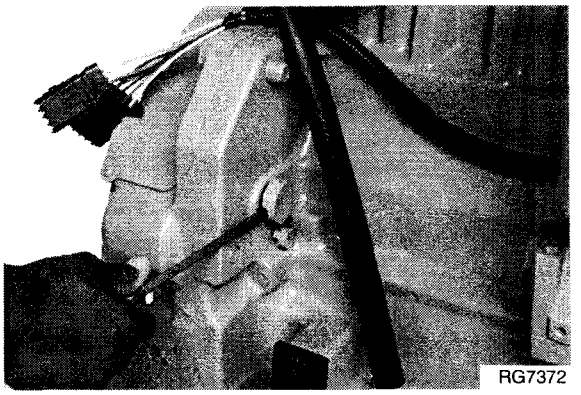
CHECKING AND ADJUSTING ENGINE VALVE CLEARANCE


RG7372

Too little valve clearance throws valves out of time. Valves open too early and close too late. This causes the valves to overheat due to hot combustion gases rushing past valves when out of time. Overheating lengthens valve stems which prevents proper seating of valves. The valves seat so briefly or poorly that normal heat transfer Into the cooling system does not have time to take place causing burned valves and low power.

Too much valve clearance causes a lag In valve timing causing engine valve train imbalance. The fuel-air mixture enters the cylinders late during intake stroke. The exhaust valve closes early and prevents waste gases from being completely removed from cylinders. Also, the valves close with a great deal of impact, which may crack or break the valves and scuff the camshaft and followers

IMPORTANT: Valve clearance MUST BE checked and adjusted with engine COLD.

1. Remove rocker arm cover with ventilator tube.

IMPORTANT: Visually inspect contact surfaces of wear caps and rocker arm wear pads. Check all parts for excessive wear, breakage, or cracks. Replace parts that show visible damage.

2. Remove plastic plugs from cylinder block bores and install JDG820 Flywheel Turning Tool and JDE81-4 Timing Pin.

3. Rotate engine with the flywheel turning tool until timing pin engages timing hole in flywheel.

If the rocker arms for No. 1 cylinder are loose, the engine is at No. 1 "TDC-Compression."

If the rocker arms for No. 6 cylinder are loose, the engine is at No. 6 "TDC-Compression." Rotate the engine one full revolution to No. 1 "TDC-Compression."

4. With engine lock-pinned at "TDC" of No. 1 piston's compression stroke, check and adjust (as needed) valve clearance an Nos. 1. 3 and 5 exhaust valves and Nos. 1, 2 and 4 intake valves.

VALVE CLEARANCE SPECIFICATIONS

Intake Valves ..... 0.406 - 0.508 mm (0.016 - 0.020 in.)

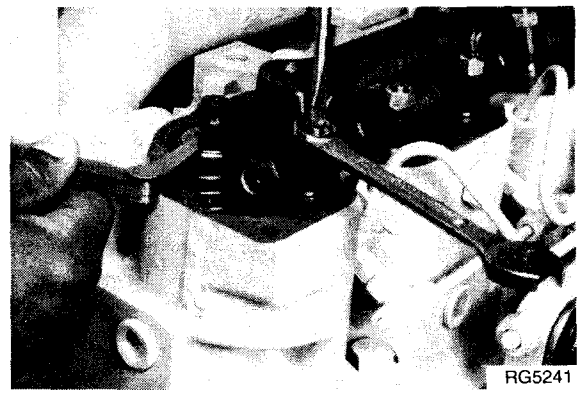
Exhaust Valves ..... 0.661- 0.761 mm (0.026 - 0.030 in.)

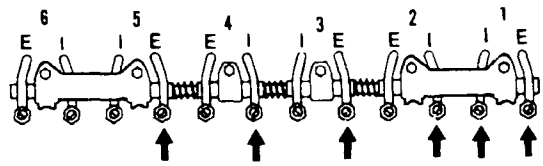
5. If valve clearance needs to be adjusted, loosen the locknut on rocker arm adjusting screw. Turn adjusting screw until feeler gauge slips with a slight drag. Hold the adjusting screw from turning with screwdriver and tighten locknut to 27 N•m (20 lb-ft). Recheck clearance again after tightening locknut. Readjust clearance as necessary.

6. Rotate flywheel 360° until No. 6 piston is at "TDC" of its compression stroke. Rocker arms for No. 6 piston should be loose.

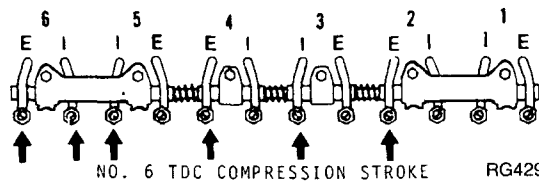
7. Check and adjust (as needed) valve clearance to the same specifications on Nos. 2, 4 and 6 exhaust and Nos. 3, 5, and 6 intake valves. Tighten valve adjusting screw locknut to 27 N·m (20 lb-ft).

8. Recheck clearance on all valves again after locknut is tightened.


RG5241



NO. 1 TDC COMPRESSION STROKE



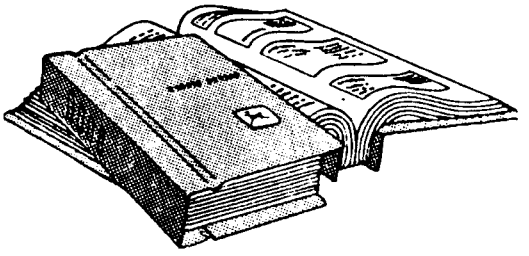
NO. 6 TDC COMPRESSION STROKE

RG4295

Service As Required

ADDITIONAL SERVICE INFORMATION

This is not a detailed service manual. If you want more detailed service information, use the form in the back of this manual to order a component technical manual.

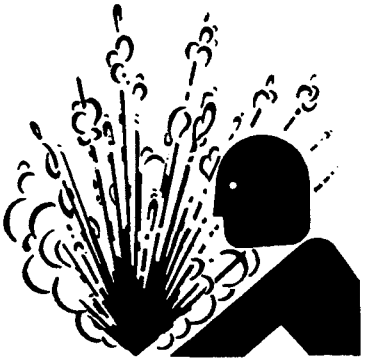


RG4624

ADDING COOLANT

CAUTION: Explosive release of fluids from pressurized cooling system can cause serious burns.

Shut off engine. Only remove filler cap when cool enough to touch with bare hands. Slowly loosen cap to first stop to relieve pressure before removing completely.



TS281

IMPORTANT:
- **Never pour cold liquid into a hot engine, as it may crack cylinder head or block. DO NOT operate engine without coolant for even a few minutes.**
- **John Deere TY15161 Cooling System Sealer may be added to the radiator to stop leaks. DO NOT use any other stop-leak additives in the cooling system.**
- **Air must be expelled from cooling system when coolant is added.**

1. Loosen temperature sending unit fitting at rear of cylinder head or plug in side of thermostat housing to allow air to escape when filling system.

IMPORTANT: When adding coolant to the system, use the appropriate coolant solution. (See ENGINE COOLANT SPECIFICATIONS in Fuels, Lubricants, and Coolant Section for mixing of coolant ingredients before adding to cooling system.)

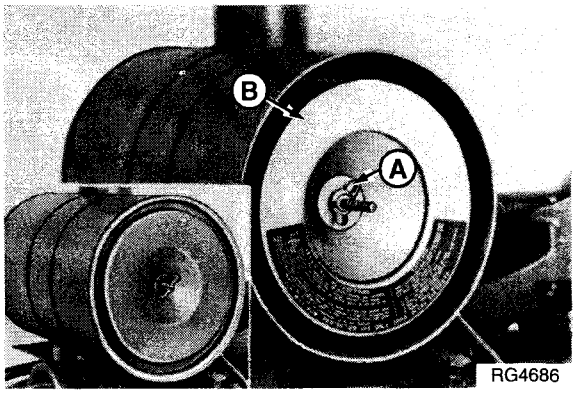
Do not overfill cooling system. A pressurized system needs space for heat expansion without overflowing at top of radiator.

2. Fill until coolant level touches bottom of radiator filler neck.
3. Tighten plugs and fittings when air has been expelled from system.

REPLACING AIR CLEANER FILTER ELEMENTS

IMPORTANT: ALWAYS REPLACE primary air cleaner element when air restriction indicator shows a vacuum of 625 mm (25 in.) H_2O, is torn, or visibly dirty.

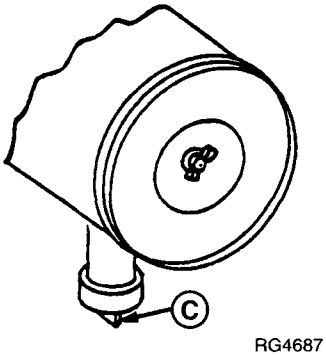
NOTE: This procedure applies to John Deere air cleaner kits. Refer to manufacturers' instructions for servicing air cleaners not supplied by John Deere.



RG4686

1. Remove wing nut and remove canister cover shown in small illustration inset.
2. Remove wing nut (A) and remove primary element (B) from canister.
3. Thoroughly clean all dirt from inside canister.

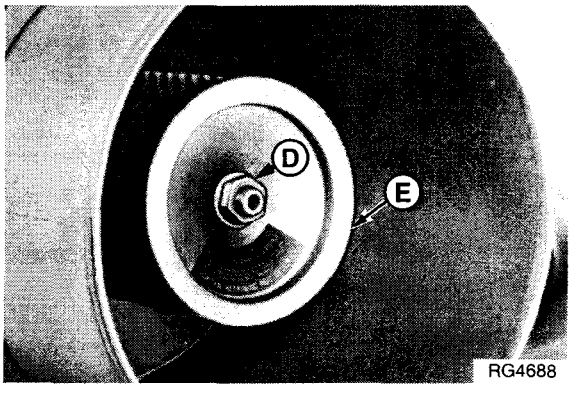
NOTE: Some engines may have a dust unloader valve (C) on the air cleaner. If equipped, squeeze valve tip to release any trapped dirt particles.



RG4687

IMPORTANT: Remove secondary (safety) element (E) ONLY for replacement. DO NOT attempt to clean, wash, or reuse secondary element. Replacement of secondary element is usually necessary ONLY when primary element has a hole in it.

4. To replace secondary element, remove retaining nut (D) and secondary element (E). Immediately replace secondary element with new element to prevent dust from entering air intake system.
5. Install new primary element and tighten wing nut securely. Install cover assembly and tighten retaining wing nut securely.



RG4688

IMPORTANT: Whenever the air cleaner has been serviced or had cover removed, ALWAYS fully depress the air restriction indicator reset button (if equipped) to assure accurate readings.

6. If equipped, fully depress air restriction indicator reset button and release to reset indicator.

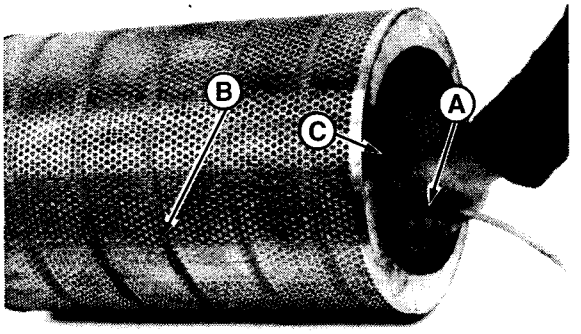
INSPECTING PRIMARY FILTER ELEMENT

Inspect filter to determine if it is practical to clean or for damage after cleaning filter.

1. Hold a bright light inside element (A) and check carefully for holes. Discard any element which shows the smallest hole or rupture.
2. Be sure outer screen (B) is not dented. Vibration would quickly wear a hole in filter.
3. Be sure filter gasket (C) is in good condition. If gasket is damaged or missing, replace element.

IMPORTANT: Air cleaner MUST BE DRY before storing in plastic bag.

If the filter is to be stored for later use, place it in a plastic bag to protect it from dust and damage.

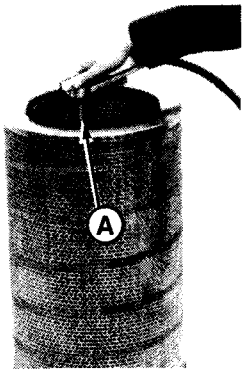


RW4768

CLEANING PRIMARY FILTER ELEMENT

IMPORTANT: Always replace secondary (safety) filter elements. DO NOT attempt to clean them.

Do not blow air from outside portion of filter with air nozzle. Wear safety glasses and remove bystanders.



RW4765

1. Gently pat sides of element with palm of hand to loosen dirt. DO NOT tap element against a hard surface.

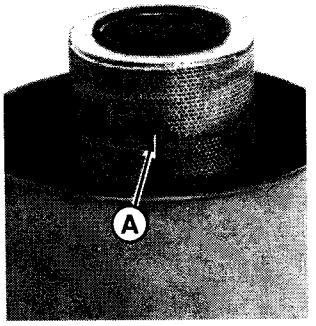
CAUTION: Only a special air cleaning gun (A) should be used. Concentrated air pressure from an ordinary air nozzle may severely damage filter element. Do not exceed 210 kPa (2.1 bar) (30 psi) when cleaning filter element.

2. Insert the cleaning gun into element, hold air nozzle about 25.4 mm (1.0 in.) from perforated metal retainer. Force air through filter from inside to outside and move air gun up and down pleats to remove as much dirt as possible.
3. Repeat steps 1 and 2 to remove additional dirt.
4. Inspect element for damage after cleaning. Replace element if any damage is found.

WASHING PRIMARY FILTER ELEMENT

IMPORTANT: Never wash element in gasoline or any solvent. Never use compressed air on a wet element. Do not oil element.

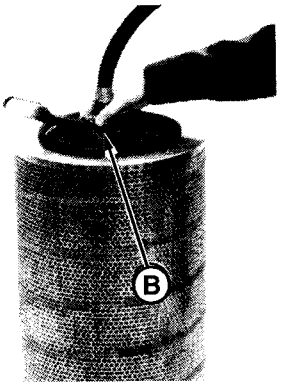
Use extreme caution when washing filters as washing can damage filtering media which could result in failure.



RW4766

Although filter elements can be washed, replacement is highly recommended. Wash oily or sooty filter only if you have a second clean filter available since it may take up to 3 days to dry after washing.

1. Blow dust from the filter with compressed air or flush with clean water.
2. Soak filter for at least 15 minutes in a solution of warm water and John Deere R36757 Filter Element Cleaner. Agitate the filter gently to flush out dirt after soaking.
3. Rinse element thoroughly from inside (B) with clean water. Keep water pressure under 280 kPa (2.8 bar) (40 psi) to avoid damaging filtering pleats.
4. Allow element to dry completely before using. This usually takes from one to three days. Do not oven dry or use drying agents. Protect element from freezing until dry.
5. Inspect element before installing. (See INSPECTING PRIMARY FILTER ELEMENT, earlier in this section.)



RW4767

ELEMENT STORAGE

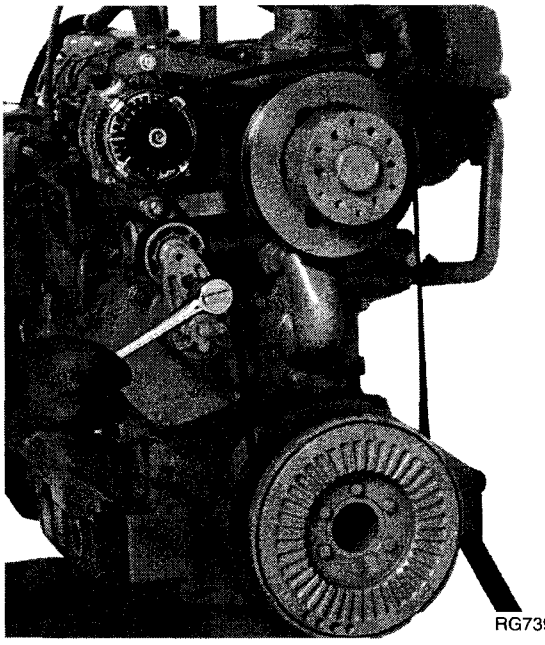
Seal element in a plastic bag and store in shipping container to protect against dust and damage.

IMPORTANT: Air cleaner element MUST BE DRY before storing in plastic bag.

REPLACING FAN/ALTERNATOR V-BELT

Refer to CHECKING BELT TENSIONER SPRING TENSION AND BELT WEAR in Lubrication and Maintenance/600 Hour/12 Month section to determine if V-belt needs replacing.

1. Release tension on belt using a 1/2 in. drive rachet.
2. Remove V-belt from pulleys and discard belt.
3. Install new belt, be sure that belt is correctly seated in all pulley grooves.
4. Apply tension to belt with tensioner. Remove rachet.
5. Start engine and check belt alignment.



RG7392

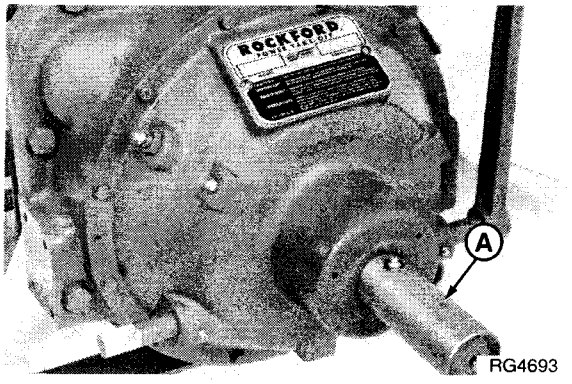
POWER TAKE-OFF (PTO) CLUTCH

CAUTION: Entanglement in rotating driveline can cause serious injury or death. Keep shield on PTO drive shaft (A) between the clutch housing and the engine driven equipment at all times during engine operation. Wear close fitting clothing. Stop the engine and be sure PTO driveline is stopped before making adjustments.

TS198

Proper performance of the power take-off unit will be related to the care it is given. Lubricate it periodically and keep the clutch properly adjusted. (See Lubrication and Maintenance/250 Hour Section.)

If the power take-off does not work properly after adjustment and lubrication, contact your authorized servicing dealer or engine distributor.

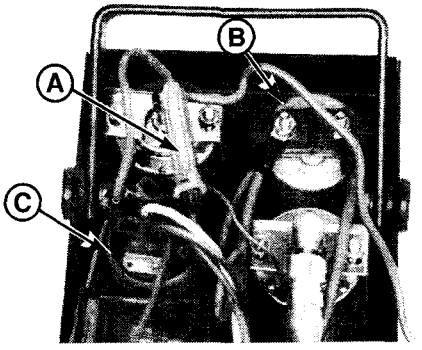


RG4693

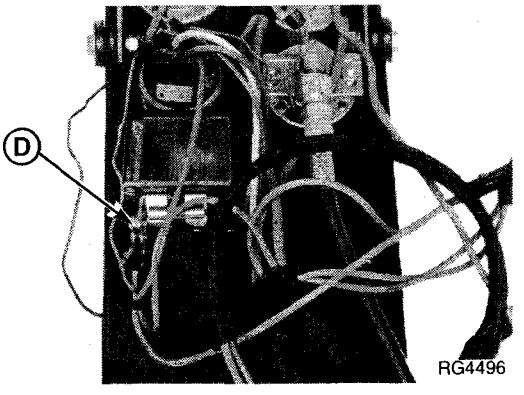
CHECKING FUSES

The following instructions apply to engines equipped with a John Deere instrument panel.

1. Check the fuse (A) between the ammeter (B) and key switch (C) located on back side of instrument panel. If defective replace with an equivalent 25-amp fuse.
2. Check the fuse (D) mounted on the bottom of the magnetic safety switch. If defective, install an equivalent 14-amp fuse.



RG4493

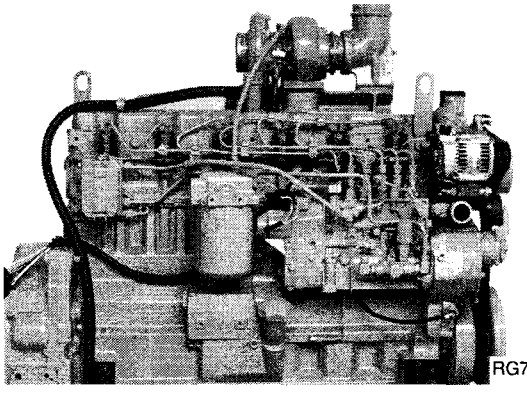


RG4496

DO NOT MODIFY FUEL SYSTEM

IMPORTANT: Modification or alteration of the injection pump (arrow), the injection pump timing, or the fuel injectors in ways not recommended by the manufacturer will terminate the warranty obligation to the purchaser.

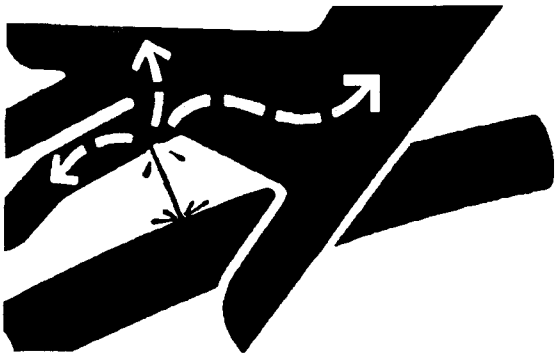
Do not attempt to service injection pump or fuel injectors yourself. Special training and special tools are required. (See your authorized servicing dealer or engine distributor.)


RG7374

BLEEDING THE FUEL SYSTEM

CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of cardboard or paper to search for leaks. Do not use your hand.

If ANY fluid is injected into the skin, it must be surgically removed within a few hours by a doctor familiar with this type injury or gangrene may result. Doctors unfamiliar with this type of injury may call the Deere & Company Medical Department in Moline, Illinois, or other knowledgeable medical source.

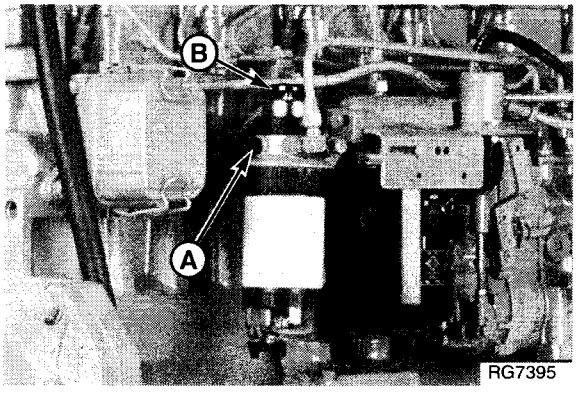


X9811

Whenever the fuel system has been opened up for service (lines disconnected or filters removed), it will be necessary to bleed air from the system.

- **At Round Primary Fuel Filter/Water Separator:**

1. Drain water and contaminants from clear sediment bowl.
2. Loosen air bleed vent screw (A) on fuel filter base.
3. Operate hand primer (B) until fuel flow is free from air bubbles.
4. Tighten vent screw as hand primer is held in downward pumping position.

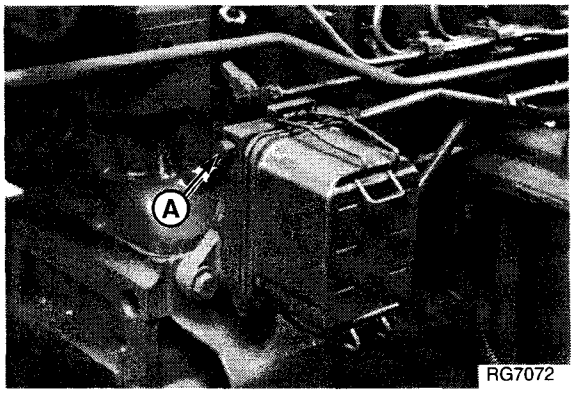


RG7395

BLEEDING THE FUEL SYSTEM—CONTINUED

- **At Rectangular Final Fuel Filter:**

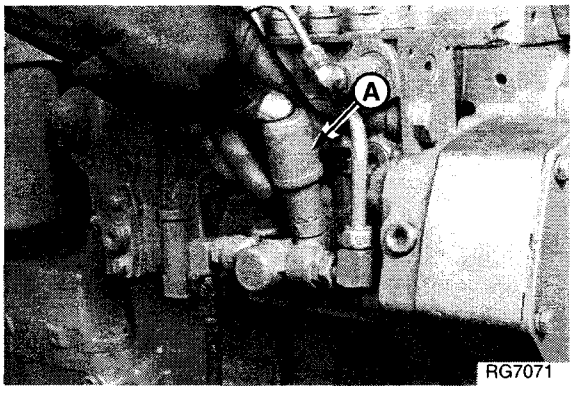
1. Turn key switch to "ON" position.
2. Loosen bleed plug (A) on fuel filter base



RG7072

3. Operate hand primer (A) on fuel supply pump until a smooth flow of fuel, free of bubbles, comes out of the filter plug hole.
4. Simultaneously stroke the hand primer down and close the filter port plug. This prevents air from entering the system. Tighten plug securely. DO NOT overtighten.
5. Start engine and check for leaks.

If engine will not start, it may be necessary to bleed air from fuel system at injection nozzles as explained next.

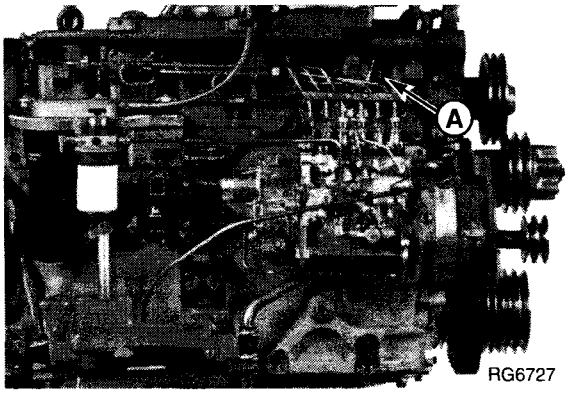


RG7071

BLEEDING THE FUEL SYSTEM—CONTINUED

- **At Fuel Injection Nozzles:**

1. Place throttle lever in fast idle position, if so equipped.
2. Loose fuel line connection at nO. 1 injection nozzle (A).
3. Crank engine with starting motor (but do not start engine), until fuel free from bubbles flows out of loosened connections. Retighten connection.
4. Start engine and check for leaks.
5. If engine does not start, repeat procedure at remaining injection nozzles (if necessary) until enough air has been removed from fuel system to allow engine to start.



RG6727

Troubleshooting

GENERAL TROUBLESHOOTING INFORMATION

Troubleshooting engine problems can be difficult. An engine wiring diagram is provided in this section to help isolate electrical problems on power units using John Deere wiring harness and instrument (gauge) panel.

Later in this section is a list of possible engine problems that may be encountered accompanied by possible causes and corrections. The illustrated diagrams and troubleshooting information are of a general nature, final design of the overall system for your engine application may be different. See your engine distributor or servicing dealer if you are in doubt.

A reliable program for troubleshooting engine problems should include the following basic diagnostic thought process:

- Know the engine and all related systems.
- Study the problem thoroughly.
- Relate the symptoms to your knowledge of engine and systems.
- Diagnose the problem starting with the easiest things first.
- Double-check before beginning the disassembly.
- Determine cause and make a thorough repair.
- After making repairs, operate the engine under normal conditions to verify that the problem and cause was corrected.

ENGINE WIRING DIAGRAM LEGEND

A1—Speed Control Unit

B1—Magnetic Speed Sensor

B2—Coolant Temperature Sensor

B3—Oil Pressure Sensor

F1—Starting Circuit Fuse (25 amp)

F2—Safety Switch Fuse (10 amp)

F3—Tachometer Fuse (3 amp)

G1—Battery

G2—Alternator

H1—Coolant Temperature Indicator Lamp

H2—Oil Pressure Indicator Lamp

H3—Alternator Indicator Lamp

K1—Starter Relay

K2—Fuel Shut-off Relay

M1—Starter Motor

P1—Coolant Temperature Gauge

P3—Crankcase Oil Level Switch/Gauge

P4—Tachometer

P5—Hourmeter

P6—Ammeter

S1—Key Switch

S2—Magnetic Safety Switch

Y2—Fuel Shut-off Solenoid

BLK—Black

BLU—Blue

BRN—Brown

GRN—Green

ORG—Orange

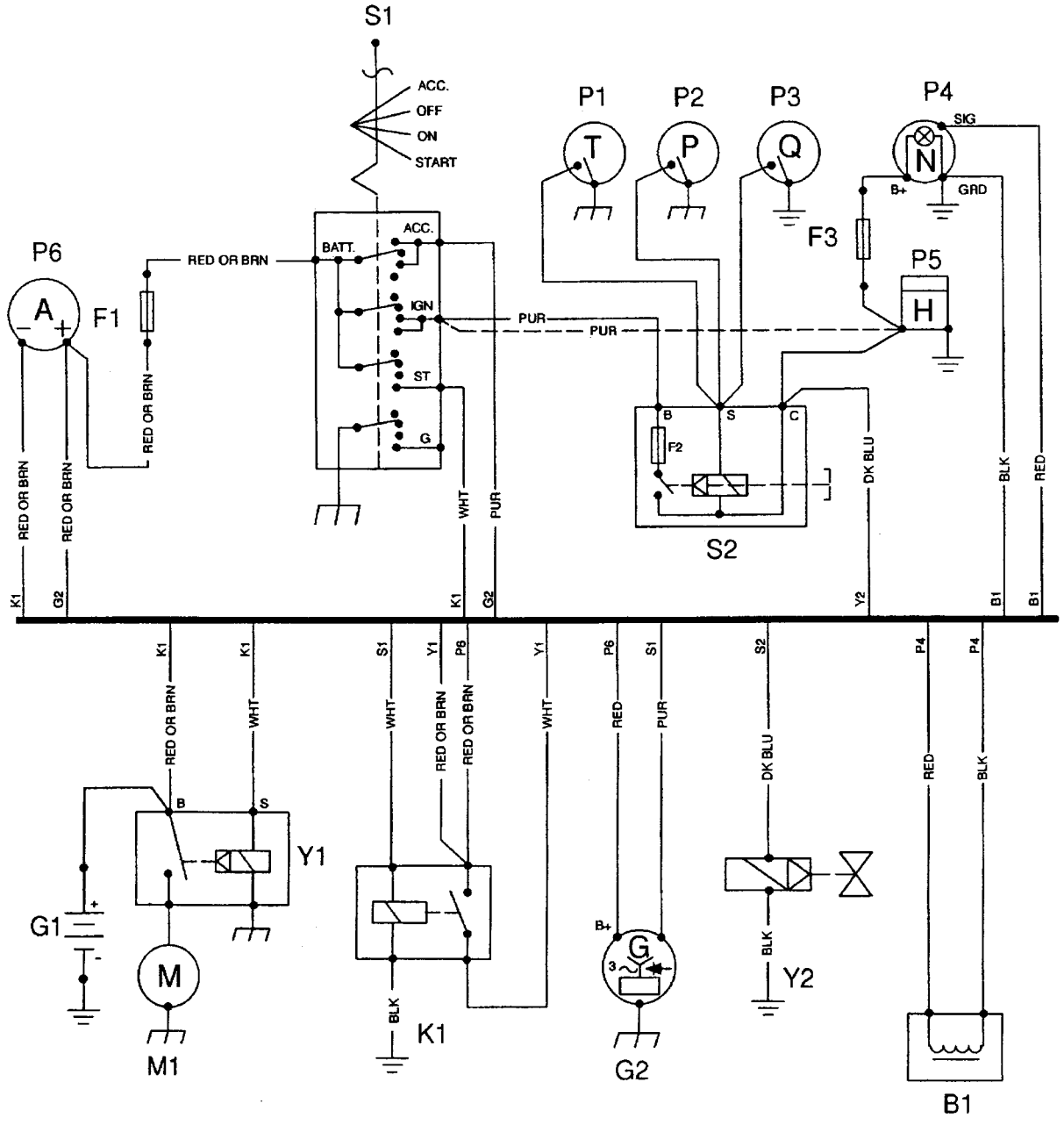
PUR—Purple

RED—Red

YEL—Yellow

ENGINE WIRING DIAGRAM

KEY SWITCH					
	B	G	ACC.	ON	ST.
OFF					
ACC.	•		•		
ON	•		•	•	
START	•	•		•	•



RG7020

ENGINE TROUBLESHOOTING

SYMPTOM	PROBLEM	SOLUTION
Engine emits white smoke	Improper type of fuel.	Use proper fuel.
	Low engine temperature.	Warm up engine to normal operating temperature.
	Defective thermostat.	Remove and check thermostat.
	Defective injection nozzles.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.
Engine emits black or gray exhaust smoke	Improper type of fuel.	Use proper fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Injection nozzles dirty.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.
	Turbocharger not functioning.	See your authorized servicing dealer or engine distributor.
Engine Overheats	Engine overloaded.	Reduce load.
	Low coolant level.	Fill radiator to proper level, check radiator and hoses for loose connections or leaks.
	Faulty radiator cap.	Have serviceman check.
	Stretched V-belt or defective belt tensioner.	Check automatic belt tensioner and check belts for stretching. Replace as required.
	Low engine oil level.	Check oil level. Add oil as required.
	Cooling system needs flushing.	Flush cooling system.
	Defective thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check water temperature with thermometer and replace, if necessary.
	Incorrect grade of fuel.	Use correct grade of fuel.

Continued on next page

SYMPTOM	PROBLEM	SOLUTION
High fuel consumption	Improper type of fuel.	Use proper type of fuel.
	Clogged or dirty air cleaner.	Service air cleaner.
	Engine overloaded.	Reduce load.
	Improper valve clearance.	See your authorized servicing dealer or engine distributor.
	Injection nozzles dirty.	See your authorized servicing dealer or engine distributor.
	Engine out of time.	See your authorized servicing dealer or engine distributor.
	Defective turbocharger.	See your authorized servicing dealer or engine distributor.
	Low engine temperature.	Check thermostat.

ELECTRICAL TROUBLESHOOTING

SYMPTOM	PROBLEM	SOLUTION
Undercharged system	Excessive electrical load from added accessories.	Remove accessories or install higher output alternator.
	Excessive engine idling.	Increase engine rpm when heavy electrical load is used.
	Poor electrical connections on battery, ground strap, starter, or alternator.	Inspect and clean as necessary.
	Defective battery.	Test battery.
	Defective alternator.	Test charging system.
Battery used too much water	Cracked battery case.	Check for moisture and replace as necessary.
	Defective battery.	Test battery.
	Battery charging rate too high.	Test charging system.
Batteries will not charge	Loose or corroded connections.	Clean and tighten connections.
	Sulfated or worn-out batteries.	See your authorized servicing dealer or engine distributor.
	Stretched V-belt or defective belt tensioner.	Adjust belt tension or replace belts.
Starter will not crank	PTO engaged.	Disengage PTO.
	Loose or corroded connections.	Clean and tighten loose connections.
	Low battery output voltage.	See your authorized servicing dealer or engine distributor.
	Faulty start circuit relay.	See your authorized servicing dealer or engine distributor.
	Blown fuse (MDL-25)	Replace fuse.

Continued on next page

SYMPTOM	PROBLEM	SOLUTION
Starter cranks slowly	Low battery output.	See your authorized servicing dealer or engine distributor.
	Crankcase oil too heavy.	Use proper viscosity oil.
	Loose or corroded connections.	Clean and tighten loose connections.
Starter and hour meter functions; rest of electrical system does not function	Blown fuse on magnetic switch.	Replace fuse.
Entire electrical system does not function	Faulty battery connection.	Clean and tighten connections.
	Sulfated or worn-out batteries.	See your authorized servicing dealer or engine distributor.
	Blown fuse (MDL-25).	Replace fuse.

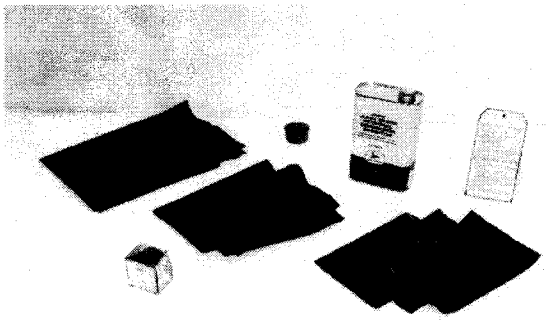
ENGINE STORAGE GUIDELINES

1. John Deere engines can be stored outside for up to three (3) months with no long term preparation IF COVERED BY WATERPROOF COVERING.
2. John Deere engines can be stored in a standard overseas shipping container for up to three (3) months with no long term preparation.
3. John Deere engines can be stored inside, warehoused, for up to six (6) months with no long term preparation.
4. John Deere engines expected to be stored more than six (6) months, long term storage preparation MUST BE taken. (See PREPARING ENGINE FOR LONG TERM STORAGE, later in this section.)
5. For John Deere engines not yet installed in machines, run a line from a container of AR41937 Nucle Oil to the fuel transfer pump intake, and another line from the fuel return manifold to the tank, so that Nucle Oil is circulated through the injection system during cranking.

USE AR41785 ENGINE STORAGE KIT

See your John Deere servicing dealer or engine distributor for an AR41785 Engine Storage Kit. Closely follow instructions provided with this kit.

IMPORTANT: Inhibitors can easily change to gas. Seal or tape each opening immediately after adding inhibitor.



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PREPARING ENGINE FOR LONG TERM STORAGE

The following storage preparations are good for long term engine storage up to one year. After that, the engine should be started, warmed up, and retreated for an extended storage period.

IMPORTANT: Any time your engine will not be used for over six (6) months, the following recommendations for storing it and removing it from storage will help to minimize corrosion and deterioration. Use the AR41785 Engine Storage Kit. Follow recommended service procedure included with storage kit.

1. Change engine oil and replace filter. Used oil will not give adequate protection. (See CHANGE ENGINE OIL AND FILTER in Lubrication and Maintenance/250 Hour Section.)
2. Service air cleaner. (See REPLACING AIR CLEANER FILTER ELEMENTS in Service As Required Section.)
3. Draining and flushing of cooling system is not necessary if engine is to be stored only for several months. However, for extended storage periods of a year or longer, it is recommended that the cooling system be drained, flushed, and refilled. Refill with appropriate coolant. (See RECOMMENDED ENGINE COOLANT in Fuels, Lubricants, and Coolant Section and ADDING COOLANT in Service As Required Section.)
4. Drain fuel tank and add 30 ml (1 oz) of inhibitor to the fuel tank for each 15 L (4 U.S. gal) of tank capacity. Completely drain fuel filter and close fuel valve, if equipped.
5. Add 30 ml (1 oz) of inhibitor to the engine crankcase for each 0.95 L (1 qt) of crankcase oil.
6. Disconnect air intake piping from the manifold. Pour 90 ml (3 oz) of inhibitor into intake system and reconnect the piping.
7. Crank the engine several revolutions with starter (do not allow the engine to start).
8. Remove fan/alternator V-belt, if desired.
9. Remove and clean batteries. Store them in a cool, dry place and keep them fully charged.
10. Disengage the PTO clutch.
11. Clean the exterior of the engine with salt-free water and touchup any scratched or chipped painted surfaces with a good quality paint.
12. Coat all exposed (machined) metal surfaces with grease or corrosion inhibitor if not feasible to paint.
13. Seal all openings on engine with plastic bags and tape supplied in storage kit. Follow instructions supplied in kit.
14. Store the engine in a dry protected place. If engine must be stored outside, cover it with a waterproof canvas or other suitable protective material and use a strong waterproof tape.

REMOVING ENGINE FROM LONG TERM STORAGE

Refer to the appropriate section for detailed services listed below or have your authorized servicing dealer or engine distributor perform services that you may not be familiar with.

1. Remove all protective coverings from engine. Unseal all openings in engine and remove covering from electrical systems.
2. Remove the batteries from storage. Install batteries (fully charged) and connect the terminals.
3. Install fan/alternator V-belts if removed.
4. Fill fuel tank.
5. Perform all appropriate prestarting checks. (See DAILY PRESTARTING CHECKS in Engine Operating Guidelines Section.)

IMPORTANT: DO NOT operate starter more than 30 seconds at a time. Wait at least 2 minutes for starter to cool before trying again.

6. Crank engine for 20 seconds with starter (do not allow the engine to start). Wait 2 minutes and crank engine an additional 20 seconds to assure bearing surfaces are adequately lubricated.
7. Start engine and run at low idle and no load for several minutes. Warm up carefully and check all gauges before placing engine under load.
8. On the first day of operation after storage, check overall engine for leaks and check all gauges for correct operation.

Specifications

GENERAL OEM ENGINE SPECIFICATIONS

ITEM	UNIT OF MEASURE	6081TF	6081AF	6081HF
Number of Cylinders	——	6	6	6
Fuel	——	Diesel	Diesel	Diesel
Bore	mm (in.)	116 (4.56)	116 (4.56)	116 (4.56)
Stroke	mm (in.)	129 (5.06)	129 (5.06)	129 (5.06)
Displacement	L (cu in.)	8.1 (496)	8.1 (496)	8.1 (496)
Compression Ratio	——	16.5:1	16.5:1/15.7:1	15.7:1
Physical Dimensions:				
Width	mm (in.)	727 (28.6)	727 (28.6)	555 (21.8)
Height	mm (in.)	1020 (40.2)	1020 (40.2)	1040 (40.9)
Length	mm (in.)	1208 (47.6)	1208 (47.6)	1208 (47.6)
Basic Dry Weight	kg (lb)	735 (1618)	869(1916)	837 (1845)

FUEL INJECTION PUMP SPECIFICATIONS[1]

ENGINE MODEL	INJECTION PUMP OPTION CODES	POWER RATING @RATED SPEED WITHOUT FAN kW (hp)	RATED SPEED[2] (rpm)	SLOW IDLE (rpm)	FAST IDLE[3] (rpm)
6081TF	1601,1602, 1605	149 (200)	2200	850	2420
	1603,1604, 1606	151 (202)	1800	850	1890
	1608,1609, 1610	151 (202)	1500	850	1575
6081AF	1603,1604,1605	182 (244)	1500	850	1575
	1613, 1615, 1620	205 (275)	2200	850	2420
	1607, 1608, 1609	219 (293)	1500	850	1575
	1610, 1618, 1640	187 (250)	2200	850	2420
	1611, 1656, 1617	205 (275)	2200	850	2420
	1612, 1619, 1676	205 (275)	2200	850	1890
	1616	159 (213)[4]	2200	850	2420
	1621	175 (235)[4]	2200	850	2420
	1622, 1623, 1624	219 (293)	1800	850	1890
6081HF	1601, 1602, 1605	224 (300)	2200	850	2420
	1603, 1604, 1606	245 (328)	1800	850	1890
	1621	190 (255)[4]	2200	850	2420
	1622, 1623	200 (268)	1500	850	1575
	1624	245 (328)	1500	850	1575

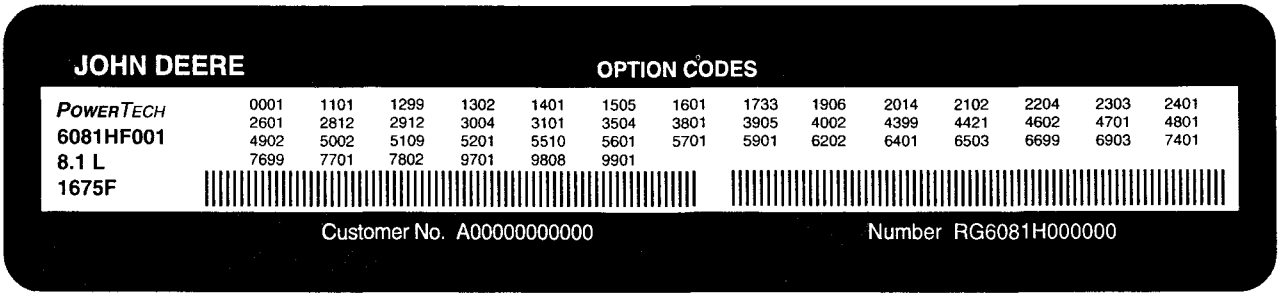
[1] Engine speeds listed are preset to factory specification. Slow idle speed may be reset depending upon specific vehicle application requirements. Refer to your machine operator's manual for engine speeds that are different from those preset at the factory.

[2] Generator set engines (3-5% governor) usually run at 1500 rpm (50 Hz) or 1800 (60 Hz) when operating under load depending on cycles of AC current.

[3] For engines with standard governor, fast idle is 7-10% above rated speed. For engines with generator set governors, fast idle is 3-5% above rated speed.

[4] These engines have a 7% power bulge which allows for INTERMITTENT operation of 7% above rated power.

ENGINE CRANKCASE OIL FILL QUANTITIES



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Option Code Label

Each engine has a 13-digit John Deere engine serial number. The first two digits identify the factory that produced the engine:

"RG" indicates the engine was built in Waterloo, Iowa.

In addition to the serial number plate, OEM engines have an engine option code label affixed to the rocker arm cover. These codes indicate which of the engine options were installed on your engine at the factory. When in need of parts or service, furnish your authorized servicing dealer or engine distributor with these numbers.

To determine the option code for the oil fill quantity of your engine, refer to the engine option code label affixed to the rocker arm cover. The first two digits of the code (19) identify the oil pan group. The last two digits of each code identify the specific oil pan on your engine.

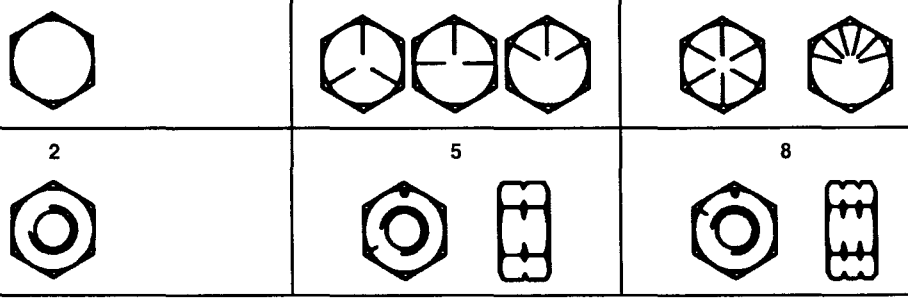
Listed below are engine crankcase oil fill quantities:

Engine Model	Oil Pan Option Code (s)	Crankcase Oil Capacity
6081TF, AF, HF	1906, 1908, 1916	28.5 L (30.1 qt)

Crankcase oil capacity may vary slightly from amount shown. ALWAYS fill crankcase to full mark or between arrows on dipstick, whichever is present. DO NOT overfill.

UNIFIED INCH BOLT AND CAP SCREW TORQUE VALUES

SAE Grade and Head Markings	NO MARK	1 or 2[b]	5 5.1 5.2	8 8.2
SAE Grade and Nut Markings	NO MARK	2	5	8



Size	Grade 1				Grade 2[b]				Grade 5, 5.1, or 5.2				Grade 8 or 8.2			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
1/4	3.7	2.8	4.7	3.5	6	4.5	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15	11	20	15	25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35	26	44	33	50	36	63	46
7/16	22	16	28	20	35	26	44	32	55	41	70	52	80	58	100	75
1/2	33	25	42	31	53	39	67	50	85	63	110	80	120	90	150	115
9/16	48	36	60	45	75	56	95	70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78	135	100	170	125	215	160	240	175	300	225
3/4	120	87	150	110	190	140	240	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190	140	240	175	490	360	625	450	700	500	875	650
1	290	210	360	270	290	210	360	270	725	540	925	675	1050	750	1300	975
1-1/8	400	300	510	375	400	300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725	530	570	425	725	530	1300	950	1650	1200	2050	1500	2600	1950
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2150	1550	2700	2000	3400	2550
1-1/2	1000	725	1250	925	990	725	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.*

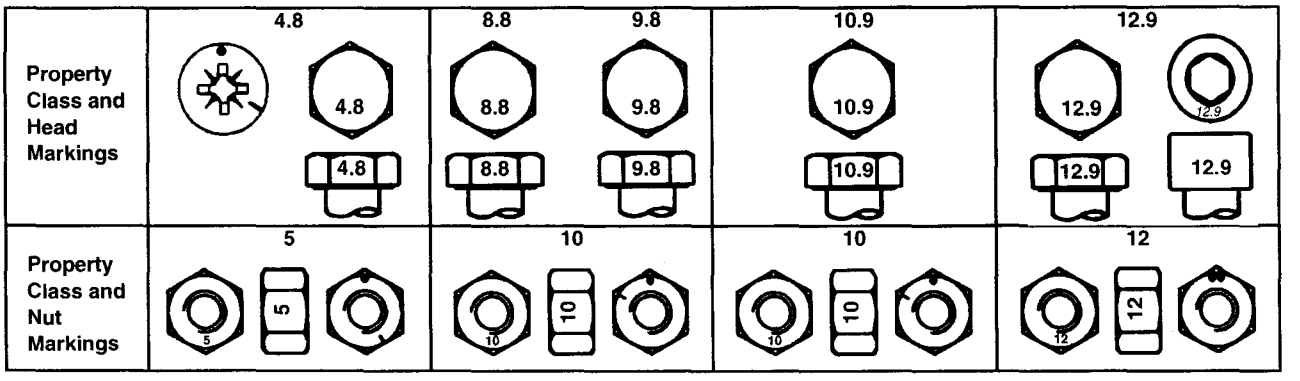
[b] *Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6-in.) long. Grade 1 applies for hex cap screws over 152 mm (6-in.) long, and for all other types of bolts and screws of any length*

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

METRIC BOLT AND CAP SCREW TORQUE VALUES



Size	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
	Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]		Lubricated[a]		Dry[a]	
	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	190
M16	100	73	125	92	190	140	240	175	275	200	350	255	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical class.

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

[a] *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated without any lubrication.*

Lubrication and Maintenance Records

USING LUBRICATION AND MAINTENANCE RECORDS

Refer to specific Lubrication and Maintenance Section for detailed service procedures.

1. Keep a record of the number of hours you operate your engine by regular observation of hour meter.
2. Check your record regularly to learn when your engine needs service.
3. DO ALL the services within an interval section. Write the number of hours (from your service records) and the date in the spaces provided. For a complete listing of all items to be performed and the service intervals required, refer to the quick-reference chart near the front of the Lubrication and Maintenance Section.

IMPORTANT: The service recommendations covered in this manual are for the accessories that are provided by John Deere. Follow manufacturer's service recommendations for servicing engine driven equipment not supplied by Deere.

DAILY (PRESTARTING) SERVICE

NOTE: Refer to DAILY PRESTARTING CHECKS in Engine Operating Guidelines Section for detailed procedures.

- Check engine oil level.
- Check (primary) fuel filter/water separator
- Check coolant level.
- Check air cleaner dust unloader valve and air restriction indicator, if equipped.
- Lubricate PTO release bearing
- Visual walkaround inspection.

100 HOUR/EVERY 2 WEEKS SERVICE

- Service fire extinguisher
- Lubricate PTO clutch shaft bearings.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

250 HOUR SERVICE

- Change engine oil and filter.*
- Service battery.
- Check PTO clutch adjustment.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

** If John Deere PLUG-50 oil is used along with a John Deere oil filter, the oil change interval may be extended by 50 hours.*

600 HOUR/12 MONTH SERVICE

- Lubricate PTO clutch internal levers and linkage.
- Clean crankcase vent tube.
- Replace primary and final fuel filter elements.
- Check cooling system
- Coolant solution analysis - add SCA's as needed.
- Check air intake hoses, connections, and system.
- Replace air cleaner elements.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

1200 HOUR/24 MONTH SERVICE

- Have your authorized servicing dealer or engine distributor adjust valve clearance.
- Flush cooling system.*
- Have your authorized servicing dealer or engine distributor pressure teat overall cooling system and cap.
- Check automatic belt tensioner and belt wear.

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

** If John Deere Antifreeze/Summer Coolant Concentrate or John Deere COOL-GARD is used, the flushing interval may be extended to 2000 hours. If John Deere Prediluted Antifreeze/Summer Coolant is used, the flushing interval may be extended to 3000 hours or 36 months, whichever occurs first.*

SERVICE AS REQUIRED

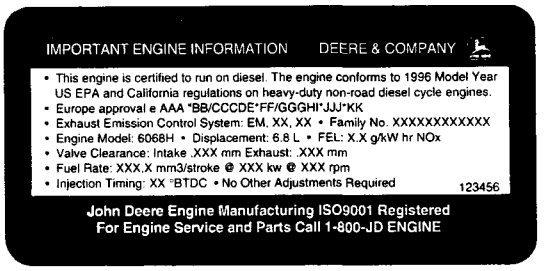
- Service air cleaner.
- Replace V-belt.

Hours									
Date									
Hours									
Date									
Hours									
Date									

Emission System Warranty

EMISSIONS CONTROL SYSTEM WARRANTY LABEL

The emissions warranty described below applies only to those engines that have been certified by the Environmental Protection Agency (EPA) and/or California Air Resources Board (CARB). The presence of an emissions label like the one shown to the right signifies that the engine has been certified with the EPA and CARB. The EPA and CARB emissions warranties do not apply to engines that were built before 01 January 1996.



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U.S. EMISSIONS CONTROL WARRANTY STATEMENT

Emissions control-related parts and components are warranted by John Deere for five years or 3000 hours of operation, whichever occurs first. John Deere further warrants that the engine covered by this warranty was designed, built, and equipped so as to conform at the time of sale with all U.S. emissions standards at the time of manufacture, and that it is free of defects in materials and workmanship which would cause it not to meet these standards within the period of five years or 3000 hours of operation, whichever occurs first.

Warranties stated in this manual refer only to emissions-related parts and components of your engine. The complete engine warranty, less emissions-related parts and components, is provided separately as the "John Deere New Off-Highway Engine Warranty".

CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT

Your Warranty Rights and Obligations

The California Air Resources Board (CARB) and John Deere are pleased to explain the emission control system on your new engine. In California, new heavy-duty engines must be designed, built, and equipped to meet the State's stringent anti-smog standards. John Deere must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect, or improper maintenance of your engine.

Your emissions control system includes:

- Fuel Metering System
  - Fuel Injection System
- Air Induction System
  - Intake Manifold
  - Turbocharger System
  - Charge Air Cooling System
- Miscellaneous Items used in above systems

Where a warrantable condition exists, i.e. failure due to defect in John Deere-supplied material and/or workmanship, John Deere will repair your heavy-duty engine at no cost to you including diagnosis, parts and labor.

John Deere's Warranty Coverage:

The emission control system of your heavy-duty engine is warranted for five years or 3000 hours of operation, whichever occurs first. If any emission-related part on your engine is defective, the part will be repaired or replaced by John Deere. Warranties stated in this manual refer only to emissions-related parts and components of your engine. The complete engine warranty, less emissions-related parts and components, is provided separately as the "John Deere New Off-Highway Engine Warranty".

CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT—CONTINUED

Owner's Warranty Responsibilities:

As the heavy-duty engine owner, you are responsible for the performance of the required maintenance as outlined in this Operation and Maintenance Manual. John Deere recommends that you retain all receipts covering maintenance on your heavy-duty engine, but John Deere cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

However, as the heavy-duty engine owner, you should be aware that John Deere may deny you warranty coverage if your heavy-duty engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

Your engine is designed to operate on diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with California's emissions requirements.

You are responsible for initiating the warranty process. The CARB suggests that you present your heavy-duty engine to the nearest John Deere engine service dealer as soon as a problem is suspected. The warranty repairs should be completed by the service dealer as expeditiously as possible.

If you have any questions regarding your warranty rights and responsibilities, you should contact John Deere at 1-319-292-5400.

The warranty period begins on the date the engine is delivered to an ultimate purchaser, or when otherwise put into service. John Deere warrants to the ultimate purchaser and each subsequent purchaser that the engine is designed, built, and equipped so as to conform with all applicable regulations adopted by the Air Resources Board, and that it is free from defects in materials and workmanship which would cause the failure of a warranted part.

Any warranted part which is scheduled for replacement as required maintenance by this Operation and Maintenance Manual is warranted by John Deere for the period of time prior to the first scheduled replacement point for that part. If the part fails prior to the first scheduled replacement point, the part shall be repaired or replaced under the warranty. Any such part repaired or replaced under warranty is warranted for the remainder of the period prior to the first scheduled replacement point for the part.

Any warranted part which is not scheduled for replacement as required maintenance, or which is scheduled only for regular inspection to the effect of repairing or replacing as necessary, is warranted for the warranty period.

Repair or replacement of a warranted part will be performed at no charge to you by a John Deere engine service dealer. You will not be charged for diagnostic labor which leads to the determination that a warranted part is defective, if the diagnostic work is performed by a John Deere engine service dealer.

John Deere is liable for damages to other engine components caused by the failure under warranty of any warranted part.

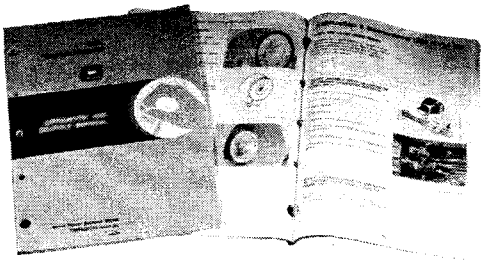
Any replacement part may be used in the performance of any maintenance or repairs, and such use will not reduce the warranty obligations of John Deere. However, the use of add-on or modified parts are grounds for disallowing a warranty claim.

John Deere Service Literature Available

OPERATOR'S MANUAL

The operator's manual provides safety, operating, maintenance, and service information about John Deere engine.

An extra copy of the operator's manual is available. The operator's manual and safety signs on your engine may also be available in other languages. (See your John Deere dealer to order.)



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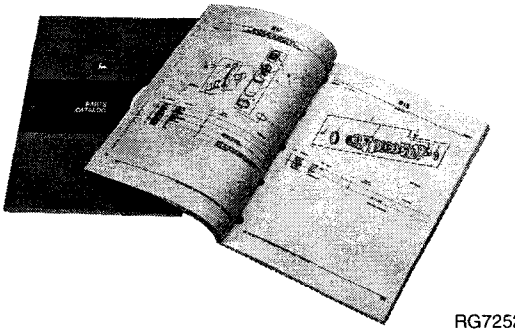
PARTS CATALOG

The parts catalog lists service parts available for your engine with exploded view illustrations to help you identify the correct parts. It is also useful in assembling and disassembling.



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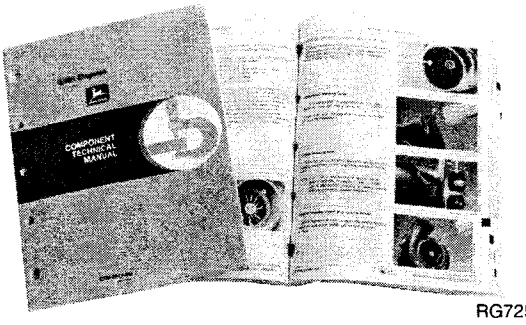
TECHNICAL AND SERVICE MANUALS

Technical and service manuals are service guides for your machine. Included in the manual are specifications, diagnosis, and adjustments; also illustrations of assembly and disassembly procedures, hydraulic oil flows, and wiring diagrams.

Component technical manuals are require for some products. These supplemental manuals cover specific components.



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FMO AND FOS MANUALS

Covering all types of vehicles, regardless of manufacturer, each book starts with basic theory and proceeds through complex systems. There are four series:

- Farm Business Management (FBM)
- Fundamentals of Machine Operation (FMO)
- Fundamentals of Service (FOS)
- Fundamentals of Compact Equipment Service (FCP)

TS1646

John Deere Distribution Service Center
Service Publications Department
P.O. Box 186, Moline, IL 61266-0186

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Name _____

Address _____

City _____

State _____ Zip _____

Phone ( ) _____

Title	Order Number	Price Each	x Quantity	= Total
POWERTECH 8.1 L OEM Engines				
Operator's Manual (English)	OMRG24828		x	=
Parts Catalog	PC2527		x	=
Component Technical Manual *POWERTECH* 8.1 L Engine	CTM86		x	=
OEM Engine Accessories	CTM67		x	=
Alternators and Starting Motors	CTM77		x	=
			x	=
FOS Manual—Hydraulics	FOS1005B		x	=
FOS Manual—Electrical Systems	FOS2006B		x	=
FOS Manual—Engines	FOS3007B		x	=
FOS Manual—Power Trains	FOS4006B		x	=
FOS Manual—Shop Tools	FOS5105B		x	=
FOS Manual—Welding	FOS5207B		x	=
FOS Manaul—Belts and Chains	FOS5304B		x	=
FOS Manual—Bearings and Seals	FOS5405B		x	=
FOS Manual—Tires and Tracks	FOS5507B		x	=
FOS Manual—Air Conditioning	FOS5707B		x	=
FOS Manual—Fuels Lubricants & Coolant	FOS5807B		x	=
FOS Manual—Fasteners	FOS6004B		x	=
FOS Manual—Identification of Parts Failures	FOS6104B		x	=
1-inch 3-Ring Binder (400 pages max.)	SX2062		x	=
1 1/2-inch 3-Ring Binder (600 pages max.)	SX2063		x	=
1—1 1/2-inch 3-Post Binder (600 pages max.)	SX2066		x	=
2—3 1/2-inch 3-Post Binder (1400 pages max.)	SX2064		x	=
2—4-inch 4-Post Expandable (2000 pages max.)	SX2056		x	=
Catalog of Available Service Publications	DB1112	No Charge		
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Illinois state residents add 6.25% and Iowa state residents add 5% for Retail Occupation Tax or show tax exemption number. Other states excluded.	
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Amount Due in U.S. Dollars (Prices subject to change without notice.)	

Index

John Deere Service Keeps You On The Job

JOHN DEERE PARTS

We help minimize downtime by putting genuine John Deere parts in your hands in a hurry.

That's why we maintain a large and varied inventory—to stay a jump ahead of your needs.

THE RIGHT TOOLS

Precision tools and testing equipment enable our Service Department to locate and correct troubles quickly . . . to save you time and money.

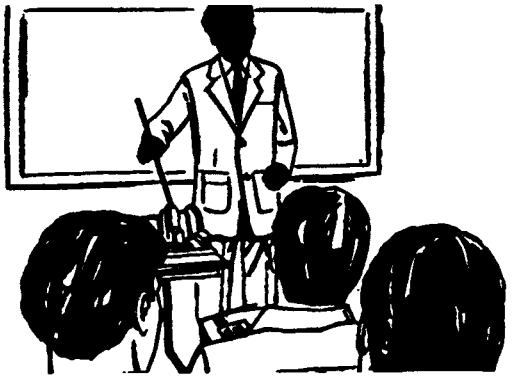
WELL-TRAINED TECHNICIANS

School is never out for John Deere service technicians.

Training schools are held regularly to be sure our personnel know your equipment and how to maintain it.

Result?

Experience you can count on!



PROMPT SERVICE

Our goal is to provide prompt, efficient care when you want it and where you want it.

We can make repairs at your place or at ours, depending on the circumstances: see us, depend on us.

JOHN DEERE SERVICE SUPERIORITY: We'll be around when you need us.