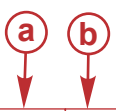


Circulate to: ☒ Sales Manager ☐ Accounting ☒ Service Manager ☒ Technician ☒ Parts Manager

## Joystick Piloting for Outboard (JPO) Vessel Upgrade

### Affected Boat Serial Numbers

All JPO boats manufactured with a hull identification number (HIN) date prior to G717 (July 2017) are within the scope of this bulletin. The manufacture date (month, year, model year) is located in the ninth through twelfth position in the hull identification number.



**a** - Month and year of certification or manufacture  
**b** - Model year

US ABC45678G717

65275

A—January	G—July
B—February	H—August
C—March	I—September
D—April	J—October
E—May	K—November
F—June	L—December

### Scope

Worldwide

### Situation

Mercury Marine has identified a potential issue with the power steering pump which may affect steering performance. The power steering pump may intermittently shut down, causing the steering not to function on the affected engine. Power steering pumps must be inspected and, if necessary, replaced. The operation software must also be validated to ensure it is up-to-date and, if necessary, reflashed to the current software version. Additionally, a critical system and operations checklist must be completed. The system checklist is included with this bulletin.

**IMPORTANT: A copy of the system checklist must be delivered to the Mercury Marine Warranty Department. Failure to return a completed checklist will result in the claim being denied.**

Return completed System Checklist to:

- Warranty claims fax: 920-906-6033
- Email: outboardwarranty@mercmarine.com

### OEM/Dealer Inventory

Inventory must be inspected and, if necessary, updated according to this bulletin, prior to delivering to the customer.

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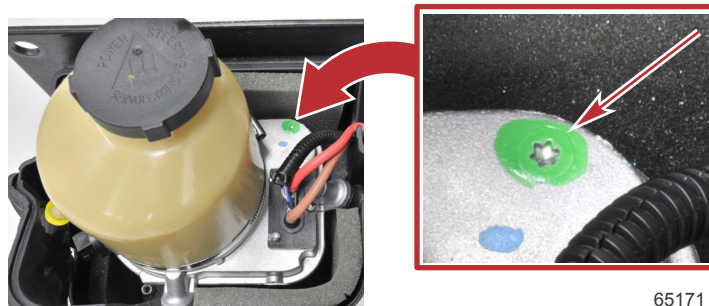
## Owner Notification

A customer letter will be mailed to all registered owners, notifying them that their Mercury Marine JPO boat requires an unscheduled service inspection. As a Mercury Marine dealer, you should contact affected customers to advise them of this service bulletin and schedule a service appointment. A copy of the letter is included with this service bulletin.

**Limited Time Offer Only to the Registered Boat Owner:** During this time when the vessel system is upgraded and inspected, we are offering to install VesselView Mobile in the boat if it is not already equipped—no charge to the registered boat owner. This offer is not extended past this system upgrade/inspection service appointment. If the customer does not want the VesselView Mobile system installed, the customer must tell the dealer not to install the VesselView Mobile.

## Correction

1. Remove the cover of the power steering pump.
2. Inspect the pump motor body for a green color paint dot. This dot will be located aft of the wire harness exiting the pump motor body. Refer to the following picture.



Green color paint dot

3. If the power steering pump body is not marked with a green color paint dot, a new power steering pump assembly must be ordered, installed, and the system purged of air. Refer to the appropriate service manual or installation manual on how to purge the power steering system of air.
4. Review reflash outboard service bulletins 2016-11R3 and 2016-12R3.
5. Connect CDS G3 to the engine and verify the software listed in the previous two bulletins are uploaded into the vessel operating system. If the software is not uploaded, perform the steps outlined in the bulletins to complete the reflash.
6. After completing the previous steps, complete the system checklist included with this bulletin. The system checklist must be completed and delivered to the Mercury Marine Warranty Department to process the warranty claim approval.
7. If the customer has agreed to the VesselView Mobile special offer, install the VesselView Mobile system if not already equipped and assist the owner with downloading the app and setup. Instructions for the installation and setup are included with the device.

## Parts Information

- 8M0134736—power steering pump replacement
- 8M0115080—VesselView Mobile
- Refer to outboard service bulletins 2016-11R3 and 2016-12R3 for possible additional parts

## Warranty

Warranty outside the United States and Canada: Follow instructions issued by your local office or distributor.

Mercury Marine will credit the dealer for the cost of parts, labor, and completed checklist.

Submit a warranty claim through your normal warranty-processing channel for each engine, listing:

- Starboard engine
  - a. Serial number
  - b. Power steering pump part number (if replaced)
  - c. Power steering pump: part code 804, fail code 40
  - d. Power steering pump flat rate code: **SB10** (1.0 hour)

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- e. Check list flat rate: **SB25** (2.5 hours)
- f. VesselView Mobile part number (if installed)
- g. VesselView Mobile: part code 640, fail code 99
- h. VesselView Mobile flat rate code: SB05 (0.5 hour)
- Port engine
  - a. Serial number
  - b. Power steering pump part number (if replaced)
  - c. Power steering pump: part code 804, fail code 40
  - d. Power steering pump flat rate code: **SB10** (1.0 hour)
- Starboard inner engine (if equipped)
  - a. Serial number
  - b. Power steering pump part number (if replaced)
  - c. Power steering pump: part code 804, fail code 40
  - d. Power steering pump flat rate code: **SB10** (1.0 hour)
- Port inner engine (if equipped)
  - a. Serial number
  - b. Power steering pump part number (if replaced)
  - c. Power steering pump: part code 804, fail code 40
  - d. Power steering pump flat rate code: **SB10** (1.0 hour)

## System Checklist

An editable copy of the System Checklist can be found on the MercNET website home page.

## Boat Information

Step	Check	Notes/Action Items			Complete
1	Manufacture name				
2	Boat model				
3	HIN				
4	Number of engines				
5	Number of helms				
6	Engine serial number and hours	Port			
		Port inner			
		Starboard inner			
		Starboard			
7	Steering cylinder serial number: Reference SB 17-09	Port			
		Port inner			
		Starboard inner			
		Starboard			

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## G3 Diagnostic Tool

Step	Check	Notes/Action Items	Complete
1	Create full report and save for later review	From G3 home screen select <b>File &gt; Print Full Report</b> . When full report window opens, click on the gear icon, add customer information, click <b>Finish</b> . Select gear icon again and click <b>Add Dealer Information</b> . When complete, click <b>Export to PDF</b> . When the save file window opens, select the desktop as the destination and name the file using the customer name and boat model. Click <b>Save</b> .	
2	Check for software updates on G3 home screen	Perform appropriate reflash bulletin as directed by G3: outboard service bulletin 2016-11R3 for design 1 joysticks, or outboard service bulletin 2016-12R3 for design 2 joysticks.	
3	Verify vessel personality (VSL) file is loaded	In G3 go to: <b>Configuration &gt; Personality &gt; Vessel Personality</b> . The VSL name will be displayed in the upper right corner of the screen. Verify it correctly matches the boat model and configuration, click <b>Show Details</b> .	
4	Manual drive alignment is verified	In G3 go to: <b>Configuration &gt; Manual Drive Alignment &gt; Joystick Piloting Outboard</b> . Follow the instructions to start the test. When the steering angle boxes are shown, any number other than 0.0 in each box is OK. If 0.0 is displayed in both boxes, the manual drive alignment needs to be completed. If the vessel is out of the water, follow the manual drive alignment steps outlined in the JPO Diagnostic Service Manual 8M0110489, page 5A-9.	
5	Clear all module faults and freeze frame	In G3 go to the Module data page, highlight each module individually, click <b>Freeze Frame</b> on the top of the screen, click on the gear icon > <b>Clear History</b> . Repeat for all PCMs, TVMs, and CCMs.	

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## Power Steering Pump

Step	Check	Notes/Action Items	Complete
1	Install new design power steering pump (if required)	Refer to the instructions included with the kit.	
2	Inspect: power steering pump power and ground connections are tightened to the specified torque	If loose, tighten to the torque specified in the power steering pump instruction. Also see JPO Diagnostic Service Manual 8M0110489.	
3	Inspect: power steering pump ring terminals are correct size for the stud they are on	Outside diameter of the stud must be slightly smaller than the inside diameter (I.D.) of the ring terminal. If the I.D. of the ring terminal is too large, the nut may loosen. Loose connections can cause the power steering pump to shut down.	
4	Electrical cables are connected to the appropriate battery	Verify rigging. Example: Starboard pump connected to starboard battery.	
5	If a current sensor is installed on the power steering fuse, check the fuse connections	Pull on each fuse wire to ensure the wires are properly seated in the fuse holder. Verify the fuse holder is properly secured to the bulkhead.	
6	Inspect: power steering pump hoses are installed and routed correctly	Hoses must be separated by a minimum of 6.35 mm (0.25 in.). Minimum length 3 m (10 ft) for each hose. No kinks or restrictions in the hoses. If access is limited, inspect what is visible.	
7	Power signal harness is connected to the appropriate TVM power steering pump	Start one engine at a time: does the correct power steering pump start. If not, connect the 3-pin signal harness to the correct TVM.	
8	Power steering pump current sensor is installed on the correct pump	In G3, monitor TVM live data. Go to <b>Current_Measured</b> . <ol style="list-style-type: none"> <li>Key on, engine off: the reading should be 0.1–0.2 amp. If the value is 65555A, the current sensor harness is not connected to the TVM or the sensor.</li> <li>Start and run one engine at a time: <ol style="list-style-type: none"> <li>At idle with no steering input, reading should be between 8–15 amps.</li> <li>If the reading remains at 0.1–0.2 amp and <b>PumpNot Active</b> fault is set, the current sensor is connected to the wrong TVM.</li> </ol> </li> <li>Test all engines/pumps individually.</li> </ol>	
9	Power steering pump hydraulic lines are connected to the appropriate engine	Start one engine at a time: does the engine steer with hydraulic assist? If not, correct the power steering hose rigging at the splash well bulkhead fittings.	
10	Power steering pump fluid level is full	Fluid should be between the two lines on the cap dipstick.	

## Steering Cylinder

Refer to the following graphic illustration to identify the step locations.

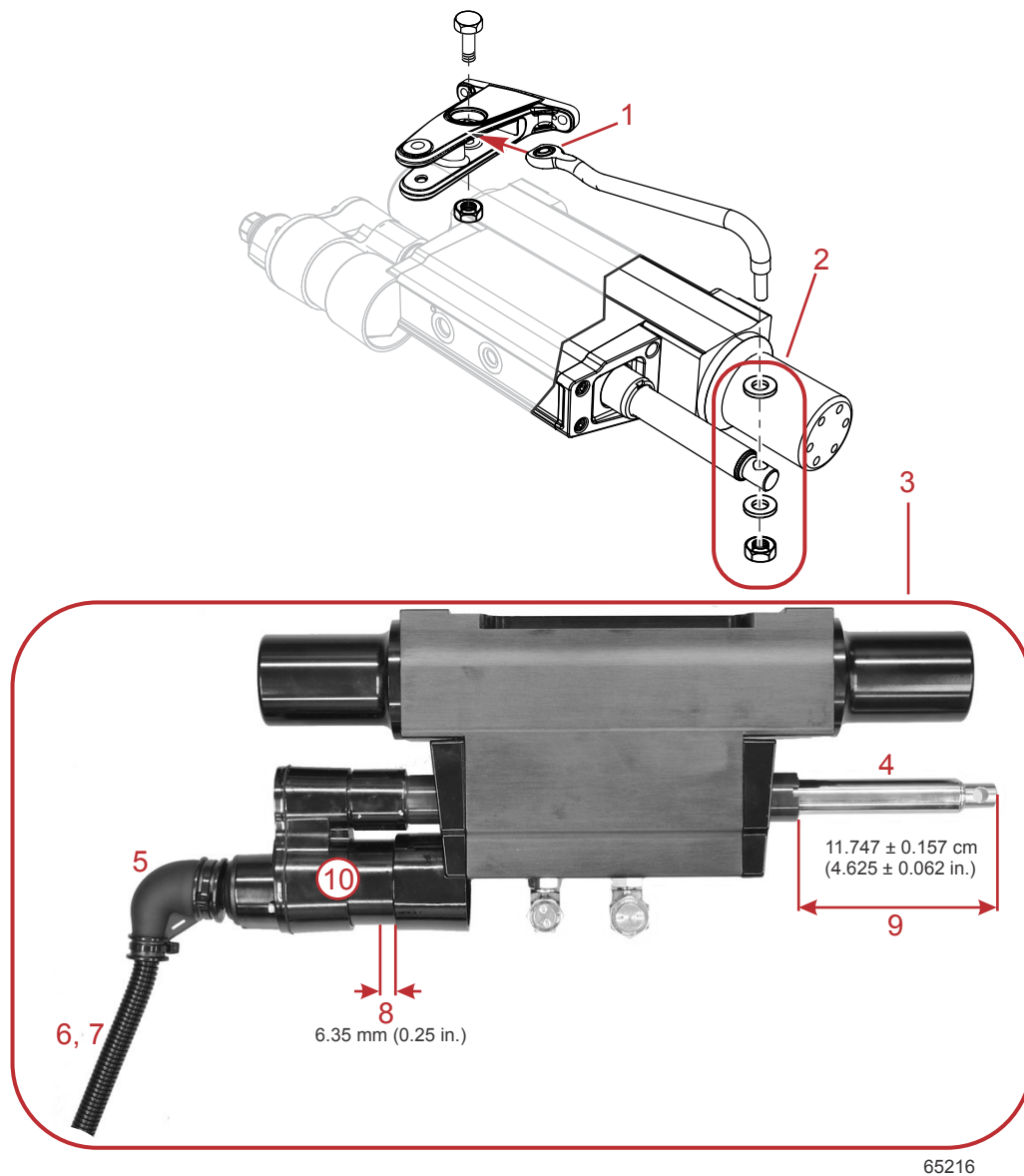
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Step	Check	Notes/Action Items	Complete
1	Link rod between actuator extension tube and tie bar arm can be moved by hand	Apply 2-4-C with PTFE to the link rod extension arm ball joint at the tie bar arm.	
2	Steering cylinder link rod nut is properly tightened	Top and bottom washers should spin freely. Tighten the nut to 13.5 Nm (120 lb-in.) then back off 1/4 turn.	
3	Steering cylinder assembly is not obstructed	Turn steering wheel lock-to-lock; ensure no interference or contact with other components or the bulkhead.	
4	No grease in the steering cylinder extension tube	Clean with mild solvent spray if grease is found. Apply engine oil to the extension tube.	
5	Steering cylinder plastic 90° elbow is installed correctly—secured to the actuator with cable ties	If elbow is missing, order and install elbow.	
6	Steering cylinder 6-pin electrical harness on transom is loose and not restrained within 15.3 cm (6 in.) of the cylinder	If the harness is too tight, it will restrict movement which will lead to little or no hydraulic assist and cause steering follow faults.	
7	Steering cylinder 6-pin electrical harness is routed below the anticollision cable	If routed above, disconnect anticollision cable and route the electrical cable below.	
8	Steering cylinder motor has obstructed movement near antirotation bracket	With the engine running, rotate the steering wheel rapidly 1/4 turn back and forth while watching the electric motor of the steering cylinder near the antirotation bracket: electric motor should move approximately 6.35 mm (0.25 in.) total. <b>NOTE:</b> G3 JPO steering system bleed test can be utilized for 250 hp and 300 hp (2B144123 and up) and all 350 hp and 400R engines.	
9	Steering cylinder extension tube (silver piston) indexing is correct	In G3, go to TMV live data. Monitor <b>Drive_Pos_Pri_ADC</b> and <b>Drive_Pos_Sec_ADC</b> . Move the engine so the values show 511–513. Measure from the end of the spool to the end of the extension tube. The measurement must be $11.747 \pm 0.157$ cm ( $4.625 \pm 0.062$ in.). See JPO Diagnostic Service Manual 8M0110489, page 3F-2 steering cylinder indexing. <a href="https://www.youtube.com/watch?v=GU3ZdDwVylgbe">https://www.youtube.com/watch?v=GU3ZdDwVylgbe</a>	
10	Perform the maximum power output test to check the health of the cylinder. Test in water only! Testing on land will not be accurate.	<ol style="list-style-type: none"> <li>1. Remove the power steering pump fuse for the suspect engine.</li> <li>2. Disconnect the power steering current sensor.</li> <li>3. Start all engines.</li> <li>4. In G3, go to TMV live data. Monitor <b>SteerMotor_Current</b> and <b>Steer_Motor_DutyCycle</b>, record the data for review.</li> <li>5. Turn the steering wheel lock-to-lock rapidly. Slow steering wheel movement will result in a lower amp reading. If the reading on <b>SteerMotor_Current</b> is below 10000mA when the <b>Steer_Motor_DutyCycle</b> is 100%, contact Mercury Technical Service for a replacement steering cylinder.</li> </ol> <b>NOTE:</b> All steering cylinders must be returned to Mercury Marine for testing. <a href="https://www.youtube.com/watch?v=WONq6qUcihg">https://www.youtube.com/watch?v=WONq6qUcihg</a>	

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Step locations—steering cylinder

## Anticollision Cable

Step	Check	Notes/Action Items	Complete
1	Rigging tube is routed above the anticollision cable	If below, disconnect the cable and reposition the rigging tube above the cable.	
2	Correct length anticollision cable for the engine drive separation	Verify the engines do not contact each other.	
3	Anticollision cable installed correctly so spring forces cable towards the bow	With engines centered, the anticollision cable ends should point slightly forward.	

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## Thrust Vector Module (TVM)

Step	Notes/Action Items	Complete
Check for evidence of water near the TVM	Correct any source of water ingress near the TVM. Verify rod holder drains or water hose routing near the TVMs are secure and directed away from the TVM.	

## General Rigging

Step	Check	Notes/Action Items	Complete
1	Verify all unused electrical connections have a weather cap installed	Ensure any unused engine or helm connections have a weather cap installed. At the helm, check the J-Box, and 2-pin CAN links.	
2	Ensure all 14-pin connections are tight	Manually check the 14-pin connections are tight at the following locations: <ul style="list-style-type: none"> <li>At the engine</li> <li>TVM</li> <li>Helm</li> </ul>	
3	Helm 20-amp fuse clean power harness is connected to starboard engine battery switch (switch side)	Locate and inspect the connection (circuit breaker or fuse are OK if connected to the engine battery switch [switch side]). <b>IMPORTANT: Version 2 joystick applications do not utilize the 20-amp helm fuse.</b>	
4	Verify the battery type and rating	USA	Type: AGM
			Rating: 800 MCA, 650 CCA
			RC: 25
		EN (International)	Type: AGM
			Rating: 975 CCA
			Ah: 65

## System Function

Step	Check	Notes/Action Items	Complete
1	Joystick functionality	Vessel responds in direction the Joystick is moved	
2	Steers normal	Lock-to-lock steering shows no signs of binding or hesitation	
3	Overall engine operation systems	No faults are generated	

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