isolate the boat hydraulic system from the engine. Remove the hydraulic lines from the swivel and install a short length of hydraulic line from one fitting to the other as a bypass. Manually turn the engine from full lock to full lock in each direction. Should have smooth operation.
- If the engine moves freely from one side to the other, the issue is in the boat hydraulic system.

Steering wheel keeps turning and does not stop / helm “freewheels” in one direction

Remove the hydraulic lines from the swivel. Install plugs into the fittings on the hydraulic lines, as well as on the fittings on the swivel.

- With the fittings on the swivel, you should not be able to manually move the engine very much from side to side along the steering axis.
- With the plug fittings on the hydraulic lines, you should not be able to turn the helm very much to either side.
 - If either system presents free movement, that is the culprit system and needs to be repaired / replaced.

DPS Troubleshooting

DPS2 Module Troubleshooting

DPS2 Module Troubleshooting

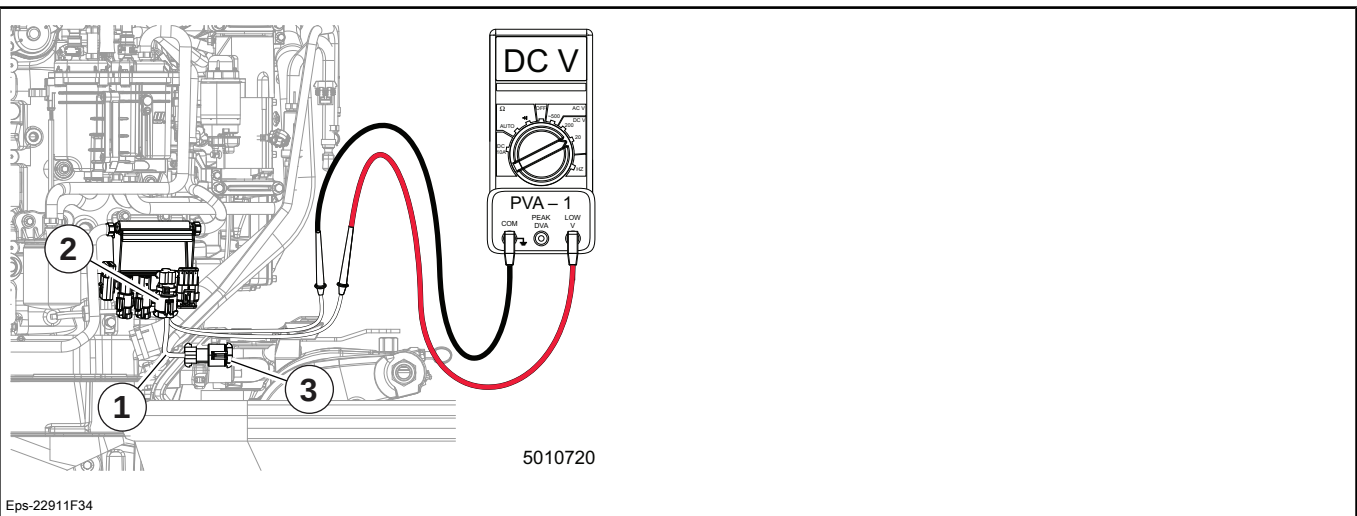
The output of the DPS module is Pulse Width Modulated (PWM). Use the DPS Test Lead, P/N 5010720, and a Peak Reading Voltmeter such as a Stevens CD-77, or a Digital Multimeter with a DVA Adapter, such as a Stevens PVA-1, to check the DPS module output.

Install the test lead between the DPS module and the DPS motor cable.

Connect the meter leads to the DPS Test Lead, P/N 5010720. Connect the positive meter lead to the red lead. Connect the negative meter lead to the black lead. If using a Stevens CD-77, set to “POS” and “50”.

If using a digital multimeter, turn the multimeter on. Set as recommended by the instructions for the DVA adapter. Select a voltage range that will read a minimum of 12 volts.

If using a Stevens PVA-1 set the multimeter to “DC Volts”. Select a voltage range that will read a minimum of 12 volts.



1. DPS Test Lead, P/N 5010720
2. DPS module
3. DPS motor cable

Turn the key switch to the ON position.

Turn the steering wheel in a smooth even motion and observe the voltage reading.

IMPORTANT: Turning the steering wheel erratically will result in erratic voltage readings. Any result ABOVE 0.0 volts indicates output from the module.

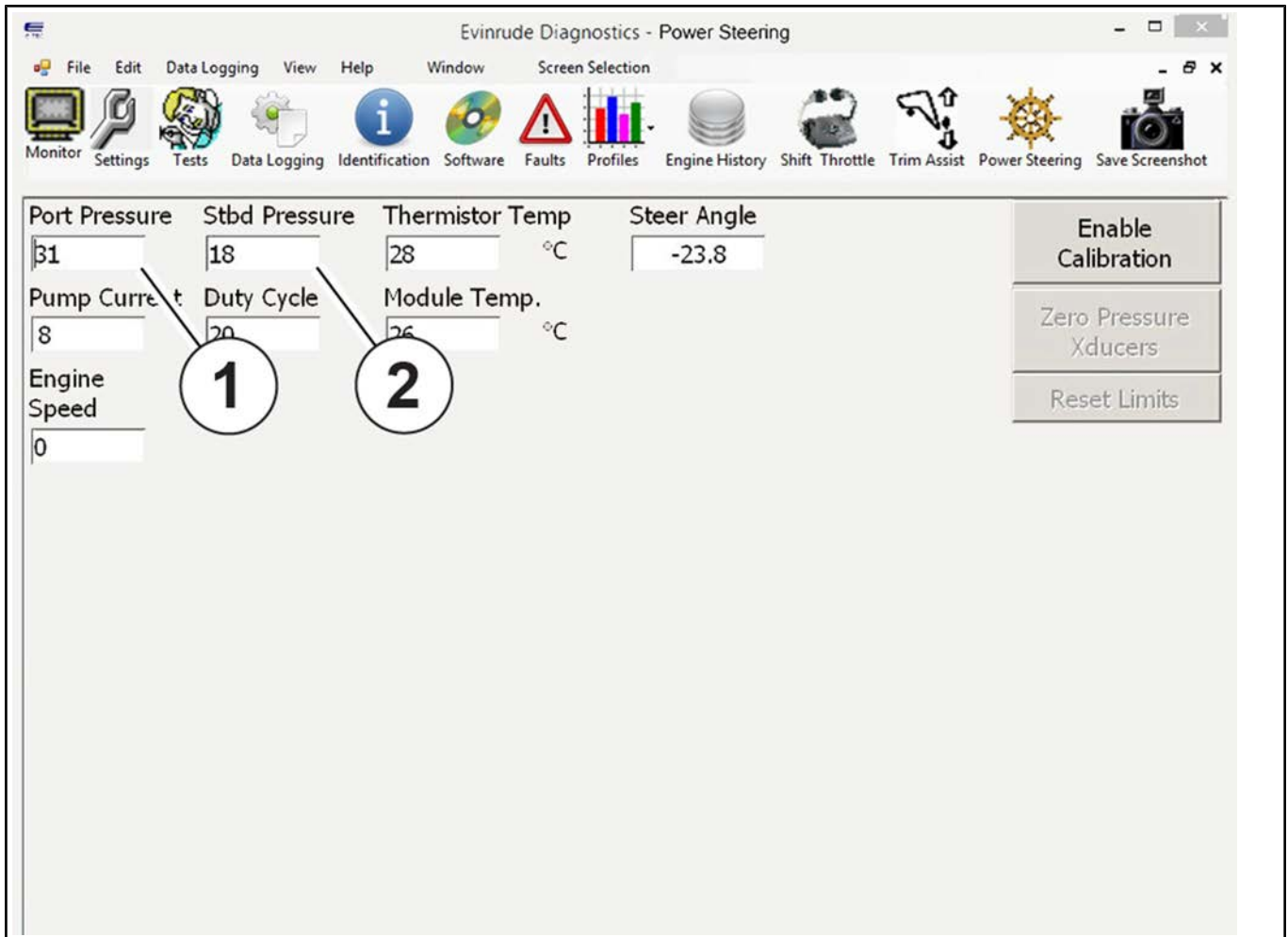
Results

If test results indicate output from the DPS module (12V approximately), the DPS module is good. Check wiring and test the DPS steering motor. If test results indicate no output (0.0 volts) from the DPS module, additional troubleshooting is required.

If no voltage output is observed use the “Power Steering” tab of *Evinrude® Diagnostics 6* software v 6.4 or higher, as follows:

Monitor the PORT and STARBOARD pressure while steering the outboard.

Confirm a 12psi (82.7 kPa) difference between PORT and STARBOARD pressures, which is required to activate the DPS motor.



1. PORT pressure
2. STARBOARD pressure

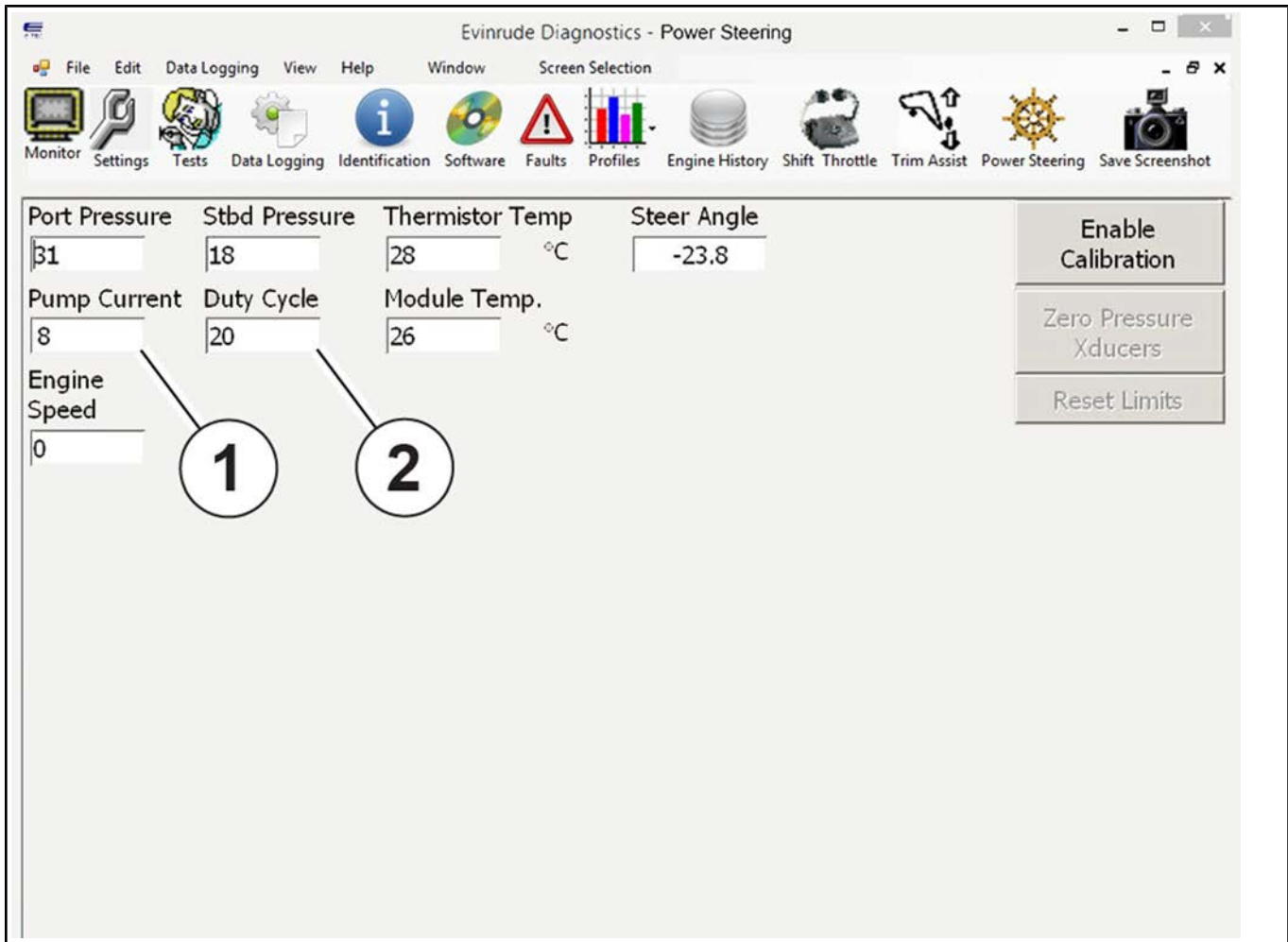
If a 12 psi (82.7 kPa) difference is present, observe the Pump Current and Duty Cycle.

Result

- If the Duty Cycle increases but the Pump Current remains at 0, replace the DPS Module.

DPS Troubleshooting

DPS2 Module Troubleshooting

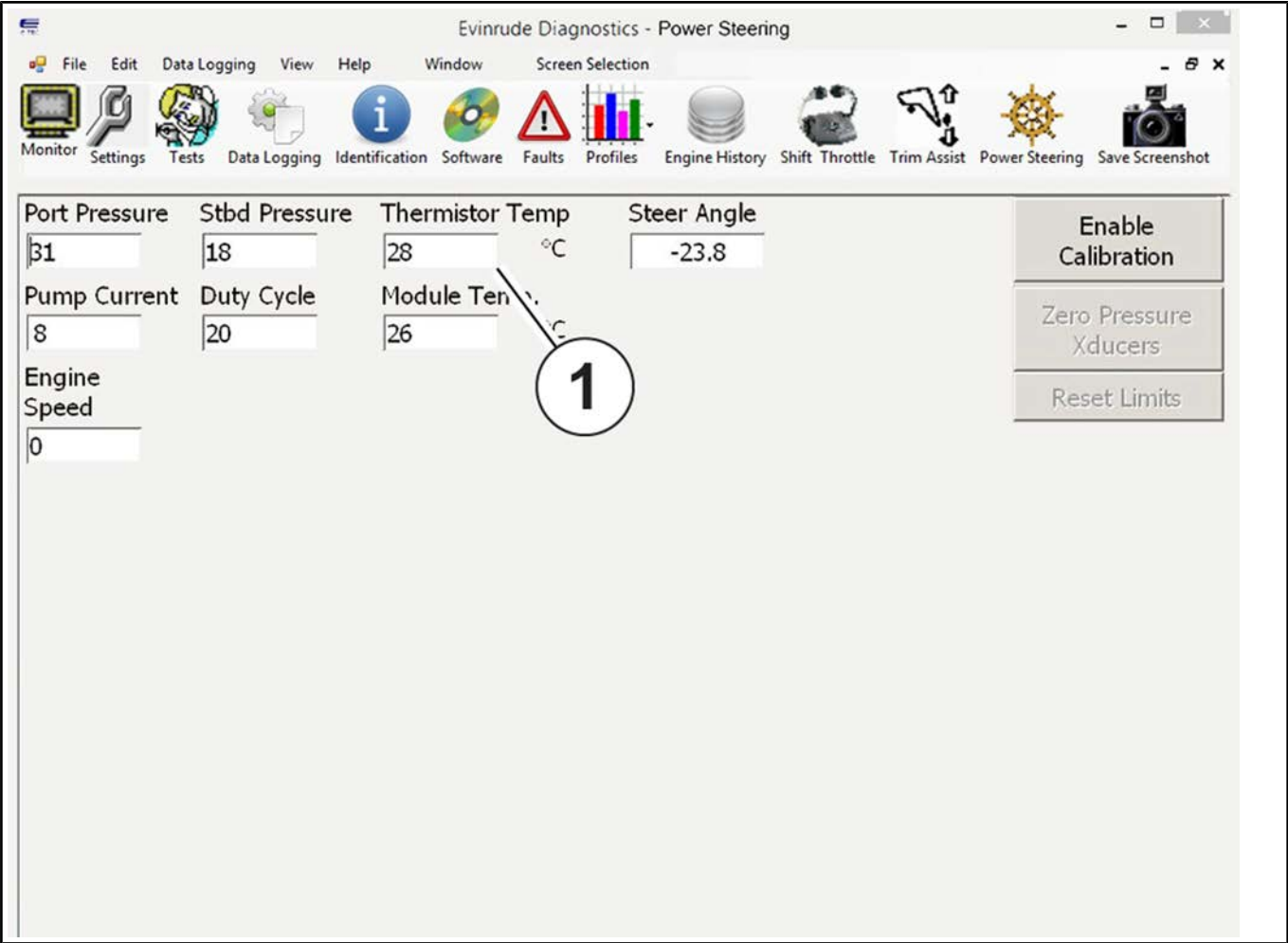


1. Pump Current
2. Duty Cycle

Confirm that the DPS Module Thermistor Temp is less than 150°F (66°C).

Result

- If the Thermistor Temp is greater than 150°F (66°C), the system has derated to the point which it will no longer function.
- If the Thermistor Temp is greater than 150°F (66°C) immediately after powering up the system, replace the DPS Module.



1. Thermistor Temp

DPS - Coupler

Problem:

Short term failures of the DPS motor coupler caused by material. Loss of power steering. Steering still operates but requires additional effort on the operator's part.

A recent product improvement changed the material on the Dynamic Power Steering (DPS) motor coupler.

If the pump current is noticed to be <20 amps when the commanded pump duty cycle is at 100%, it is most likely due to a failed DPS coupler.



The original coupler was black in color and made of Acetal plastic (left-hand side).

An updated version was made of Nylon (right-hand side).



The latest version is the powdered metal coupling, P/N 359280, which was tooled and tested to improve long-term durability.

1. Verify that the DPS motor is operational. Use the Power Steering screen of *EvDiag6* to monitor the **Pump Current** and the **Duty Cycle** while steering the engine from side to side.
2. Inspect the motor (and coupler) if the **Pump Current** and **Duty Cycle** do not increase during the steering test.

Replace the DPS motor and coupler with MOTOR, O-RING & COUPLER KIT, P/N 5009941.

The Coupler and O-ring are available to purchase separately if the motor is in operational condition: Coupler, P/N 359280 and O-ring, P/N 321163.

DPS Specific Fault Codes

DPS Fault Code Chart

Fault Code No.	EMM/Circuit Sensor	Evinrude® Digital Touch Screen Display	System Check Display	Time to Activate	Fault Information	Possible Causes for the Fault	Service Action NOTE: Use BOSSWeb>Info Center>Case for warranty authorization. Include the engine's model number and serial number, Remote Control's serial number, accurate service information, and current Engine Report files (pdf) for the EMM, the Remote Control, and (if equipped) iDock components.
Dynamic Power Steering (DPS)							
211	Power steering motor has an OPEN circuit (DPS1/DPS2)	Engine	Check Engine	1 second	Power steering motor (DPS) current is LESS than 0.5 amps with the duty cycle over 25%.	1. The power steering wiring is damaged or there is a faulty wire connection. 2. The power steering motor is faulty 3. The DPS module is faulty	Refer to Fault Code 211 in Service Actions.
212	200 - 300 HP 3.4L ABA Engine Models (DPS-1): DPS helm pressure sensor BELOW expected voltage range	Engine	Check Engine	1 second	200 - 300 HP 3.4L ABA Engine Models (DPS-1): Helm pressure sensor voltage is LESS than 0.12 Volts.	1. The helm pressure sensor has damaged wiring (OPEN circuit) or a faulty connection. 2. The helm pressure sensor is damaged.	Refer to Fault Code 212 in Service Actions.
	AFA and Newer Engine Models (DPS-2): PORT helm pressure sensor BELOW expected voltage range	Engine	Check Engine		AFA and Newer Engine Models (DPS-2): PORT helm pressure sensor voltage is LESS than 0.12 Volts.		
213	200 - 300 HP 3.4L ABA Engine Models (DPS-1): DPS helm pressure sensor ABOVE expected voltage range	Engine	Check Engine	1 second	200 - 300 HP 3.4L ABA Engine Models (DPS-1): Helm pressure sensor voltage is GREATER than 4.60 Volts.	1. The helm pressure sensor has damaged wiring (SHORT circuit) or a faulty connection. 2. The helm pressure sensor is damaged	Refer to Fault Code 213 in Service Actions.
	AFA and Newer Engine Models (DPS-2): PORT helm pressure sensor ABOVE expected voltage range	Engine	Check Engine		AFA and Newer Engine Models (DPS-2): PORT helm pressure sensor voltage is LESS than 4.60 Volts.		

Fault Code No.	EMM/Circuit Sensor	Evinrude® Digital Touch Screen Display	System Check Display	Time to Activate	Fault Information	Possible Causes for the Fault	Service Action NOTE: Use BOSSWeb>Info Center>Case for warranty authorization. Include the engine's model number and serial number, Remote Control's serial number, accurate service information, and current Engine Report files (pdf) for the EMM, the Remote Control, and (if equipped) iDock components.
214	200 - 300 HP 3.4L ABA Engine Models (DPS-1): DPS pump pressure BELOW expected voltage range	Engine	Check Engine	1 second	200 - 300 HP 3.4L ABA Engine Models (DPS-1): DPS pressure sensor voltage is LESS than 0.12 Volts	1. The helm/DPS pressure sensor has damaged wiring (OPEN circuit) or a faulty connection. 2. The helm pressure sensor is damaged.	Refer to Fault Code 214 in Service Actions.
	AFA and Newer Engine Models (DPS-2): STARBOARD helm pressure BELOW expected voltage range	Engine	Check Engine		AFA and Newer Engine Models (DPS-2): STARBOARD helm pressure sensor voltage is LESS than 0.12 Volts		
215	ABA Engine Models (DPS-1): DPS pump pressure ABOVE expected voltage range	Engine	Check Engine	1 second	ABA Engine Models (DPS-1): DPS pressure sensor voltage is GREATER than 4.60 volts.	1. The helm pressure sensor has damaged wiring (SHORT circuit) or a faulty connection. 2. The helm pressure sensor is damaged.	Refer to Fault Code 215 in Service Actions.
	AFA and Newer Engine Models (DPS-2): STARBOARD helm pressure ABOVE expected voltage range	Engine	Check Engine		AFA and Newer Engine Models (DPS-2): STARBOARD helm pressure sensor voltage is LESS than 4.60 volts. (DPS-2) If an i-Dock installation, contact Technical Service for assistance.		
216	DPS Motor over-current shutdown	Engine	Check Engine	3 occurrences	Excessive current detected. Power Steering (DPS) Motor shutdown due to short circuit condition.	1. Wiring or electrical connections for the power supply of the power steering module are loose, damaged, or incorrect. 2. Power steering motor is faulty	Refer to Fault Code 216 in Service Actions.
217	The power supply voltage to the power steering (DPS) module is BELOW the expected voltage range	Engine	Check Engine	10 seconds	The power steering supply voltage for the power steering (DPS) module is LESS than 5 volts.	1. Wiring or electrical connections for the power supply of the power steering module are loose, damaged, or incorrect. 2. Power steering module is faulty	Refer to Fault Code 217 in Service Actions.

Fault Code No.	EMM/Circuit Sensor	Evinrude® Digital Touch Screen Display	System Check Display	Time to Activate	Fault Information	Possible Causes for the Fault	Service Action NOTE: Use BOSSWeb>Info Center>Case for warranty authorization. Include the engine's model number and serial number, Remote Control's serial number, accurate service information, and current Engine Report files (pdf) for the EMM, the Remote Control, and (if equipped) iDock components.
218	DPS module temperature ABOVE expected range	Engine	Check Engine	1 second	The power steering module temperature is GREATER than 176° (80°C).	1. Cooling water flow to the power steering module is restricted. 2. Power steering module is overheating due to an excessive duty cycle 3. Power steering module is faulty	Refer to Fault Code 218 in Service Actions.
219	Power steering fault detected by iDock Control Module	Engine	Check Engine	1 second	A power steering fault detected by the iDock Control Module that is not an EMM failure. S.A.F.E. Mode	1. There is an iDock Fault Code that initiated the engine to go into S.A.F.E. mode.	Refer to Fault Code 219 in Service Actions.
220	The steering position sensor voltage is BELOW expected voltage range (DPS-2 only)	Engine	Check Engine	1 second	The steering position sensor is LESS than 0.12 volts	1. The steering position sensor has damaged wiring or has a faulty connection 2. The steering position sensor has an OPEN circuit	Refer to Fault Code 220 in Service Actions.
221	The steering position sensor voltage is ABOVE expected range (DPS-2 only)	Engine	Check Engine	1 second	The power steering position sensor is GREATER than 4.60 volts.	1. The power steering position sensor has damaged wiring or has a faulty connection 2. The power steering position sensor has an OPEN circuit	Refer to Fault Code 221 in Service Actions.

Fault Code Service Actions

Fault Code 211

1. Use EVD6 EvDIAG6 Software Manager screen to review software updates. Tip: Go to HELP Menu in EVD6 and select "Check for program updates". Select Contents to access User Help File and to learn about DPS System Software Updates.
2. Use EVD6 Power Steering screen to observe power steering system reactions while turning the steering wheel. Watch the PUMP CURRENT and the DUTY CYCLE fields. See the DPS Troubleshooting Charts (DPS1/DPS2).
3. Locate the wiring and the connections for the power steering motor (DPS). Repair damaged power steering wiring or faulty wire connection.
4. Perform the Power Steering Motor tests. (See BOSSWeb for the latest version of the service manual)
5. Perform the Power Steering Module test.

Fault Code 212

1. Use EVD6 Power Steering screen to observe power steering (DPS) system reactions while turning the steering wheel. Observe the Port Pressure and the Starboard Pressure.
2. Turn the steering wheel to PORT. While holding the steering wheel against the stop, observe the PORT Pressure.

-Pressure should be approximately 1000 psi (6895 kPa) for a standard helm, or approximately 1500 psi (10342 kPa) for a Pro-Series or SVS-Series helm. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).

3. Turn the steering wheel fully to STARBOARD. While holding the steering wheel against the stop, observe STARBOARD Pressure.

-Pressure should be approximately 1000 psi (6895 kPa) for a standard helm, or approximately 1500 psi (10342 kPa) for a Pro-Series or SVS-Series helm. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).

4. Check wiring and connections for the helm/ DPS pressure sensor and the DPS module.
5. Perform the Steering Pressure Sensor Tests. (See BOSSWeb for the latest version of the service manual) If the engine is part of an Evinrude® i-Dock installation, Use BOSSWeb>Info Center>Case for technical or warranty support.

Fault Code 213

1. Use EVD6 Power Steering screen to observe power steering (DPS) system reactions while turning the steering wheel. Observe the Port Pressure and the Starboard Pressure.
2. Turn the steering wheel to PORT. While holding the steering wheel against the stop, observe the PORT Pressure.

-Pressure should be approximately 1000 psi (6895 kPa) for a standard helm, or approximately 1500 psi (10342 kPa) for a Pro-Series or SVS-Series helm. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).

3. Turn the steering wheel fully to STARBOARD. While holding the steering wheel against the stop, observe STARBOARD Pressure.

-Pressure should be approximately 1000 psi (6895 kPa) for a standard helm, or approximately 1500 psi (10342 kPa) for a Pro-Series or SVS-Series helm. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).

4. Check wiring and connections for the helm/ DPS pressure sensor and the DPS module.
5. Perform the Steering Pressure Sensor Tests. (See BOSSWeb for the latest version of the service manual) If the engine is part of an Evinrude® i-Dock installation, Use BOSSWeb>Info Center>Case for technical or warranty support.

Fault Code 214

1. Use EVD6 Power Steering screen to observe power steering (DPS) system reactions while turning the steering wheel. Observe the Port Pressure and the Starboard Pressure.
2. Turn the steering wheel to PORT. While holding the steering wheel against the stop, observe the PORT Pressure.

-Pressure should be approximately 1000 psi (6895 kPa) for a standard helm, or approximately 1500 psi (10342 kPa) for a Pro-Series or SVS-Series helm. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).

3. Turn the steering wheel fully to STARBOARD. While holding the steering wheel against the stop, observe STARBOARD Pressure.

-Pressure should be approximately 1000 psi (6895 kPa) for a standard helm, or

DPS Specific Fault Codes

Fault Code Service Actions

approximately 1500 psi (10342 kPa) for a Pro-Series or SVS-Series helm. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).

4. Check wiring and connections for the helm/DPS pressure sensor and the DPS module.
5. Perform the Steering Pressure Sensor Tests. (See BOSSWeb for the latest version of the service manual) If the engine is part of an Evinrude® i-Dock installation, Use BOSSWeb>Info Center>Case for technical or warranty support.

Fault Code 215

1. Use EVD6 Power Steering screen to observe power steering (DPS) system reactions while turning the steering wheel. Observe the Port Pressure and the Starboard Pressure.
2. Turn the steering wheel to PORT. While holding the steering wheel against the stop, observe the PORT Pressure.

-Pressure should be approximately 1000 psi (6895 kPa) for a standard helm, or approximately 1500 psi (10342 kPa) for a Pro-Series or SVS-Series helm. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).

3. Turn the steering wheel fully to STARBOARD. While holding the steering wheel against the stop, observe STARBOARD Pressure.

-Pressure should be approximately 1000 psi (6895 kPa) for a standard helm, or approximately 1500 psi (10342 kPa) for a Pro-Series or SVS-Series helm. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).

4. Check wiring and connections for the helm/DPS pressure sensor and the DPS module.
5. Perform the Steering Pressure Sensor Tests. (See BOSSWeb for the latest version of the service manual) If the engine is part of an Evinrude® i-Dock installation, Use BOSSWeb>Info Center>Case for technical or warranty support.

Fault Code 216

1. Use EVD6 Power Steering screen to observe power steering (DPS) system reactions while turning the steering wheel. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).
2. Locate the wiring and the connections for the power steering module. Check the BLACK ground wire connection from the module to the engine block. Check the RED (B+) wire connection to the module. Check the RED (B+)

wire connection at the starter solenoid and at the RED (B+) battery stud at the top of the center frame.

3. Perform the power steering pump and control circuit test BEFORE replacing the power steering motor. Use BOSSWeb>Info Center>Case for technical or warranty support.

Fault Code 217

1. Use EVD6 Power Steering screen to observe power steering (DPS) system reactions while turning the steering wheel. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).
2. Locate the wiring and the connections for the power steering module. Check the BLACK ground wire connection from the module to the engine block. Check the RED (B+) wire connection to the module. Check the RED (B+) wire connection at starter solenoid and at the RED (B+) battery stud at top of the center frame.
3. Perform the power steering pump and control circuit test BEFORE replacing the power steering module. Use BOSSWeb>Info Center>Case for technical or warranty support.

Fault Code 218

1. Use EVD6 Power Steering screen to observe the power steering (DPS) control module temperature. Watch the PUMP CURRENT and the DUTY CYCLE fields. See DPS Troubleshooting Charts (DPS1/DPS2).
2. Verify if there are other fault codes related to engine overheating and the engine's cooling system. Repair any engine cooling system issues. Check the cooling water flow to and through the power steering module. Retest after the cooling issue is resolved.
3. Is there an excessive duty cycle related to over active steering activity?
4. Perform power steering pump and control circuit test BEFORE replacing the power steering module. Use BOSSWeb>Info Center>Case for technical or warranty support.

Fault Code 219

1. Review the iDOCK Control Module Fault Codes chart.

Fault Code 220

1. Use EVD6 Power Steering screen to observe the power steering (DPS) system reactions while turning the steering wheel, observe the steering angle.

If an Evinrude® i-Dock installation, the Evinrude® i-Dock must be selected. This is a setup requirement.

2. Check the DPS module connectors and wiring.
3. Perform the electrical circuit tests.

(BLACK). Connect the negative meter lead to a clean engine ground.

-Meter reading should be less than 5 ohms.

Fault Code 221

1. Use EVD6 Power Steering screen to observe the power steering (DPS) system. Observe the PORT and STARBOARD helm pressures and the steering angle while turning the steering wheel in a counter-clockwise directions and then in a clockwise direction.

2. Perform a Steering Pressure Sensor Test. Turn the steering wheel to PORT (counter-clockwise). While holding the steering wheel against the stop, observe the PORT pressure reading. Then turn the steering wheel to STARBOARD (clockwise). While holding the steering wheel against the stop, observe the STARBOARD pressure reading. The pressure readings will vary depending upon the amount of effort applied to the steering wheel. Look for the helm pressure reading to change relative to the applied steering effort.

-The typical steering pressure reading can vary between approximately 25 - 1000 psi (6895 kPa) for a standard helm and at 1500 psi (10342 kPa) for a Pro-Series or SVS-Series helm. The steering helm's pressure relief valve limits the maximum system pressure at 1000 psi (6895 kPa) for a standard helm, and at 1500 psi (10342 kPa) for a Pro-Series or SVS-Series helm.

3. Power Steering (DPS) Position Sensor circuit voltage is too high. Check wiring and connectors. Perform electrical circuit tests.

-Use the diode test function of a digital multimeter to check the signal circuit. Connect the BLACK meter lead to PIN1 wire (BLUE), connect the RED meter lead to the engine ground.

-Meter reading should be approximately 0.5 VDC.

4. Use a digital multimeter with appropriate test probe leads to measure Power Steering (DPS) Position Sensor ground circuit resistance. Connect the RED meter lead to the PIN3 wire

Notes

Technician's Notes

Related Documents

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