

Exhaust System

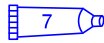
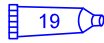

Section 7A - Manifolds and Elbows

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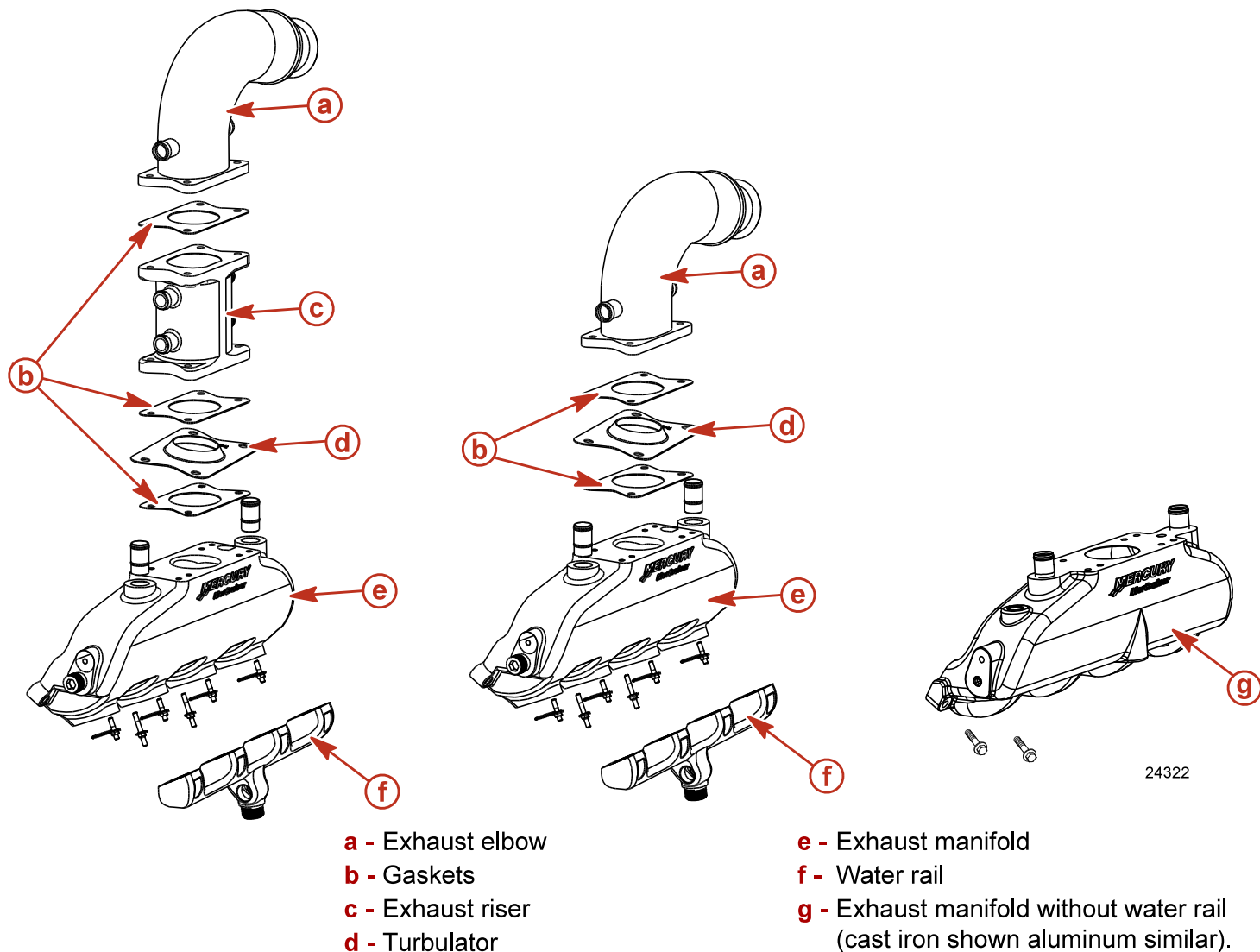
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Lubricant, Sealant, Adhesives

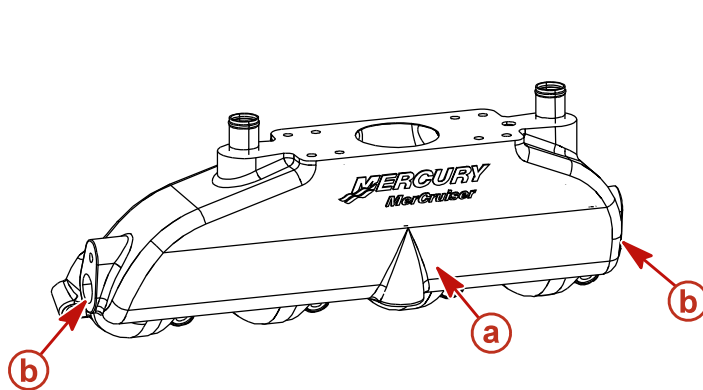
Tube Ref No.	Description	Where Used	Part No.
 7	Loctite 271 Threadlocker	Coarse threads of exhaust elbow studs	92-809819
 19	Perfect Seal	Exhaust manifold threads	92-34227-1
 66	Loctite 242 Threadlocker	Coarse threads of water rail studs	92-809821

Exploded View

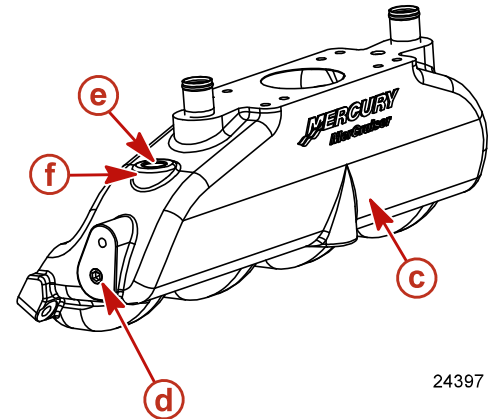


Exhaust Manifold Identification

The following information has been developed to aid in the visual identification of the aluminum and cast iron exhaust manifolds without water rails. The aluminum exhaust manifold is equipped with two 3/4 in. drain plugs located in each end of the exhaust manifold. The cast iron exhaust manifold is equipped with a single 3/8 in. drain plug located in one end of the exhaust manifold. The cast iron exhaust manifold is also equipped with one expansion plug located in a casting boss on the upper edge of the exhaust manifold.



- a** - Aluminum exhaust manifold (without water rail)
- b** - 3/4 in. drain plug
- c** - Cast iron exhaust manifold



- d** - 3/8 in. drain plug
- e** - Expansion plug
- f** - Casting boss

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Removal

⚠ WARNING

Avoid injury or product damage from a short in the electrical system. Before proceeding, disconnect all battery cables from the battery.

1. Disconnect the battery cables from the battery.

⚠ CAUTION

Avoid severe engine damage. Exhaust elbows and manifolds must be drained to prevent coolant from entering combustion chambers when exhaust elbows are removed.


2. Drain the water from the manifold, elbow, and riser, if equipped.
3. Disconnect the exhaust and cooling hoses.
4. Remove any other components that are mounted to the exhaust manifold, exhaust elbow, and exhaust riser, if equipped.
5. Remove the exhaust elbow and exhaust riser, if equipped.
6. Remove the exhaust manifold fasteners.
7. Remove the exhaust manifold assembly and discard the gaskets.
8. Remove and retain the water rail nuts and water rail, if equipped.
9. If necessary remove the water rail studs, if equipped.

Cleaning and Inspection

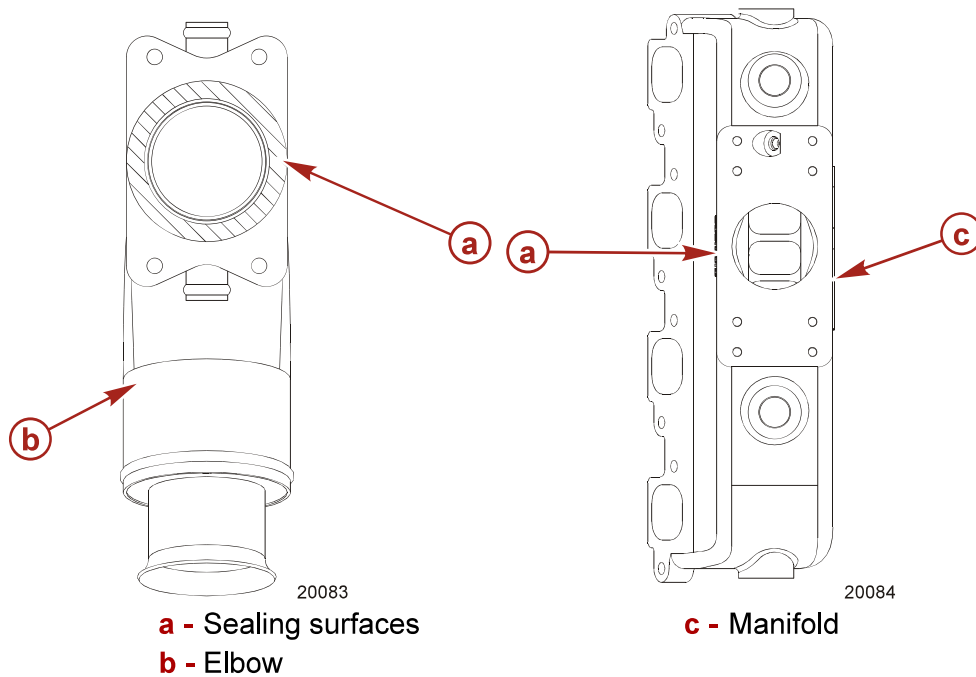
1. Clean the gasket material from all surfaces.

2. Check the water passages for foreign material. The passages must be clean for efficient cooling.
3. If a more thorough inspection is desired, the pipe plugs may be removed from the exhaust manifold.

IMPORTANT: If the plugs are removed, coat the threads with sealant before reinstalling.

Tube Ref No.	Description	Where Used	Part No.
 19	Perfect Seal	Exhaust manifold threads	92-34227-1

4. Check for cracks.
5. To test the exhaust manifold and water rail, if equipped, for leaks, block-off plates, plugs, or short hoses with plugged ends must be used. One block-off plate must have a threaded hole for attaching a compressed air hose. Use new gaskets when installing block-off plates. Apply 138 kPa (20 psi) of air pressure and submerge the manifold in water. Air bubbles indicate a leak.
6. Inspect all sealing surfaces carefully. Machined surfaces must be clean and free of all marks and deep scratches or exhaust leaks may result.



7. Check the flatness of all gasket surfaces. Maximum overall warp is 0.07 mm (0.003 in.) , with not more than a 0.02 mm (0.001 in.) difference within 25 mm (1 in.).

NOTE: Maximum material that can be removed is 0.25 mm (.010 inches) to flatten a gasket surface.


8. Look at the condition of the metal around the exhaust outlet in the casting. Inspect for damaged metal caused by saltwater or exhaust gas corrosion in the manifold, elbow, and riser, if equipped. Replace all damaged parts.

Installation

Manifold

1. For models without water rails, skip to step 8.
2. Align the O-rings onto the water rail, if equipped.

3. Apply adhesive to the coarse threads of the water rail studs, if equipped.

Tube Ref No.	Description	Where Used	Part No.
 66	Loctite 242 Threadlocker	Coarse threads of water rail studs	92-809821

4. Install the water rail studs into the exhaust manifold. Torque the studs.

Description	Nm	lb. in.	lb. ft.
Water rail stud	10		7

5. Install the water rail onto the exhaust manifold, and secure using the nuts. Torque the nuts.

Description	Nm	lb. in.	lb. ft.
Water rail nut	8		6

6. If using cap screws, install the water rail onto the exhaust manifold using the cap screws. Torque the cap screws.

Description	Nm	lb. in.	lb. ft.
Water rail cap screw	10		7

7. For exhaust manifolds with or without water rails.


8. Position a new exhaust manifold gasket onto the exhaust manifold.

9. Install the exhaust manifold onto the cylinder head, and secure using the exhaust manifold screws. Torque the screws.

Description	Nm	lb. in.	lb. ft.
Exhaust manifold screw	35		26

10. To install the exhaust elbow without riser:

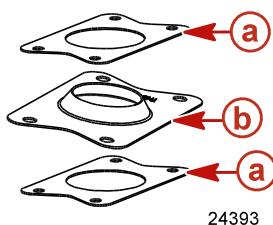
- a. For exhaust manifolds equipped with water rails and aluminum exhaust manifolds without water rails, apply adhesive to the coarse threads of the exhaust elbow studs.

Tube Ref No.	Description	Where Used	Part No.
 7	Loctite 271 Threadlocker	Coarse threads of exhaust elbow studs	92-809819

- b. Install the exhaust elbow studs into exhaust manifold. Torque the studs.

Description	Nm	lb. in.	lb. ft.
Exhaust elbow stud	20		15

- c. For exhaust manifolds equipped with water rails, aluminum exhaust manifolds without water rails, and cast iron exhaust manifolds, position the exhaust elbow gaskets, and turbulator onto the exhaust manifold as shown.



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a - Exhaust elbow gasket

b - Turbulator

- d. For exhaust manifolds equipped with water rails and aluminum exhaust manifolds without water rails, Install the exhaust elbow onto the exhaust manifold and secure using the exhaust elbow nuts. Torque the nuts.


Description	Nm	lb. in.	lb. ft.
Exhaust elbow nut	16		12

- e. For cast iron exhaust manifolds, Install the exhaust elbow onto the exhaust manifold and secure using cap screws. Torque the cap screws.

Description	Nm	lb. in.	lb. ft.
Exhaust elbow cap screw	16		12

11. To install the exhaust elbow with 152 mm (6 in.) riser:

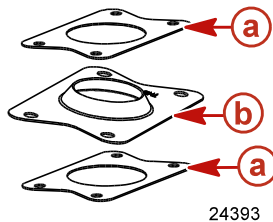
- a. Apply adhesive to the coarse threads of the exhaust elbow and riser studs.

Tube Ref No.	Description	Where Used	Part No.
	Loctite 271 Threadlocker	Coarse threads of exhaust elbow studs	92-809819

- b. Install the exhaust elbow, and riser studs into exhaust manifold. Torque the studs.

Description	Nm	lb. in.	lb. ft.
Exhaust elbow and riser stud	20		15

- c. Position the exhaust elbow gaskets, and turbulator onto the exhaust manifold as shown.



a - Exhaust elbow gasket

b - Turbulator

- d. Position the 152 mm (6 in.) riser onto the exhaust manifold, and elbow studs until seated onto the exhaust manifold.
- e. Position the exhaust riser to exhaust elbow gasket onto the exhaust riser.
- f. Install the exhaust elbow onto the exhaust riser, and secure using the exhaust elbow nuts. Torque the nuts.

Description	Nm	lb. in.	lb. ft.
Exhaust elbow nut	16		12

12. Install any components previously removed.

13. Install exhaust elbows and cooling hoses.

14. Reconnect the battery cables to the battery. Tighten securely.

15. Start the engine and check for fuel, exhaust, and water leaks.