Caterpillar

Service Manual

3412 Engine
S/n 60M1 & Up

Service Manual

CT-S-ENG3412

SHOP

CATERPILLAR

3412 MARINE ENGINE

60M1-UP

OPERATION
MAINTENANCE
REPAIR

OWNER'S MANUAL

3412 MARINE ENGINE

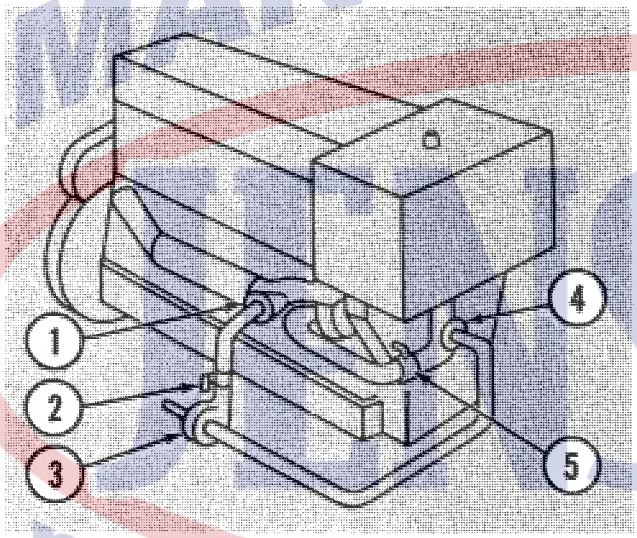
SERIAL NUMBERS
60M1-UP

OPERATING UNDER ABNORMAL CONDITIONS

Certain worldwide marine classification societies require sea going propulsion engines to be equipped to allow continuous operation if the engine water pump or oil pump should fail.

Engine Jacket Water Pump Failure

If the engine jacket water pump should fail, fresh water can be supplied to the engine jacket using the emergency water system.

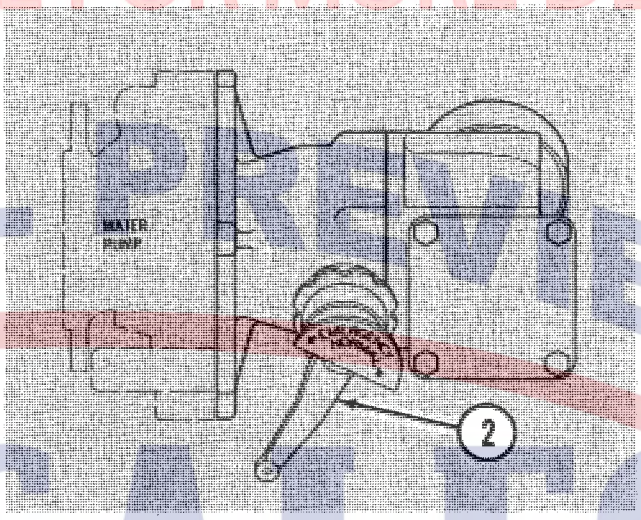


Emergency Jacket Water Connections

1 - Tee Connector
2 - Valve
3 - Emergency Jacket Water Pump
4 - Tee Connector
5 - Valve

1. Stop the engine. If the water pump bearing has failed, the water pump need not be removed.

2. Open valve (2).



3. Move and secure valve handle in the EMERGENCY position.

4. Start the emergency jacket water pump (3). Allow the air to escape from the emergency cooling system. Observe the coolant level. Add fresh water as required.

5. Start the engine.

6. Engage the marine transmission; operate the vessel at normal speed.

If the jacket coolant water is lost (such as when a water line fails) and an insufficient supply is available to replenish the jacket water coolant while at sea, sea water may be pumped through the engine jacket if necessary.

1. Stop the engine and make the necessary water pump and lines connections for pumping sea water into the jacket water system and back to the sea.

2. Remove the temperature regulating thermostats from the regulator housing, and install the housing cover.

3. Start the emergency pump and/or start the engine.

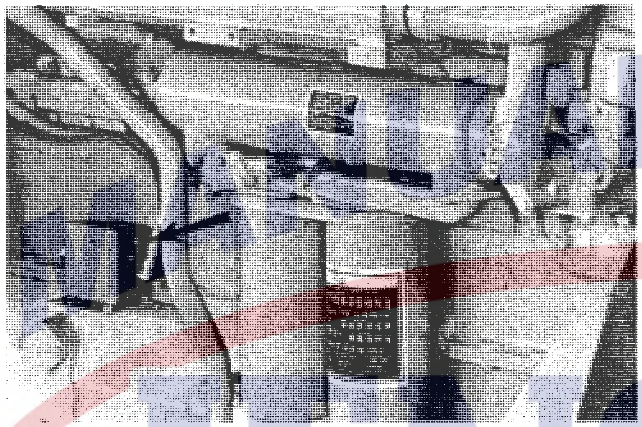
NOTE

The sea water should be pumped through the engine jacket and returned to the sea.

4. With the governor control at low idle, engage the marine transmission forward clutch.

5. Operate the engine at the lowest speed for existing sea conditions.

This device is usually mounted on the side of the engine, and oil lines are connected to the switch. Low oil pressure closes the switch.



To reset the switch, push the button until it latches. After the engine starts and develops oil pressure, the button will move to the extended (running) position.

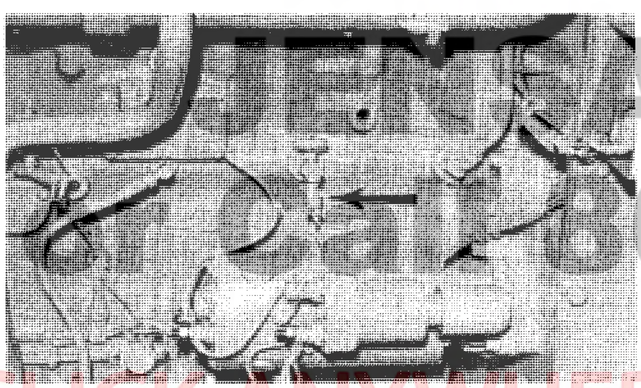
CAUTION

The button must be in the RUN position to protect the engine.

If the button remains in the off position, the engine oil pump may not be developing normal oil pressure and proper checks should be made.

Manually operated systems require resetting of this switch before starting. Automatic start-stop systems use a pressure switch which resets itself.

Oil Pressure Switch

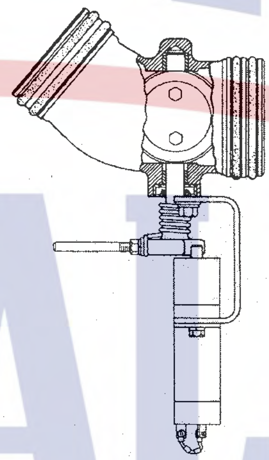


This switch is mounted in the oil manifold. Low oil pressure opens this switch to disconnect the electrical circuit to the shutoff solenoid. This prevents the battery from continuously energizing the solenoid while the engine is stopped.

This switch is also used with the electric governor. On start-up, oil pressure will close the switch to allow the electric governor to increase engine speed.

This switch does not require resetting.

Air Shutoff Control

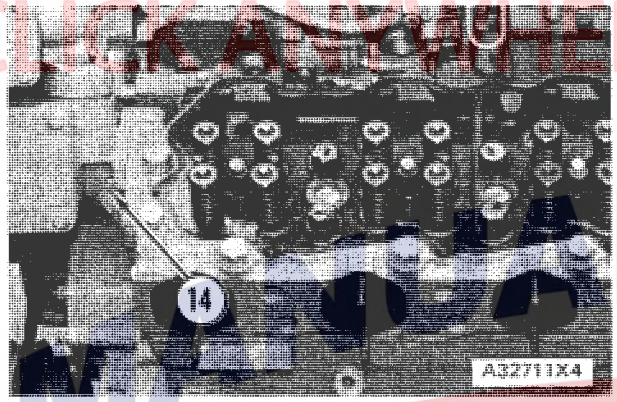


The air shutoff control is an attachment to the shutoff devices. When an emergency condition occurs, the solenoid pushes the rack into the shutoff position and a solenoid trips a butterfly valve, located in the inlet manifold, to the closed position, cutting off intake air to the engine. This control must be reset before starting.

Overspeed Shutoff

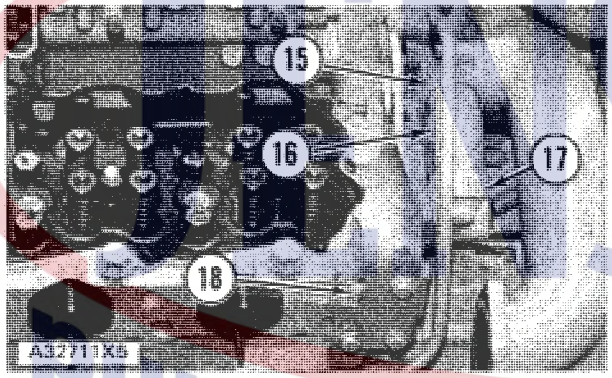
This switch uses a magnetic pick-up mounted in the flywheel housing to sense engine speed.

CYLINDER HEAD



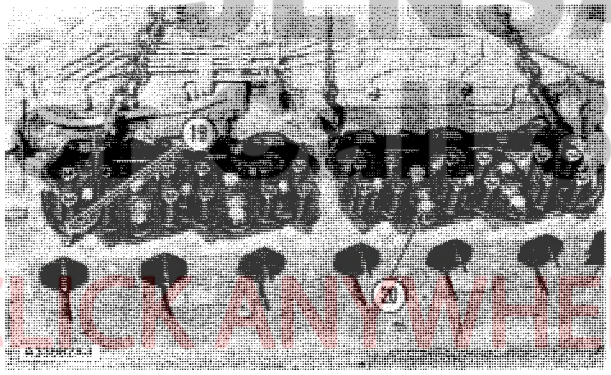
REMOVAL OF COOLANT ELBOW BOLTS
14. Bolt.

16. Remove bolts (14) from coolant elbow at front of cylinder head.



REMOVAL OF COOLANT LINES
15. Elbow. 16. Coupling. 17. Elbow. 18. Lifting bracket.

17. Remove lifting bracket (18).
18. Remove coolant elbows (15) and (17) and coupling (16) at rear of cylinder head.
19. Install three 5/16"-18 NC forged eye bolts (19) in the cylinder head as shown. Attach lifting equipment to eye bolts (19).

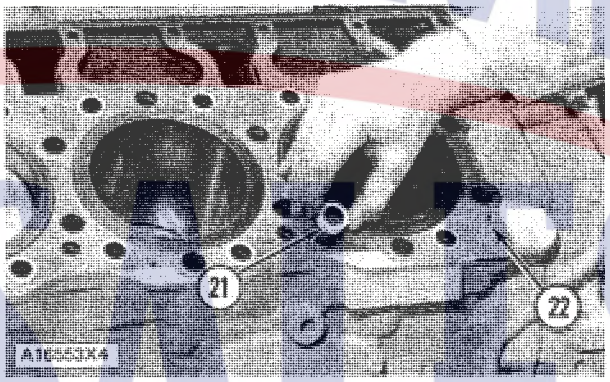


CYLINDER HEAD REMOVAL
19. Eye bolt. 20. Head bolt.

NOTE: The cylinder head is positioned on two dowels. The head must be raised evenly and straight away from the cylinder block face until free from the dowels.

20. Remove cylinder head bolts (20). Remove the cylinder head. Weight of the cylinder head is 300 lbs. (135 kg).

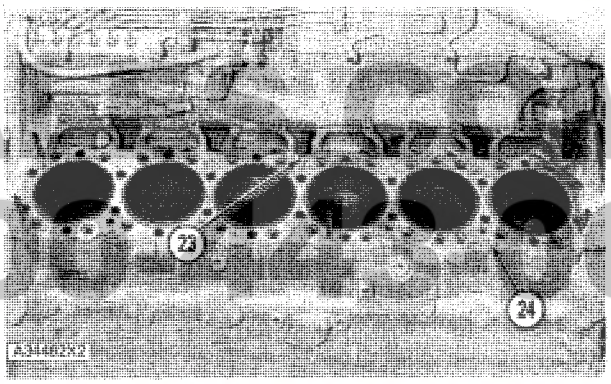
NOTE: Do not set cylinder head on a flat surface or damage may occur to nozzles which protrude from bottom of head.



REMOVING COOLANT SEALS
21. Seal. 22. Spacer plate.

21. Remove coolant seals (21) from spacer plate (22).
22. Install six 3/8"-16 NC forcing screws (23) in the spacer plate. Tighten the screws evenly until the spacer plate (22) is free of the dowels in the cylinder block.

CAUTION
Do not cause damage to dowels (24) when the spacer plate is removed.



SPACER PLATE REMOVAL
23. Screw. 24. Dowel.

23. Remove spacer plate (22) and gasket. Clean the surfaces of spacer plate and cylinder block.