Tools and Materials

Special Tools

NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).

Required Tools

Tool Name	Tool No.	Tool Use
Magnetic Follower Holder Kit	D15001NU	Holds cam followers when removing and installing camshaft.
Nozzle Cleaning Kit	JDF13	Used to clean fuel injection nozzles.
Valve Guide Knurler	D-20019W1	Used to knurl inside diameter of valve guides.
Valve Guide Driver	JDE118	Used to remove and install valve guides in cylinder head.
Valve Guide Reamer	D-20021W1	Used to ream out valve guides.
Belt Tension Gauge	JDG529 or JDST28	Used to measure and adjust belt tension.
Cooling System Pressure Pump	D05104ST	Used to test cooling system for leakage.
Radiator Pressure Test Kit (Adapters)	JDG692	Used in conjunction with D05104ST Cooling System Pressure Pump.
Hand-Held Digital Tachometer	JT05719	Used to adjust engine idle speed.
Compression Gauge Assembly	JT01682	Used to test cylinder compression.
Adapter	JDG560	Used in conjunction with JT01682 Compression Gauge Assembly.

Required Tools

Tool Name	Tool No.	Tool Use
Diesel Fuel Injection Nozzle Tester	D01109AA	Used to test fuel injection nozzles.
Adapter Set	D01110AA	Used with D01109AA Diesel Fuel Injection Nozzle Tester.
Straight Adapter	23622	Used with D01109AA Diesel Fuel Injection Nozzle Tester.
Hose Assembly	JT03017	Used to test engine oil pressure.
690 kPa (100 psi) Pressure Gauge	JT05577	Used to test engine oil pressure.
Connector	JT03349	Used to test engine oil pressure.
Hose Fitting	JT03274	Used to test fuel supply pump pressure.
Female Quick Coupler	JT01609	Used to test fuel supply pump pressure.
0-1034 kPa (0-150 psi) Gauge w/ Male Quick Coupler	JT03115	Used to test fuel supply pump pressure.

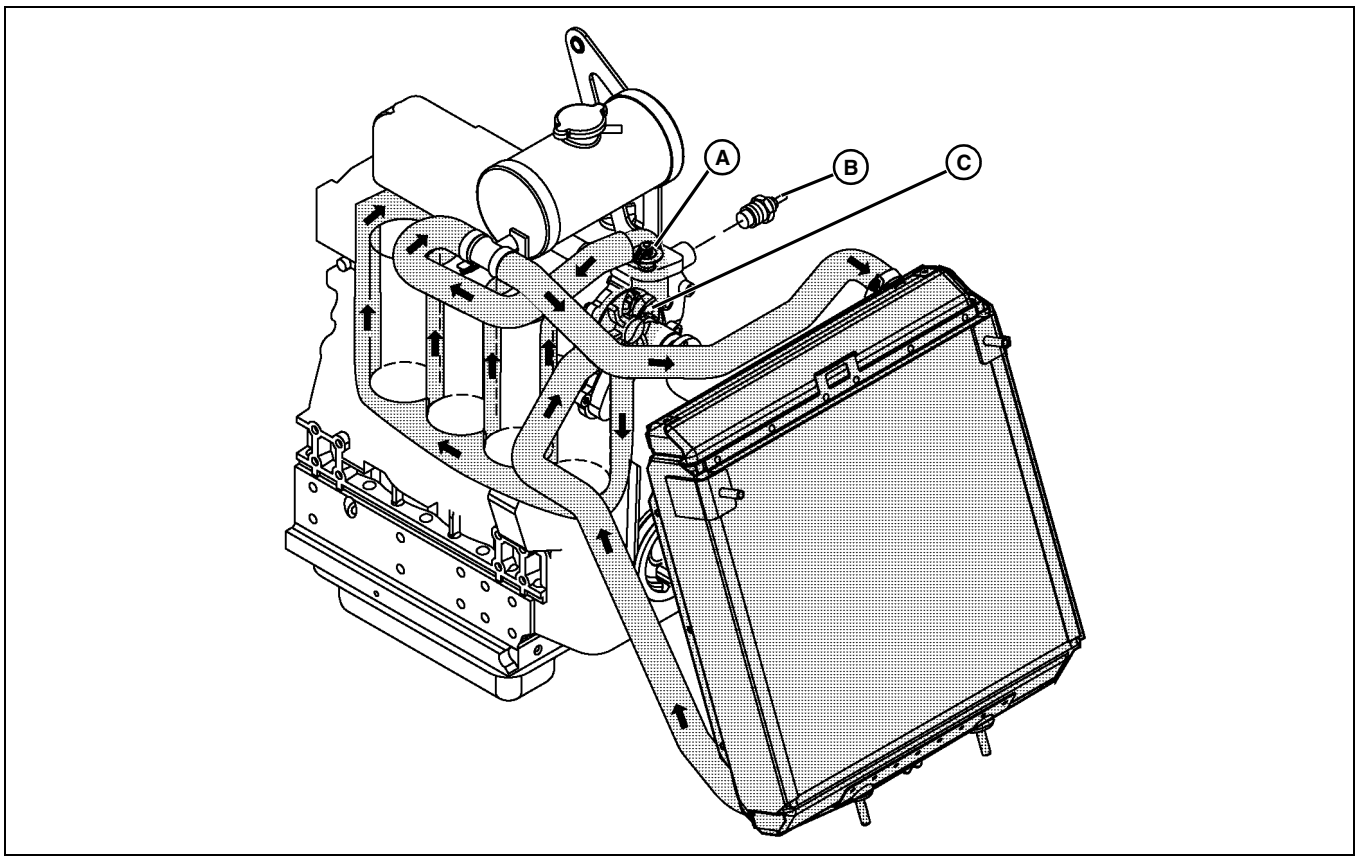
Other Materials

Other Material

Part No.	Part Name	Part Use
TY15130 LOCTITE®	John Deere Form-In-Place Gasket	Seals crankcase extension, rear oil seal case and flywheel housing to engine block. Seals oil pan to timing gear housing and engine block.
TY9370 LOCTITE No. 242	Thread Lock and Sealer (Medium Strength)	Apply to threads of crankshaft pulley cap screw.

Theory of Operation

Cooling System Operation



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Function

The coolant pump (A) circulates coolant through the cooling system, drawing hot coolant from the engine block and circulating it through the radiator for cooling.

Theory of Operation

The pressurized cooling system includes the radiator, water pump, fan and thermostat (B).

During the warm-up period, the thermostat remains closed and the impeller-type coolant pump draws coolant from the bypass tube. Coolant from the pump flows to the cylinder block water jacket and up through the cylinder head providing a fast warm-up.

Once the engine has reached operating temperature, the thermostat opens and coolant is pumped from the bottom of the radiator via the lower radiator hose into the cylinder block. Here it circulates through the block and around the cylinders.

From the block, coolant is then directed through the cylinder head, and into thermostat housing. With the thermostat open, warm engine coolant passes through the housing into the top of the radiator where it is circulated to dissipate heat.

When coolant system pressure exceeds **48 kPa (7 psi)**, a valve in the radiator cap opens to allow coolant to discharge.

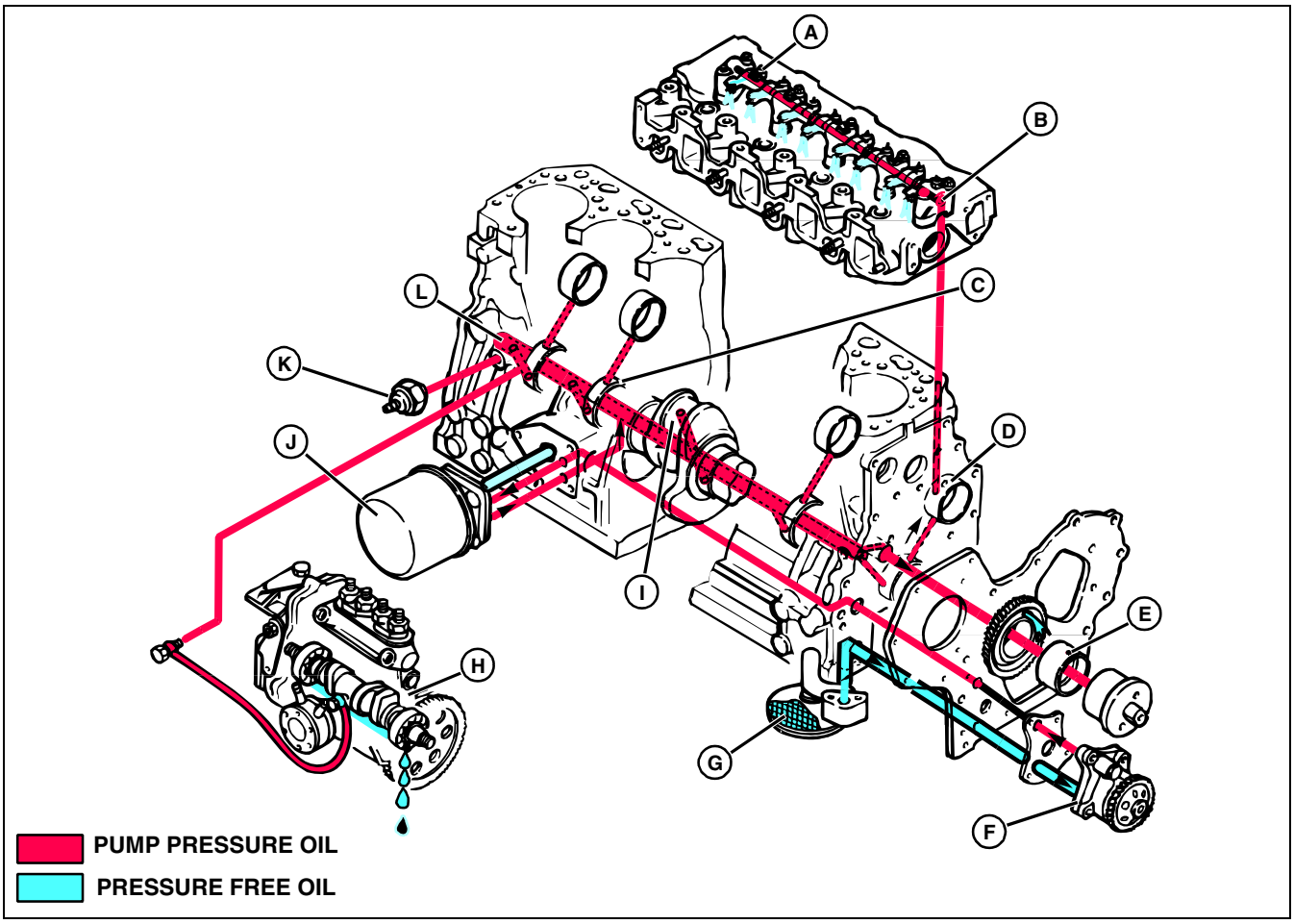
A coolant temperature sensor (C) informs the operator of the engine coolant temperature and warns of a high temperature condition by lighting a lamp.

Specifications

Start to Open . . . . . 9.5-72.5°C (157-163°F)

Fully Opened . . . . . 85°C (185°F)

Lubrication System Operation



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A - Rocker Arms
B - Rocker Arm Shaft
C - Crankshaft Main Bearings
D - Camshaft Bearings
E - Idler Gear Bushing
F - Oil Pump
G - Intake Screen
H - Injection Pump
I - Connecting Rod Journal
J - Oil Filter
K - Oil Pressure Sensor
L - Main Oil Galley

Function

A full pressure system lubricates engine parts with filtered oil.

Theory of Operation

The pressure lubrication system consists of a positive displacement gear-driven oil pump (F), intake screen (G), full flow oil filter (J), oil pressure regulating valve and an electrical pressure warning switch. (K)

The pump draws lubrication oil from the oil pan through a strainer and a suction tube. The oil is then pumped through an oil passage to the oil filter and through the engine block main oil galley (L).

From the main oil galley, oil is forwarded under pressure to the crankshaft main bearings (C) and idler gear bushing (E). Drilled cross-passages in the connecting rod journal (I) distribute the oil from the main bearings to connecting rod bearings.

Lube oil holes in main bearing oil grooves direct oil to the camshaft bearings (D).

A drilled passage from the rear camshaft bearing through the cylinder block and cylinder head supplies lubricating oil to the rocker arm shaft (B). The hollow shaft distributes oil to the rocker arms (A), cam followers and valves.

Lubrication oil is supplied to the fuel injection pump (H) from the main oil galley through external oil lines.

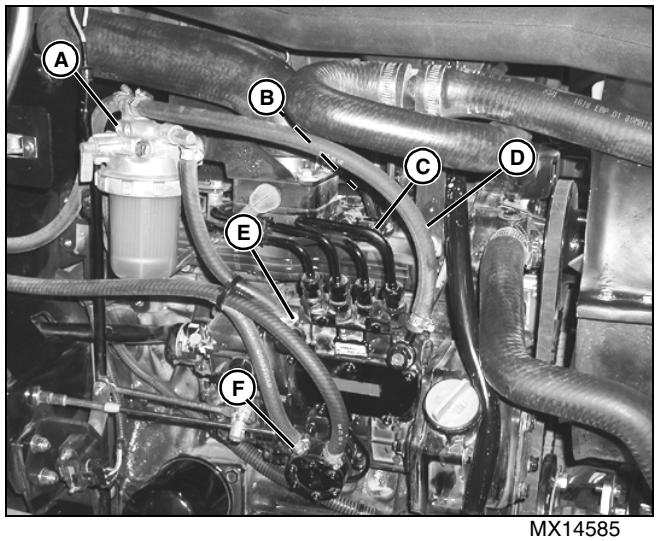
An oil pressure sensor (K) activates an indicator light to alert the operator to shut down the engine if oil pressure drops below specification.

Fuel System Operation

Function

Fuel system supplies fuel to the combustion chambers.

Theory of Operation



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Fuel is drawn from the fuel tank by a mechanical fuel transfer pump (F). Low pressure fuel is pumped through the fuel filter/water separator (A) and then to the inlet port of the injection pump (E). The injection pump sends high pressure fuel through the injector lines (C) to the fuel injectors (B) located in the cylinder head. Excess fuel from the injectors and the injection pump is returned to the fuel tank through return line (D).

If the unit runs out of fuel, there are two air bleed lines that allow air to escape from the top of the filter and the injection pump. These two lines allow the system to be self-bleeding.

The engine speed is controlled by the throttle lever and cable. The cable is connected to the injection pump governor control lever. The fuel shutoff solenoid controls the injection pump shutoff shaft. When the solenoid is retracted (key in the START or ON position), the engine can be started. When the key is turned off, return springs on the shutoff shaft extend the solenoid, moving the shutoff linkage to the shutoff position. The solenoid also closes if the tractor is operated in an unsafe condition. (See “Run Circuit Operation” on page 160.)

The injection pump meters fuel as determined by the governor and delivers it at high pressure to the injection nozzles.

The injection nozzle prevents flow until high pressure is reached, opening the valve and spraying atomized fuel into the combustion chamber. Injection lines contain trapped fuel whenever injection is not taking place.

A small amount of fuel leaks past the nozzle valve to lubricate the fuel injection nozzle. This leakage combines with excess fuel from the injection pump and is returned to tank. Any air in the fuel system is bled out with return fuel to the fuel tank.

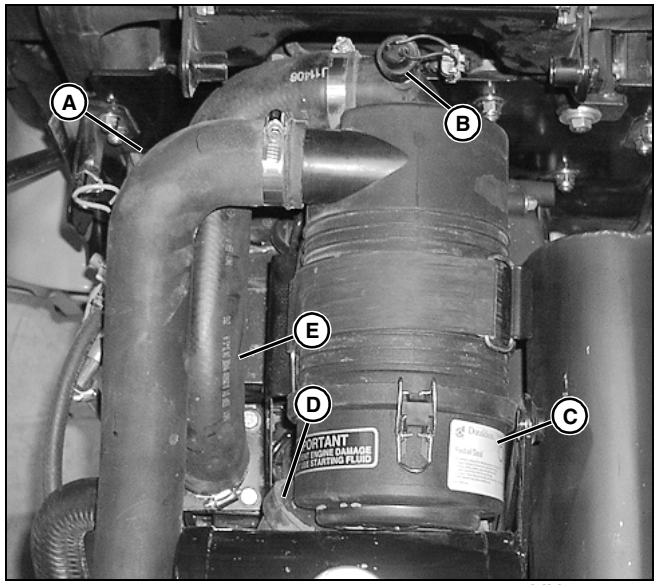
A fuel level sensor mounted in the fuel tank informs the operator of the fuel level.

Air Intake System Operation

Function

The air intake system filters and supplies air needed for combustion.

Theory of Operation



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Engine intake air enters the inlet hose (A) behind the grille, and flows into the air filter body (C). The air cleaner also has a rubber, one-way, unloading valve (D), that ejects heavy dirt particles from the air stream during engine operation before they reach the filters. The operator can squeeze the valve to remove the large particles. The air cleaner elements filter the air, which then flows through hose (E) to the intake manifold.

An air filter restriction sensor (B) at the rear of the air cleaner operates a warning lamp on the instrument panel to inform the operator when the air filter needs servicing.

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