

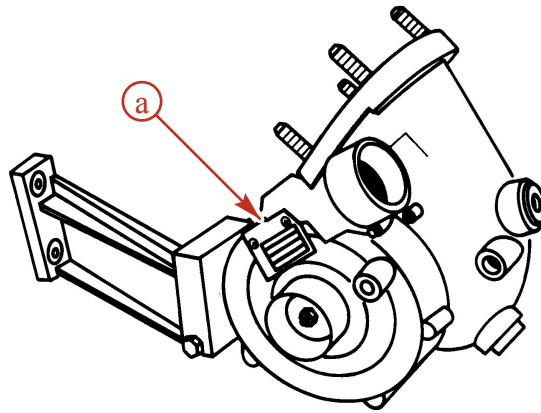
Intake and Exhaust System

Section 7C - Turbocharger

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Turbocharger Identification



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Typical

a - Identification number location

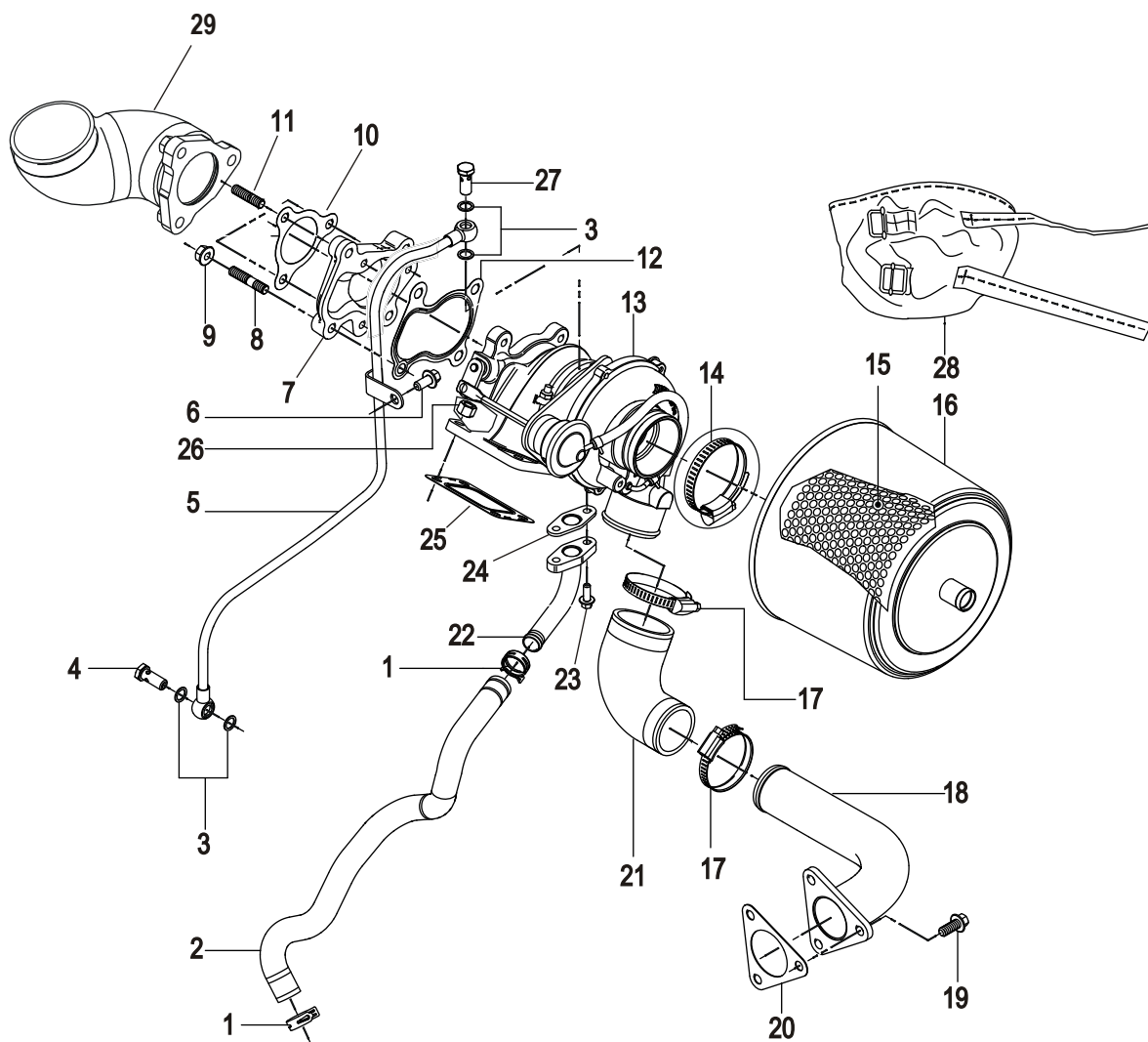
Important Information

The turbocharger boost pressure control components are not individually serviceable. If a boost pressure control component fails replace the turbocharger assembly. Boost pressure control components are calibrated for this specific application. Attempts to adjust or defeat the boost pressure control system may result in product failure.

Notes:

Exploded Views

Turbocharger and Related Components



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Turbocharger and Related Components

Ref. No.	Qty.	Description	Torque		
			Nm	lb-in.	lb-ft
1	2	Hose clamp	5.5	48	–
2	1	Oil return hose			
3	4	Sealing washers			
4	2	Hollow bolt fitting	24.5	–	18
5	1	Oil supply pipe			
6	1	Screw	13	115	–
7	1	Flange adaptor			
8	3	Stud	16	–	12
9	3	Nut	32	–	24
10	1	Gasket			
11	3	Stud			
12	1	Gasket			
13	1	Turbocharger			
14	1	Hose clamp	5.7	50	–
15	1	Air filter housing			
16	1	Air filter			
17	2	Hose clamp	5.7	50	–
18	1	Tube, air supply			
19	3	Screw	24.5	–	18
20	1	Gasket			
21	1	Hose, air supply			
22	1	Oil return pipe			
23	2	Screw	11	97	–
24	1	Gasket			
25	1	Gasket			
26	4	Nut	32.5	–	24
27	1	Hollow bolt fitting	24.5	–	18
28	1	Heat Shield			

Turbocharger

IMPORTANT: Before exploring whether the turbocharger is causing problems with engine performance or operation, confirm that the fuel injection system and engine mechanical components are functioning correctly.

Checking the Turbine Bearings—Assembled

1. Refer to **Section 1B—Air Filter** and remove the air filter housing.
2. Check turbine operation by rotating the impeller by hand. If the turbine does not turn smoothly the bearing has failed and the turbocharger must be replaced.

Testing the Turbocharger Boost Pressure

IMPORTANT: For complete engine performance data refer to the Cummins MerCruiser Diesel Performance Curves and Datasheets at www.cmdmarine.com.

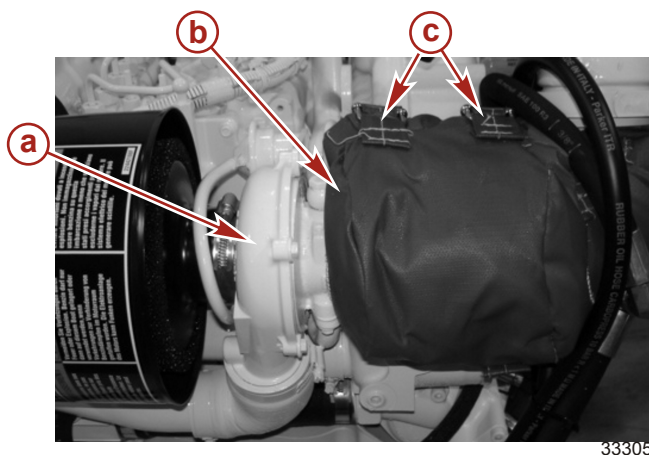
Prior to testing, the engine should be at normal operating temperature and the engine air filter should be cleaned or replaced. Check turbocharger boost pressure by monitoring the manifold absolute pressure and intake air temperature (MAP-IAT) sensor with a CDS.

Turbocharger boost pressure	
Maximum pressure at 3800 RPM	For complete engine performance data refer to the Cummins MerCruiser Diesel Performance Curves and Datasheets at www.cmdmarine.com .

If no mechanical engine problems, ECS issues, or intake or exhaust system restriction exists readings lower than specified indicate possible turbocharger or boost pressure control system failure. Refer to the appropriate sections in this manual, including **Troubleshooting**. No boost pressure may indicate a faulty turbocharger requiring replacement.

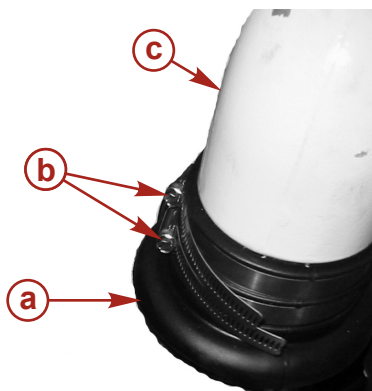
Removal

1. Allow the engine to cool.
2. Disconnect both battery cables from the battery terminals.
3. Close the seacock or disconnect and plug the seawater supply hose and drain the seawater system.
4. Remove the turbocharger heat shield.



- a** - Turbocharger
b - Heat shield
c - Heat shield buckles

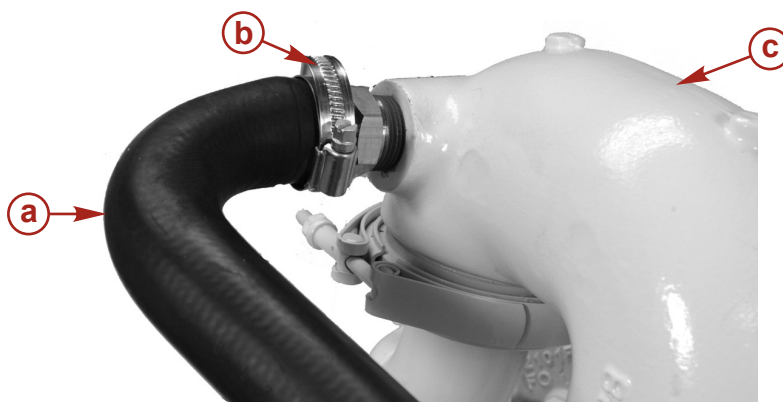
5. Loosen the hose clamps on the exhaust hose connected to the exhaust elbow.



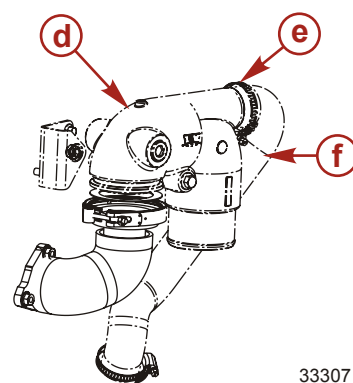
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- a** - Exhaust hose
b - Hose clamps
c - Exhaust elbow

6. Disconnect the seawater hose from the exhaust elbow.



- a** - Seawater hose
b - Hose clamp
c - Early production exhaust elbow



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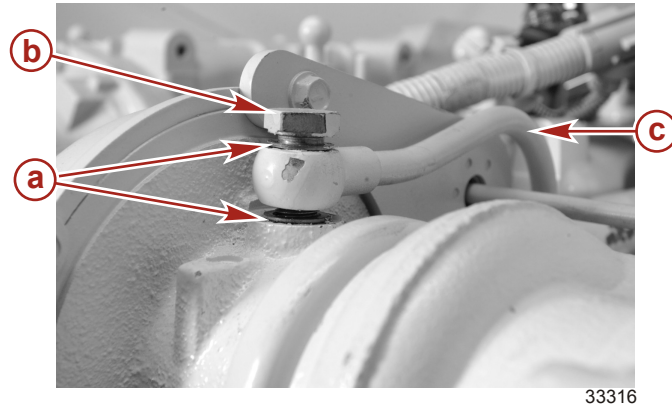
- d** - Late production exhaust elbow
e - Hose clamp
f - Seawater hose

7. Disconnect the air intake hose pipe and hose. See **Section 7A—Air Intake Pipe**.

NOTE: Be prepared to contain any oil spills that occur when disconnecting the turbocharger oil lines.

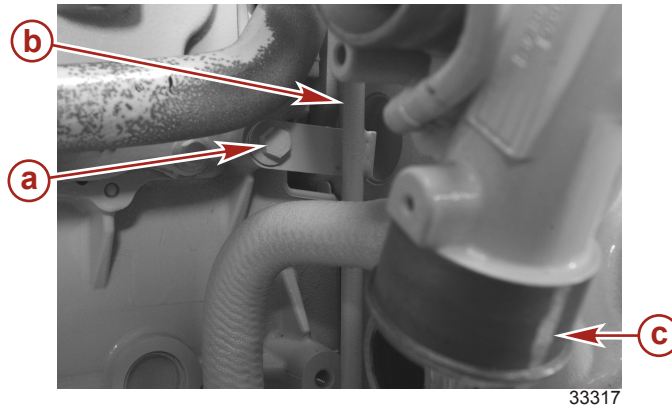
8. Disconnect the turbocharger oil supply line.

- a. Remove the hollow bolt fitting from the turbocharger housing. Discard the used sealing washers.



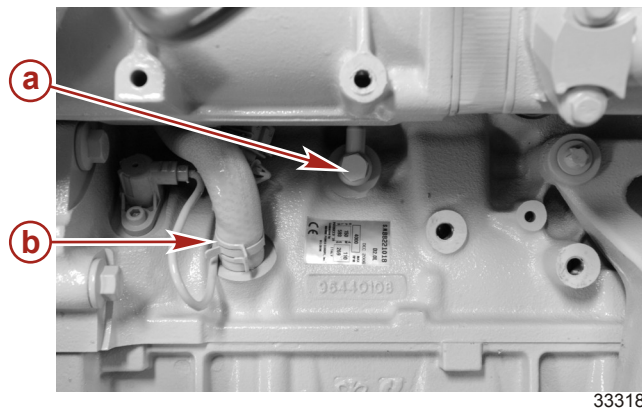
- a** - Sealing washers
b - Hollow bolt
c - Oil supply line

- b. Remove the oil supply line anchor screw.



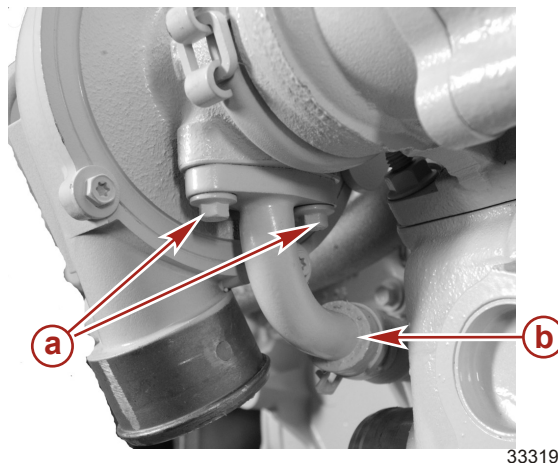
- a** - Anchor screw
b - Oil supply line
c - Turbocharger air outlet

- c. Disconnect the oil supply line to engine block hollow bolt fitting. Discard the used sealing washers.



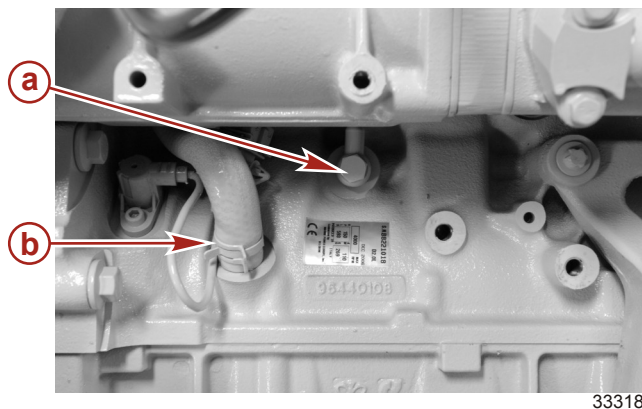
- a** - Oil supply line connection
b - Oil return line connection

9. Disconnect the turbocharge oil return line.
 - a. Detach the oil return line from the turbocharger. Discard the used gasket.



- a** - Screws
b - Oil return line

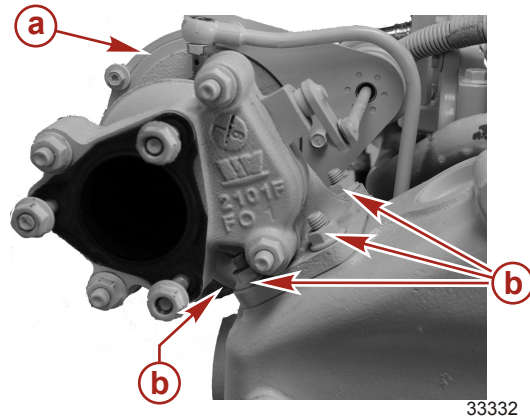
- b. Detach the oil return line from engine block.



- a** - Oil supply line connection
b - Oil return line connection

10. Disconnect and remove the exhaust elbow. See **Section 7B—Exhaust Elbow**.

11. Remove the four nuts from the studs attaching the turbocharger to exhaust manifold heat exchanger assembly.



a - Turbocharger
b - Nut

12. Remove the turbocharger and discard the used mounting gasket.

Cleaning

IMPORTANT: Never use a caustic cleaning solution, as it may damage the aluminum. Never use a wire brush, which could damage impeller or mating surfaces.

1. Before cleaning, inspect the disassembled parts for burned areas, abrasion, carbon deposits, and gas and oil leakage.

⚠ CAUTION

Using compressed air can cause serious injury. Always wear eye protection when working with compressed air to prevent injury from ruptured hoses or flying debris.

⚠ WARNING

Do not allow rotating parts to spin while drying them with compressed air. If spun during drying, bearings can explode and turbine blades will cut or sever if contacted causing serious injury. Spinning the turbine dry will also damage the turbine shaft bearings.

2. Thoroughly clean all the parts with clean diesel fuel, using a soft brush. Dry with compressed air.

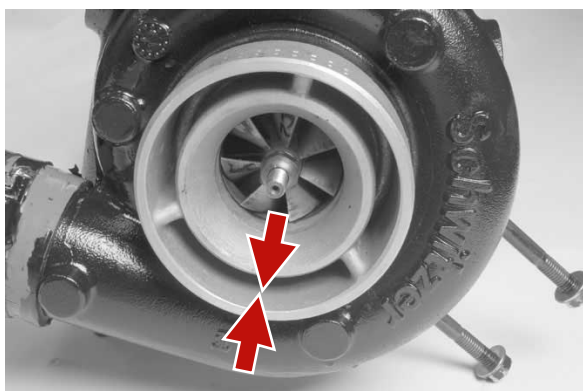
Inspection

IMPORTANT: Replace the turbocharger if the impeller does not turn freely without sticking.

Checking the Axial (End) Play

1. Place the turbocharger in a vise and push the turbocharger shaft in one direction. Verify that the blades rotate freely and do not rub.
2. Repeat the test with the shaft pushed in the opposite direction. Verify that the blades rotate freely and do not rub.

3. If in step 1 or 2, the blades rub or do not rotate freely, replace the turbocharger.

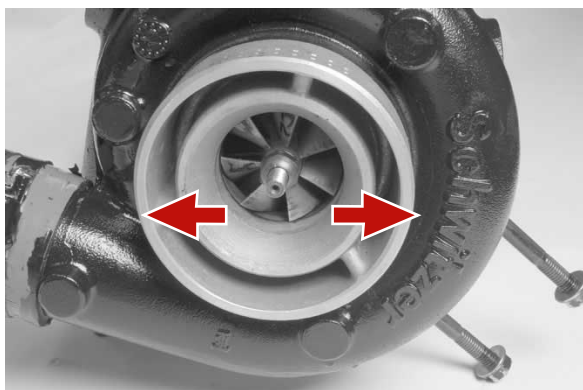


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Checking axial (end) play

Measuring the Radial (Side) Play

1. Place the turbocharger in a vise and push the turbocharger shaft to the side. Verify that the blades rotate freely and do not rub.
2. Repeat the test with the shaft pushed in the opposite direction. Verify that the blades rotate freely and do not rub.
3. Replace the turbocharger if the blades rub or do not rotate freely.

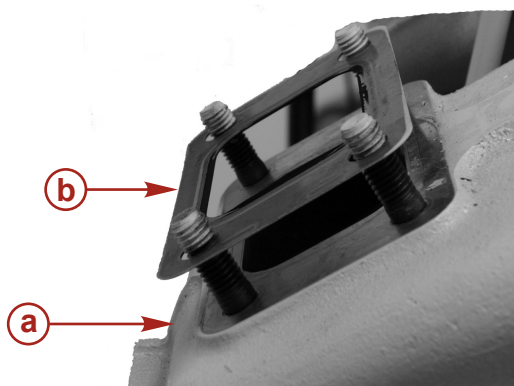


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Checking radial (side) play

Installation

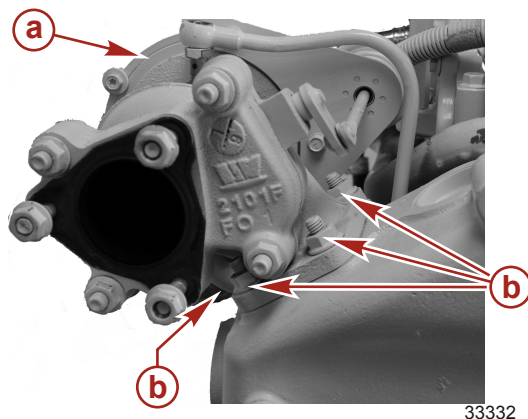
1. Place a new turbocharger mounting gasket over the turbocharger mounting studs.



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- a** - Exhaust manifold heat exchanger assembly
b - Gasket

2. Place the turbocharger on the mounting studs and tighten the four flange nuts on the studs attaching the turbocharger to exhaust manifold heat exchanger assembly.

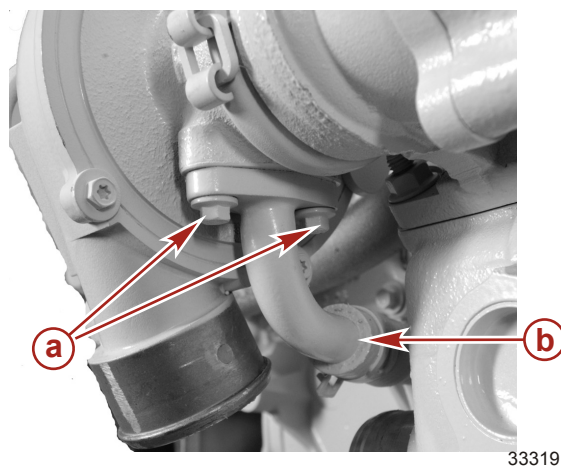


- a** - Turbocharger
b - Flange nut

3. Tighten the turbocharger flange nuts to specification.

Description	Nm	lb-in.	lb-ft
Turbocharger flange nut	32.4	—	24

4. Install the exhaust elbow. See **Section 7B—Exhaust Elbow**.
5. Connect the turbocharge oil return line.
 - a. Attach the oil return line to the turbocharger with a new gasket.

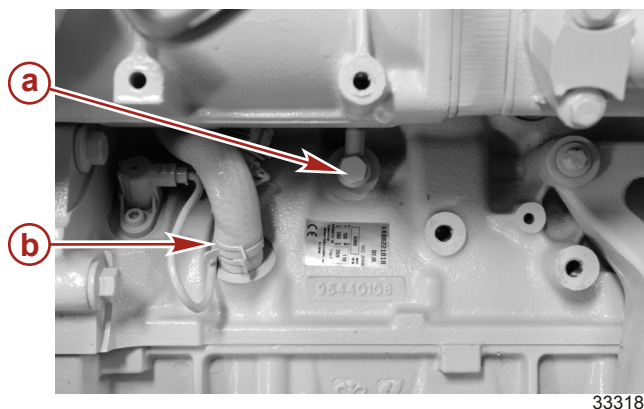


- a** - Screws
b - Oil return line

- b. Tighten the oil return line screws to specification.

Description	Nm	lb-in.	lb-ft
Oil return line screw	10.8	96	—

- c. Attach the oil return line to engine block with a spring-loaded hose clamp.

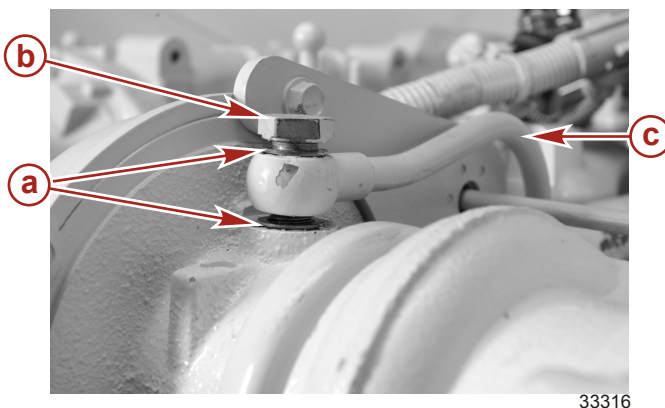


a - Oil supply line connection

b - Oil return line connection

6. Connect the turbocharger oil supply line.

- a. Install the hollow bolt fitting with new sealing washers and the oil supply line to the turbocharger housing.



a - Sealing washers

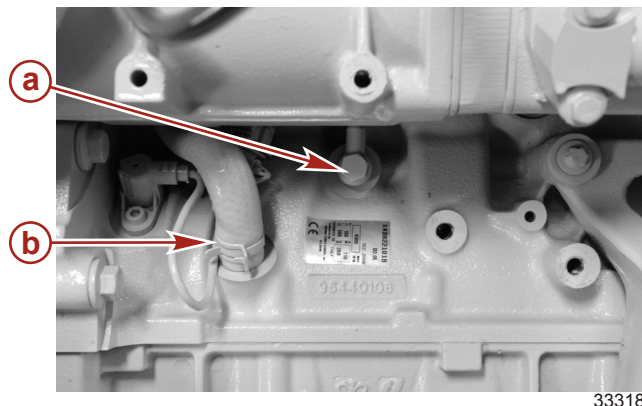
b - Hollow bolt

c - Oil supply line

- b. Tighten the oil supply line hollow bolt to specification.

Description	Nm	lb-in.	lb-ft
Hollow bolt	24.5	–	18

- c. Install the hollow bolt fitting with new sealing washers and the oil supply line to the engine block fitting.

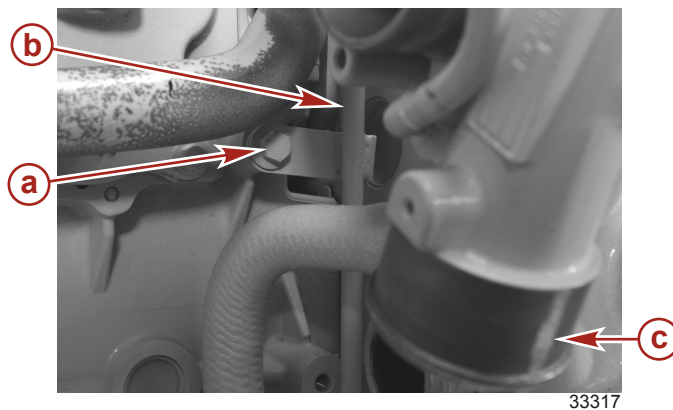


- a** - Oil supply line connection
b - Oil return line connection

- d. Tighten the oil supply line hollow bolt to specification.

Description	Nm	lb-in.	lb-ft
Hollow bolt	24.5	–	18

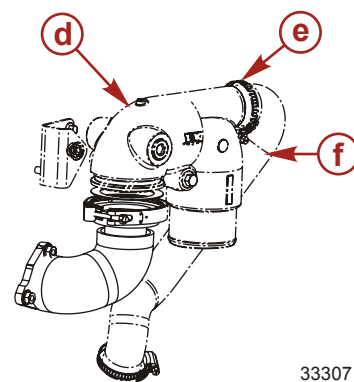
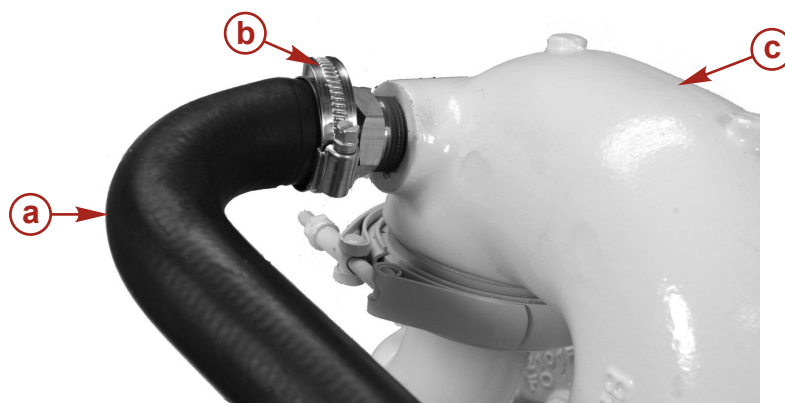
- e. Attach the oil supply line anchor screw.



- a** - Anchor screw
b - Oil supply line
c - Turbocharger air outlet

7. Install the air intake pipe and hose to the turbocharger. See **Section 7A—Air Intake Pipe**.

8. Connect the seawater hose to the exhaust elbow.



a - Seawater hose

b - Hose clamp

c - Early production exhaust elbow

d - Late production exhaust elbow

e - Hose clamp

f - Seawater hose

9. Tighten the seawater inlet hose clamp to specification.

Description	Nm	lb-in.	lb-ft
Hose clamp	5.7	50	–

10. Install the exhaust hose to the exhaust elbow.



a - Exhaust hose

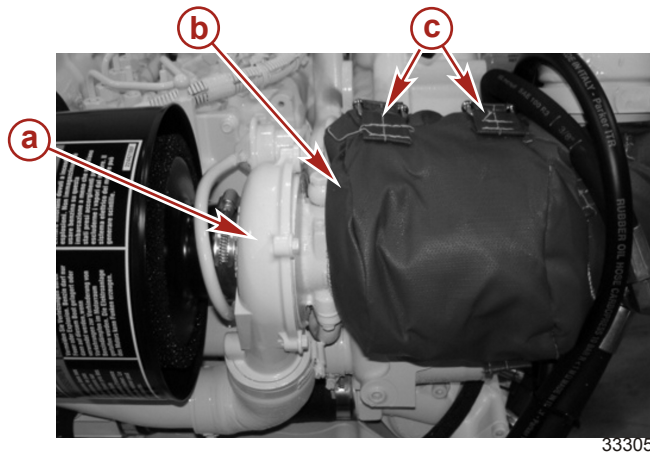
b - Hose clamps

c - Exhaust elbow

11. Tighten both exhaust hose clamps to specification.

Description	Nm	lb-in.	lb-ft
Hose clamps	5.7	50	–

12. Install and buckle the turbocharger heat shield.



- a** - Turbocharger
- b** - Heat shield
- c** - Heat shield buckles

13. Open the seacock or unplug and connect the seawater hose.

14. Connect both battery cables.

15. Test run the engine. Allow it to reach operating temperature. Check for any fluid, exhaust gas or air intake leaks.