

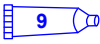
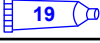

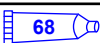
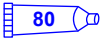
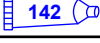
Cooling System

Section 6A - Seawater Supply System

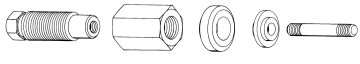

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Lubricants, Sealants, Adhesives

Tube Ref No.	Description	Where Used	Part No.
 9	Loctite 567 PST Pipe Sealant	Connector threads	92-809822
 19	Perfect Seal	Both sides of the poppet valve gasket	92-34227Q02
 66	Loctite 242 Threadlocker	Impeller housing cover or seawater pump actuator housing screw threads	92-809821
		Seawater pump bracket screw threads	
 68	Loctite 609	Outer diameter of retainer seal	Obtain Locally
 80	SAE Engine Oil 30W	Outer diameter of the bearings	Obtain Locally
		Seawater pump shaft	
 142	Loctite 598 RTV Sealant	Actuator housing wear plate	Obtain Locally

Special Tools

Pulley Pusher Installer	91-93656A1
 <p>10047</p>	Installs the pulley onto the power steering pump.
Power Steering Pump Pulley Remover	Kent Moore J-21239
 <p>25952</p>	Removes the pulley on the DHB power steering pumps and water pumps with smaller shafts.

General Information

The 8.2 engine is fitted with a closed cooling system designed to keep the engine operating temperature at approximately 79 °C (175 °F) for optimum performance, fuel economy, and durability. The Mercury MerCruiser closed cooling systems are sometimes called fresh water-cooling and use a combination of fresh water (antifreeze and water) and seawater for cooling. Refer to the cooling system flow diagram at the end of this section.

To monitor the cooling system, a temperature sensor is incorporated into the audio warning system, which alerts the operator of an abnormal condition if the temperature exceeds approximately 93 °C (200 °F).

NOTE: *This engine is not equipped with an analog temperature sender. When using analog gauges an AGI box is required.*

The cooling system must receive a sufficient amount of seawater under all operating conditions to operate properly.

NOTICE

Without sufficient cooling water, the engine, the water pump, and other components will overheat and suffer damage. Provide a sufficient supply of water to the water inlets during operation.

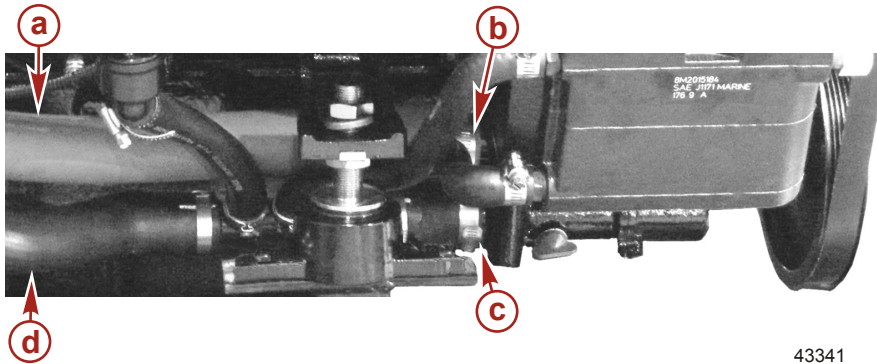
Seawater Supply

Seawater Supply Hose Specifications

Description	Hose and Connection	Vacuum
Seawater inlet hose	32 mm (1-1/4 in.) I.D. low restriction routing and connections	Able to support 34 kPa (10 in. Hg) (5 psi) of vacuum without collapsing hose
Seawater pickup		
Seacock (ABYC requirement)		
Sea strainer (optional)		

Seawater Inlet Hose

- A reinforced hose capable of supporting 34 kPa (10 in. Hg) (5 psi) vacuum must be used to prevent the seawater inlet hose from collapsing from pump suction.
- The hose should be oil and seawater resistant.
- Use the shortest hose length possible with the least number of bends to minimize restriction.
- All connections must be secured with hose clamps.
- Fasten the hose as appropriate to maintain proper routing and to prevent chafing or contact with other moving parts.



- a** - Seawater inlet hose
- b** - Hose clamp connection to pump inlet
- c** - Hose clamp connection to pump outlet
- d** - Seawater outlet hose

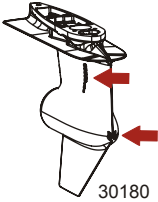
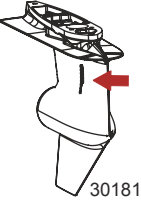
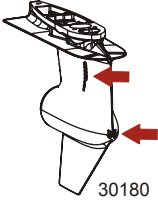
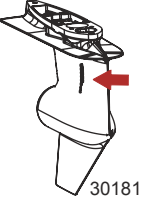
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Sterndrive Seawater Supply

The 8.2 Bravo engine packages do not require additional seawater pickups if:

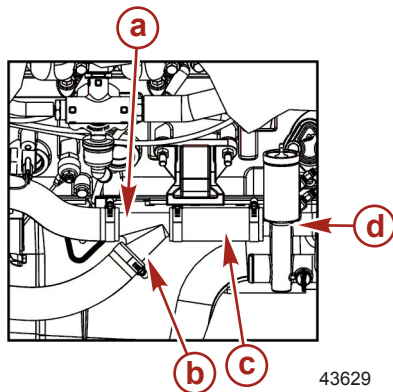
- The sterndrive gearcase has dual water pickups.
- The boat is capable of 64 km/h (40 mph) fully loaded and operated within the specified operating range.

The 8.2 Bravo Two sterndrive packages must have a through-the-hull or through-the-transom seawater pickup in addition to the sterndrive side water pickups. Install the Y-fitting at the engine's seawater pump inlet. See **Installing the Y-Fitting**.

Seawater Pickups Required for 8.2 Engine Models with Bravo Sterndrive			
Boat speed with the maximum load operating within the specified range	SeaCore Bravo has side water pickup	SeaCore Bravo has dual water pickup	Through-the-hull or through-the-transom seawater pickup
64 km/h (40 mph) or greater			Not required
Less than 64 km/h (40 mph)			Required, see Installing the Y-Fitting
64 km/h (40 mph) or greater			Required, see Installing the Y-Fitting

Installing the Y-Fitting

All 8.2 engine models with Bravo Two sterndrive require a through-the-hull or through-the-transom seawater pickup and a Y-fitting at the engine seawater pump inlet port. The Y-fitting directs the seawater from the sterndrive and through-the-hull or through-the-transom seawater pickup to the engine's seawater pump to meet the minimum flow specifications.



- a - Y-fitting port to water inlet from sterndrive
- b - Y-fitting port to water inlet from through-the-hull or through-the-transom seawater pickup
- c - Hose 101.6 mm (4 in.) from seawater pump inlet to Y-fitting
- d - Engine seawater pump

NOTE: The 8.2 engine models are not factory equipped with a Y-fitting. Refer to **Mercury Parts Catalog, Closed Cooling Systems (Bravo)** to order one Y-fitting 864727, three hose clamps 815504222, and seawater supply bulk hose that meets MerCruiser specifications.

1. Cut a 101.6 mm (4 in.) length piece of the supply hose and install it to the seawater pump inlet and the Y-fitting.
2. Install a seawater supply hose to the Y-fitting and the sterndrive's water inlet at the transom. Cut off any excess hose as needed.
3. Install a seawater supply hose to the Y-fitting and the through-the-hull or through-the-transom seawater pickup. Cut off any excess hose as needed.
4. Properly secure all hoses to all fittings to prevent water leaking into the boat.

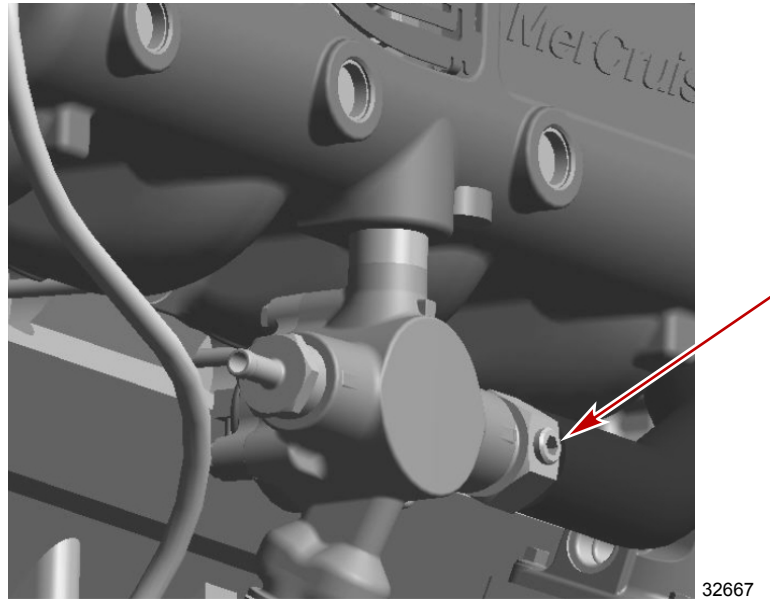
Propeller Shaft Log Seal Connection

NOTICE

Incorrectly installing the water supply hose to the shaft log seal can cause increased exhaust system corrosion or submersion or freeze damage due to siphoning. Position and securely fasten the water supply hose with a portion of the hose above the engine exhaust elbows.

1. Attach the shaft log seal cooling water hose to the access port in the reducer fitting, located on the poppet valve underneath the exhaust manifold. There are reducing fittings on the port and starboard manifolds.

IMPORTANT: Do not remove the reducer fitting, even if you are not using the shaft log seal. The reducer fitting has been carefully sized to maintain the proper pressure balance in the cooling system.



Shaft log seal access port

2. Route the propeller shaft log seal hose so that a portion of the hose extends above the top of the engine exhaust elbows to prevent a siphoning action when the engine is not running.
3. Fasten the hose securely to keep it properly positioned.

Installing the Hot Water Heater

IMPORTANT: Hot water heater supply and return hoses must not exceed specification.

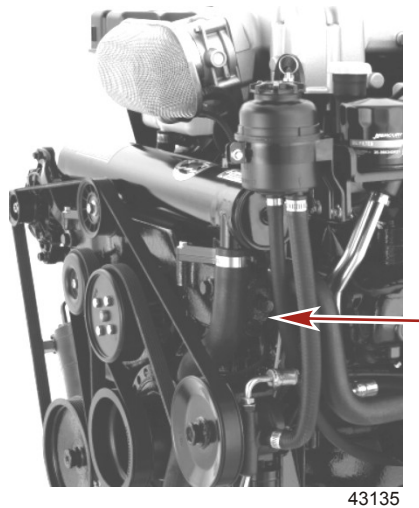
Hot Water Heater Hose Specification	
Supply hose	16 mm (5/8 in.) ID
Return hose	

When connecting a cabin heater or hot water heater:

- Use specified hot water heater supply and return hoses.
- Make the engine connections for the hot water heater only at the locations described in the **Installing the Hot Water Heater** section of the engine's installation manual.
- Refer to the heater manufacturer's instructions for complete installation information and procedures.
- Do not reposition the engine temperature switch; it must remain where installed by the factory.
- Inspect the complete system for leaks after the heater is connected to the cooling system.

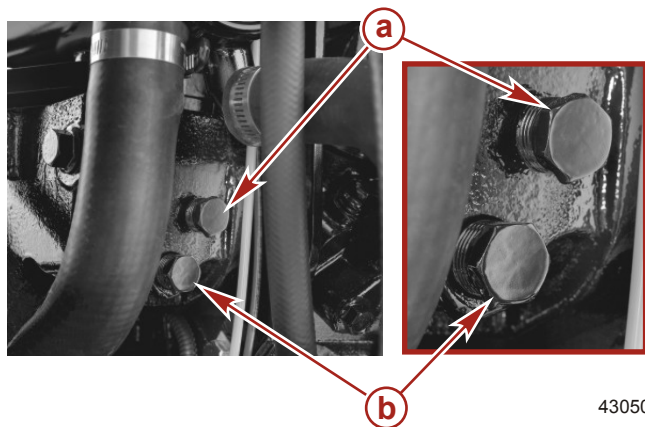
Seawater Supply System

- Monitor the engine coolant temperature after the heater is connected.



Location of the hot water heater connections

Connecting Hoses




- a - Heater supply (pipe plug)
- b - Heater return (pipe plug)

NOTICE

Discharge of oil, coolant, or other engine/drive fluids into the environment is restricted by law. Use caution not to spill oil, coolant, or other fluids into the environment when using or servicing your boat. Be aware of the local restrictions governing the disposal or recycling of waste, and contain and dispose of fluids as required.

1. Place a 4 Liter (1 US gal) fluid catch container under the pipe plugs.
2. Remove the pipe plug from the heater supply and return locations on the engine. Properly dispose of the coolant.
3. Apply Loctite 567 PST Pipe Sealant to the threads of each hose connector and install. Tighten 1–2 turns beyond hand-tight.

Tube Ref No.	Description	Where Used	Part No.
 9	Loctite 567 PST Pipe Sealant	Connector threads	92-809822

4. Install the supply and return heater hose to the appropriate connector and secure with a hose clamp.
5. Add clean coolant to the full level in the coolant reservoir. Secure the coolant pressure cap.

NOTICE

Without sufficient cooling water, the engine, the water pump, and other components will overheat and suffer damage. Provide a sufficient supply of water to the water inlets during operation.

NOTICE

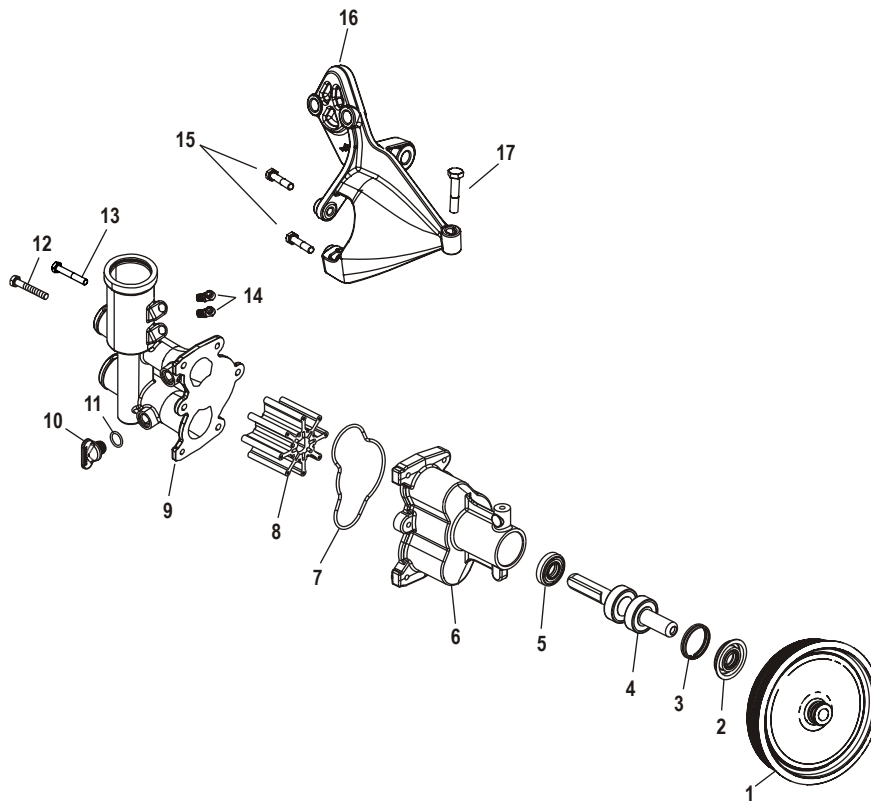
Blocking the coolant flow at the heater can cause reduced engine performance or overheating. Check for continuous coolant flow from the engine to the water circulating pump.

6. Supply cooling water to the engine.
7. If applicable, supply cooling water to the sterndrive.
8. Start the engine and check for leaks and adequate coolant flow.
9. Allow the engine to reach normal operating temperature. Ensure that engine temperature remains normal and that no leaks are present.

CAUTION

A sudden loss of pressure can cause hot coolant to boil and discharge violently resulting in serious injury from burns. Allow the engine to cool down before removing the coolant pressure cap.

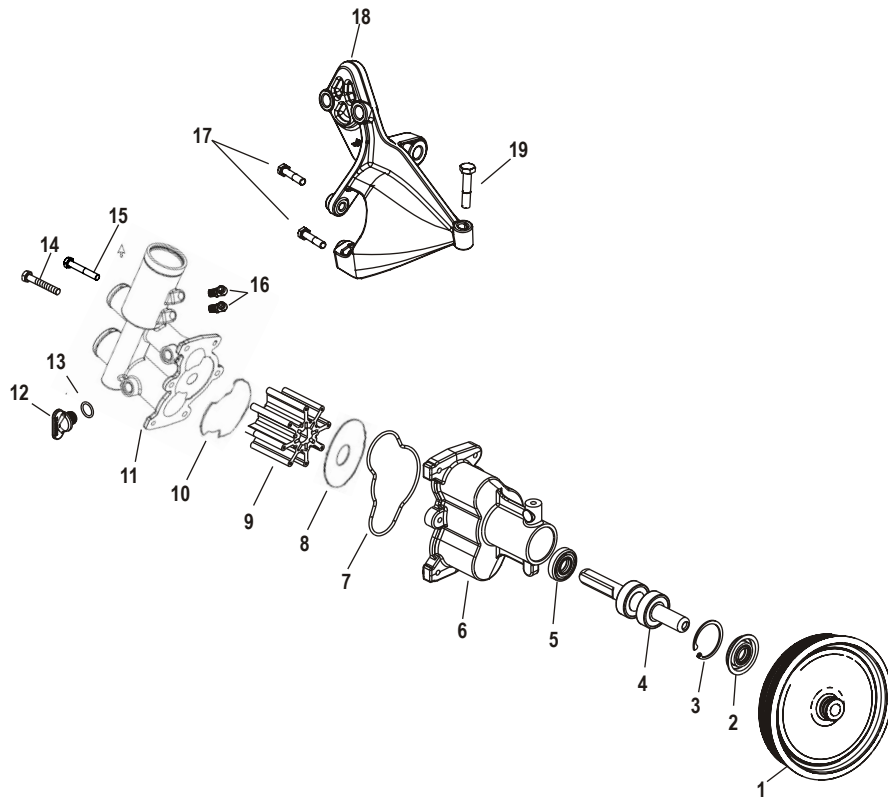
10. Stop the engine. If necessary, add new coolant to the full level in the coolant reservoir.

Seawater Pump Maintenance**Seawater Pump Assembly****Seawater pump with air actuator**

- 1 - Pulley
- 2 - Retainer seal
- 3 - Retainer ring
- 4 - Bearing shaft assembly
- 5 - Rear oil seal
- 6 - Seawater pump impeller housing
- 7 - O-ring
- 8 - Impeller
- 9 - Seawater pump actuator housing
- 10 - Drain plug
- 11 - O-ring
- 12 - Screw (M6 x 16)
- 13 - Screw (M6)
- 14 - Fitting (orange and gray)
- 15 - Screw (M6)
- 16 - Seawater pump bracket
- 17 - Screw (M6)

45994

Seawater Pump Assembly with Wear Plate

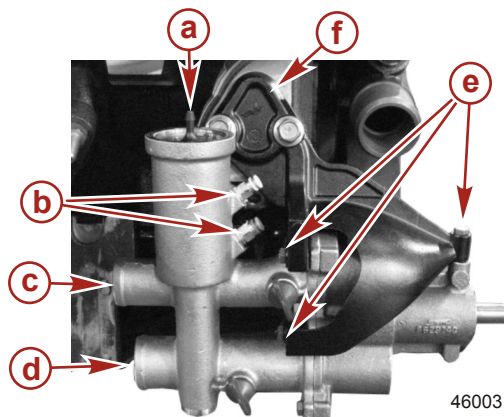


- 1 - Pulley
- 2 - Retainer seal
- 3 - Retainer ring
- 4 - Bearing shaft assembly
- 5 - Rear oil seal
- 6 - Seawater pump impeller housing
- 7 - O-ring
- 8 - Impeller housing wear plate (if equipped)
- 9 - Impeller
- 10 - Actuator housing wear plate
- 11 - Seawater pump actuator housing
- 12 - Drain plug
- 13 - O-ring
- 14 - Screw (M6 x 16)
- 15 - Screw (M6)
- 16 - Fitting (orange and gray)
- 17 - Screw (M6)
- 18 - Seawater pump bracket
- 19 - Screw (M6)

46198

Removal

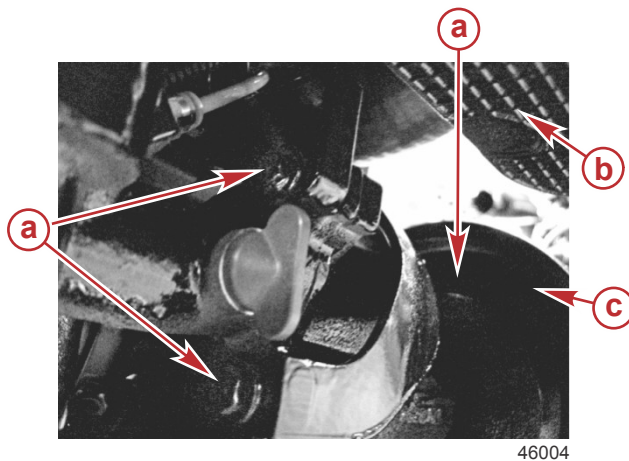
1. Drain the seawater section of the cooling system.
2. Remove the seawater inlet and outlet hoses from the aft side of the seawater pump.
3. Disconnect the vent hose from the top of the drain valve.
4. Disconnect the air hoses from the drain valve by pushing in and holding the plastic ring around the air hose and pulling the air hose out of the fitting.
IMPORTANT: If a belt is to be reused, it should be installed in the same direction of rotation as before.
5. Remove the serpentine drive belt. Mark the direction of travel if the belt will be reused.
6. Remove the dual idler pulley bracket or the automatic tensioner bracket from the front of the engine.
NOTE: The seawater pump bracket mounts to the engine, sealing an opening on the engine block. The bracket should remain mounted to the engine whenever you are removing or installing the seawater pump.
7. Remove the three screws securing the seawater pump to the bracket.
8. Remove the seawater pump from the bracket. Do not remove the bracket from the engine.



Engine components and seawater pump pulley removed for visual clarity

- a - Drain valve vent hose fitting
- b - Drain valve air hose fitting
- c - Seawater inlet hose fitting
- d - Seawater outlet hose fitting
- e - Screw (seawater pump to bracket)
- f - Seawater pump bracket on engine

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46004

Seawater pump and pulley on the engine

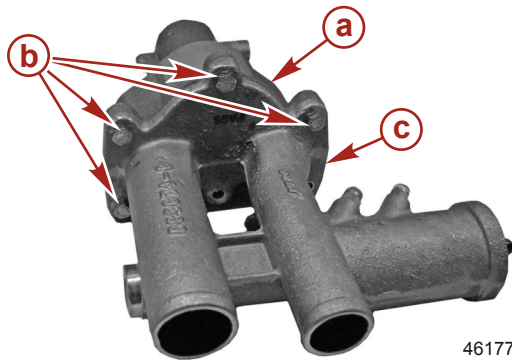
- a** - Screw (seawater pump to bracket)
- b** - Gen III fuel pump
- c** - Seawater pump pulley

Disassembly

⚠ CAUTION

Removing the snap ring from the top of the air-actuated drain valve can allow the components to come apart forcefully, resulting in injury or product damage. Do not try to repair the valve or remove the snap ring.

1. Remove the seawater pump pulley using an appropriate puller.
2. Remove the screws, and separate the impeller housing from the actuator housing.

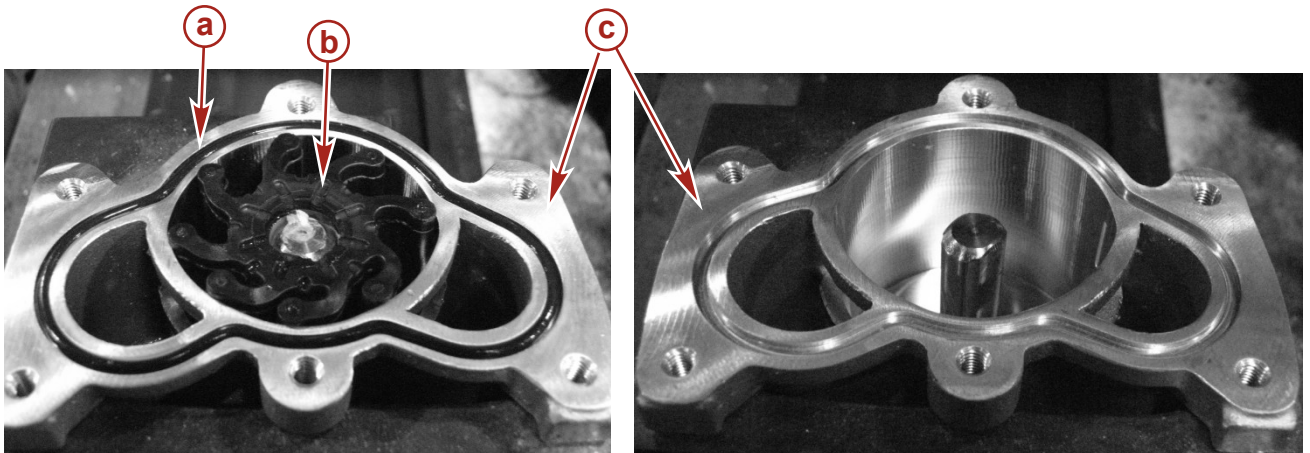


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Seawater pump assembly

- a** - Impeller housing
- b** - Screws
- c** - Actuator housing

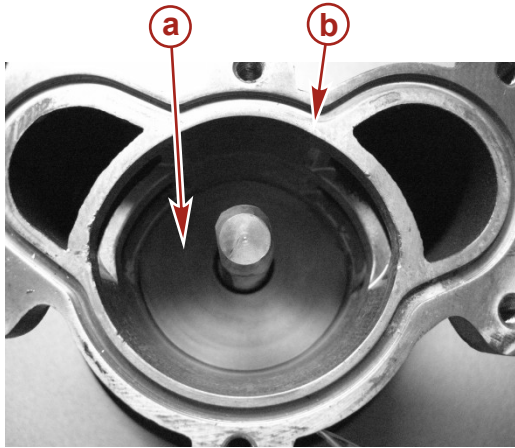
3. Remove the O-ring and the impeller.



46178

- a** - O-ring
- b** - Impeller
- c** - Impeller housing

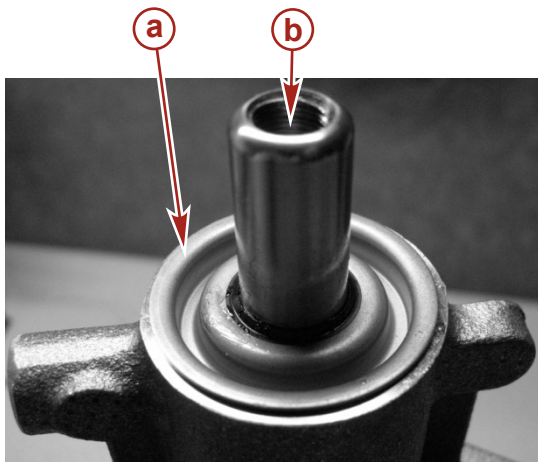
4. If equipped, remove the stainless steel plate.



- a** - Stainless steel plate
b - Impeller housing

46181

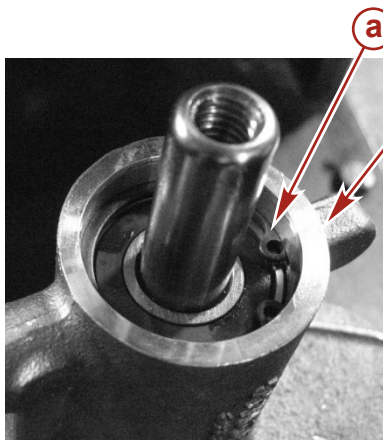
5. Remove the retainer seal.



- a** - Retainer seal
b - Pulley end of bearing shaft

46180

6. Remove the retainer ring.



- a** - Retainer ring
b - Housing

46179

7. Press the shaft and bearing assembly out of the housing from the impeller side.
8. Remove the rear oil seal.

Cleaning and Inspection

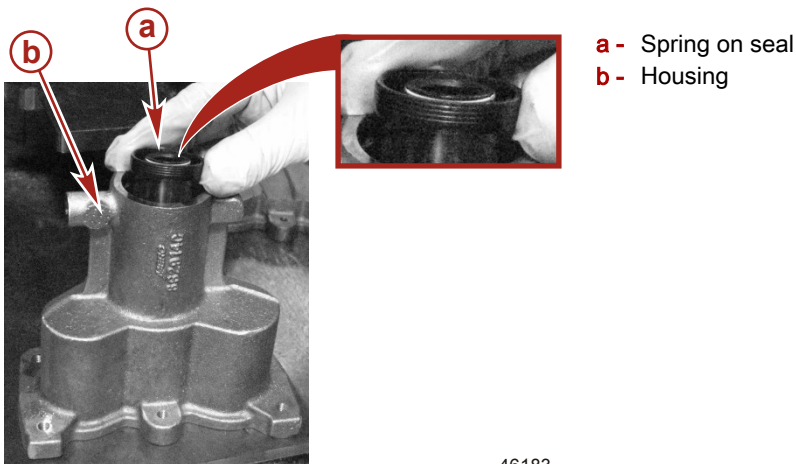
⚠ WARNING

Spin-drying bearings with compressed air can cause serious injury or death. The bearings can explode, even if spun at very slow speeds. Do not allow the bearings to spin when drying with compressed air.

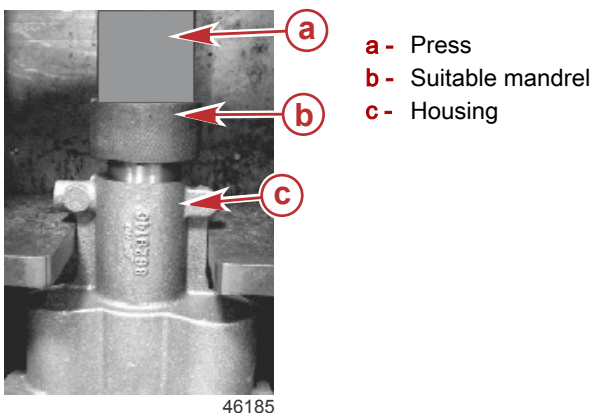
1. Clean the metal parts in solvent, and dry them with compressed air.
2. Clean all gasket material and sealant from the sealing surfaces.
3. Inspect the bearing housing. Examine its surfaces where the bearings contact the housing for evidence of the bearing outer races turning in the housing.
4. Inspect the seals in the bearing housing for damage or leaks.
5. Rotate the bearing shaft in the bearing housing. Replace the bearing shaft and bearing assembly if bearings feel rough or if either end of the shaft wobbles.
6. Inspect the impeller housing surfaces where the impeller rides. Replace the impeller housing if significant grooves exist.
7. Inspect the face of the impeller housing cover for grooves. The face of the impeller housing cover can be resurfaced to remove grooves. Remove a maximum of 1.0 mm (0.040 in.) of material.
8. Inspect the pump impeller and replace if any of the following conditions exist:
 - Wear on the ends and tips of the blades
 - Cracks in the area where the blades flex
 - Cracks in the impeller hub
 - Blade set (blades remain curved)
9. Inspect the pump pulley for bends or cracks.
10. Inspect the serpentine belt for excessive wear.

Assembly

1. Install the rear seal with the spring toward the bearing shaft assembly.




2. Using a suitable mandrel, press the seal to seat it in the housing.

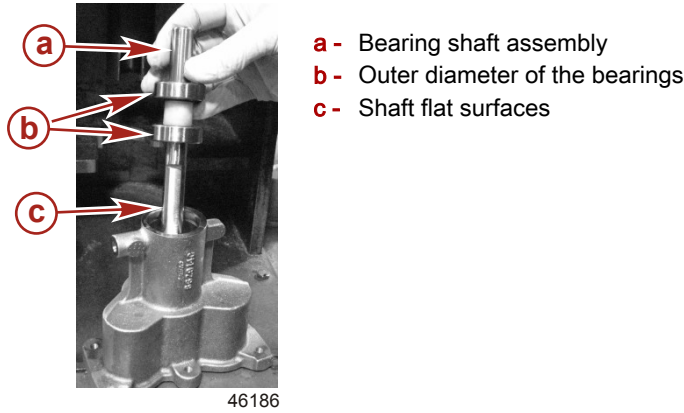


IMPORTANT: The bearing shaft assembly should slip easily into the bearing housing, using only minimal force.

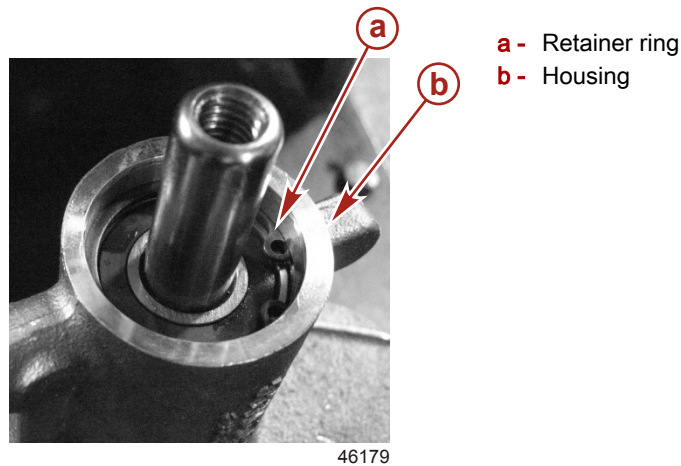
- Lubricate the outer diameter of the bearings on the bearing shaft assembly.

Tube Ref No.	Description	Where Used	Part No.
 80	SAE Engine Oil 30W	Outer diameter of the bearings	Obtain Locally


- Install the bearing shaft assembly into the impeller housing. The end of the shaft with flat surfaces should extend into the impeller cavity. Clean any assembly lube or oil from the forward end of the impeller housing.



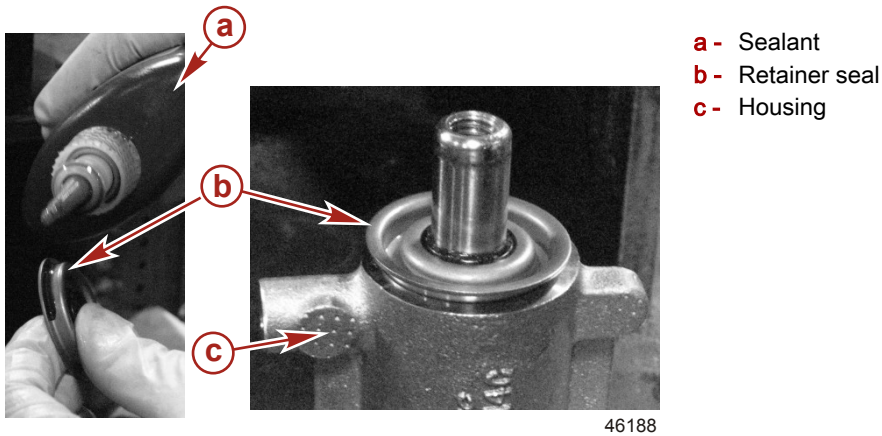
- Insert the retainer ring into the impeller housing.



- Apply adhesive to the outer diameter of the retainer seal. Do not allow adhesive to contact the seal portion or the bearing shaft assembly.

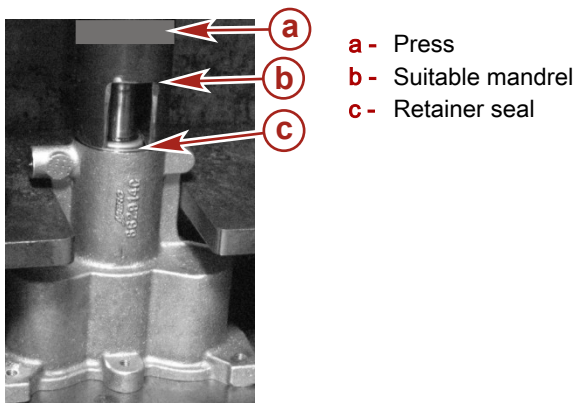
Tube Ref No.	Description	Where Used	Part No.
 68	Loctite 609	Outer diameter of retainer seal	Obtain Locally

7. Install the retainer seal onto the bearing shaft assembly and slide it down until it contacts the end of the impeller housing.



46188

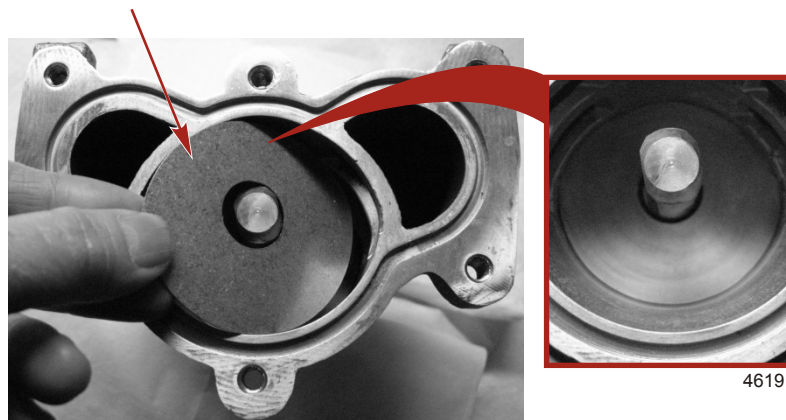
8. Press the retainer seal into place. Wipe away excess adhesive.



46187

IMPORTANT: Only use the 0.030 in. inner wear plate in conjunction with the 0.030 in. shorter impeller. This impeller is marked orange on alternate vanes. The plate and shorter impeller come as a set when a new impeller is ordered.

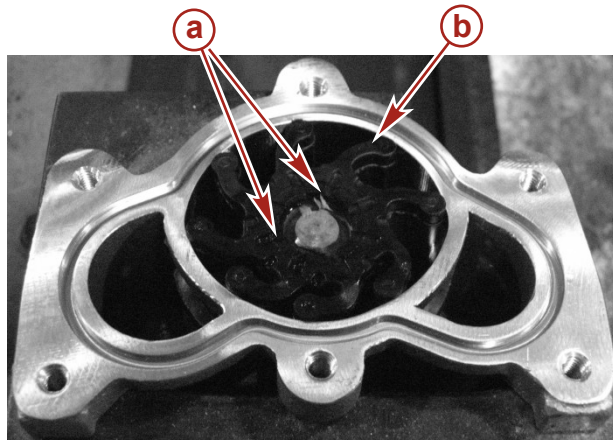
9. If equipped, install the stainless steel plate into the impeller cavity.



46191

Stainless steel 0.030 in. inner wear plate

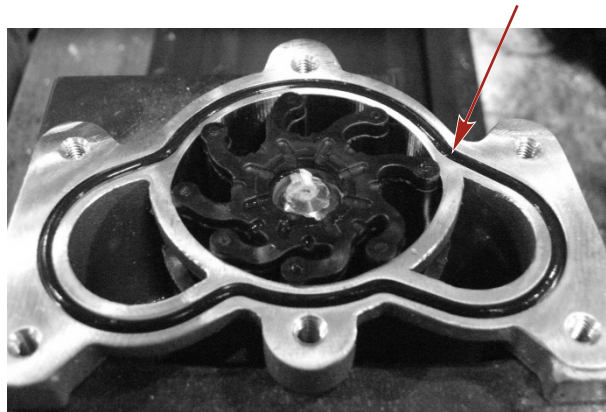
10. Lubricate the impeller with soapy water. Align the flat surfaces of the impeller hub and bearing shaft and install the impeller into the impeller cavity.



- a - Flat surfaces
- b - Impeller

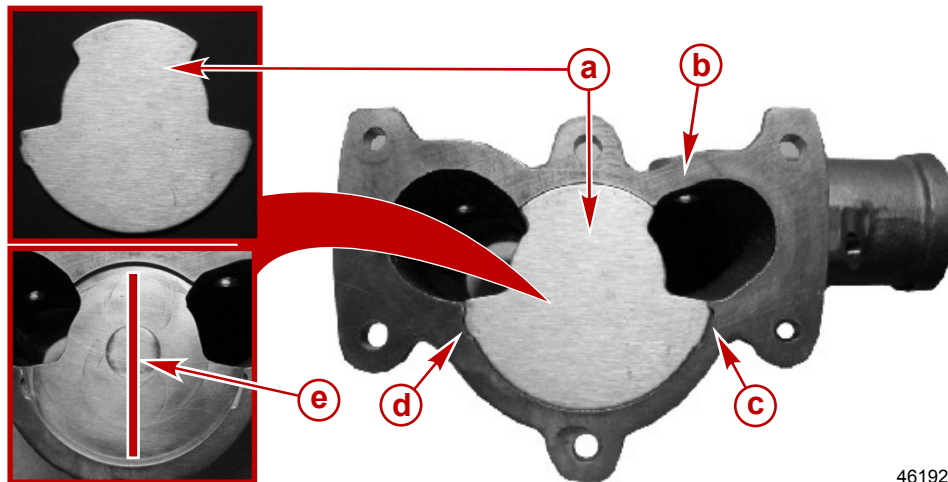
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11. Install the O-ring into the groove in the impeller housing rear face.




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12. If you have the design shown below, apply a 1/8-inch wide bead of adhesive across the actuator housing; then place the stainless steel wear plate on the housing with the tabs aligned. Bolt the assembly to the pump within five minutes.

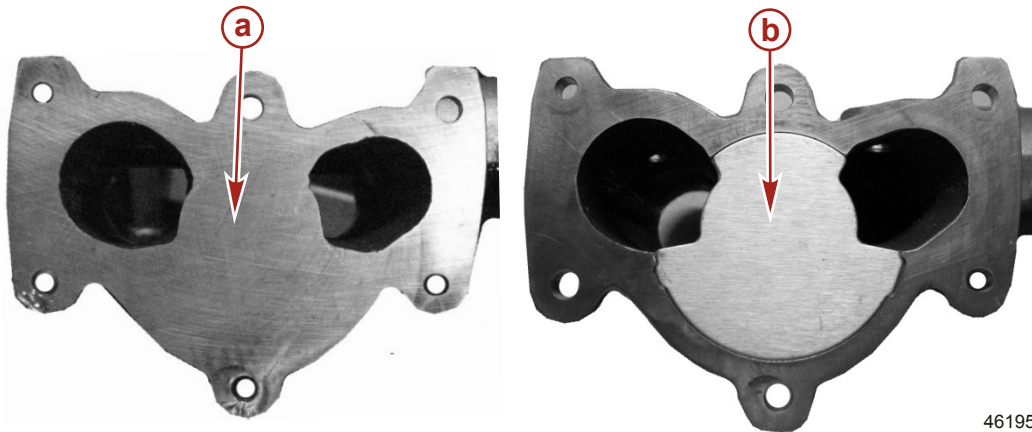


- a - Stainless steel wear plate
- b - Actuator housing
- c - Large tab
- d - Small tab
- e - Adhesive on housing

46192

Tube Ref No.	Description	Where Used	Part No.
 142	Loctite 598 RTV Sealant	Actuator housing wear plate	Obtain Locally

IMPORTANT: The following actuator housing styles will mate with both impeller styles.

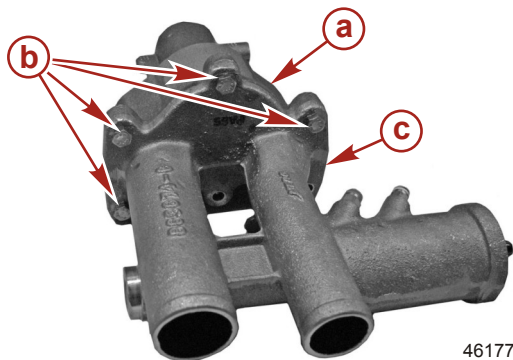


- a - Actuator housing style with milled even surface
- b - Actuator housing style with wear plate

13. Align and install the actuator housing on the impeller housing assembly.
14. Screws that are reused may require Loctite. Apply adhesive to the threads of the screws as necessary.

Tube Ref No.	Description	Where Used	Part No.
66	Loctite 242 Threadlocker	Impeller housing cover or seawater pump actuator housing screw threads	92-809821

15. Install the four screws and tighten to the specified torque.



- Seawater pump assembly**
- a - Impeller housing
 - b - Screws
 - c - Actuator housing

Description	Nm	lb-in.	lb-ft
Impeller housing cover or the seawater pump actuator housing screw	10	89	-

Installation

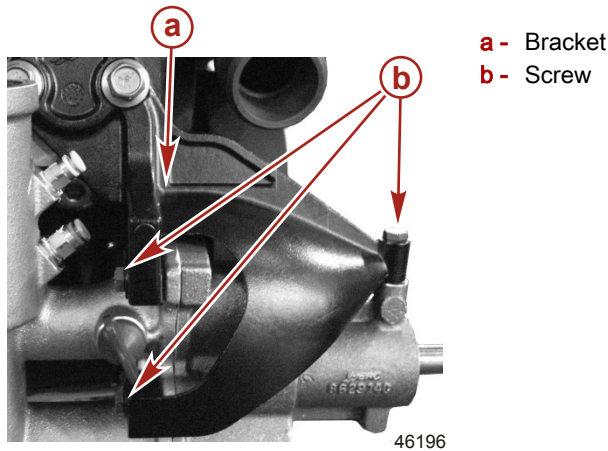
1. Screws that are reused may require Loctite. Apply adhesive to the threads of the three seawater pump bracket screws as necessary.

Tube Ref No.	Description	Where Used	Part No.
66	Loctite 242 Threadlocker	Seawater pump bracket screw threads	92-809821

2. Install the seawater pump assembly onto the bracket on the engine. Hand-start two screws through the bracket and into the seawater pump assembly. Hand-start the screw that attaches the seawater pump bracket to the top of the seawater pump assembly.

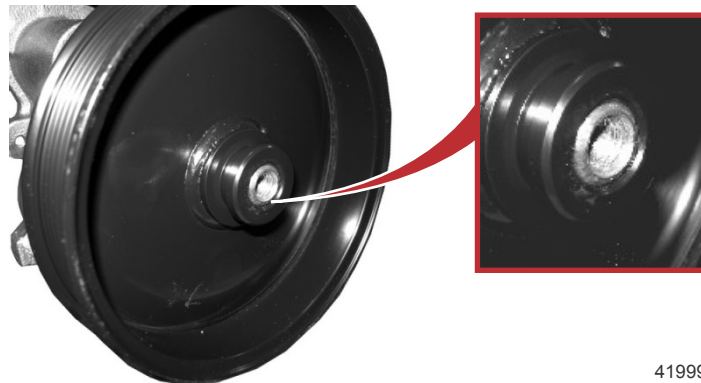
Seawater Supply System

- Tighten the three screws to the specified torque.




Description	Nm	lb-in.	lb-ft
Seawater pump bracket screws	10	89	–

- Lubricate the seawater pump shaft and install the seawater pump pulley onto the shaft using an appropriate pulley installer. Ensure that the end of the shaft is even with the face of the pulley hub.



Seawater pump pulley installed

Tube Ref No.	Description	Where Used	Part No.
 80	SAE Engine Oil 30W	Seawater pump shaft	Obtain Locally

Pulley Pusher Installer	91-93656A1
Power Steering Pump Pulley Remover	Kent Moore J-21239

- If removed, install the blue drain plugs in the seawater pump cover or actuator housing.
- Install the dual idler pulley bracket or idler/tensioner bracket onto the studs in front of the cylinder block using the nuts previously removed.
- Tighten the nuts to the specified torque.

Description	Nm	lb-in.	lb-ft
Idler pulley bracket or idler/tensioner bracket	50	–	37

- Install the seawater inlet and outlet hoses. Tighten the hose clamps securely.
- Install the vent hose onto the top of the drain valve.
NOTE: The air lines for the air-actuated drain valve are two different sizes.
- Install the appropriate air lines into the appropriate fittings on the air-actuated drain valve by fully inserting the air lines into the fittings. Pull on the air lines to ensure that they are properly installed.
IMPORTANT: If the engine serpentine belt is to be reused, it should be installed in the same direction of rotation as before.

11. Install the serpentine drive belt.

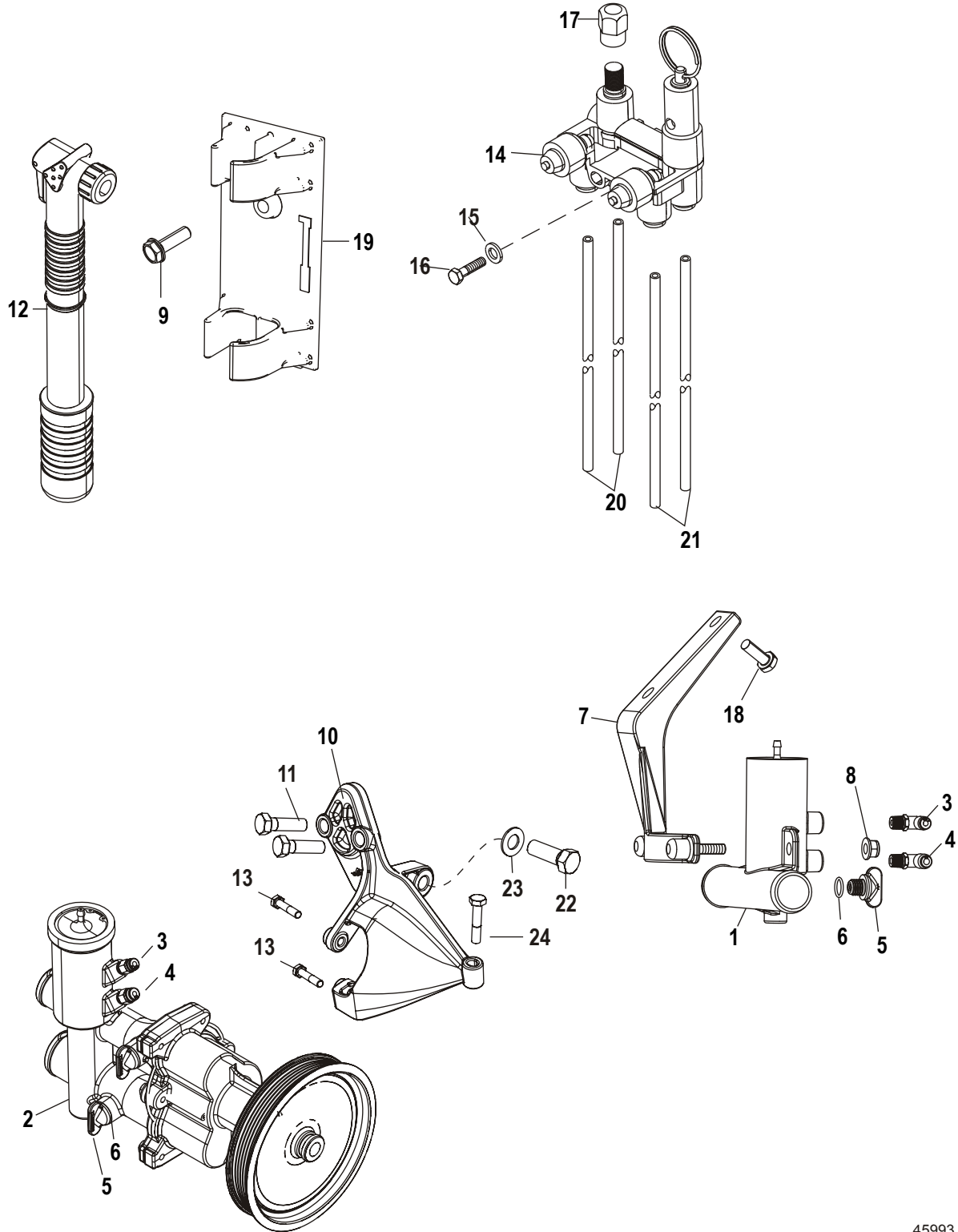
NOTICE

Without sufficient cooling water, the engine, the water pump, and other components will overheat and suffer damage. Provide a sufficient supply of water to the water inlets during operation.

12. Supply cooling water.
13. Start the engine and check for leaks.

Air-Actuated Drain System

Air-Actuated Drain System Exploded View



45993

Air-Actuated Drain System Exploded View

Ref. No.	Qty.	Description	Torque		
			Nm	lb-in.	lb-ft
1	1	Air actuator			
2	1	Seawater pump with air-actuated drain			
3	2	Gray 90-degree fitting			
4	2	Orange 90-degree fitting			
5	2	Blue drain plug			
6	2	O-ring			
7	1	Air-actuator mounting bracket			
8	4	Nut (M8)	24	–	18
9	2	Screw (#12-11 x 0.750)			
10	1	Bracket			
11	2	Screw (M6 x 30)			
12	1	Air pump			
13	2	Screw (M6 x 40)	5	44	–
14	1	Air manifold assembly			
15	2	Washer			
16	2	Screw	5	44	–
17	1	Service point cap			
18	1	Screw			
19	1	Air pump bracket			
20	2	Green air line			
21	2	Gray air line			
22	1	Screw (0.437-14 x 1.250)			
23	1	Washer (0.453 x 0.875 x 0.060)			
24	1	Screw			

General Information

The air-actuated drain system uses compressed air to move a piston that pulls a plug out of a drain port or moves a drain tube to expose a hole to a water passage allowing water to drain into the engine compartment. All of the drain locations are arranged to allow any debris to be continually flushed away from the drains during normal engine operation. A feedback mechanism provides positive indication of proper piston movement. When each piston moves far enough in its cylinder, a port is uncovered that allows compressed air to flow back to the air manifold and cause the green indicator to extend. The drains are closed by opening the manual release valve that releases the compressed air from the system. The manual release valve also functions as an automatic pressure relief valve that opens at approximately 482.7 kPa (70 psi), thereby protecting the compressed air circuit from damage due to excess pressure.

Testing

⚠ CAUTION

Water can enter the bilge when the drain system is open, damaging the engine or causing the boat to sink. Remove the boat from the water or close the seacock, disconnect and plug the seawater inlet hose, and ensure the bilge pump is operational before draining. Do not operate the engine with the drain system open.

⚠ CAUTION

Removing the snap ring from the top of the air-actuated drain valve can allow the components to come apart forcefully, resulting in injury or product damage. Do not try to repair the valve or remove the snap ring.

1. Remove the boat from the water.
2. Using the hand pump or other air source, pump air into the system until both of the green indicators extend and the manual release valve opens to relieve excess pressure. If one or both of the green indicators have not extended when the relief valve opens, the corresponding air-actuated drain valve has not opened and may be seized.
3. Release the compressed air from the air circuit by pulling up on the manual release valve ring.
4. Ensure both of the air-actuated drain valves have closed by verifying that water is no longer draining from either valve. If water continues to drain from an air-actuated drain valve after the air pressure has been released, the valve is seized and must be replaced.

Air Manifold

Removal

1. Remove the air manifold assembly from the air manifold bracket. Retain the washers and screws.
NOTE: The air lines are arranged in pairs of one gray and one green air line for each drain valve. To avoid reconnecting these hoses incorrectly, note which side of the air manifold each pair of air lines is connected to before removing them from the air manifold.
2. Disconnect the air lines from the air manifold. Push in and hold the plastic ring around the air line and pull the air line out of the fitting.

Installation

1. Connect each pair of air lines to the proper side of the air manifold by fully inserting the air lines into the fittings on the air manifold.
2. Install the air manifold assembly onto the air manifold bracket using the washers and screws. Tighten the screws to the specified torque.

Description	Nm	lb-in.	lb-ft
Air manifold assembly to bracket screw	5	44	–

3. Test the drain system for proper operation.

Air-Actuated Drain Valve

Removal

1. Remove the boat from the water.
2. If the air-actuated drain valve to be replaced is part of the seawater pump assembly, the entire seawater pump assembly must be removed from the engine. Refer to **Seawater Pump Maintenance, Removal** and **Seawater Pump Maintenance, Disassembly**.
3. Disconnect any water hoses connected to the air-actuated drain valves.

4. Disconnect the air lines from the drain valves. Push in and hold the plastic ring around the air line, and pull the air line out of the fitting.
5. Disconnect the cylinder vent hose from the top of the drain valve.
6. Remove the nuts that secure the port drain valve to the mounting bracket.

⚠ CAUTION

Removing the snap ring from the top of the air-actuated drain valve can allow the components to come apart forcefully, resulting in injury or product damage. Do not try to repair the valve or remove the snap ring.

7. Remove the drain valve.

Installation

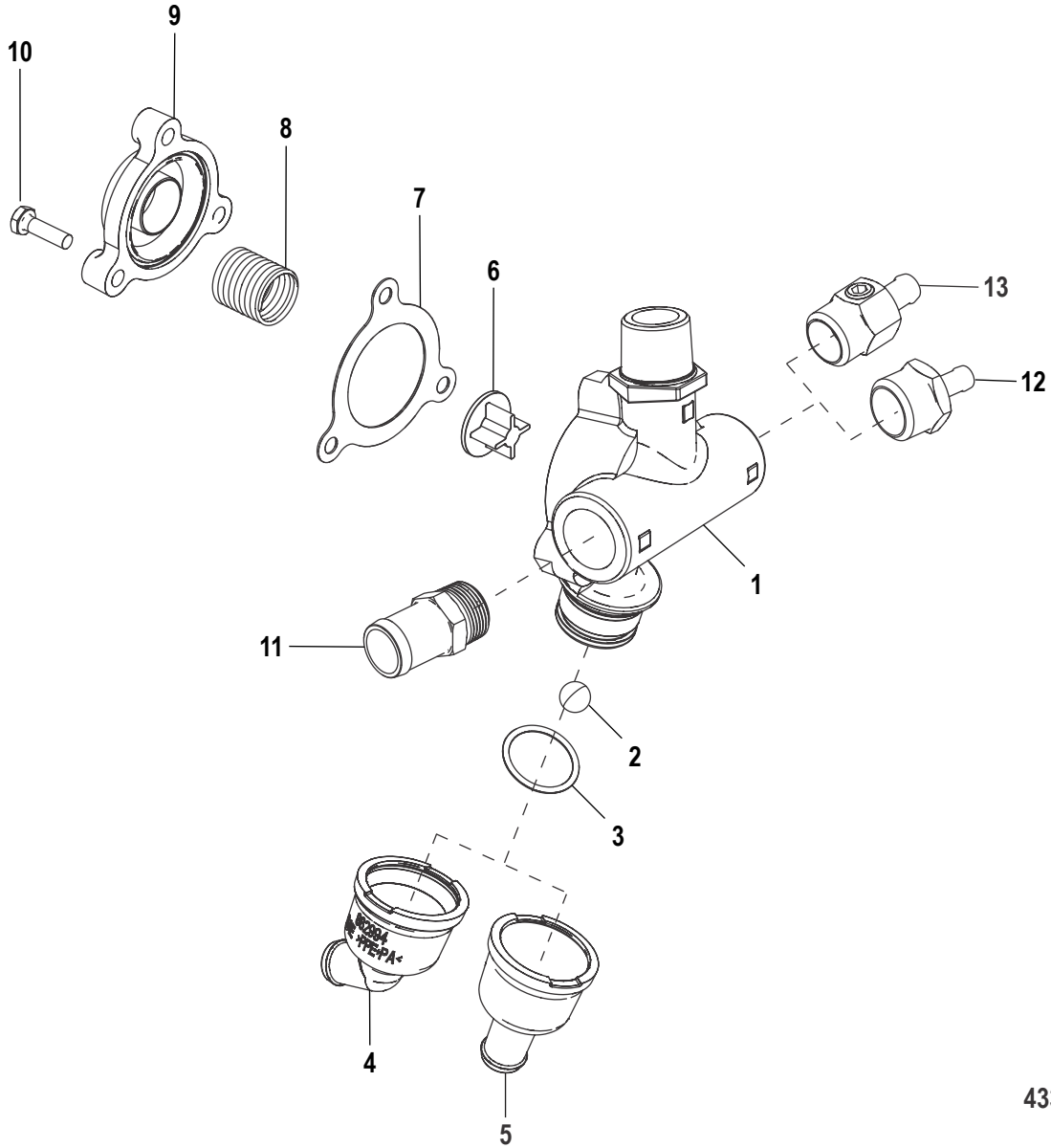
1. If the air-actuated drain valve to be replaced is part of the seawater pump assembly, install the new drain valve onto the seawater pump and install the seawater pump onto the engine. Refer to **Seawater Pump Maintenance, Removal** and **Seawater Pump Maintenance, Disassembly**.
2. Install the port drain valve onto the mounting bracket and secure with the nuts. Tighten the nuts to the specified torque.

Description	Nm	lb-in.	lb-ft
Port drain valve nut	24	–	18

3. Connect the vent hose to the top of the drain valve. Route the vent hose the same as it was before removal.
4. Connect the air lines to the drain valve by fully inserting the air lines into the fittings.
5. Install the water hoses onto the drain valve. Tighten the hose clamps securely.
6. Test the drain system for proper operation.

Exhaust Manifold Poppet Valves

Design I

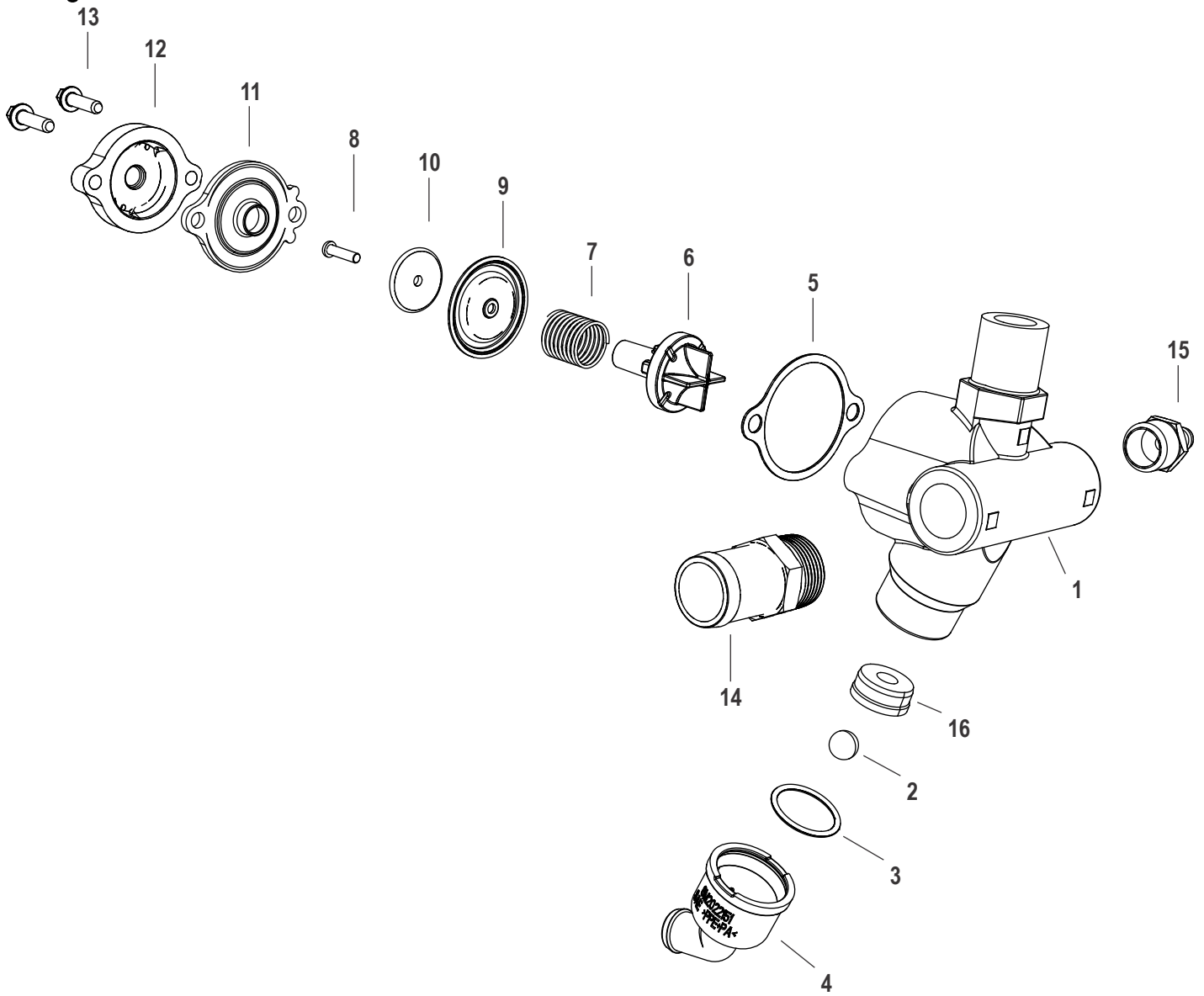


43358

Design I

Ref. No.	Qty.	Description	Torque		
			Nm	lb-in.	lb-ft
1	1	Poppet valve assembly			
2	1	Ball			
3	1	O-ring (1.112 x 0.103)			
4	1	Fitting			
5	1	Fitting (port—1A351400 and below)			
6	1	Poppet			
7	1	Gasket			
8	1	Spring (stainless steel)			
9	1	Cap			
10	3	Stainless screw (0.250-20 x 0.875)	13.5	120	–
11	2	Straight fitting			
12	2	Straight fitting (MCM)			
13	2	Straight fitting (MIE)			

Design II



51001

Design II

Ref. No.	Qty.	Description	Torque			
			Nm	lb-in.	lb-ft	
1	1	Poppet valve assembly				
2	1	Ball				
3	1	O-ring (1.112 x 0.103)				
4	1	Fitting				
5	1	Gasket				
6	1	Poppet				
7	1	Spring (stainless steel)				
8	1	Screw	2.5	22.1	-	
9	1	Diaphragm				
10	3	Washer				
11	1	Plate				
12	1	Cover				
13	2	Screw (M8 x 30)	First	7	62	-
			Final	19	168	-
14	1	Fitting				
15	1	Fitting (MCM)				
15	1	Fitting (MIE)				
16	1	Ball seat				

Disassembly

1. Drain the water from the engine's seawater cooling passages.
2. Disconnect the hoses from the poppet valve housing.
3. Remove the screws and thermostat cap.
4. Remove the spring, gasket, and poppet.
5. Discard the existing gasket.

Inspection


1. Inspect the bypass slot. If the passage is clogged, clean it. If the passage is rusted, replace the valve.
2. Check all parts for excessive wear. Replace as necessary.

Assembly

Different engine models use different, color-coded springs. Ensure that you install the correct spring.

Model	Spring Color
8.2 models	Silver

1. Remove all gasket material from the mating surfaces on the housing.
2. Coat both sides of a new gasket with Perfect Seal.

Tube Ref No.	Description	Where Used	Part No.
 19	Perfect Seal	Both sides of the poppet valve gasket	92-34227Q02

3. Install the new components. Tighten the screws to the specified torque.
4. Connect the inlet and outlet hoses. Tighten the hose clamps to the specified torque.

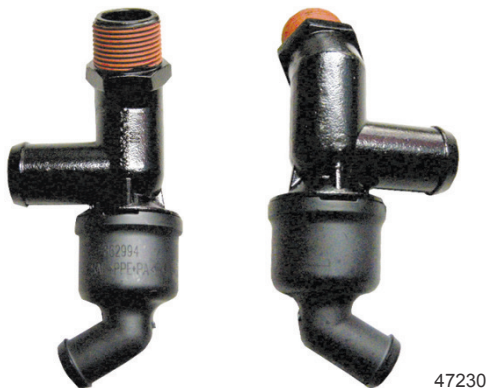
Description		Nm	lb-in.	lb-ft
Poppet valve cap screws (Design I)		13.5	120	–
Poppet valve cap screws (Design II)	First	7	62	–
	Final	19	168	–
Hose clamps		3	27	–

5. Start the engine and check for leaks.

Exhaust Manifold Drain Check Valve

General Information

Some engine models are equipped with drain check valves located on the port and starboard exhaust manifolds. The drain check valve is a nonserviceable item.



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