VII

JOHN DEERE

237946

OPERATORS MANUAL

Series 300 3029, 4039, 4045, 6059, and 6068 OEM Diesel Engines

OMRG18293 Issue H4 English

Series 300 3029, 4039, 4045, 6059, and 6068 OEM Diesel Engines

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OMRG18293 Issue H4 English

Deere Power Systems Group
OMRG18293 Issue H4
(This manual replaces OMRG18293 C3)

LITHO IN U.S.A.
ENGLISH

Introduction

READ THIS MANUAL CAREFULLY to learn how to operate and service your engine corectly. Failure to do so could result in personal injury or equipment damage.

THIS MANUAL SHOULD BE CONSIDERED a permanent part of your engine and should remain with the engine when you sell it.

MEASUREMENTS IN THIS MANUAL are given in both metric and customary U.S. unit equivalents. Use only correct replacement parts and fasteners. Metric and inch fasteners may require a specific metric or inch wrench.

RIGHT-HAND AND LEFT-HAND sides are determined by standing at the drive or flywheel end (rear) of the engine and facing toward the front of the engine.

WRITE ENGINE SERIAL NUMBERS and the option codes in the spaces indicated in the Specifications section. Accurately record all the numbers. Your dealer also needs these numbers when parts are ordered. File the identification numbers in a secure place off the engine.

SETTING FUEL DELIVERY beyond published factory specifications or otherwise overpowering will result in loss of warranty protection for this engine.

CERTAIN ENGINE ACCESSORIES such as radiator, air cleaner, and instruments are optional equipment on John Deere OEM Engines. These accessories may be provided by the equipment manufacturer instead of John Deere. This operator's manual applies only to the engine and those options available through the John Deere distribution network.

Engine Owner

JOHN DEERE ENGINE OWNER:

Don't wait until you need warranty or other service to meet your local John Deere Engine Distributor or Service Dealer.

Learn who he is and where he is. At your first convenience, go meet him. He'll want to get to know you and to learn what your needs might be.

UTILISATEURS DE MOTEURS JOHN DEERE:

N'attendez pas d'être obligé d'avoir recours a votre Concessionnaire ou Point de Service le plus proche pour vous adresser a lui.

Renseignez-vous des que possible pour l'identifier et le localiser. A la première occasion, prenez contact avec lui et faites-vous connaître. Il sera lui aussi heureux de faire votre connaissance et de savoir que vous pourrez compter sur lui le moment venu.

AN DEN BESITZER DES JOHN DEERE MOTORS

Warten Sie nicht auf einen evt. Reparaturfall um den nächstgelegenen John Deere Händler kennen zu lernen.

Machen Sie sich bei ihm bekannt und nutzen Sie sein "Service Angebot".

PROPRIETARIO DEL MOTORE JOHN DEERE:

Non aspetti fino a quando ha bisogno della garanzia o di un altro tipo di assistenza per incontrarsi con il Suo Concessionario che fornisce l'assistenza tecnica.

Impari a conoscere chi è e dove si trova. Alla Sua prima occasione cerchi d'incontrarlo. Egli desidera farsi conoscere e conoscere le Sue necessità.

PROPIETARIO DE EQUIPO JOHN DEERE:

No espere hasta necesitar servicio de garantía o de otro tipo para conocer a su Distribuidor de Motores John Deere o al Concesionario de Servicio.

Entérese de quién es, y dónde está situado. Cuando tenga un momento, vaya a visitarlo. A él le gustará conocerlo, y saber cuáles podrían ser sus necesidades.

JOHN DEERE MOTORÄGARE:

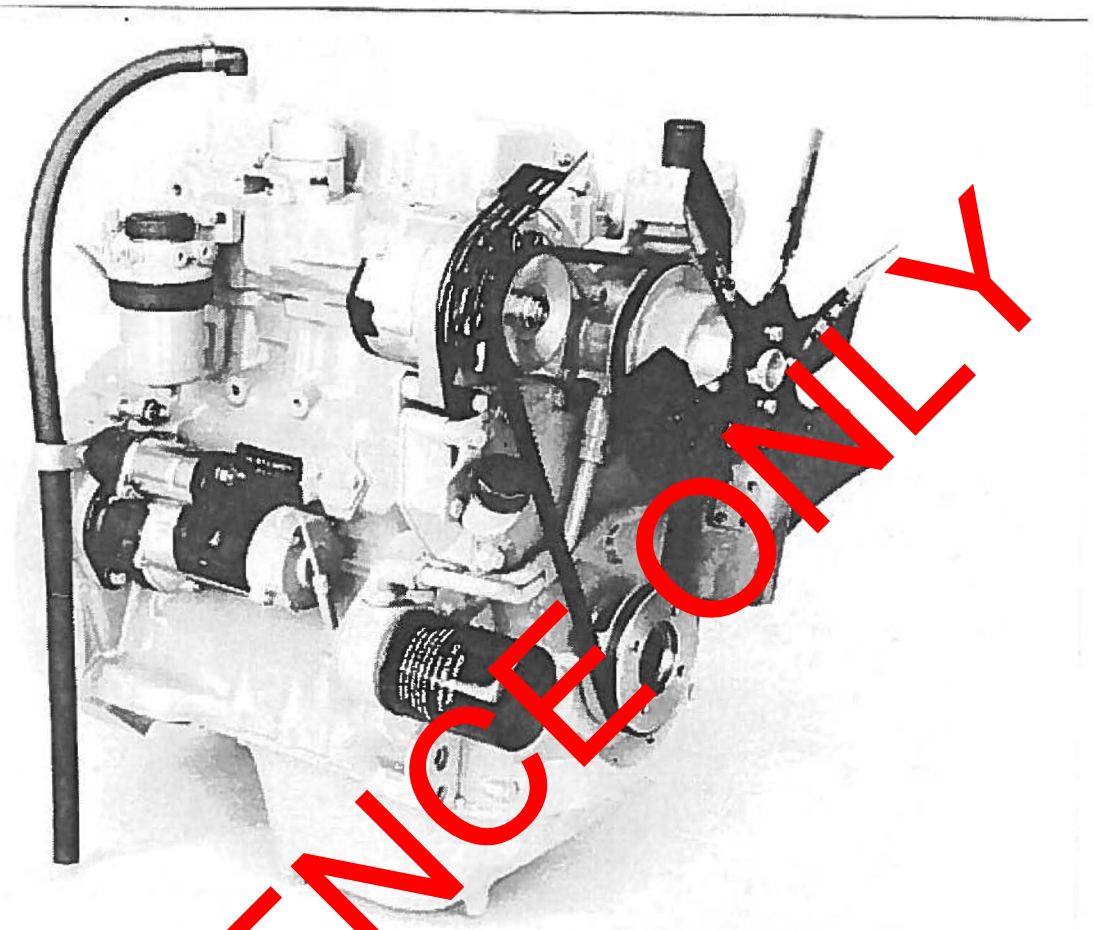
Vänta inte med att besöka Din John Deere återförsäljare till dess att Du behöver service eller garanti reparation.

Bekanta Dig med var han är och vem han är. Tag första tillfälle att besöka honom. Han vill också träffa Dig för att få veta vad Du behöver och hur han kan hjälpa Dig.

RG6656 -UN-22FEB93

RG,OWNER -19-18FEB93

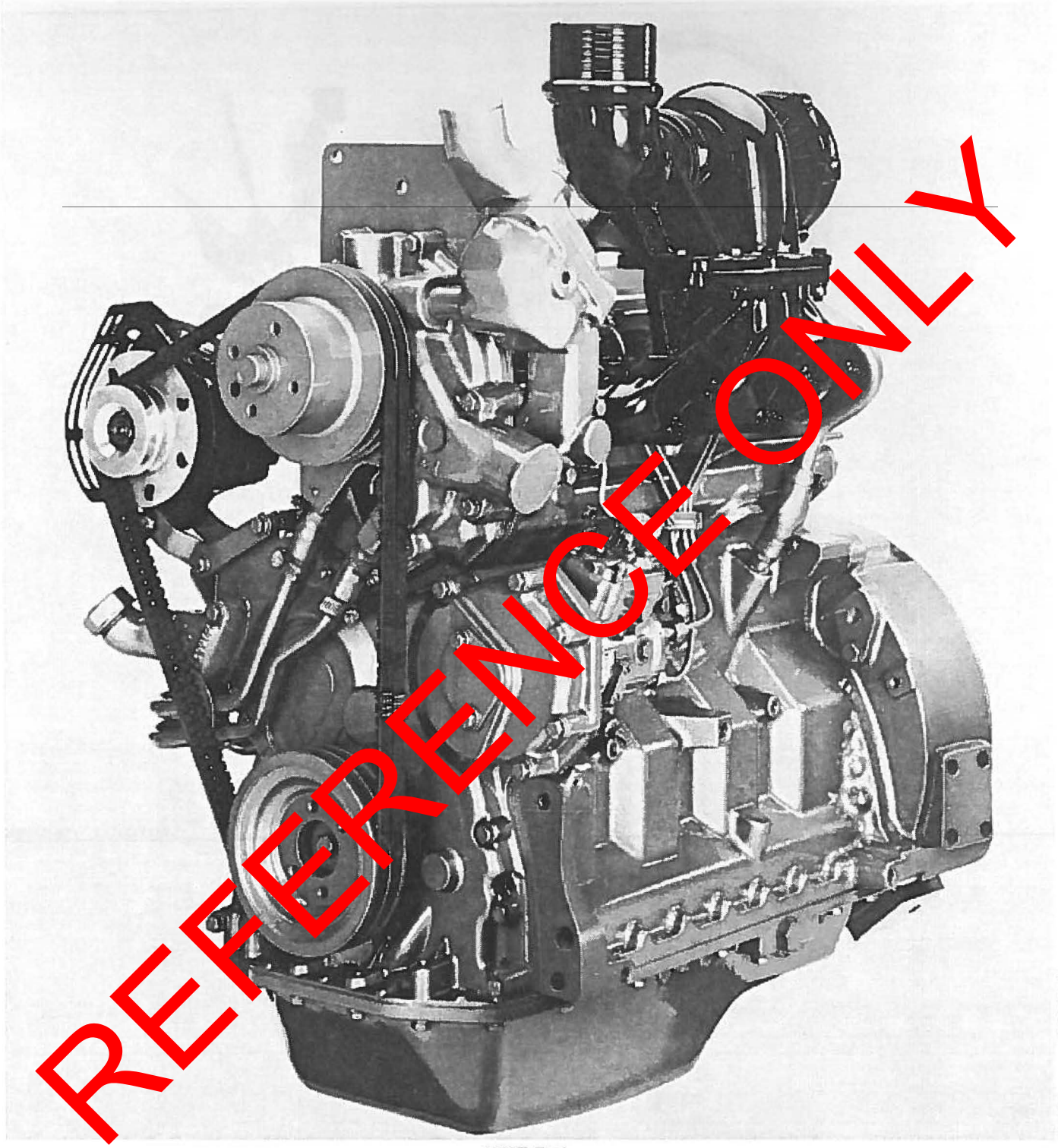
Identification Views



3029D Engine

CD30356 -UN-03FEB93

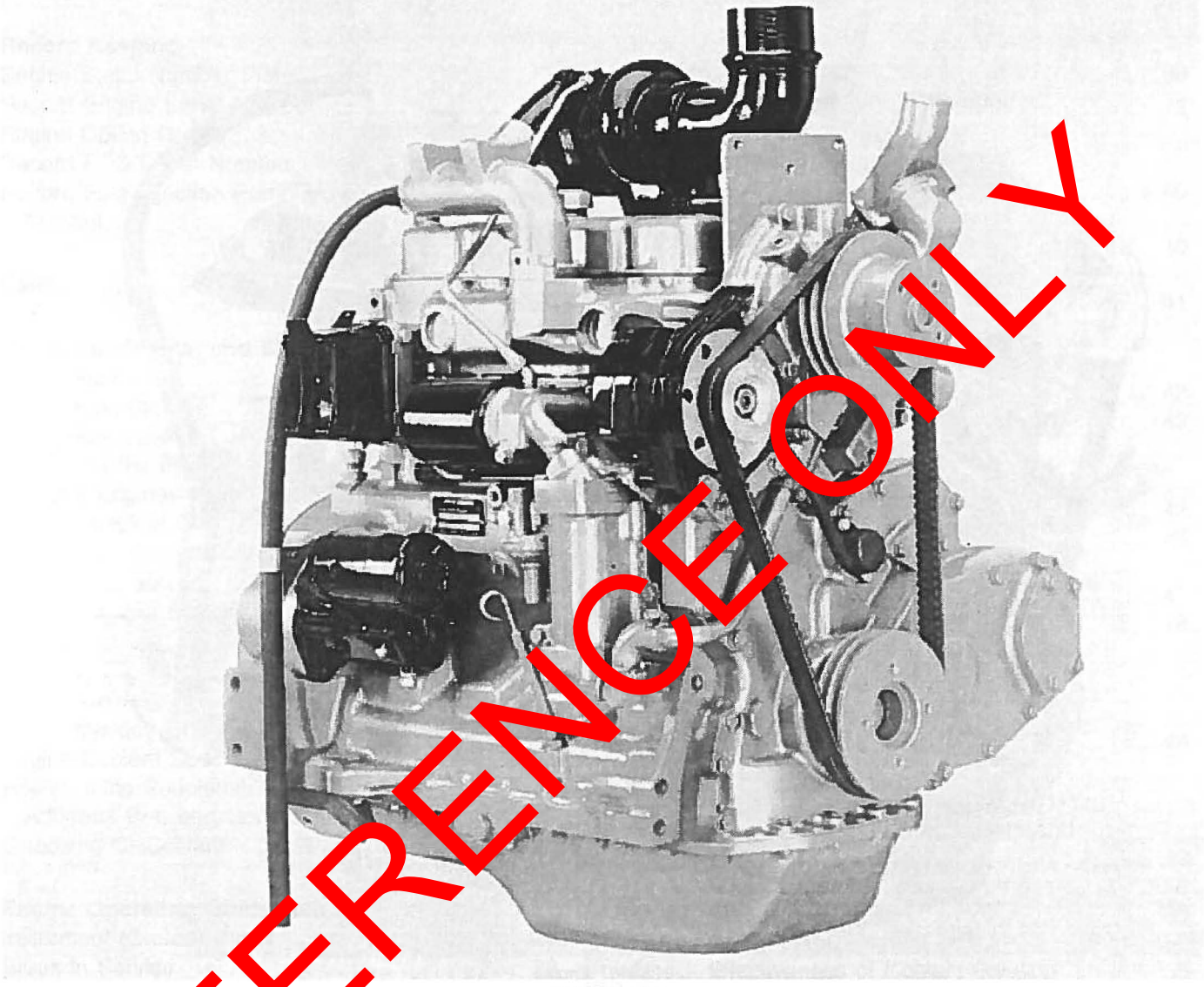
S11,CONT,L3 -19-17FEB93



RG6613 -UN-03FEB93

4039T Engine

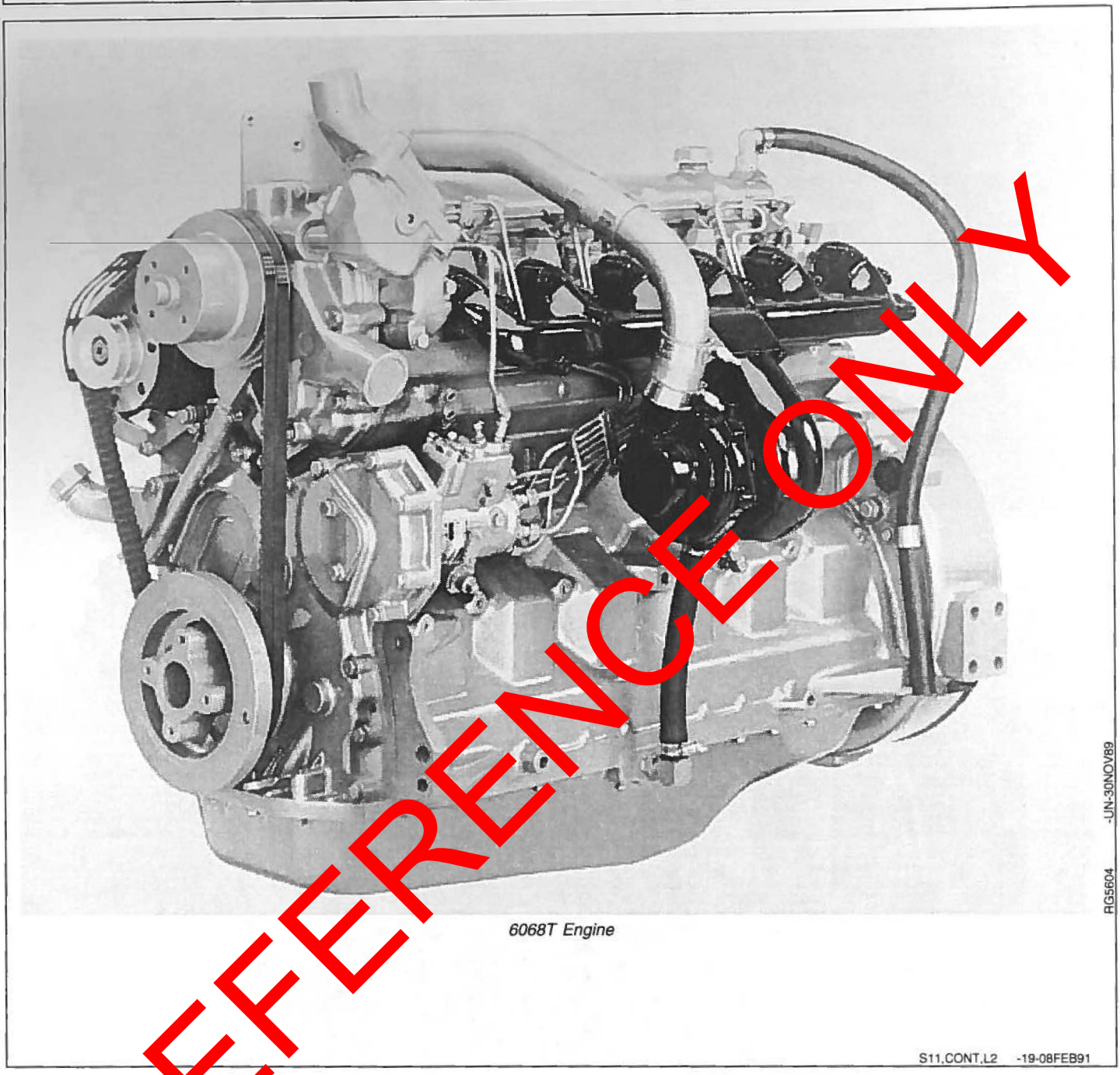
S11,CONT,L4 -19-17FEB93



RG5603 -UN-30NOV89

4045T Engine

S11,CONT,L1 -19-08FEB91



RG5604 -UN-30NOV89

6068T Engine

S11,CONT,L2 -19-08FEB91

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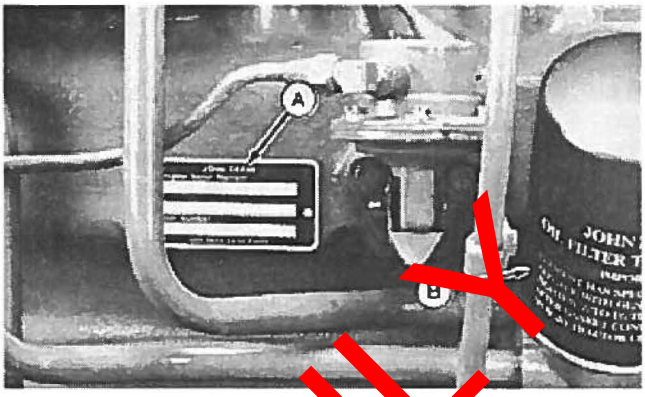
Record Keeping

ENGINE SERIAL NUMBER PLATE

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

"T0" indicates the engine was built in Dubuque, Iowa
"CD" indicates the engine was built in Saran, France

Your engine's serial number plate (A) is located on right-hand side of cylinder block near the oil filter housing (B).



RG,18293,SNPLTE-19-09AUG94

RECORD ENGINE SERIAL NUMBER

Your engine will have a serial number plate.

Record all of the numbers and letters found on your engine serial number plate in the spaces provided below.

This information is very important for repair parts or warranty information.

Engine Serial Number (A)

_____

Application Data (B)

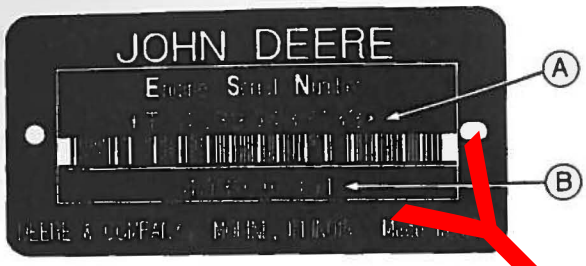
_____

European Customer Model/Application Data (C)

_____

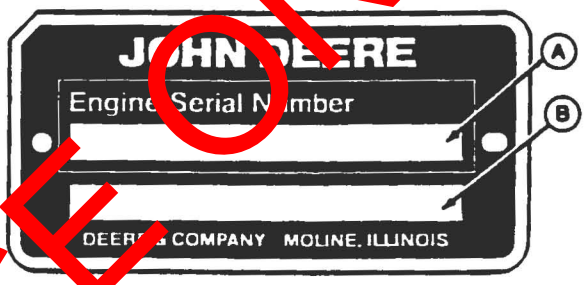
Coefficient of Absorption Value (D)

_____



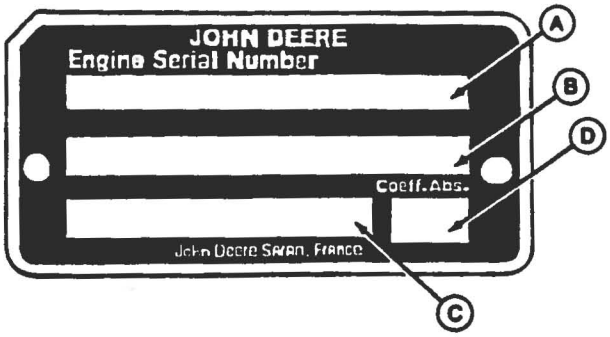
-UN-07JUL94 RG7225

Dubuque Bar Coded Serial Number Plate



-UN-09JAN90 RG5609

Dubuque Serial Number Plate



-UN-09JAN90 RG5610

Saran Serial Number Plate

S55,OMSN,B -19-02AUG94

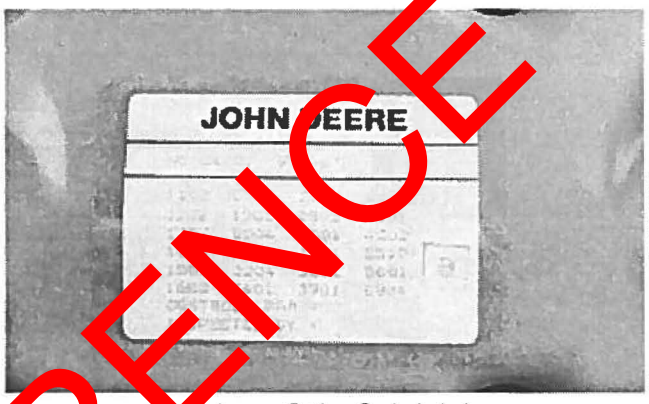
ENGINE OPTION CODES

```
J O H N   D E E R E                                  11/05/94

Commande: 182838760    Base code: 147AA    Load: 654150
   -    18  1101- 1202- 1301- 1406- 1501- 1603- 1701-
1902- 2004- 2109- 2204- 2403- 2802- 2902- 3001- 3115-
3519- 3601- 3703- 3901- 4005- 4199- 4398- 4499- 4599-
4603- 4708- 47AA  4802- 4901- 5001- 5101- 5299- 5325-
5601- 5906- 6206- 6699- 6903- 7699- 9801-
Controle par (inspected by):                    ***
```

RG7222 -UN-21JUN94

Saran Option Code Label



RG4907 -UN-15DEC88

Dubuque Option Code Label

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.

On Saran unit engines, the engine option code label includes an engine base code. This base code must also be recorded along with the option codes. At times it will be necessary to furnish this base code to differentiate two identical option codes for the same engine model.

The first two digits of each code identify a specific group, such as alternators. The last two digits of each code identify one specific option provided on your engine, such as a 12-volt, 55-amp alternator.

If an engine is ordered without a particular component, the last two digits of that functional group option code will be nines (99). The following list shows only the first two digits of the code numbers. For future reference such as ordering repair parts, it is important to have these code numbers available. To ensure this availability, enter the third and fourth digits shown on your engine option code label in the spaces provided on the following page.

NOTE: Your engine option code label may not contain all option codes if an option has been added after the engine left the producing factory.

S11,OMSN,P -19-09AUG94

ENGINE OPTION CODES—CONTINUED

Engine Base Code:_____

Option Codes	Description	Option Codes	Description
11 _____	Rocker Arm Cover	40 _____	Dipstick
12 _____	Oil Filler	41 _____	Belt Driven Front Auxiliary Driv
13 _____	Crankshaft Pulley	43 _____	Air Inlet Heater
14 _____	Flywheel Housing	44 _____	Timing G r Cover With Gears
15 _____	Flywheel	45 _____	Bala For 4-Cylinder Engines
16 _____	Injection Pump	46 _____	C inder Blo k With Liners and Camshaft
17 _____	Air Inlet	47 _____	Crankshaft and Bearings
18 _____	Air Cleaner	48 _____	Connecting Rods and Pistons
19 _____	Oil Pan	49 _____	Valve Actuating Mechanisms
20 _____	Water Pump	50 _____	Oil Pumps
21 _____	Thermostat Cover	51 _____	Cylinder Head With Valves
22 _____	Thermostat	52 _____	Auxiliary Gear Drive
23 _____	Fan Drive	55 _____	Shipping Stand
24 _____	Fan Belt	56 _____	Paint Option
25 _____	Fan	59 _____	Oil Cooler and Filter
27 _____	Radiator	62 _____	Alternator Mounting
28 _____	Exhaust Manifold	64 _____	Exhaust Elbow
29 _____	Ventilator System	65 _____	Turbocharger
30 _____	Starting Motor	66 _____	Temperature Switch
31 _____	Alternator	69 _____	Engine Serial Number PLate
32 _____	Instrument Panel	75 _____	Air Restriction Indicator
35 _____	Fuel Filter	76 _____	Oil Pressure Switch
36 _____	Front Plate	91 _____	Special Equipment (Factory Installed)
37 _____	Fuel Transfer Pump	97 _____	Special Equipment (Field Installed)
39 _____	Thermostat Housing	98 _____	Shipping

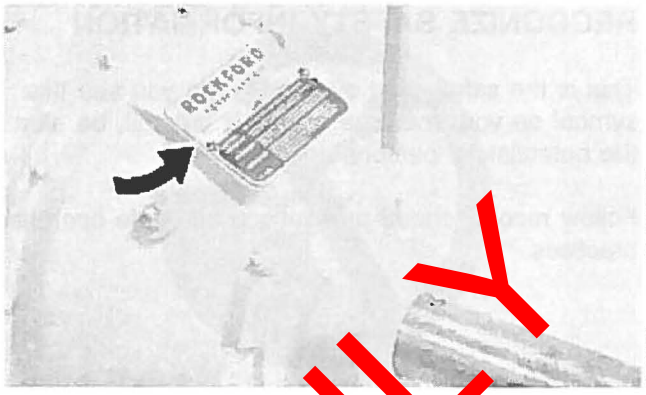
S11,OMSN,Q -19-09JUN94

RECORD PTO SERIAL NUMBER

Serial number and model number are located on cover plate (Bold Arrow) of PTO housing. Record the numbers in the following spaces:

Serial Number _____

Model Number _____



RG4622 -UN-15DEC88

S11,OMSN,N -19-26FEB93

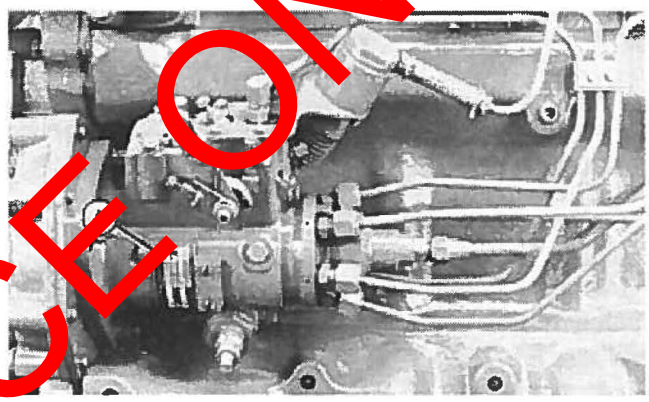
RECORD FUEL INJECTION PUMP MODEL NUMBER

Record the fuel injection pump model and serial information found on the serial number plate (A).

Model No. _____ RPM _____

Manufacturer's No. _____

Serial No. _____



RG4906 -UN-15DEC88

S11,OMSN,O -19-02JUL86

RECOGNIZE SAFETY INFORMATION

This is the safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.

T81389 -UN-07DEC88

DX,ALERT -19-03MAR93

UNDERSTAND SIGNAL WORDS

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

TS187 -19-30SEP88

DX,SIGNAL -19-03MAR93

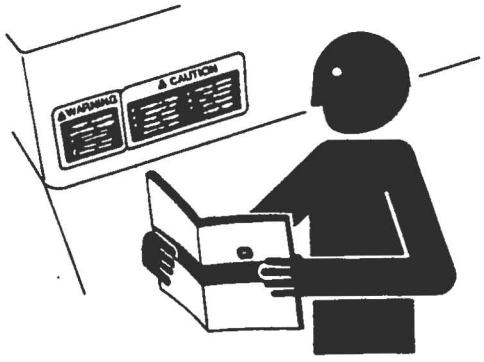
FOLLOW SAFETY INSTRUCTIONS

Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your John Deere dealer.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual and need assistance, contact your John Deere dealer.



TS201 -UN-23AUG88

DX,READ -19-03MAR93

PREVENT BYPASS STARTING

Avoid possible injury or death from engine runaway.

Do not start engine by shorting across starter terminal. Engine will start with PTO engaged if normal circuitry is bypassed.

Start engine only from operator's station with PTO disengaged or in neutral.

RG5419 -UN-28FEB89

PAS1 -19-19MAR91

HANDLE FUEL SAFELY—AVOID FIRES

Handle fuel with care: it is highly flammable. Do not refuel the machine while smoking or when near open flame or sparks.

Always stop engine before refueling machine. Fill fuel tank outdoors.

Prevent fires by keeping machine clean of accumulated trash, grease, and debris. Always clean up spilled fuel.

TS202 -UN-23AUG88

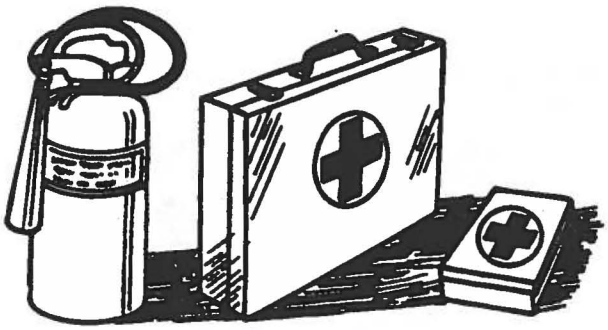
DX,FIRE1 -19-03MAR93

PREPARE FOR EMERGENCIES

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctor, ambulance service, hospital, and fire department near your telephone.



TS291 -UN-23AUG88

DX,FIRE2 -19-03MAR93

HANDLE STARTING FLUID SAFELY

Starting fluid is highly flammable.

Keep all sparks and flame away when using it. Keep starting fluid away from batteries and cables.

To prevent accidental discharge when storing the pressurized can, keep the cap on the container, and store in a cool, protected location.

Do not incinerate or puncture a starting fluid container.

TS1356 -UN-18MAR92

DX,FIRE3 -19-16APR92

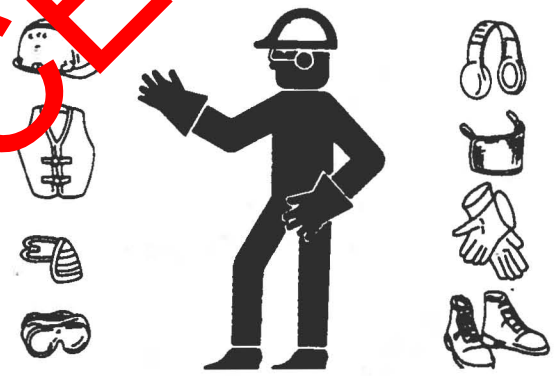
WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.



TS206 -UN-23AUG88

DX,WEAR -19-10SEP90

PROTECT AGAINST NOISE

Prolonged exposure to loud noise can cause impairment or loss of hearing.

Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

TS207 -UN-23AUG88

DX,NOISE -19-03MAR93

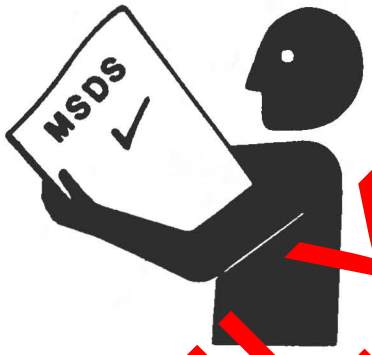
HANDLE CHEMICAL PRODUCTS SAFELY

Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with John Deere equipment include such items as lubricants, coolants, paints, and adhesives.

A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.

Check the MSDS before you start any job using a hazardous chemical. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and recommended equipment.

(See your John Deere dealer for MSDS's on chemical products used with John Deere equipment.)



TS1132 -UN-26NOV90

DX,MSDS,NA -19-03MAR93

STAY CLEAR OF ROTATING DRIVELINES

Entanglement in rotating driveline can cause serious injury or death.

Keep master shield and driveline shields in place at all times. Make sure rotating shields turn freely.

Wear close fitting clothing. Stop the engine and be sure the PTO driveline is stopped before making adjustments or performing any other service on the engine or PTO-driven equipment.

TS198 -UN-23AUG88

RG21891,3 -19-25JAN93

PRACTICE SAFE MAINTENANCE

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet , and clothing from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to the ground. Stop the engine. Remove the key. Allow machine to cool.

Securely support any machine elements that must be raised for service work.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

Disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

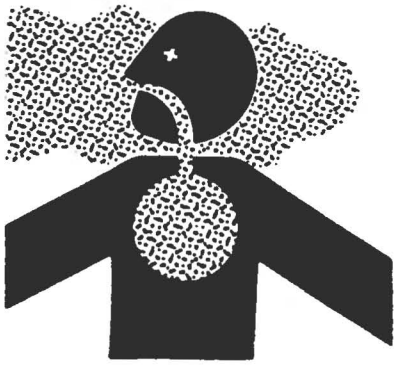
TS218 -UN-23AUG88

DX,SERV -19-03MAR93

WORK IN VENTILATED AREA

Engine exhaust fumes can cause sickness or death. If it is necessary to run an engine in an enclosed area, remove the exhaust fumes from the area with an exhaust pipe extension.

If you do not have an exhaust pipe extension, open the doors and get outside air into the area.



TS220 -UN-23AUG88

DX,AIR -19-04JUN90

AVOID HIGH-PRESSURE FLUIDS

X9811 -UN-23AUG88

Escaping fluid under pressure can penetrate the skin causing serious injury.

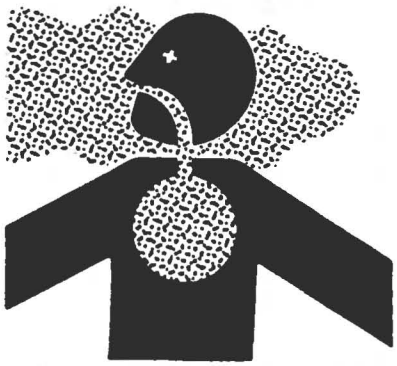
Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines. Tighten all connections before applying pressure.

Search for leaks with a piece of cardboard. Protect hands and body from high pressure fluids.

If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result. Doctors unfamiliar with this type of injury should reference a knowledgeable medical source. Such information is available from Deere & Company Medical Department in Moline, Illinois, U.S.A.

DX,FLUID -19-03MAR93

REMOVE PAINT BEFORE WELDING OR HEATING



TS220 -UN-23AUG88

Avoid potentially toxic fumes and dust.

Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch.

Do all work outside or in a well ventilated area. Dispose of paint and solvent properly.

Remove paint before welding or heating:

- If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
- If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

DX,PAINT -19-03MAR93

AVOID HEATING NEAR PRESSURIZED FLUID LINES

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area.

TS953 -UN-15MAY90

DX,T[illegible]C -19-03MAR93

SERVICE COOLING SYSTEM SAFELY

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 -UN-23AUG88

DX,RCAP -19-04JUN90

DISPOSE OF WASTE PROPERLY

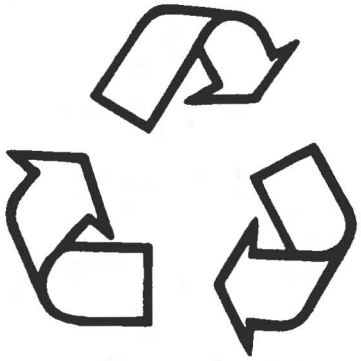
Improperly disposing of waste can th[illegible]n th[illegible] environment and ecology. Potentia[illegible]y har[illegible]ful wa[illegible]te used with John Deere equipment includ[illegible] su[illegible] ite[illegible] as oil, fuel, coolant, brake fluid, filte[illegible], and b[illegible]tteries.

Use leakproof containe[illegible] w[illegible] draini[illegible] fluids. Do not use food or beverag[illegible] containe[illegible] th[illegible] may mislead someone into drink[illegible] fr[illegible] them.

Do not pour [illegible]aste onto [illegible]e ground, down a drain, or into any wat[illegible] so[illegible]rce.

Air c[illegible]ditio[illegible]ing re[illegible]gerants escaping into the air can dam[illegible]ge th[illegible] Earth's atmosphere. Government regulations may re[illegible]uire a certified air conditioning service center to recover a[illegible]d recycle used air conditioning refrigerants.

Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.



TS1133 -UN-26NOV90

DX,DRAIN -19-03MAR93

DIESEL FUEL

Consult your local fuel distributor for properties of the diesel fuel available in your area.

In general, diesel fuels are blended to satisfy the low temperature requirements of the geographical area in which they are marketed. Recommended standard grades are shown on the temperature charts.

In North America, diesel fuels meeting Military Specification VV-F-800E are preferred. In most European countries, diesel fuel is specified to EN 590. If diesel fuel specified to ASTM D975 is used or EN 590 is not available, the fuel must meet the following properties:

• Cetane Number 40 minimum.
Cetane number greater than 50 is preferred, especially for temperatures below -20˚C (-4˚F) or elevations above 1500 m (5000 ft).

• Cold Filter Plugging Point (CFPP) below the expected low temperature OR Cloud Point at least 5˚C (9˚F) below the expected low temperature

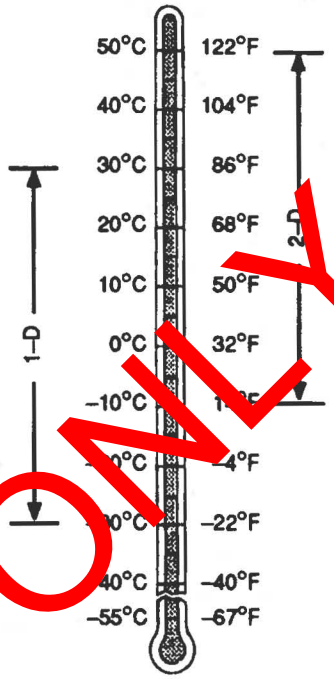
• Sulfur content:
— Sulfur content should not exceed 0.5% Sulfur content less than 0.05% is preferred.
— If diesel fuel with sulfur content greater than 0.5% sulfur content is used, reduce the service interval for engine oil and filter by 50%
— DO NOT use diesel fuel with sulfur content greater than 1.0%

• Lubricity
— Fuel lubricity must pass the BOCLE scuffing test at 3300 gram minimum load level.
— If fuel of low or unknown lubricity is used, add John Deere All-Season Diesel Fuel Conditioner at specified concentration.

Bio-diesel fuels with these properties and meeting an appropriate specification may be used as an alternative to petroleum-based diesel fuel.

Arctic fuels (such as Military Specification VV-F-800E, Grade DF-A) may be used at temperatures below -30˚C (-22˚F).

CAUTION: Handle fuel carefully. Do not fill the fuel tank when engine is running. DO NOT smoke while you fill the fuel tank or service the fuel system.



North America ASTM D975

TS1611 -UN-31JAN94

RG,FUEL1 -19-10AUG94

DIESEL FUEL STORAGE

Proper fuel storage is critically important. Use clean storage and transfer tanks. Periodically drain water and sediment from bottom of tank. Store fuel in a convenient place away from buildings.

IMPORTANT: DO NOT store diesel fuel in galvanized containers. Diesel fuel stored in galvanized containers reacts with zinc coating on container to form zinc flakes. If fuel contains water, a zinc gel will also form. The gel and flakes will quickly plug fuel filters, damage injection nozzles and injection pump.

DO NOT use use brass-coated containers for fuel storage. Brass is an alloy of copper and zinc.

Store diesel fuel in plastic containers, aluminum containers, and specially coated steel containers made for diesel fuel storage.

Avoid storing fuel over long periods of time. If there is a very slow turnover in fuel tank or supply tank, it may be necessary to add John Deere TY22030 All Season Diesel Fuel Conditioner to prevent water condensation. TY22030 Conditioner also reduces fuel gelling and controls wax separation during cold weather.

Consult your John Deere Parts Network for local availability and always follow manufacturer's directions on label.

RG21891,5 -19-02MAR93

FILLING FUEL TANK

CAUTION: Be careful when handling fuel. Never fill tank while engine is hot or running. DO NOT smoke while filling fuel tank.

IMPORTANT: The fuel tank should be vented through filler cap. If new filler cap is required, always replace it with a vented cap.

Fill fuel tank at end of each day's operation. This prevents condensation in tank as moist air cools.

TS202 -UN-23AUG88

S11,OMFL,C -19-02MAR93

MINIMIZING THE EFFECT OF COLD WEATHER ON DIESEL ENGINES

John Deere diesel engines are designed to operate effectively in cold weather. However, for effective starting and cold weather operation, a little extra care is necessary. The information below outlines steps that can minimize the effect that cold weather may have on starting and operation of your engine. See your authorized engine distributor or servicing dealer for additional information and local availability of cold weather aids.

Use Grade No. 1-D Fuel

When temperatures fall below 5° C (40° F), Grade No. 1-D fuel is best suited for cold weather operation. Grade No. 1-D fuel has a lower cloud point and a lower pour point.

Cloud point is the temperature at which wax will begin to form in the fuel and this wax causes fuel filters to plug. Pour point is the temperature at which fuel begins to thicken and become more resistant to flow through fuel pumps and lines.

NOTE: On an average, Grade No. 1-D fuel has a lower BTU (heat content) rating than Grade No. 2-D fuel. When using Grade No. 1-D fuel you may notice a drop in power and fuel efficiency, but should not experience any other engine performance effects. Check the grade of fuel being used before troubleshooting for low power complaints in cold weather operation.

Diesel Fuel Flow Additive

IMPORTANT: Treat fuel before temperature drops to 0°C (32° F). For best results, use with untreated fuel. Follow all recommended instructions on label.

Use John Deere TY22030 All Season Diesel Fuel Conditioner to treat Grade No. 2-D fuel if No. 1-D is not readily available during the cold weather season.

NOTE: John Deere TY22030 Diesel Fuel Conditioner can also be used to treat No. 1-D fuel.

John Deere TY22030 Diesel Fuel Conditioner will:

—Reduce the formation of wax to improve fuel flow through filters by reducing fuel gelling.

—Lower the pour point of untreated fuel from 5° C (40° F) to less than -40° C (-40° F). Allowing the burning of Grade No. 2-D fuel year-round which provides more BTU per gallon than No. 1-D fuel and reduces fuel costs.

Coolant Heaters

Engine block heaters (coolant) are an available option to aid cold weather starting.

Seasonal Viscosity Oil and Proper Coolant Concentration

Use seasonal grade viscosity engine oil based on expected air temperature range between oil changes and a proper concentration of low silicate antifreeze as recommended later in this group. See ENGINE OIL and ENGINE COOLANT REQUIREMENTS later in this section.

RG,23321,3 -19-09MAY94

ENGINE BREAK-IN OIL

This engine is filled at the factory with John Deere Engine Break-In Oil. This break-in oil should be drained and the oil filter changed after the first 100 hours of operation.

During the break-in period, add John Deere Engine Break-In Oil as needed to maintain the specified oil level.

A second 100-hour service interval with John Deere Engine Break-In Oil may be required if the engine is operated under light loads during the first 100-hour break-in period.

After the break-in period, use John Deere TORQ-GARD SUPREME© PLUS-50™ or other heavy-duty diesel engine oil as recommended in this manual.

IMPORTANT: Do not use TORQ-GARD SUPREME PLUS-50 engine oil during the first 100 hours of operation after an engine rebuilt. TORQ-GARD SUPREME PLUS-50 will not allow the engine to wear properly during the break-in period.

DX,ENOIL4 -19-20JUL94

ENGINE OIL

Use oil viscosity based on the expected air temperature range during the period between oil changes.

The following oil is preferred:

- John Deere TORQ-GARD SUPREME PLUS-50™

The following oils are also recommended:

- John Deere TORQ-GARD SUPREME®
- John Deere UNI-GARD™

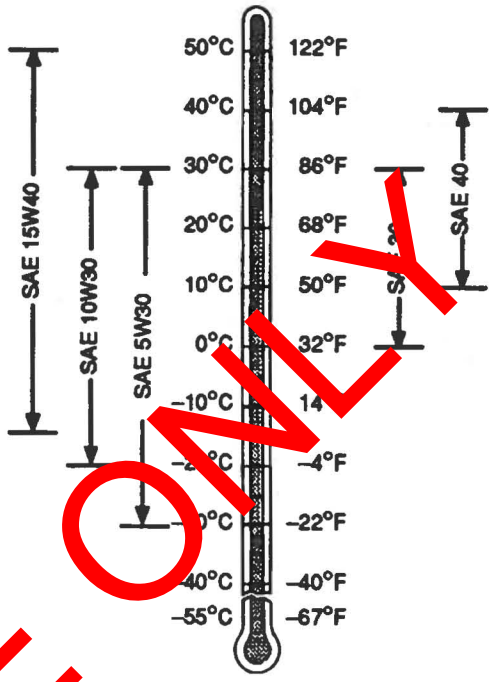
Other oils may be used if they meet one or more of the following:

- API Service Classification CE
- API Service Classification CD
- CCMC Specification D5
- CCMC Specification D4

If John Deere TORQ-GARD SUPREME PLUS-50™ engine oil and a John Deere oil filter are used, the oil and filter service interval may be extended by 50 hours.

If diesel fuel with sulfur content greater than 0.5% is used, reduce the service interval for engine oil and filter by 50%.

Arctic oils (such as Military Specification MIL-L-46167B) may be used at temperatures below -30°C (-22°F).



TS1411 -UN-31JAN94

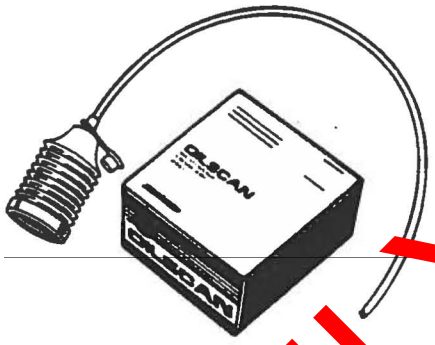
DX,ENOIL -19-01FEB94

OILSCAN® AND COOLSCAN™

OILSCAN and COOLSCAN are John Deere sampling programs to help you monitor machine performance and identify potential problems before they cause serious damage.

Oil and coolant samples should be taken from each system prior to its recommended change interval.

Check with your John Deere dealer for the availability of OILSCAN and COOLSCAN kits.



T6828AB -UN-15JUN89

T6829AB -UN-18OCT88

DX,OILSCAN -19-16APR92

ALTERNATIVE AND SYNTHETIC LUBRICANTS

Conditions in certain geographical areas may require lubricant recommendations different from those printed in this manual. Some John Deere lubricants may not be available in your location. Consult your John Deere dealer to obtain information and recommendations.

Synthetic lubricants may be used if they meet the performance requirements listed in this manual.

DX,ALTER -19-01FEB94

GREASE

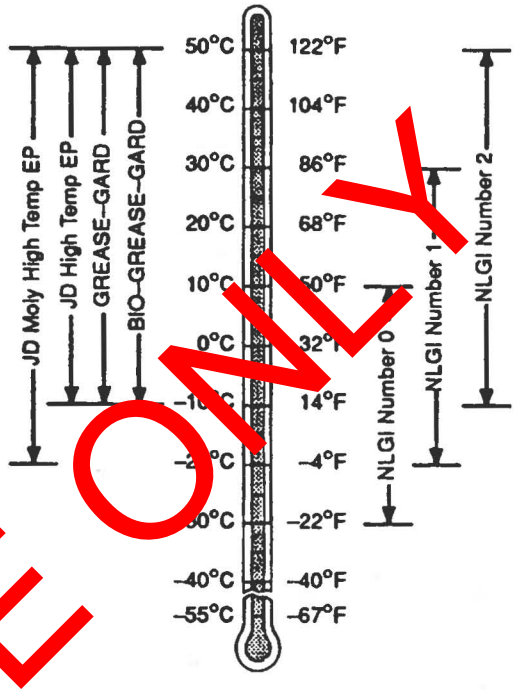
Use grease based on NLGI consistency numbers and the expected air temperature range during the service interval.

The following greases are preferred:

- John Deere MOLY HIGH TEMPERATURE EP GREASE
- John Deere HIGH TEMPERATURE EP GREASE
- John Deere GREASE-GARD™
- John Deere BIO-GREASE-GARD™[1]

Other greases may be used if they meet **both** of the following:
- NLGI Performance Classification GC
- NLGI Performance Classification LB

Arctic greases (such as Military Specification MIL-G-10924F) may be used at temperatures below -30°C (-22°F).



TS1417 -UN-31JAN94

[1]BIO-GREASE-GARD meets or exceeds the requirements for biodegradability of 80% within 21 days according to CEC L-33-T-82 test method.

DX,GREA1 -19-01FEB94

LUBRICANT STORAGE

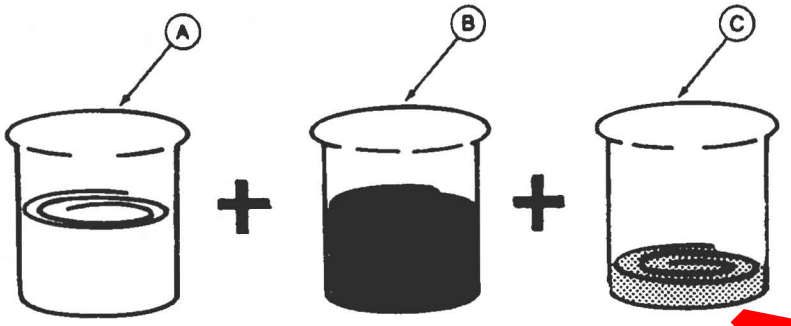
Your equipment can operate at top efficiency only if clean lubricants are used.

Use clean containers to handle all lubricants.

Whenever possible, store lubricants and containers in an area protected from dust, moisture, and other contamination. Store containers on their side to avoid water and dirt accumulation.

DX,LUBST -19-01FEB94

ENGINE COOLANT REQUIREMENTS



RG,18293,REQ1AA-19-22APR92

A—Quality Water

B—Ethylene Glycol Concentrate (Antifreeze)

C—Supplemental Coolant Additives (SCA's)

Engine Coolant

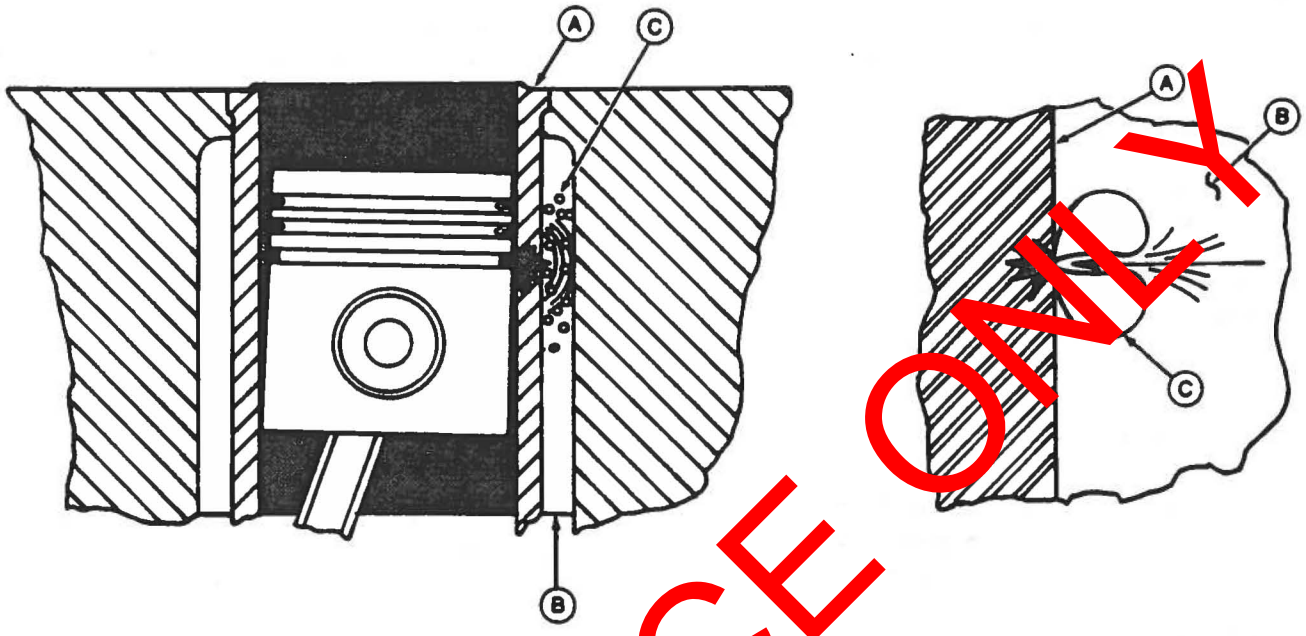
To meet cooling system protection requirements, the coolant MUST consist of a 50/50 mixture of quality water and ethylene glycol concentrate (antifreeze). Add to the mixture 3% (by volume) supplemental coolant additives (SCA's). See ENGINE COOLANT SPECIFICATIONS, later in this section, for further definition.

Makeup of the coolant between changes MUST consist of the same requirements as during a complete change. Performing a COOLSCAN analysis is the recommended method for determining the amount of quality water, ethylene glycol concentrate, and supplemental coolant additives that should be added.

IMPORTANT: Supplemental coolant additives MUST be added to the coolant solution. Ethylene glycol concentrate (antifreeze) DOES NOT contain chemical inhibitors needed to control liner pitting or erosion, rust, scale, and acidity.

RG,18293,REQ1AA-19-09AUG94

ENGINE COOLANT REQUIREMENTS—CONTINUED



RG6263 -UN-22APR92

A—Cylinder Liner Walls B—Engine Coolant C—Vapor Bubbles

Coolant solutions of ethylene glycol concentrate (antifreeze), quality water, and supplemental coolant additives (SCA's) MUST be used year-round to protect against freezing, boil-over, liner erosion or pitting, and to provide a stable non-corrosive environment for seals, hoses, and metal engine parts.

Water pump impellers and cylinder liner walls (A) which are in contact with engine coolant (B) can be eroded or pitted unless the proper concentration and type of SCA's are present in the coolant solution.

Vapor bubbles (C) are formed when piston impacts against liner and cause walls to vibrate; sending compression waves into the coolant.

Erosion or pitting is caused by the formation and collapse of tiny vapor bubbles in the coolant on the surface of metal parts. Over a period of time, this pitting will progress completely through the metal. Generally, the most critical erosion occurs in the cylinder liner area of wet-sleeve, heavy-duty engines. If coolant is allowed to enter the combustion chamber, engine failure or other serious damage will result.

Use of SCA's will reduce the effects of erosion and pitting. The chemicals in the additives form a protective film on cylinder liner surface. This film acts as a barrier against collapsing vapor bubbles and also reduces the quantity of bubbles formed.

RG,COOL,REQ10 -19-12JUL94

RECOMMENDED ENGINE COOLANT

Solutions of antifreeze and supplemental coolant additives MUST be used year-round for freeze protection, boil-over protection, and to provide a stable, non-corrosive environment for seals, hoses and metal engine parts.

John Deere Prediluted Antifreeze/Summer Coolant and John Deere Antifreeze/Summer Coolant Concentrate are recommended. John Deere Low Silicate Antifreeze and John Deere COOL-GARD™, where available, may also be used. Supplemental coolant additives MUST be added to John Deere Low Silicate Antifreeze.

• JOHN DEERE PREDILUTED ANTIFREEZE/SUMMER COOLANT

This product contains all the necessary ingredients that make up the proper coolant solution: (chemically pure water, ethylene glycol (antifreeze), and supplemental coolant additives (SCA's). It is ready to use; no mixing is required.

• JOHN DEERE ANTIFREEZE/SUMMER COOLANT CONCENTRATE

This product contains ethylene glycol (antifreeze) and supplemental coolant additives (SCA's). It must be mixed with quality water, as described later in this group, before adding to the engine cooling system. The proportion of water to be used depends upon the lowest freeze protection temperature desired according to the following table:

% CONCENTRATE	FREEZE PROTECTION LIMIT
40	-24° C (-12° F)
50	-37° C (-34° F)
60	-52° C (-62° F)

• JOHN DEERE LOW SILICATE ANTIFREEZE

This ethylene glycol coolant concentrate MUST be mixed with proper concentration of quality water and 3% (by volume) supplemental coolant additives (SCA's) before adding to the cooling system. The proportion of water to be used depends upon the lowest freeze protection temperature desired according to the following table:

% CONCENTRATE	FREEZE PROTECTION LIMIT
40	-24° C (-12° F)
50	-37° C (-34° F)
60	-52° C (-62° F)

• JOHN DEERE COOL-GARD™ FLUID

In certain geographical areas, John Deere Engine COOL-GARD is marketed for use in the engine cooling system. This product contains all the necessary ingredients that make up the proper coolant solution: chemically pure water, ethylene glycol (low silicate antifreeze) and supplemental coolant additives (SCA's). It is ready to add to cooling system as is; no mixing or supplemental coolant additives required. Contact your John Deere Parts Network for local availability.

RG,COOL,18293 -19-04AUG94

ENGINE COOLANT SPECIFICATIONS

If John Deere coolant products are not used, ethylene glycol concentrate (antifreeze) can be used when mixed with quality water and supplemental coolant additives (SCA's), as described below and later in this section. Use an ethylene glycol concentrate meeting ASTM D5345 (prediluted coolant) or ASTM D4985 (coolant concentrate) mixed 50% with quality water.

Water Quality:

Distilled, de-ionized, or soft water is preferred for use in cooling systems. Mineral (hard/tap) water should NEVER be put in a cooling system unless first tested. However, water that meets the following water quality specifications is acceptable.

Water Quality Specifications

Item	Parts Per Million	Grains Per Gallon
Chlorides (maximum)	40	2.5
Sulfates (maximum)	100	5.9
Total Dissolved Solids (maximum).	340	20
Total Hardness (maximum)	170	10
pH Level	5.5—9	

If Chlorides, Sulfates, or Total Dissolved Solids are higher than the above given specifications, the water must be distilled, de-mineralized or de-ionized before using in cooling system.

If Total Hardness is higher than the above given specification and all other parameters are within the given specifications, the water must be softened before using in cooling system.

Ethylene Glycol Concentrate (Antifreeze):

IMPORTANT: DO NOT use methyl alcohol or methoxy propanol base concentrate. This concentrate is not compatible with additives used in supplemental coolant additives. Damage can occur to rubber seals on cylinder liners which are in contact with coolant.

DO NOT use ethylene glycol concentrate containing sealer or stop-leak additives.

DO NOT use concentrate containing less than 10% ethylene glycol.

DO NOT use concentrate containing more than 0.1% anhydrous metasilicate. This type of concentrate, which is intended for use in aluminum engines, may cause a gel-like deposit to form that reduces heat transfer and coolant flow. Check container label or consult with supplier before using.

RG,18293,COOL4 -19-09AUG94

ENGINE COOLANT SPECIFICATIONS—CONTINUED

Supplemental Coolant Additives (SCA's):

IMPORTANT: DO NOT over-inhibit antifreeze solutions, as this can cause silicate-dropout. When this happens, a gel-type deposit is created which retards heat transfer and coolant flow.

DO NOT use soluble oil.

NOTE: John Deere Prediluted Antifreeze/Summer Coolant, John Deere Antifreeze/Summer Coolant Concentrate, and John Deere Engine COOL-GARD contain supplemental coolant additives (SCA's). However, as the coolant solution loses its effectiveness, additives will need to be added.

ALWAYS inhibit the antifreeze-coolant mix with a non-chromate inhibitor such as John Deere Liquid Coolant Conditioner. Follow the supplier's recommendations printed on the container.

John Deere Liquid Coolant Conditioner is available in the following sizes:

—TY16004 473 mL (16 oz) container
—TY16005 3.8 L (1 US gal) container

IMPORTANT: John Deere Liquid Coolant Conditioner does NOT protect against freezing.

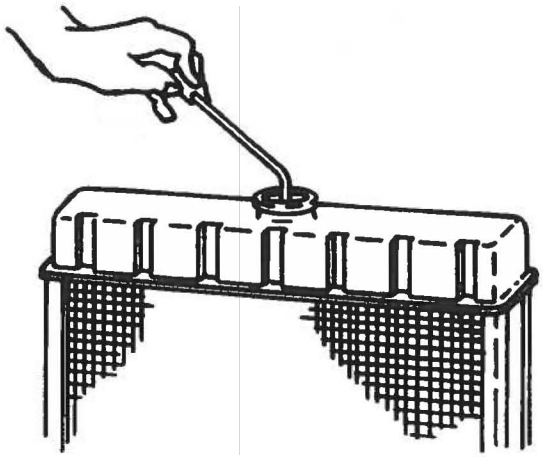
In tropical areas where antifreeze or John Deere Engine COOL-GARD is not available, it is acceptable to use water meeting the quality specifications on the previous page and John Deere Liquid Coolant Conditioner. The recommended concentration of John Deere Liquid Coolant Conditioner must be doubled to 6% (60 mL per Liter of cooling system capacity) by volume when used with water (no antifreeze).

Additives eventually lose their effectiveness and must be recharged with additional liquid coolant conditioner. See label on container for recommended service intervals and concentration rates. See REPLENISHING SUPPLEMENTAL COOLANT ADDITIVES (SCA'S) BETWEEN COOLANT CHANGES, later in this section.

Contact your authorized servicing dealer or engine distributor, if there are further questions.

RG,COOL,182932 -19-15JUN94

REPLENISHING SUPPLEMENTAL COOLANT ADDITIVES (SCA'S) BETWEEN COOLANT CHANGES



RG6261 -UN-22APR92

RG6262 -UN-22APR92

Through time and use, original additives eventually lose their effectiveness and must be recharged with additional supplemental coolant additive available in the form of liquid coolant conditioner.

NOTE: Service intervals listed are recommended engineering guideline. Refer to your vehicle operator's manual for a specific service interval.

Perform a COOLSCAN analysis after 900 hours or 1-1/2 years of operation when using John Deere Prediluted Antifreeze/Summer Coolant, and after 600 hours or 1 months of operation when using all other John Deere coolant products. If a COOLSCAN analysis is not available, recharge system per instructions printed on label of TY16004 John Deere Liquid Coolant Conditioner.

IMPORTANT: ALWAYS maintain coolant at correct level and concentration. DO NOT operate engine without coolant for even a few minutes.

If frequent coolant make-up is required, the glycol concentration should be checked with JT05460 Refractometer to assure that the desired freeze point is maintained. Follow manufacturer's instructions provided with refractometer.

See ENGINE COOLANT SPECIFICATIONS earlier in this section for proper mixing of coolant ingredients before adding to the cooling system.

RG,18293,REQ4A -19-09AUG94

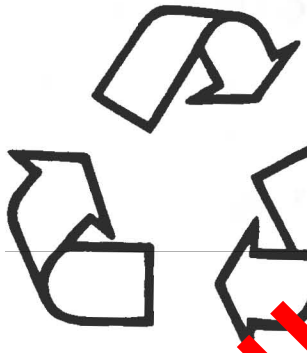
DISPOSING OF COOLANT

Improperly disposing of engine coolant can threaten the environment and ecology.

Use leakproof containers when draining fluids. Do not use food or beverage containers that may mislead someone into drinking from them.

Do not pour waste onto the ground, down a drain, or into any water source.

Inquire on the proper way to recycle or dispose of waste from your local environmental or recycling center, or from your John Deere dealer.



TS1133 -UN-26NOV90

RG,COOL,REQ5 -19-12JUL94

INSTRUMENT (GAUGE) PANEL

All controls and gauges are optional equipment for John Deere OEM Engines. They may be provided by the equipment manufacturer instead of John Deere. The following information applies only to those controls and gauges provided by John Deere.

IMPORTANT: Any time an electric gauge or meter does not register correctly, replace it with a new one. Do not attempt to repair it.

Following is a brief description of the components on the John Deere instrument (gauge) panel:

A—Electric Hour Meter—Indicates the operating hours of the engine while key switch is in the "ON" position. The hourmeter should be used as a guide for scheduling periodic service.

B—Coolant Temperature Gauge—Indicates the engine coolant temperature.

C—Tachometer—Indicates engine speed in revolutions per minute (rpm).

NOTE: A combination tachometer and hour meter is also an available option. See your authorized servicing dealer or engine distributor.

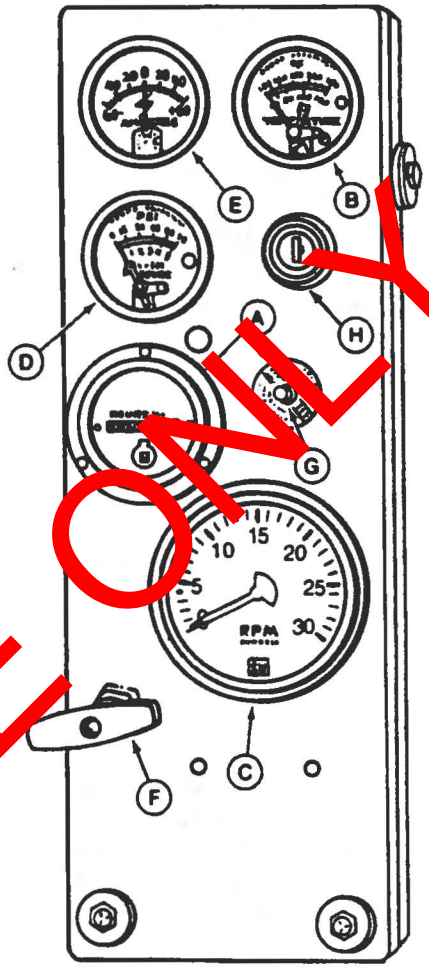
D—Oil Pressure Gauge—Indicates engine oil pressure.

E—Ammeter—Indicates charging current within electrical system.

F—Hand Throttle—Controls engine speed.

G—Reset (Safety) Switch—Overrides safety shutdown switch when depressed and held in during engine startup. Hold button in until engiine oil pressure is at a safe operating level.

H—Key Switch—The four position key switch controls the electrical system.

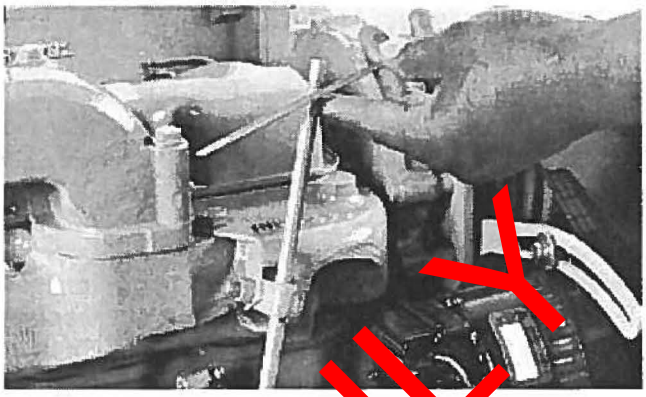


RG4477A -UN-11FEB93

A—Electric Hour Meter
B—Coolant Temperature Gauge
C—Tachometer
D—Oil Pressure Gauge
E—Ammeter
F—Hand Throttle
G—Reset Switch
H—Key Switch

S11,OMCI,D -19-03AUG94

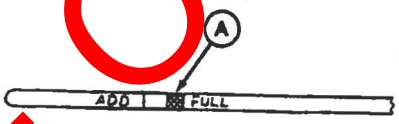
BREAK-IN SERVICE


-UN-26MAR93
RG6702

The engine is ready for normal operation, however, extra care during the first 100 hours will result in a more satisfactory long-term engine performance and life. DO NOT exceed 100 hours of operation with break-in oil.

1. This engine is factory-filled with John Deere Break-in Oil. See ENGINE BREAK-IN OIL in Fuels, Lubricants, and Coolant section. Run the engine the first 100 hours with break-in oil.

IMPORTANT: If the engine is run at constant speed and/or light load usage, a longer break-in period maybe required. In these situations, an additional 100 hour break-in period is recommended using a new change of John Deere Engine Break-In oil.



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RG5420

When operating a new engine in extreme (high temperature or dusty) conditions, break-in oil MUST be drained after the first 50 hours of operation.

IMPORTANT: DO NOT operate engine when oil level is below ADD mark on dipstick. ALWAYS keep oil level within crosshatch pattern (A) or at the FULL mark, whichever is present. Oil levels anywhere within crosshatch are considered full.

2. Check oil more frequently during engine break-in period. If oil must be added during this period, use John Deere Engine Break-In Oil. See ENGINE BREAK-IN OIL, in Fuels, Lubricants, and Coolant Section.

ENGINE SPECIFICATIONS*

Minimum Oil Pressure at 850 rpm (except 3-cylinder)	103 kPa (1.03 bar) (15 psi)
Minimum Oil Pressure at 850 rpm (3-cylinder engines)	140 kPa (1.4 bar) (20 psi)
Coolant Temperature Range	82°—94°C (180°—202°F)

** At normal operating temperature of 105°C (220°F) sump.*

S11,OMBI,I -19-03AUG94

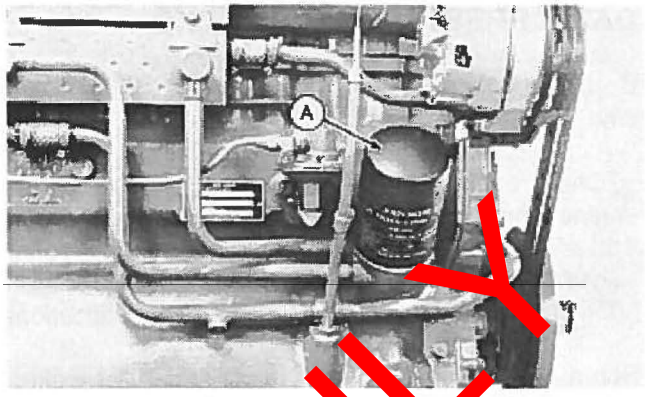
3. During the first 20 hours, avoid prolonged periods of engine idling or sustained maximum load operation.

4. If engine will idle longer than 5 minutes, stop engine.

5. After the first 100 hours maximum, drain engine oil and change engine oil filter (A). (See CHANGE ENGINE OIL AND FILTER in Lubrication and Maintenance/250 Hour section.) Fill with seasonal viscosity grade oil. (See ENGINE OIL, in Fuels, Lubricants, and Coolant Section.)

NOTE: Some increase in oil consumption may be expected when low viscosity oils are used. Check oil levels more frequently.

If air temperature is below —10°C (14F), use an engine heater.



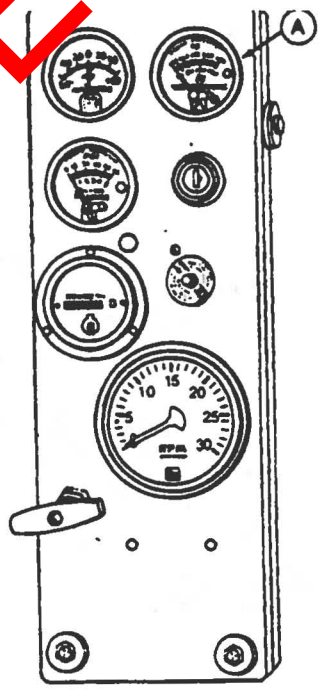
RG4876 -UN-15DEC88

S11.OMBI.J -19-09AUG94

6. Watch coolant temperatures (A) closely. If coolant temperature rises above 99°C (210°F), reduce load on engine. Unless temperature drops quickly, stop the engine and determine the cause before resuming operation.

NOTE: When the coolant temperature gauge reads approximately 104°C (220°F), the engine will shutdown automatically, if equipped with safety controls.

7. The tension on newly installed V-belts should be checked daily for the first few days of operation because of the initial stretching. Also, check belts for proper seating in pulley grooves.



RG4674 -UN-15DEC88

S11.OMBI.K -19-19MAR91

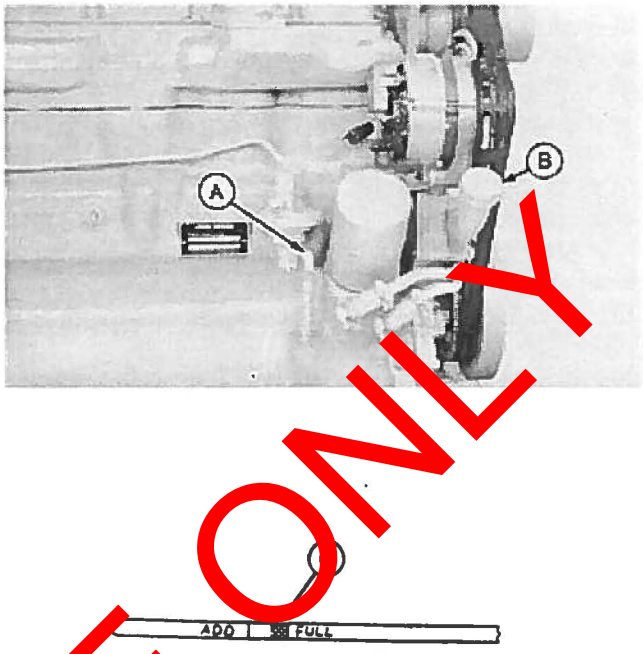
DAILY PRESTARTING CHECKS

Do the following before starting the engine for the first time each day:

1. Check engine oil level on dipstick (A). Do not operate engine when oil level is below the ADD mark on dipstick. Add oil at filler cap (B), as required, using seasonal viscosity grade oil. (See ENGINE OIL in Fuels, Lubricants, and Coolant Section for oil specifications.)

Some engines may have the oil filler cap on rocker arm cover, while others will have the filler cap on the timing gear cover.

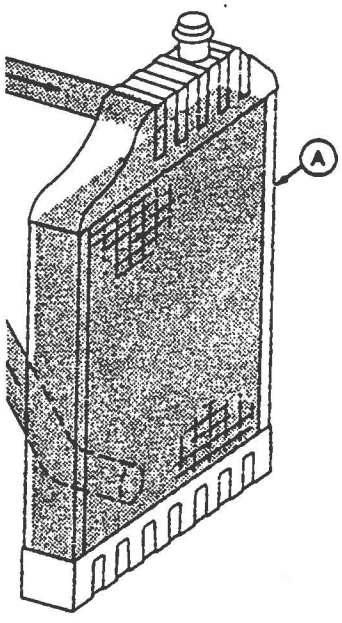
NOTE: ALWAYS keep oil level within the crosshatch pattern (C) on dipstick when operating engine. Oil levels anywhere within crosshatch are considered full.



T5953AH -UN-24FEB89
RG5421 -UN-15DEC88

S11,OMPC,O -19-09AUG94

2. Check the coolant level when engine is cold. Coolant level should be at bottom of filler neck. Fill radiator (A) with appropriate coolant. (See RECOMMENDED ENGINE COOLANT in Fuels, Lubricants and Coolant Section.)

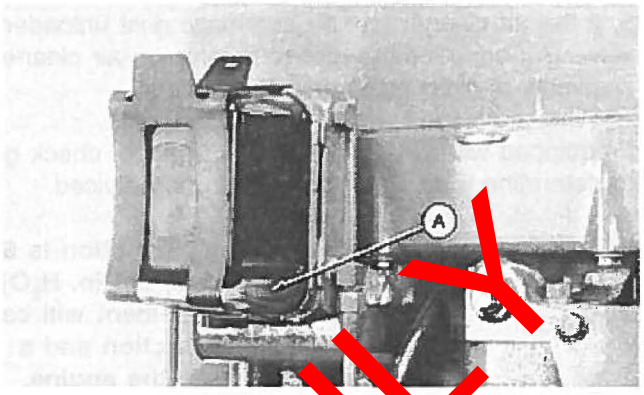


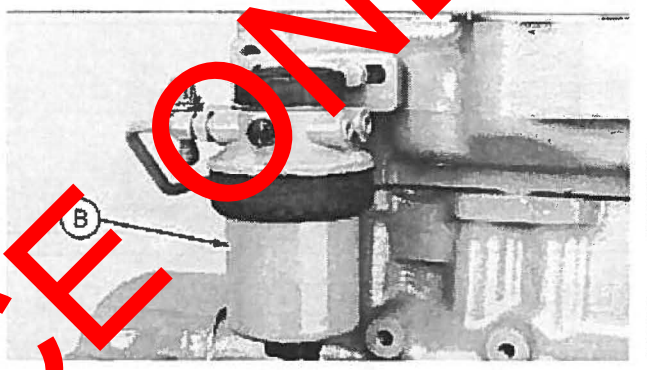
RG4675 -UN-14DEC88

S11,OMPC,P -19-17JUN94

3. Check the glass sediment chamber of the rectangular fuel filter (A) for water or debris. If present, drain the filter. (See REPLACE FUEL FILTER ELEMENT in Lubrication and Maintenance/600 Hours/1-Year Section.)

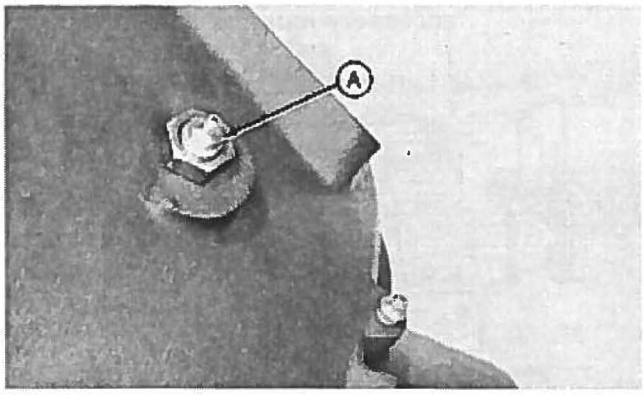
NOTE: Some engines may be equipped with metal rectangular fuel filter(s) or a round fuel filter (B). If so, periodically drain to remove water or debris and bleed the fuel system, as outlined later in Service Section.





RG18293,1 -19-17FEB93

4. Apply one shot of John Deere Multi-Purpose Lubricant or its equivalent at PTO release bearing grease fitting (A). DO NOT over lubricate.

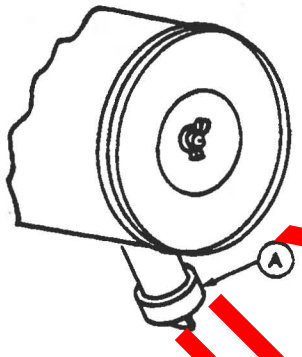


S11,OMPC,S -19-07JUN91

5. If the air cleaner has an automatic dust unloader valve (A), squeeze the unloader valve on air cleaner assembly to clear away any dust buildup.

If equipped with restriction indicator gauge, check gauge to determine if air cleaner needs to be serviced.

IMPORTANT: Maximum air intake restriction is 6.22 kPa (0.06 bar) (1.0 psi) (25 in. H_2O). A clogged air cleaner element will cause excessive intake restriction and a reduced air supply to the engine.



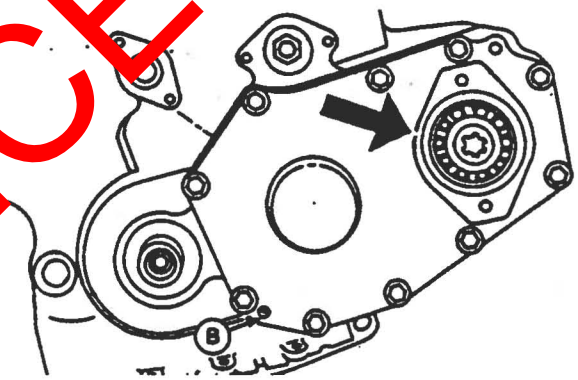
RG4676 -UN-20DEC88

S11,OMPC,R -19-03JUL86

AUXILIARY GEAR DRIVE LIMITATIONS

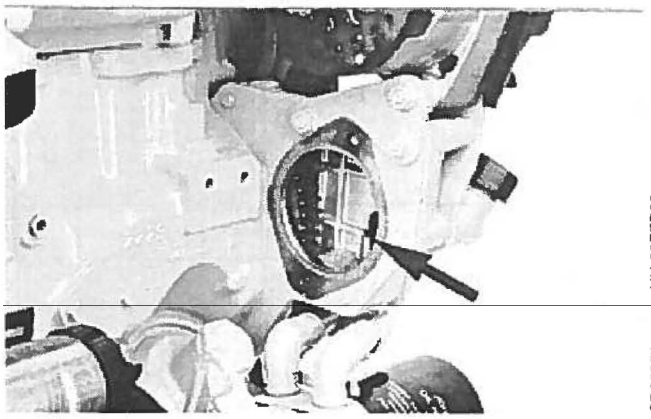
IMPORTANT: When attaching an air compressor, hydraulic pump, or other attachment to be driven by the auxiliary gear drive (engine timing gear train at front of engine), power requirement of the accessory must be limited to:

- **Left-Hand Auxiliary Gear Drive:**
  - **— 30 kW (40 hp) Continuous Operation**
  - **— 37 kW (50 hp) Intermittent Operation**
- **Right-Hand Auxiliary Gear Drive:**
  - **— 11 kW (15 hp) Continuous Operation**
  - **— 19 kW (26 hp) Intermittent Operation**



Left-hand auxiliary drive

RG5213 -UN-14DEC88



Right-hand auxiliary drive

-UN-03FEB93 CD30354

RG18293,2 -19-22FEB93

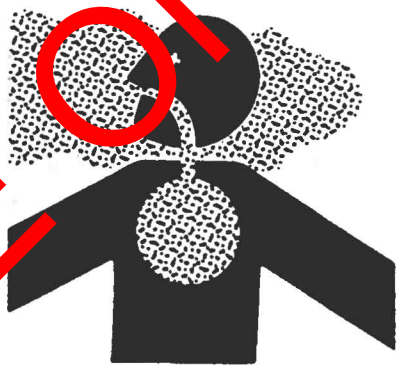
STANDBY POWER UNITS

To assure that your engine will deliver efficient standby operation when needed, start engine and run at rated speed (with 50%—70% load) for 30 minutes every 2 weeks. DO NOT allow engine to run extended period of time with no load.

OMOE,BE -19-04AUG93

STARTING THE ENGINE

The following instructions apply to the optional controls and instruments available through the John Deere Parts Distribution Network. The controls and instruments for your engine may be different from those shown here; always follow manufacturer's instructions.



TS220 -UN-23AUG88

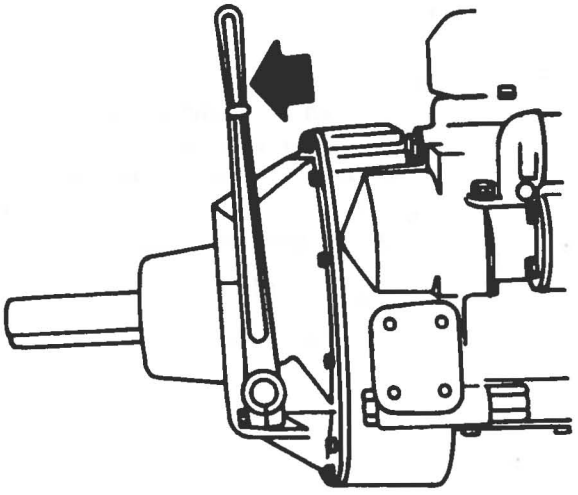
CAUTION: Before starting engine in a confined building, install proper outlet exhaust ventilation equipment. Always use safety approved fuel storage and piping.

NOTE: If temperature is below 0°C (32°F) it may be necessary to use cold weather starting aids. (See COLD WEATHER OPERATION later in this section).

1. Perform all prestarting checks outlined in previous section.

2. Open the fuel supply shut-off valve, if equipped.

3. If equipped with PTO clutch, pull lever (arrow) rearward (away from engine) to disengage PTO clutch.



RG5602 -UN-30NOV89

S11,OMOE,AS -19-09JUN94

4. Pull hand throttle (A) 1/3 of the way out. Turn the handle in either direction to lock it in place.

5. If equipped, depress and hold reset button (B) while starting.

IMPORTANT: Do not operate the starter for more than 30 seconds at a time. To do so may overheat the starter. If the engine does not start the first time, wait at least 2 minutes before trying again. If engine does not start after four attempts, see Troubleshooting Section.

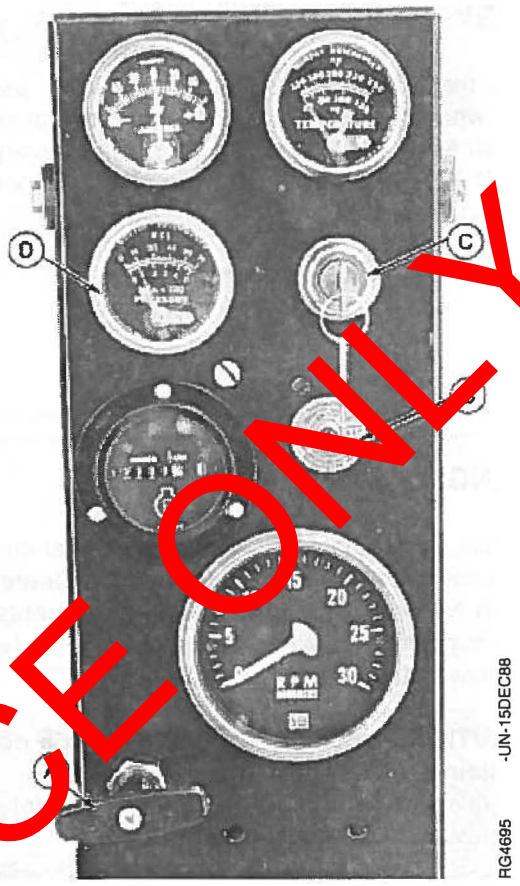
6. Turn the key switch (C) clockwise to crank the engine. When the engine starts, release the key so that it returns to the "ON" position.

IMPORTANT: If the key switch is released before the engine starts, wait until the starter and the engine stop turning before trying again. This will prevent possible damage to the starter and/or flywheel.

7. After the engine starts, continue to hold the reset button in until the oil pressure gauge (D) reads at least 103 kPa (1.03 bar) (15 psi). The safety controls will not allow the engine to run at a lower oil pressure unless the reset button is held in.

IMPORTANT: Should the engine die when operating under load, immediately disengage PTO and restart the engine to prevent overheating of turbocharged parts, caused when the flow of oil for cooling and lubrication is stopped.

8. Check all gauges for normal engine operation. If operation is not normal, stop the engine and determine the cause.



A—Hand Throttle
B—Reset Button
C—Key Switch
D—Oil Pressure Gauge

S11,OMOE,AT -19-17FEB93

COLD WEATHER OPERATION

Additional information on cold weather operation is available from your authorized servicing dealer.

Some engines are equipped with an air intake heater which will make starting the engine easier in cold weather. If equipped, follow steps 1—4 as listed under STARTING THE ENGINE, earlier in this section. Switch on the air intake heater for 30 seconds and then proceed to operate the starter. Follow remaining steps 5—8.

CAUTION: Starting fluid is highly flammable. DO NOT use starting fluid on engines equipped with air intake heaters.

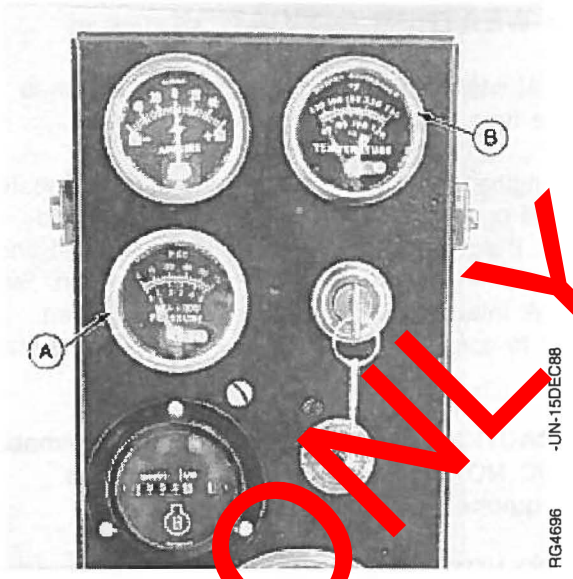
DO NOT use starting fluid near fire, sparks, or flames. DO NOT incinerate or puncture a starting fluid container.

TS1356 -UN-18MAR92

RG18293,13 -19-02AUG94

WARMING ENGINE

IMPORTANT: To assure proper lubrication, operate engine at 1200 rpm with no load for 1—2 minutes. Extend this period 2—4 minutes when operating at temperatures below freezing.



1. Check oil pressure gauge (A) as soon as engine starts. If gauge needle does not rise above minimum oil pressure specification of 103 kPa (1.03 bar) (15.0 psi) within 5 seconds, stop the engine and determine the cause. Normal engine oil pressure is 380 ± 103 kPa (3.80 bar ± 1.03 bar) (55 ± 15 psi) at rated full load speed (1800—2500 rpm) with oil at normal operating temperature of 105°C (220°F).

NOTE: On certain engines, the oil pressure and coolant temperature gauges are replaced by indicator warning lights. The lights must be "OFF" when engine is running.

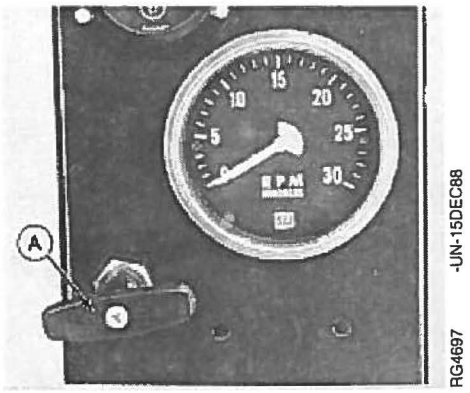
2. Watch coolant temperature gauge (B). Do not place engine under full load until it is properly warmed up. The normal engine coolant temperature range is 82°—94°C (180°—202°F).

NOTE: It is a good practice to operate the engine under a lighter load and at lower speeds than normal for the first few minutes after start-up.

S11,OMOE,AU1 -19-22FEB93

CHANGING ENGINE SPEED—STANDARD (MECHANICAL) GOVERNOR

To increase engine speed, turn handle (A) to the horizontal position and pull out until desired engine speed is obtained. Turn the handle in either direction to lock throttle position. The handle is pushed inward to decrease engine speed.



S11,OMOE,M -19-08FEB91

IDLING ENGINE

Avoid unnecessary engine idling. Prolonged idling may cause the engine coolant temperature to fall below its normal range. This, in turn, causes crankcase oil dilution, due to incomplete fuel combustion, and permits formation of gummy deposits on valves, pistons, and piston rings. It also promotes rapid accumulation of engine sludge and unburned fuel in the exhaust system.

Slow idle speed for this engine is 800—850 rpm at factory. If engine must be left running more than 3 or 4 minutes, minimum engine speed should be 1200 rpm. DO NOT allow engine to idle longer than 5 minutes.

NOTE: Generator set applications where the governor is locked at a specified speed may not have a slow idle function. These engines will idle at no load governed speed (high idle).

S11,OMOE,G -19-02MAR93

STOPPING THE ENGINE

1. Pull PTO clutch lever (arrow) rearward (away from engine) to disengage clutch.

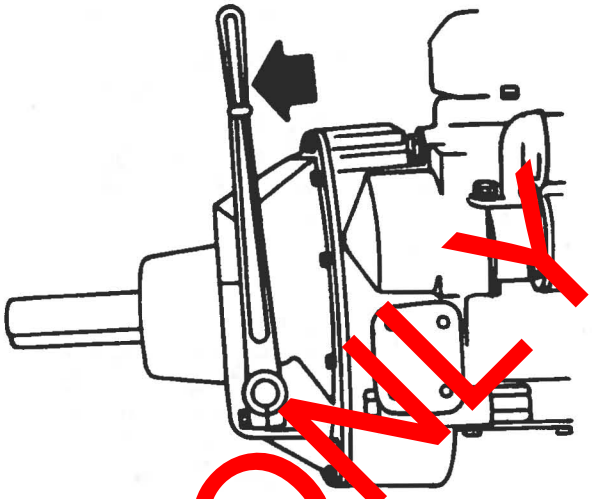
2. Move the throttle lever (A) to slow idle on standard (mechanical) governor engines.

IMPORTANT: Before stopping an engine that has been operating at working load, idle engine at least 2 minutes at 1000—1200 rpm to cool hot engine parts.

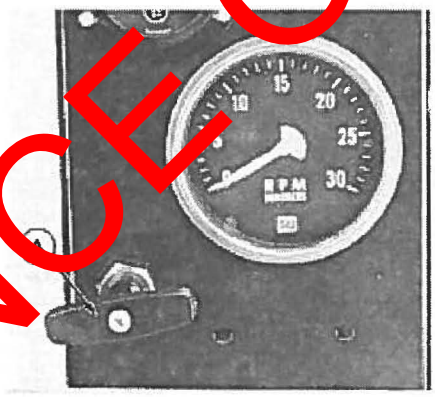
Engines in generator set applications, where the governor is locked at a specified speed and no slow idle function is available, should be unloaded and idled for at least 2 minutes at high idle.

3. Turn key switch to "OFF" position to stop the engine. Remove ignition key.

IMPORTANT: Make sure that exhaust stack cap (rain cap) is installed when engine is not running. This will prevent water and dirt from entering engine.



RG5602 -UN-30NOV89



RG4697 -UN-15DEC88

S11,OMOE,AW -19-09JUN94

USING A BOOSTER BATTERY OR CHARGER

A 12-volt booster battery can be connected in parallel with battery(ies) on the unit to aid in cold weather starting. ALWAYS use heavy duty jumper cables.

CAUTION: Gas given off by battery is explosive. Keep sparks and flames away from battery. Before connecting or disconnecting a battery charger, turn charger off. Make last connection and first disconnection at a point away from battery. Always connect NEGATIVE (-) cable last and disconnect this cable first.

IMPORTANT: Be sure polarity is correct before making connections. Reversed polarity will damage electrical system. Always connect positive to positive and negative to ground. Always use 12-volt booster battery for 12-volt electrical systems and 24-volt booster battery(ies) for 24-volt electrical systems.

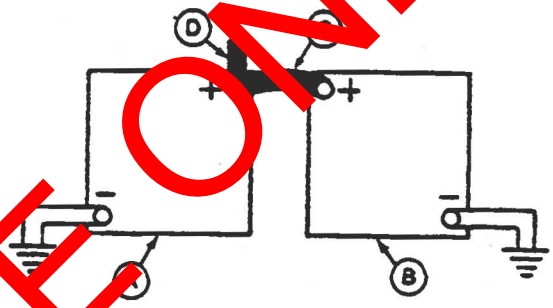
1. Connect booster battery or batteries to produce the required system voltage for your engine application.

2. Connect one end of jumper cable to the POSITIVE (+) post of battery connected to the starting motor.

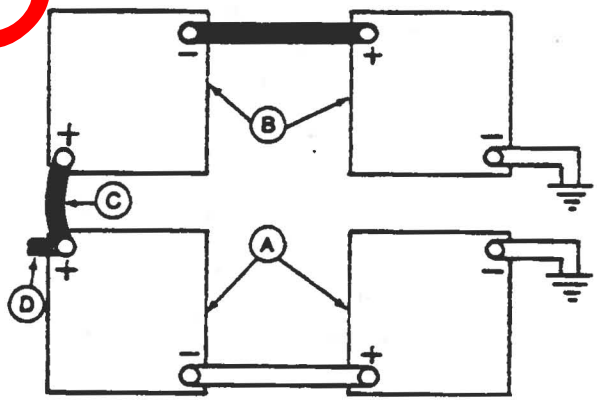
3. Connect the other end of the jumper cable to the POSITIVE (+) post of the booster battery.

4. Connect one end of the other jumper cable to the NEGATIVE (-) post of the booster battery.

5. ALWAYS complete the hook-up by making the last connection of the NEGATIVE (-) cable to a good ground on the engine frame and away from the battery(ies). When disconnecting, make this the first connection to disconnect.



12-Volt System



24-Volt System

A—12-Volt Machine Battery(ies)
B—12-Volt Booster Battery(ies)
C—Booster Cable
D—Cable To Starting Motor

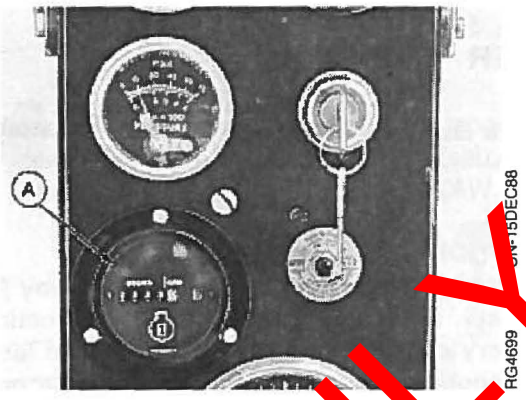
-UN-23AUG88 TS204 -UN-14DEC88 RG4678 -UN-14DEC88 RG4698

S11,OMOE,AX1 -19-07JUN91

OBSERVE SERVICE INTERVALS

Using hour meter (A) as a guide, perform all services at the hourly intervals indicated on following pages. At each scheduled maintenance interval, perform all previous maintenance operations in addition to the ones specified. Keep track of services performed in Lubrication and Maintenance Records Section.

IMPORTANT: Recommended service intervals are for normal operating conditions. Service MORE OFTEN if engine is operated under adverse conditions. Neglecting maintenance can result in failures or permanent damage to the engine.



S11,OMLM,BJ -19-09AUG94

USE CORRECT FUELS, LUBRICANTS, AND COOLANT

IMPORTANT: Use only fuels, lubricants, and coolants meeting specifications outlined in Fuels, Lubricants, and Coolant Section when servicing your John Deere Engine.

Consult your John Deere Servicing Distributor or your nearest John Deere Parts Network for recommended fuels, lubricants, and coolant. Also available are necessary additives for use when operating engines in tropical, arctic, or any other adverse conditions.

S11,OMLM,B1 -19-10AUG94

LUBRICATION AND MAINTENANCE SERVICE INTERVAL CHART

Item	Lubrication and Maintenance Service Intervals						
	Daily	100 Hour	250 Hour	400 Hour	600 Hour/ 1-Year	1200 Hour/ 2-Year	As Required
Check Engine Oil and Coolant Level	•						
Check Fuel Filter	•						
Lubricate PTO Release Bearing	•						
Check Air Cleaner Dust Unloader Valve	•						
Lubricate PTO Clutch Shaft Bearing		•					
Service Fire Extinguisher		•					
Service Battery			•				
Change Engine Oil and Filter*			•				
Check V-Belt Tension			•				
Check PTO Clutch Adjustment							
Initial Valve Clearance Adjustment**				•			
Lubricate PTO Clutch Levers & Linkage					•		
Clean Crankcase Vent Tube					•		
Check Air Intake Hoses and Connections					•		
Replace Fuel Filter Element					•		
Coolant Solution Analysis					•		
Service Air Intake System					•		
Check Cooling System					•		
Perform Engine Tune-U						•	
Check and Adjust E ine Speeds						•	
Adjust Engi Valve Clea ce						•	
Check Fuel I ion Sys m						•	
In pect T bocharg						•	
Che Crankshaft Vibration Damper						•	
Flush Cooling System & Replace Thermostats						•	
Pressure Test Cooling System						•	
Inspect and Service Air Cleaner Elements							•

*** Change the oil for the first time after 100 hours maximum of operation, then every 250 hours thereafter. If TORQ-GARD SUPREME PLUS-50 oil is used along with a John Deere oil filter, the oil change interval may be extended by 50 hours.**

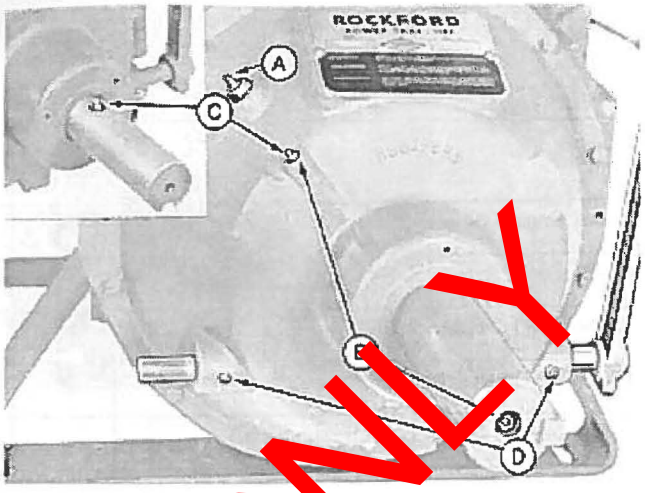
**** Have your authorized servicing dealer or engine distributor adjust valve clearance after the first 400 hours of operation. Then, have the valve clearance adjusted at 1200 hour/2-Year intervals thereafter.**

RG,OMLM,2 -19-02MAR93

LUBRICATE PTO CLUTCH SHAFT BEARINGS

Apply one or two shots of John Deere Multipurpose Lubricant or its equivalent at clutch drive shaft bearing fittings (B or C). DO NOT over-lubricate to avoid getting oil on clutch facings.

IMPORTANT: Lubricate release bearing fitting (A) daily or at 10 hour intervals for continuous operation. (See Prestarting Checks Section.) Lubricate shaft fittings (D) at 600 Hours or 1-Year intervals. (See LUBRICATE PTO CLUTCH SHAFT BEARINGS in 600 Hour/1-Year Service Section.)



R27548 -UN-15DEC88

A—Release Bearing Grease Fitting
B—Fitting for Side-Loaded Drive
C—Fittings for In-Line Drive
D—Lever Shaft Fittings

S11,OMLM,C -19-09AUG94

SERVICING FIRE EXTINGUISHER

A fire extinguisher (A) is available from your authorized servicing dealer or engine distributor.

Read and follow the instructions which are packaged with it. The extinguisher should be inspected at least every 100 hours of engine operation or once a month. Once extinguisher is operated, no matter how long, it must be recharged. Keep record of inspections on the tag which comes with the extinguisher instruction booklet.

RW4918 -UN-15DEC88

S11,OMLM,AP -19-22FEB93

SERVICE BATTERY

TS204 -UN-23AUG88

CAUTION: Battery gas can explode. Keep sparks and flames away from batteries. Use a flashlight to check battery electrolyte level.

Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.

Always remove grounded (-) battery clamp first and replace it last.

RG4694 -UN-15DEC88

In freezing weather, run engine at least 30 minutes to assure thorough mixing after adding water to battery.

1. On regular batteries, check electrolyte level. Fill each cell to bottom of filler neck with distilled water.

NOTE: Low-maintenance or maintenance-free batteries should require little additional service. However, electrolyte level can be checked by cutting the center section of decal on dash-line, and removing cell plugs. If necessary, add clean, soft water to bring level to bottom of filler neck.

2. Keep batteries clean by wiping them with a damp cloth. Keep all connections clean and tight. Remove any corrosion, and wash terminals with a solution of 1 part baking soda and 4 parts water. Tighten all connections securely.

NOTE: Coat battery terminals and connectors with a mixture of petroleum jelly and baking soda to retard corrosion.

3. Keep battery fully charged, especially during cold weather. If a battery charger is used, turn charger off before connecting charger to battery(ies). Attach POSITIVE (+) battery charger lead to POSITIVE (+) battery post. Then attach NEGATIVE (-) battery charger lead to a good ground.

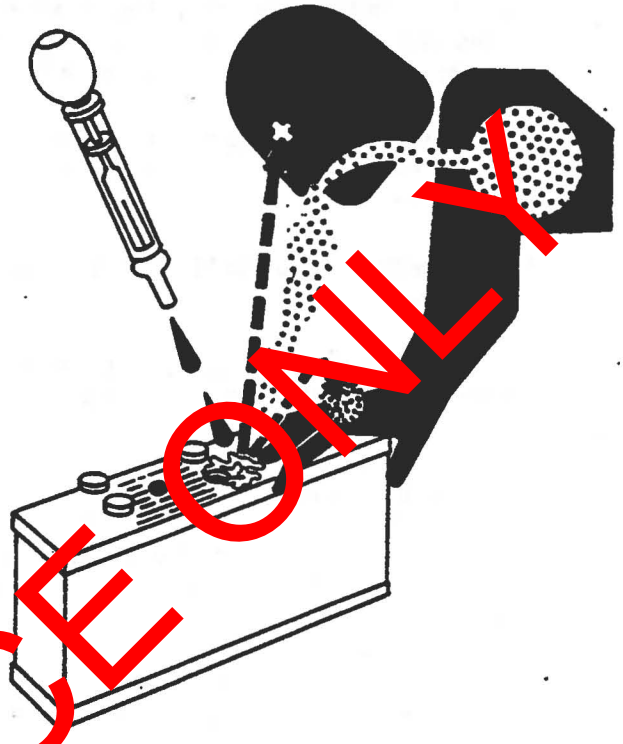
S55,OMLM,P -19-07JUN91

CAUTION: Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.

Avoid the hazard by:
1. **Filling batteries in a well-ventilated area.**
2. **Wearing eye protection and rubber gloves.**
3. **Avoiding breathing fumes when electrolyte is added.**
4. **Avoiding spilling or dripping electrolyte.**
5. **Use proper jump start procedure.**

If you spill acid on yourself:
1. **Flush your skin with water.**
2. **Apply baking soda or lime to help neutralize the acid.**
3. **Flush your eyes with water for 10—15 minutes. Get medical attention immediately.**

If acid is swallowed:
1. **Drink large amounts of water or milk.**
2. **Then drink milk of magnesia, beaten eggs, or vegetable oil.**
3. **Get medical attention immediately.**



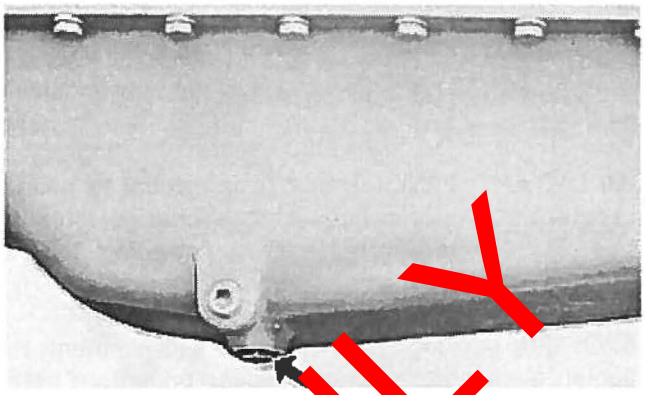
TS203 -UN-23AUG88

If necessary to replace battery(ies), replacements must meet or exceed the following recommended capabilities at -18° C (0° F):

Std. Duty Starter . . . . . 640 Cold Cranking Amps
Heavy Duty Starter . . . . . Cold Cranking Amps

S55,OMLM,Q -19-19MAR91

CHANGE ENGINE OIL AND FILTER



NOTE: Change engine oil and filter for the first time after 100 hours maximum of operation, then every 250 hours thereafter.

If John Deere TORQ-GARD SUPREME PLUS-50 engine oil and a John Deere oil filter are used, the oil and filter change interval may be extended by 50 hours.

OILSCAN is a John Deere sampling program to help you monitor machine performance and identify potential problems before they cause serious damage. OILSCAN kits are available from your John Deere dealer. Oil samples should be taken prior to the oil change. Refer to instructions provided with kit.

1. Run engine approximately 5 minutes to warm up oil. Shut engine off.

2. Drain oil while warm.

3. Remove plug (arrow) and drain oil from engine crankcase.

NOTE: Drain plug location may vary, depending on the application.

S11,OMLM,CW -19-09JUN94

4. Remove and discard oil filter element (A).

5. Remove oil filter packing and clean filter mounting pad.

IMPORTANT: Filtration of oils is critical to proper lubrication. Always change filter regularly. Use filter meeting John Deere performance specifications.

6. Oil new packing and install new filter element. Hand tighten element according to values printed on filter element. If values are not provided, tighten element approximately one turn after packing contacts filter housing. DO NOT overtighten filter element.

7. Install drain plug with a new seal when equipped.

8. Fill engine crankcase with correct John Deere engine oil through rocker arm cover opening or on some engine applications, the timing gear cover opening. (See ENGINE OIL in Fuels, Lubricants, and Coolant Section for determining correct engine oil.)

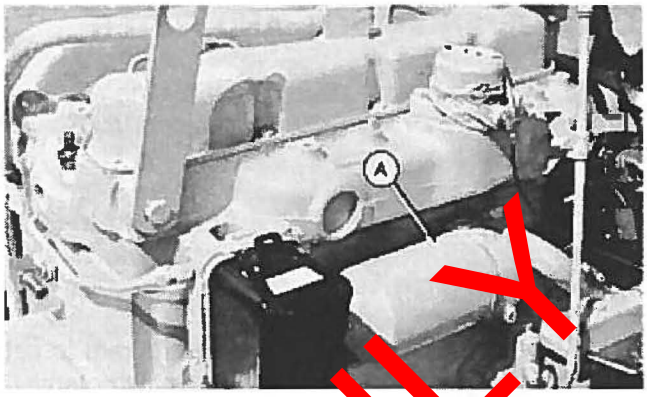
To determine the correct oil fill quantity for your engine, see ENGINE CRANKCASE OIL FILL QUANTITIES in the Specifications Section.

NOTE: Crankcase oil capacity may vary slightly. ALWAYS fill crankcase to full mark or within crosshatch on dipstick, whichever is present. DO NOT overfill.

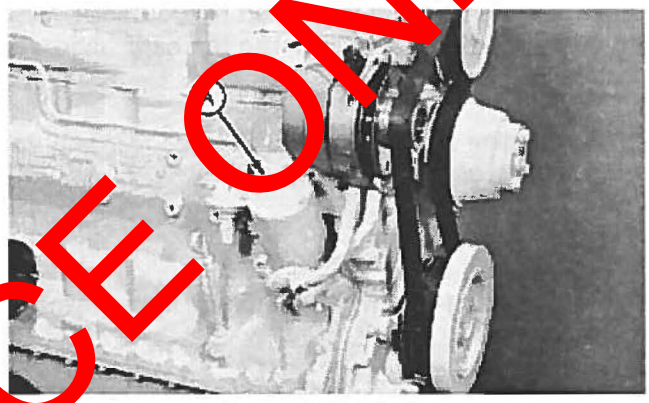
IMPORTANT: Immediately after completing any oil change, crank engine for 30 seconds without permitting engine to start. This will help insure adequate lubrication to engine components before engine start.

9. Start engine and run to check for possible leaks.

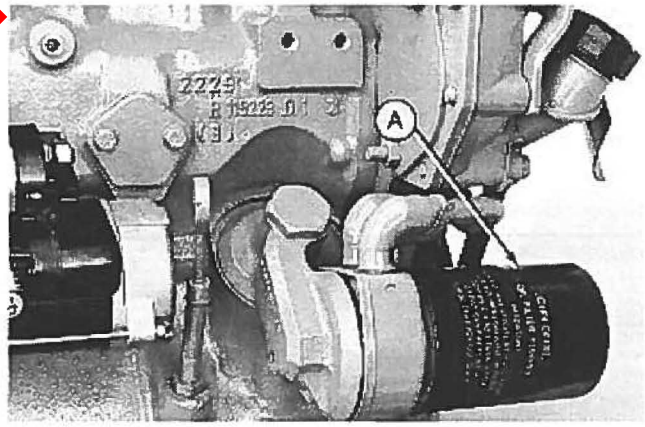
10. Stop engine and check oil level after 10 minutes. Oil level reading should be on upper mark of dipstick.



4045 and 6068 Engine



4039 and 6059 Engines



3029 Engines

S11,OMLM,CX1 -19-09AUG94

FAN AND ALTERNATOR BELTS TENSION OR REPLACEMENT

Low belt tension causes slippage resulting in excessive cover wear, burn spots, overheating, or "slip and grab", causing belt breakage.

High belt tension causes belt heating and excessive stretch, as well as damage to drive components such as pulleys and shafts. V-belts should ride on the sides of standard pulleys not on the bottom of the groove.

Standard V-Belt tension can be checked with JDG529 Tension Gauge (arrow) or equivalent gauge.

NOTE: On engines with dual belts, check tension of front belt only.

1. Inspect belts for cracks, fraying, or stretched out areas. Replace if necessary.

2. Using either JDG529 Tension Gauge (arrow) or belt tension tester (A) and straightedge (B), check tension of warm belts:

- For standard V-Belt, an 89 N (20 lb force) applied halfway between pulleys should deflect belt by 19 mm (3/4 in.).
- For Poly V-Belt, a 130 N (30 lb force) applied halfway between pulleys should deflect belt by 10 mm (1/2 in.).

3. If adjustment is necessary, loosen alternator bracket cap screw (C) and nut (D) on mounting bolt. Pull alternator frame outward until belts are correctly tensioned.

IMPORTANT: Do not pry against the alternator rear frame. Do not tighten or loosen belts while they are hot.

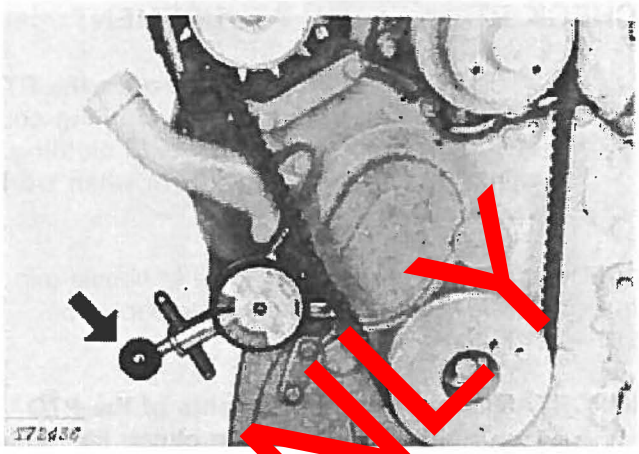
4. Tighten alternator bracket cap screw and nut firmly.

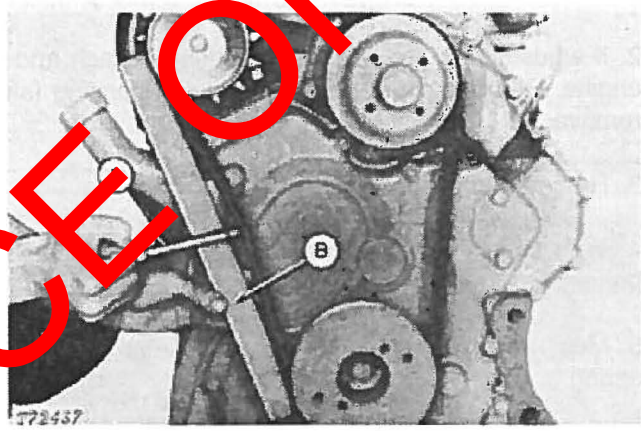
5. After a new or used belt has run for 10 minutes, recheck belt tension.

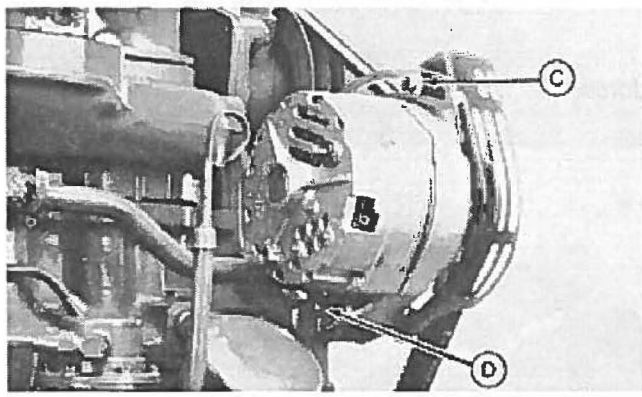
Standard V-Belts

	Tension New Belt	Tension Used* Belt
Single Belt	578—622 N (130—140 lb force)	378—423 N (85—94 lb force)
Dual Belt	423—467 N (95—104 lb force)	378—423 N (85—94 lb force)

** Belts are considered used after 10 minutes of operation.*







A—Tension Tester
B—Straightedge
C—Alternator Bracket Cap Screw
D—Nut on Mounting Bolt

RG,FANALT,A -19-11AUG94

CHECK PTO CLUTCH ADJUSTMENT


TS198 -UN-23AUG88

CAUTION: Never attempt to service the PTO while it is in operation. Loose clothing could get caught in moving parts; keep clothing tight against body. Use extreme care when working around the PTO.

1. Measure clutch engagement force at handle grip using a spring scale. The engagement force should be 267—311 N (60—70 lb force).

IMPORTANT: Improper adjustments of the PTO clutch may shorten clutch life. Make sure adjustments are made properly.

2. If adjustments are needed, disengage clutch and stop engine. Remove cover plate from clutch housing (shown removed).

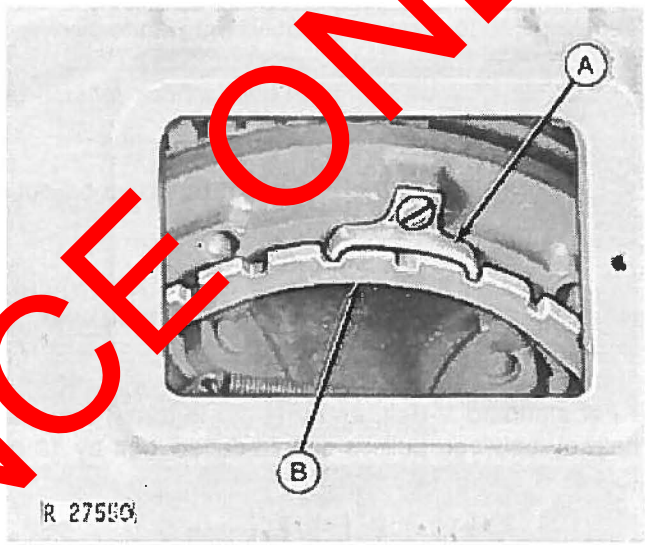
3. Remove adjusting lock (A).

4. Turn adjusting ring (B) to adjust clutch engagement pressure.

5. Measure engagement force at clutch handle with spring scale.

6. Install adjusting lock and tighten screw securely.

7. Install cover plate and recheck clutch engagement force.



R27550 -UN-14DEC88

S11,OMLM,CZ -19-02MAR93

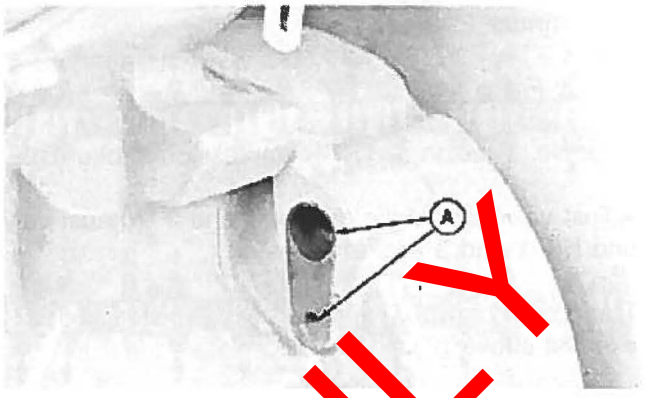
CHECK AND ADJUST ENGINE VALVE CLEARANCE

IMPORTANT: Any time air intake system is opened, it must be checked for leaks before machine is returned to service. (See CHECK AIR INTAKE HOSES in 600 Hour/1-Year Section.)

Engine valve clearance MUST BE checked and/or adjusted with engine COLD.

1. Remove rocker arm cover and crankcase ventilator hose.

2. Remove plugs or cover plate from flywheel housing timing holes (A).



RG6305 -UN-03AUG92

RG18293,3 -19-11AUG94

3. Using JD281A, JDE83, or JDG820 Engine Rotation Tool and JDE81-4 Timing Pin, rotate engine in running direction (clockwise viewed from front) until No. 1 cylinder is at TDC Compression stroke. Insert timing pin in flywheel.

NOTE: Some engines are equipped with flywheel housings which do not allow use of an engine rotation tool.

If No.1 cylinder rocker arms are loose, the engine is at No. 1 "TDC-Compression". If No. 1 cylinder rocker arms are not loose, rotate engine one full revolution (360°) to No. 1 "TDC-Compression".

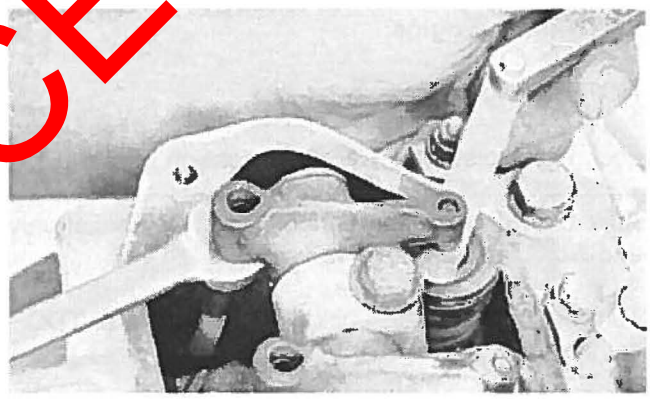
4. Check and adjust valve clearance to specifications, as directed in the following procedures for 3-, 4-, or 6-cylinder engines.

VALVE CLEARANCE (ROCKER ARM-TO-VALVE TIP) SPECIFICATION

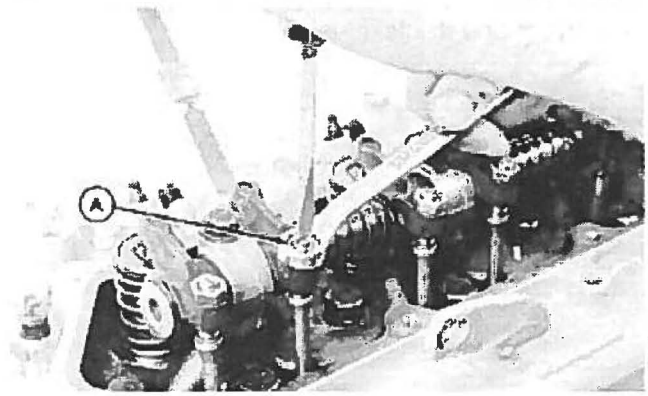
Intake Valve . . . . . 0.35 mm (0.014 in.)

Exhaust Valve . . . . . 0.45 mm (0.018 in.)

5. If rocker arm is equipped with adjusting screw and jam nut (A), tighten jam nut to 27 N·m (20 lb-ft) after adjusting valve clearance.



T81224 -UN-07NOV88



RG6307 -UN-03AUG92

RG18293,4 -19-09JUN94

- **3-Cylinder Engine:**

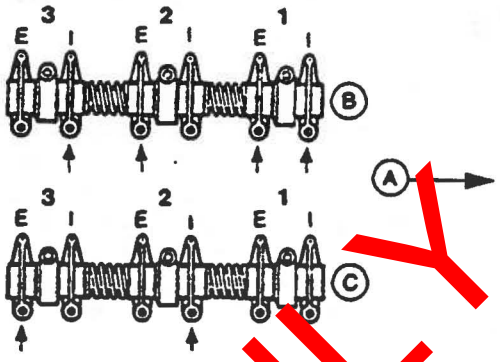
NOTE: Firing order is 1-2-3.

Lock No. 1 piston at TDC compression stroke (B).

Adjust valve clearance on No. 1 and 2 exhaust valves and No. 1 and 3 intake valves.

Turn crankshaft 360° and lock No. 1 piston at TDC exhaust stroke (C).

Adjust valve clearance on No. 3 exhaust valve and No.2 intake valve.



A—Front of Engine
B—No. 1 Piston at TDC Compression Stroke
C—No. 1 Piston at TDC Exhaust Stroke
E—Exhaust Valve
I—Intake Valve

RG,CTM8,G05,67 -19-10JUL92

- **4-Cylinder Engine:**

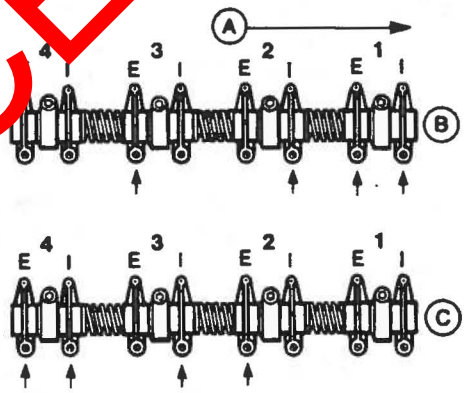
NOTE: Firing order is 1-3-4-2.

Lock No. 1 piston at TDC compression stroke (B).

Adjust valve clearance on No. 1 and 3 exhaust valves and No. 1 and 2 intake valves.

Turn crankshaft 360°. Lock No. 4 piston at TDC compression stroke (C).

Adjust valve clearance on No. 2 and 4 exhaust valve and No. 3 and 4 intake valves.



A—Front of Engine
B—No. 1 Piston at TDC Compression Stroke
C—No. 4 Piston at TDC Compression Stroke
E—Exhaust Valve
I—Intake Valve

RG,CTM8,G05,9 -19-10JUL92

• 6-Cylinder Engine:

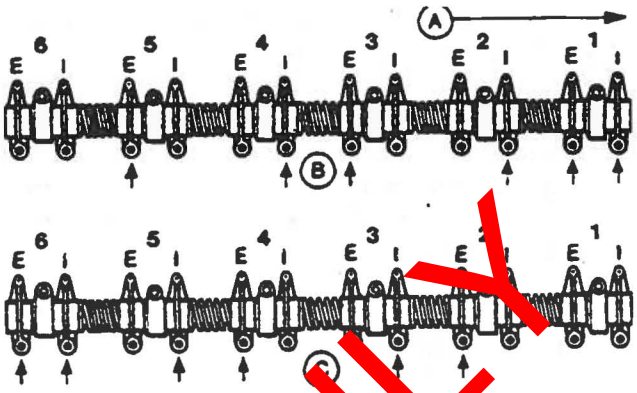
NOTE: Firing order is 1-5-3-6-2-4.

LocK No. 1 piston at TDC compression stroke (B).

Adjust valve clearance on No. 1, 3 and 5 exhaust valves and No. 1, 2 and 4 intake valves.

Turn crankshaft 360˚. Lock No. 6 piston is at TDC compression stroke (C).

Adjust valve clearance on No. 2, 4 and 6 exhaust valve and No. 3, 5 and 6 intake valves.



A—Front of Engine
B—No. 1 Piston at TDC Compression Stroke
C—No. 6 Piston at TDC Compression Stroke
E—Exhaust Valve
I—Intake Valve

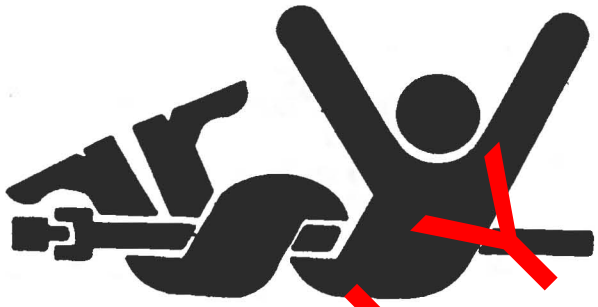
RG,CTM8,G05,10 -19-10JUL92

LUBRICATING PTO CLUTCH INTERNAL LEVERS AND LINKAGE

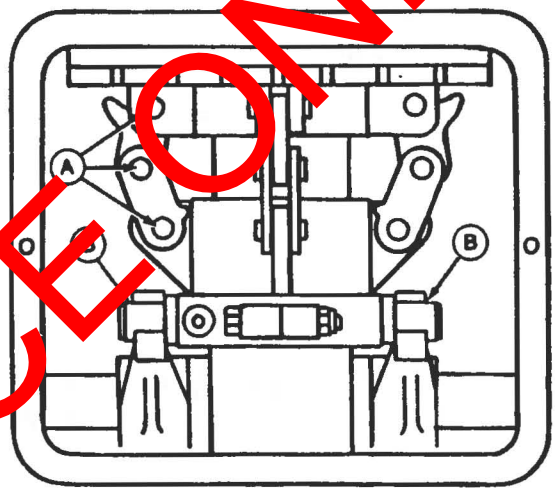
CAUTION: Never attempt to service the PTO while it is in operation. Loose clothing could get caught in moving parts; keep clothing tight against body. Use extreme care when working around the PTO.

1. Remove the PTO housing cover and apply one shot of John Deere Multipurpose Lubricant to the pivot points (A) of each clutch linkage.

2. Apply one shot of John Deere Multipurpose Lubricant to the two PTO release lever shaft fittings (B).



TS198 -UN-23AUG88



RG6641 -UN-18FEB93

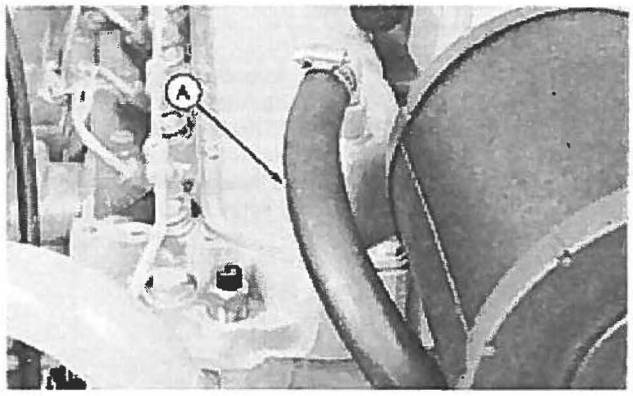
RG,21881,PTO4 -19-26FEB93

CLEAN CRANKCASE VENT TUBE

1. Remove and clean crankcase vent tube (A).

If you operate the engine in dusty conditions, clean the tube at shorter intervals.

2. Install the vent tube. Be sure the O-ring fits correctly in the rocker arm cover for elbow adapter. Tighten hose clamp securely.



RG6005 -UN-27JAN92

RG,20144,64 -19-17DEC91

CHECK AIR INTAKE HOSES

Check the clamps on the hoses which connect the air cleaner, engine and, if present, turbocharger. If necessary, tighten the hose clamps. Inspect the hoses for cracks.

IMPORTANT: The air intake system must not leak. Any leak, no matter how small, may result in engine failure due to abrasive dirt and dust entering the intake system.

S11,OMLM,DG -19-17DEC91

REPLACE FUEL FILTER ELEMENT

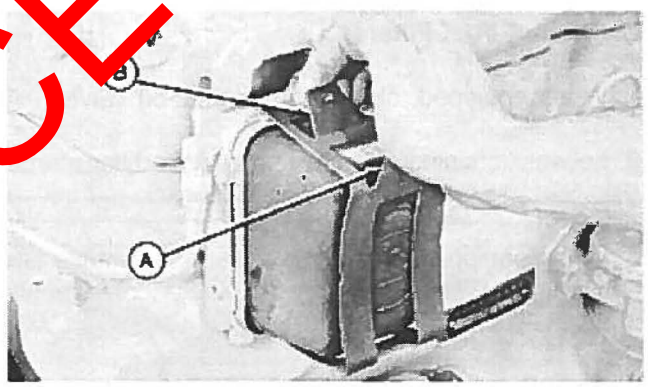
On Rectangular Fuel Filters:

1. Close the fuel shut-off valve at bottom of fuel tank, if equipped.

NOTE: Keep a small container under drain plug to catch draining fuel.

2. Loosen bleed plug on side of filter base. Remove drain plug from bottom of filter base to drain fuel from filter.

3. Push tab (A) inward while lifting tab (B) upward and release the retaining spring. Pull fuel filter off fuel filter base.



-UN-09NOV88
T88843

S11,3010,RF1 -19-17FEB93

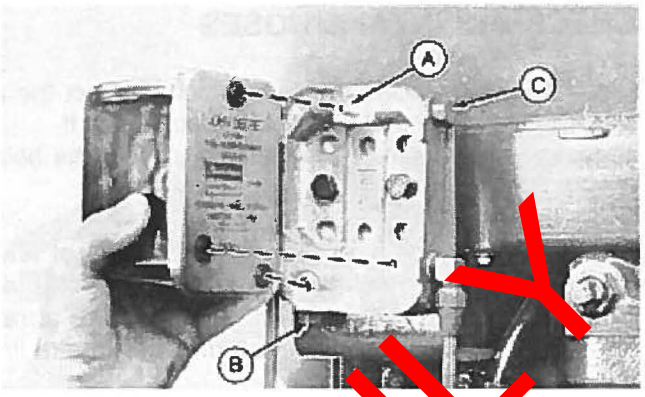
4. Place filter on filter base with upper seal over spring pin (A) on filter base.

5. Hook bottom end of retaining spring first; then hook the top end.

6. Install drain plug (B). Tighten drain plug securely.

7. Open fuel shut-off valve and bleed filters. (See BLEED FUEL SYSTEM in Service As Required Section.) Tighten bleed plug (C).

A—Spring Pin
B—Drain Plug
C—Bleed Plug



-UN-14DEC88
RG4889

S11,OMLM,DK -19-17FEB93

On Round Fuel Filters:

1. When equipped, close the fuel shut-off valve.

2. Loosen retaining ring (A) and remove filter element (B).

3. When equipped with water separator, remove filter element from glass sediment bowl. Clean sediment bowl and reinstall a new element onto bowl.

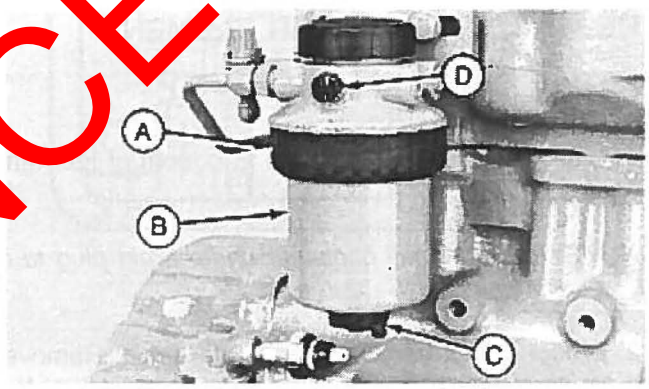
4. Align keys on filter element with slots in filter base.

5. Hand tighten until the retaining ring locks into the lock position.

NOTE: The proper installation is indicated when a "click" is heard and a release of the retaining ring is felt.

A plug is provided with the new element for plugging the used element.

6. Open fuel shut-off valve and bleed fuel system. (See BLEED FUEL SYSTEM in Service As Required Section.) Tighten bleed plug (D).



-UN-03FEB93
CD30352

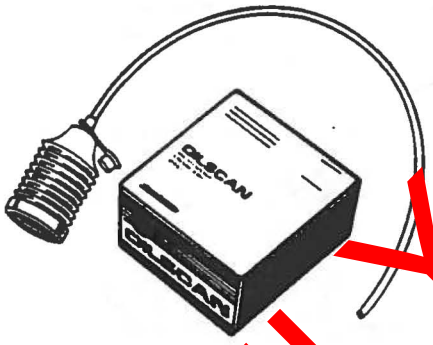
A—Retaining Ring
B—Filter element
C—Drain Plug
D—Bleed Plug

RG18293,5 -19-02AUG94

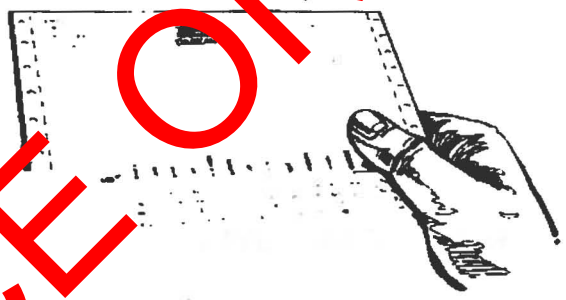
CHECK EFFECTIVENESS OF COOLANT SOLUTION

When your coolant has accumulated 600 hours of operating time, the effectiveness of your engine coolant should be evaluated by obtaining a coolant sample.

COOLSCAN is a John Deere sampling program to help you monitor the effectiveness of your engine's coolant solution and identify potential problems before they cause serious damage. COOLSCAN kits are available from your John Deere dealer. Refer to instructions provided with kit.



T6828AB -UN-15JUN89



T6829AB -UN-18OCT88

RG,OMLM,3 -19-17FEB93

REPLACE AIR CLEANER ELEMENTS

If equipped with this air cleaner, service as follows:

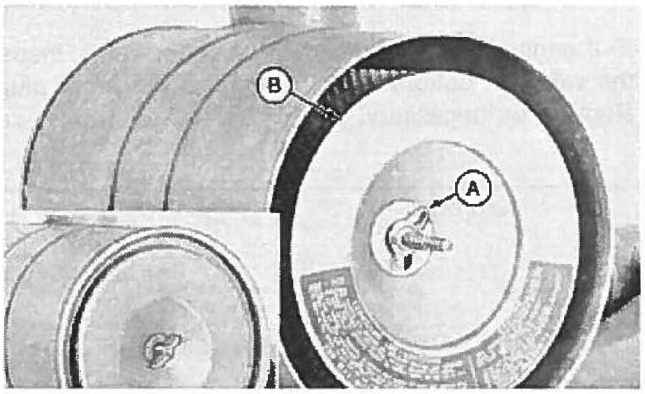
1. Remove wing nut and remove cover shown in small illustration inset.

2. Remove wing nut (A) and remove primary air cleaner assembly (B) from canister.

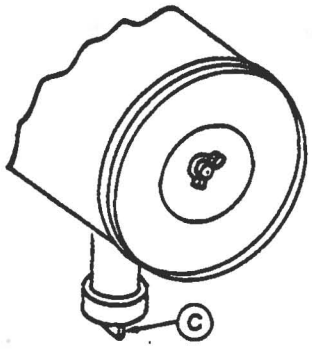
NOTE: Primary air cleaner element fits snugly in canister. It may be necessary to wiggle element as it is removed from canister.

3. Thoroughly clean all dirt from inside of canister.

4. If equipped, squeeze dust unloader valve (C) to discharge any trapped dirt particles. Inspect as instructed in Step 2 of CHECK AIR INTAKE SYSTEM, later in this section.



RG4686 -UN-20DEC88



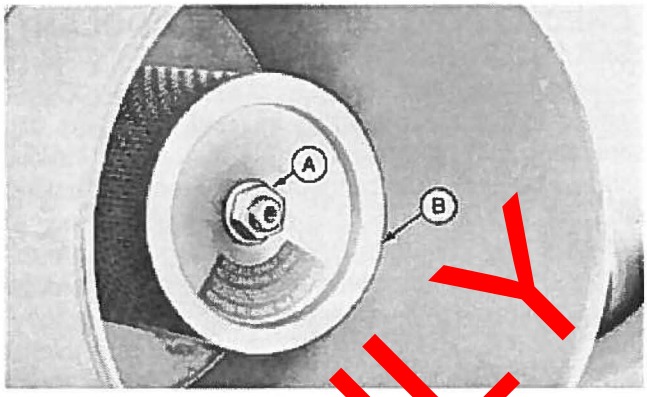
RG4687 -UN-20DEC88

S55,OMLM,R -19-10MAY91

IMPORTANT: Thoroughly clean all dirt from inside of canister before removing secondary element.

5. Remove retaining nut (A) and secondary element (B). Replace secondary element with new element immediately to prevent dust from entering air intake system.

6. Install new primary element and tighten wing nut securely. Install cover assembly and tighten retaining wing nut securely.

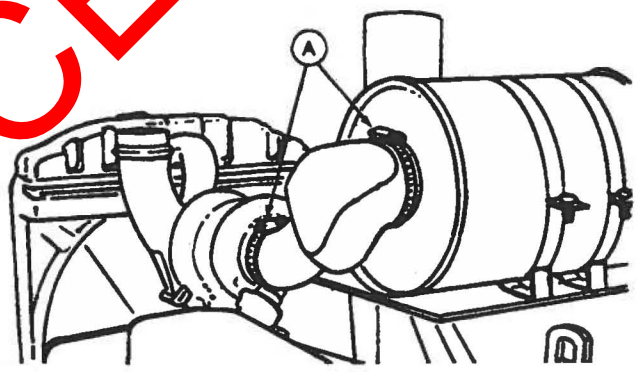


S55,OMLM,S -19-21DEC89

CHECK AIR INTAKE SYSTEM

1. Check the clamps (A) on the piping which connect the air cleaner to the engine. Tighten the clamps as necessary. This will help prevent dirt from entering the air intake system through loose connections causing internal engine damage.

2. If engine has a rubber dust unloader valve, inspect the valve on bottom of air cleaner for cracks or plugging. Replace as necessary.



S11,OMLM,DS -19-10MAY91

CHECK COOLING SYSTEM

TS281 -UN-23AUG88

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.

IMPORTANT: Air must be expelled from cooling system when system is refilled. Loosen temperature sending unit fitting at rear of cylinder head or plug in thermostat housing to allow air to escape when filling system. Retighten fitting or plug when all the air has been expelled.

1. Check entire cooling system for leaks. Tighten all clamps securely.

2. Replace hoses when hard, flimsy, or cracked.

RG,COOL,CHK,SYS-19-16JUN94

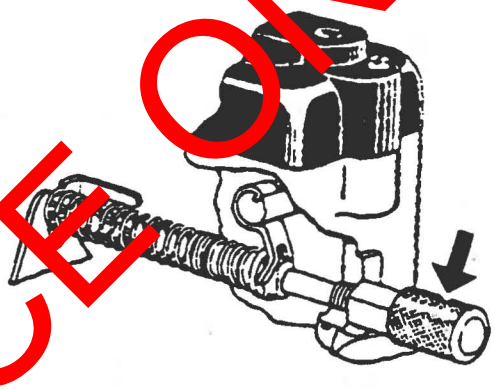
CHECK AND ADJUST ENGINE SPEEDS

If equipped with a tachometer on the instrument panel, observe the tachometer to verify engine speeds. Refer to FUEL INJECTION PUMP SPECIFICATIONS in Specifications Section, later in this manual.

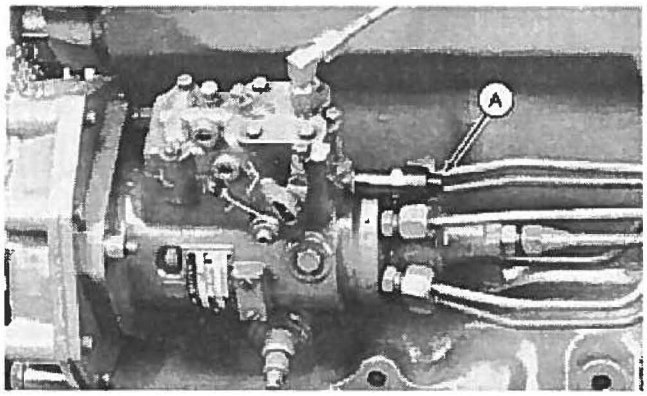
S[illegible]E.DL1 -19-09AUG94

ADJUST VARIABLE SPEED ON GENERATOR SET ENGINES (STANADYNE INJECTION PUMPS ONLY)

1. Warm engine to normal operating temperature.
2. Run engine at rated speed.
3. Apply full load.
4. Remove load.
5. Note the no-load speed or frequency.
6. If throttle is not spring-loaded type, disconnect throttle linkage or cable.
7. Turn knob (bold arrow) or screw (A) to adjust droop.
8. If necessary, adjust and reconnect throttle linkage or cables.



T86735 -UN-23FEB89



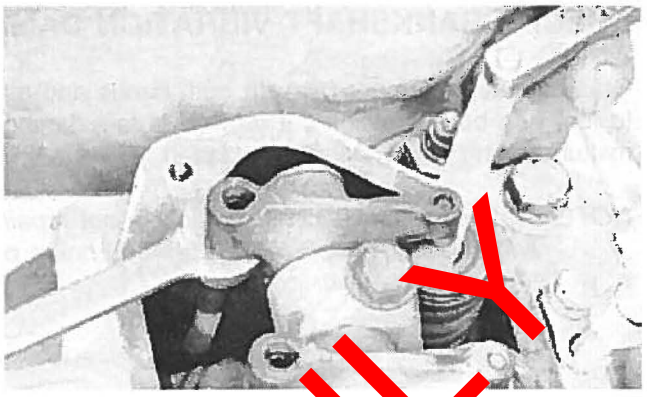
RG4890 -UN-14DEC88

S11,OMLM,DM -19-10MAY91

ADJUST ENGINE VALVE CLEARANCE

Adjust engine valve clearance. (See ADJUST ENGINE VALVE CLEARANCE in Lubrication and Maintenance/400 Hours Section or have your authorized servicing dealer or engine distributor adjust the valve clearance.)

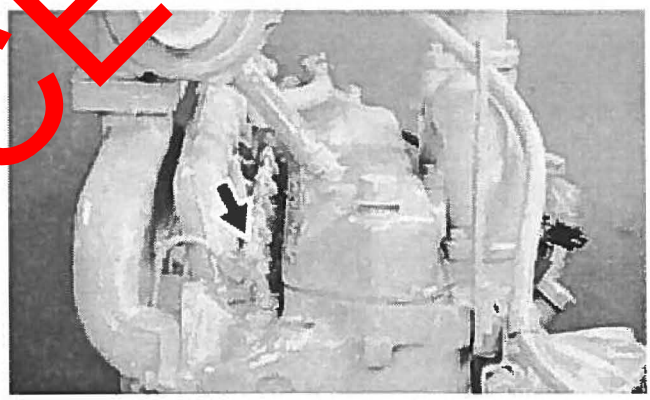
IMPORTANT: Have valves adjusted after the first 400 hours of operation on new or rebuilt engines. Then, have them adjusted at 1200 Hr/2-Year interval thereafter.



S11,OMLM,DN -19-09AUG94

CHECK FUEL INJECTION SYSTEM

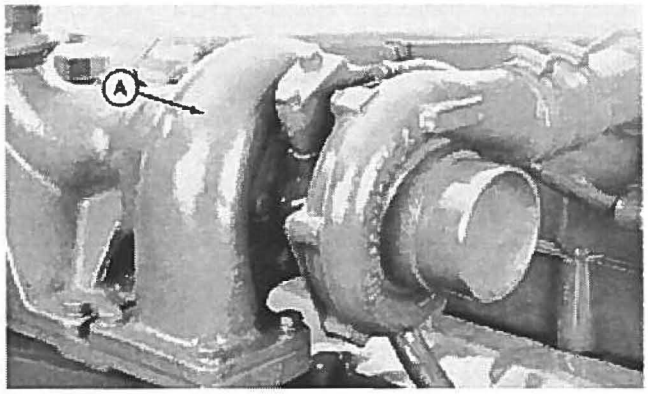
Check the overall fuel injection system. Also check the engine/injection pump timing, clean the injection nozzles and adjust opening pressure. (See your authorized diesel injection repair station, servicing dealer, or engine distributor.)



S11,OMLM,DO -19-02MAR93

INSPECT TURBOCHARGER

On turbocharged engines, check for excessive radial or axial end play of compressor wheel (A) and turbocharger boost pressure. (See your authorized servicing dealer or engine distributor.)

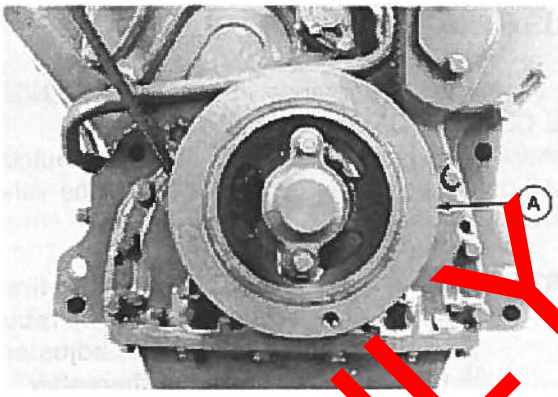


S11,OMLM,DP -19-07JUN91

CHECK CRANKSHAFT VIBRATION DAMPER

Grasp vibration damper (A) with both hands and attempt to turn it in both directions. If rotation is felt, damper is malfunctioning and should be replaced.

NOTE: The vibration damper assembly is not repairable and should be replaced every 4500 hours or 5-years, whichever occurs first.



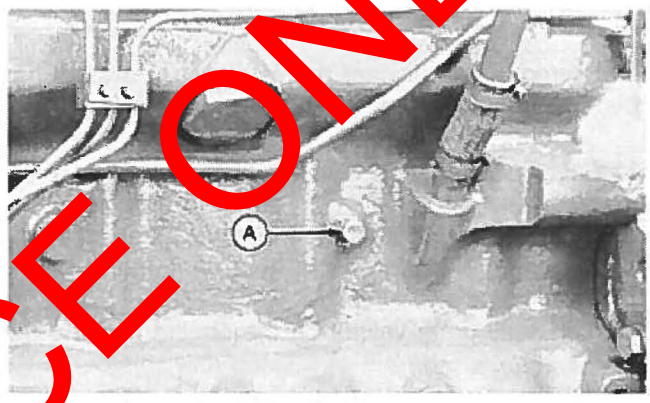
-19-07JUN91

FLUSH COOLING SYSTEM AND REPLACE THERMOSTATS

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 -UN-23AUG88



RG4894 -UN-14DEC88

Drain old coolant, flush the entire cooling system, replace thermostats, and fill with recommended clean coolant.

1. Slowly open the engine cooling system filler cap or radiator cap to relieve pressure and allow coolant to drain faster.

2. Open radiator drain valve. Drain all coolant from radiator.

3. On left side of engine, open drain valve or remove drain plug (A) from engine block. Drain all coolant from engine block.

4. Close all drain valves after coolant has drained.

5. Fill the cooling system with clean water. Run the engine about 10 minutes to stir up possible rust or sediment.

6. Stop engine and immediately drain the water from system before rust and sediment settle.

7. After draining water, close drain valves and fill the cooling system with clean water and TY15979 John Deere Heavy Duty Cooling System Cleaner or an equivalent cleaner such as Fleetguard® RESTORE™. Follow manufacturer's directions on label.

8. After cleaning the cooling system, fill with water to flush the system. Run the engine about 10 minutes, then drain out flushing water.

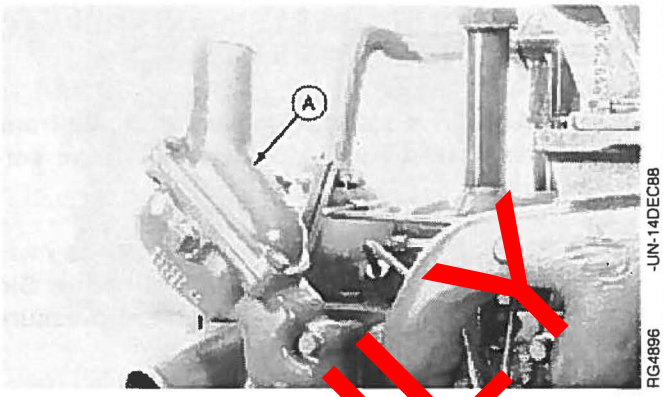
Fleetguard® is a registered trademark of Cummins Engine Company.

RESTORE™ is a trademark of Fleetguard.

S11,OMLM,DV1 -19-11AUG94

9. For thermostat replacement, remove cap screws and thermostat cover (A).

NOTE: Some engines have only one thermostat. Illustration shows the two-thermostat engine.



S11,OMLM,DX1 -19-15NOV89

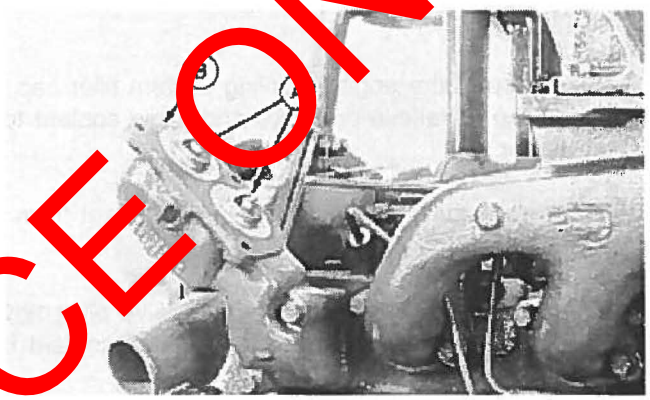
10. Remove and discard thermostats (A) and all gasket material (B).

11. Install new gasket.

12. Install new thermostats and cover. Tighten all cap screws to 27 N·m (20 lb-ft).

13. Close all drain valves on the engine and the radiator.

IMPORTANT: Air must be expelled from cooling system when system is refilled. Loosen temperature sending unit fitting, cover of cylinder head or plug in thermostat housing to allow air to escape when filling system. Retighten fitting or plug when all the air has been expelled.



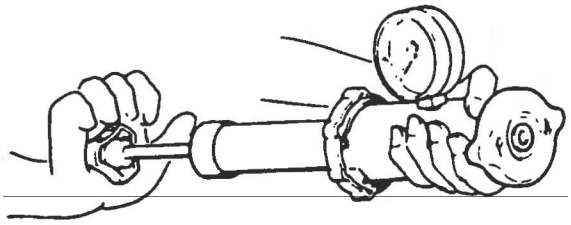
14. Add coolant to radiator until coolant reaches bottom of filler neck. (See RECOMMENDED ENGINE COOLANT in Fuels, Lubricants, and Coolant Section for determining appropriate coolant.)

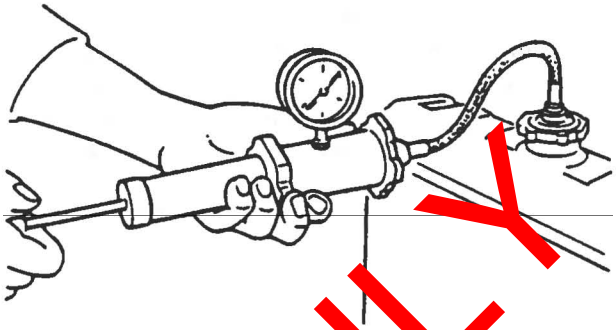
15. Run engine until it reaches operating temperature. This mixes coolant and water uniformly and circulates it through the entire system. The normal engine coolant temperature range is 82°—94°C (180°—202°F).

16. After running engine, check coolant level and entire cooling system for leaks.

S11,OMLM,DY -19-09AUG94

PRESSURE TEST COOLING SYSTEM AND RADIATOR CAP





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.

Test Radiator Cap:

1. Remove radiator cap and attach to an approved tester as shown.

2. Pressurize cap to 50 kPa (0.5 bar) (7 psi)*. Gauge should hold pressure for 10 seconds within the normal range if cap is acceptable.

If gauge does not hold pressure, replace radiator cap.

3. Remove the cap from gauge, turn it 180°, and retest cap. This will verify that the first measurement was accurate.

Test Cooling System:

NOTE: Engine should be warmed up to test overall cooling system.

1. Allow engine to cool, then carefully remove radiator cap.

2. Fill radiator with coolant to the normal operating level.

IMPORTANT: DO NOT apply excessive pressure to cooling system, doing so may damage radiator and hoses.

3. Connect gauge and adapter to radiator filler neck. Pressurize cooling system to 50 kPa (0.5 bar) (7 psi)*.

4. With pressure applied, check all cooling system hose connections, radiator, and overall engine for leaks.

If leakage is detected, correct as necessary and pressure test system again.

If no leakage is detected, but the gauge indicated a drop in pressure, coolant may be leaking internally within the system or at the block-to-head gasket. Have your servicing dealer or distributor correct this problem immediately.

**Test pressures recommended are for all Deere OEM cooling systems. On specific vehicle applications, test cooling system and pressure cap according to the recommended pressure for that vehicle.*

RG18293,6 -19-02AUG94

PERFORM ENGINE TUNE-UP

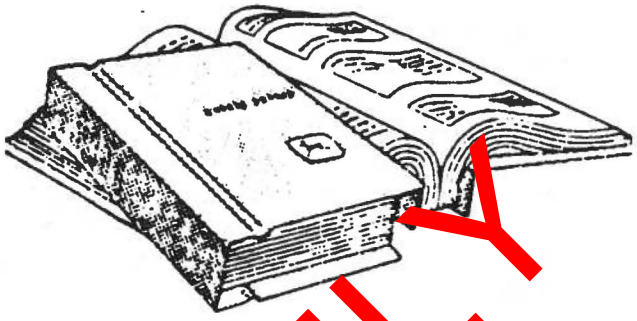
As a general guideline, an engine tune-up is recommended at 1200 Hour or 2-Year intervals (whichever comes first). However, a tune-up should be performed as often as needed to maintain optimum performance within the general condition limits of the engine. Some engine applications, such as generator sets, may require a different tune-up interval than given above. Have your authorized servicing dealer or engine distributor perform the following checks and services:

- Check, and adjust if necessary, engine valve clearance. (Lubrication and Maintenance/400 Hr and 1200 Hr/2-Yr.
- Change oil and filter. (Lubrication and Maintenance/250 Hr.)
- Check electrical system. (Lubrication and Maintenance/250 Hr.)
- Lubricate PTO clutch internal levers and linkage. (Lubrication and Maintenance/600 Hr/1-Yr)
- Clean crankcase vent tube. (Lubrication and Maintenance/600 Hr/1-Yr)
- Replace fuel filters. (Lubrication and Maintenance/600 Hr/1-Yr)
- Check air intake system and replace air cleaner elements. (Lubrication and Maintenance/600 Hr/1-Yr)
- Check, and adjust if necessary, engine speeds. (Lubrication and Maintenance/1200 Hr/2-Yr)
- Check fuel injection system: Check, and if necessary, adjust injection pump timing, clean injection nozzles and adjust opening pressure. (Lubrication and Maintenance/1200 Hr/2-Yr)
- Inspect turbocharger and check turbocharger boost pressure on turbocharged engines. (Lubrication and Maintenance/1200 Hr/2-Yr)
- Check crankshaft vibration damper. (Lubrication and Maintenance/1200 Hr/2-Yr)
- Check and service engine cooling system. (Lubrication and Maintenance/1200 Hr/2-Yr)
- Check engine oil pressure, adjust, if necessary. (See your authorized servicing dealer or engine distributor.

S55,OMTU,B -19-02MAR93

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.



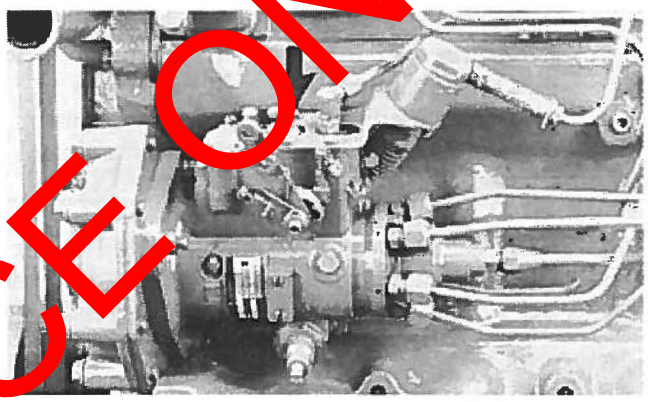
RG4624 -UN-15DEC88

S11.OMSE,AL -19-10JUN86

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.)



RG4898 -UN-14DEC88

S11.OMSE,AM -19-09AUG94

BLEED THE FUEL SYSTEM

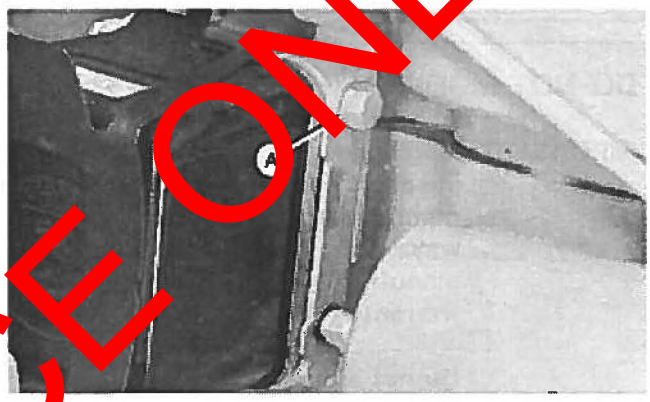
CAUTION: Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting fuel or other lines. Tighten all connections before applying pressure. Keep hands and body away from pinholes and nozzles which eject fluids under high pressure. Use a piece of 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 -UN-23AUG88

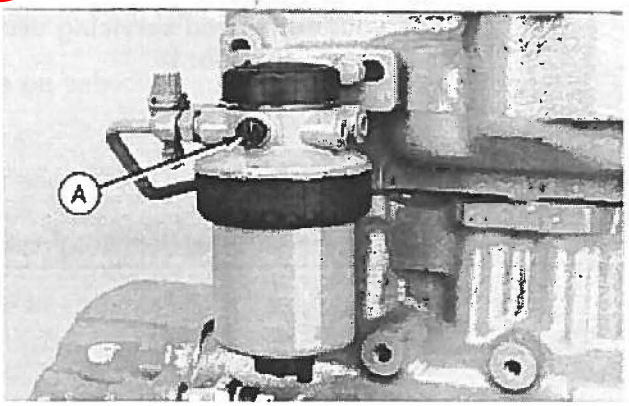
Whenever the fuel system has been opened up for service (lines disconnected or filters removed), it will be necessary to bleed air from the system.

1. Loosen the air bleed plug or air bleed screw (A) on fuel filter base.



T95989 -UN-20OCT88

Rectangular Fuel Filter



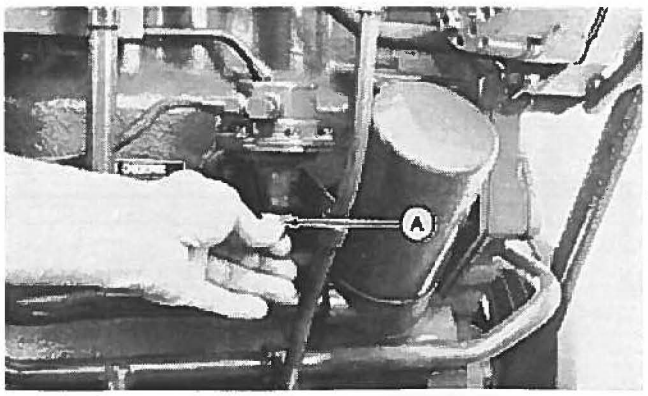
CD30353 -UN-03FEB93

Round Fuel Filter

RG18293,7 -19-17FEB93

2. When equipped, operate supply pump primer lever (A) or switch on the ignition (electric supply pumps) so that supply pump is operating.

3. Wait until fuel flow is free from air bubbles. Tighten bleed plug or screw securely, continue operating hand primer until pumping action is not felt. Push hand primer inward (toward engine) as far as it will go.



RG4900 -UN-14DEC88

S11,OMSE,AO1 -19-17FEB93

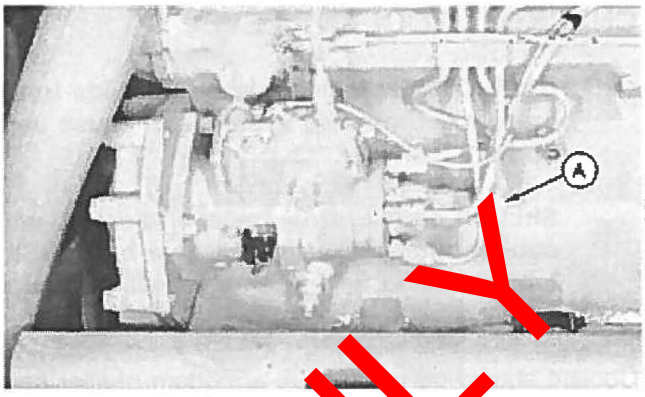
If the engine will not start:

4. Slightly loosen fuel supply line connector (A) at injection pump.

5. Pump hand primer lever until fuel, without air bubbles, flows from fuel supply line connection.

6. Tighten supply line connector to 27 N·m (20 lb-ft).

7. Leave hand primer in the inward position toward cylinder block.



S11,OMSE,AO2 -19-17FEB93

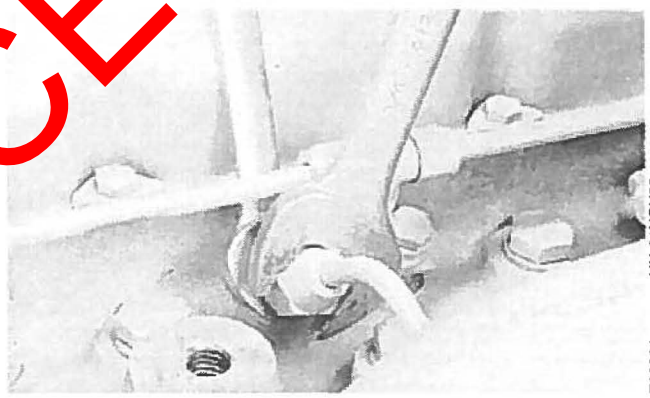
If the engine still will not start:

8. Move the speed control lever to slow idle.

9. While cranking engine with starting motor, loosen one fuel line connector slightly using two wrenches until fuel (free of air bubbles) flows from connector. Tighten connector while cranking engine.

10. Repeat procedure for remaining injection nozzles until engine starts and air has been removed from fuel system.

If engine still will not start, see your authorized servicing dealer or engine distributor.



S11,OMSE,AO3 -19-17FEB93

CHECKING COOLANT LEVEL

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 -UN-23AUG88

Coolant should be maintained at bottom of filler neck. Fill radiator with appropriate coolant. (See RECOMMENDED ENGINE COOLANT in Fuels, Lubricants, and Coolant Section for determining appropriate coolant.) Check overall cooling system for leaks.

RG,OMSE,1 -19-09AUG94

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 -UN-23AUG88

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 system is refilled. Loosen temperature sending unit fitting at rear of cylinder head or plug in thermostat housing to allow air to escape when filling system. Retighten fitting or plug when all the air has been expelled.**

Add coolant to radiator until coolant touches bottom of filler neck. (See RECOMMENDED ENGINE COOLANT in Fuels, Lubricants, and Coolant Section for determining appropriate coolant.)

Certain geographical areas may require special antifreeze or coolant practices. If you have questions, consult your authorized servicing dealer or engine distributor for the latest information and recommendations.

S11,OMLM,DZ1 -19-09AUG94

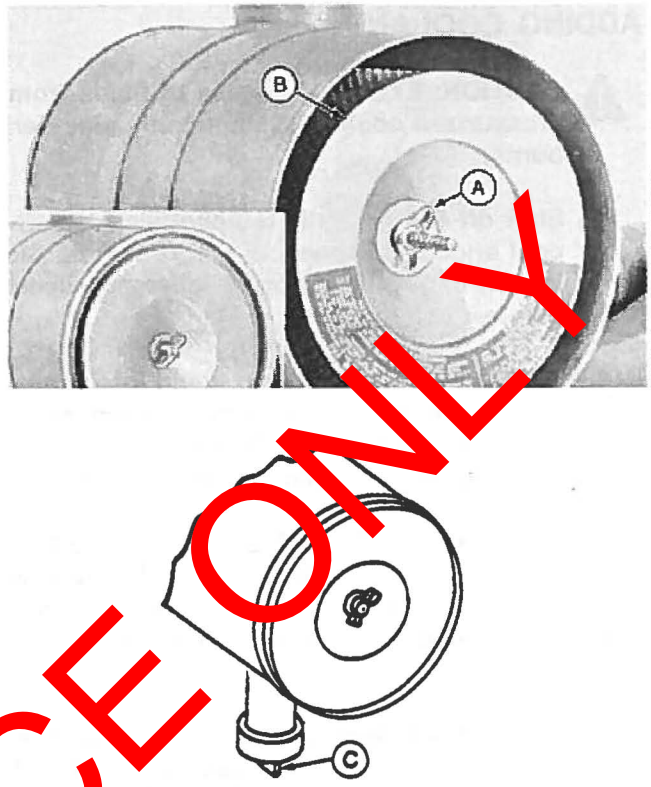
REMOVE AND INSPECT AIR CLEANER ELEMENTS

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.



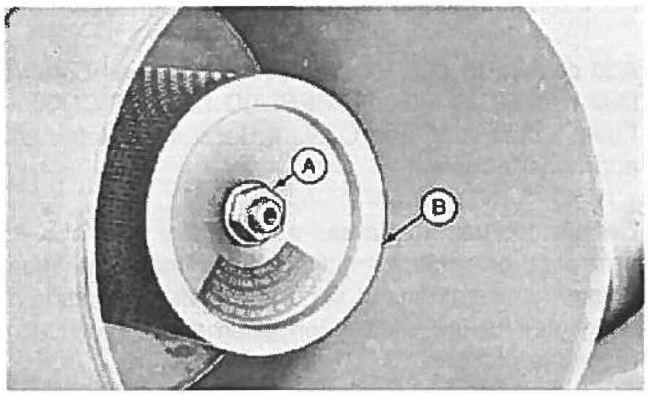
RG4686 -UN-20DEC88

RG4687 -UN-20DEC88

S11,OMLM,FE -19-02MAR93

IMPORTANT: Remove secondary element (B) ONLY if it is to be replaced. DO NOT attempt to clean secondary element.

4. To replace secondary element, remove nut (A) and remove element. Immediately install new element so dirt does not enter air intake system. (See REPLACE AIR CLEANER ELEMENTS in Lubrication and Maintenance/600 Hours/1-Year Section.)



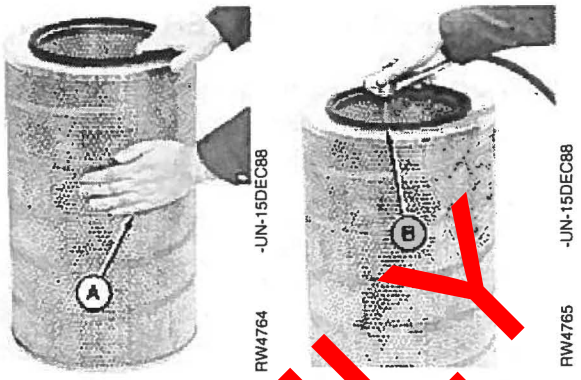
RG4688 -UN-20DEC88

S11,OMLM,FF -19-09AUG94

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.



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

CAUTION: Only a special air cleaning gun (B) 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.

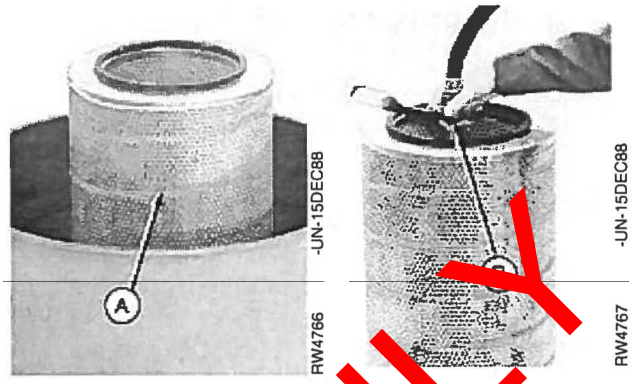
4. Inspect element for damage after cleaning. Replace element if any damage is found.

S11,OMLM,AF -19-22JUN94

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.



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 later in this section.)

S11,OMLM,AG -19-09AUG94

INSPECTING PRIMARY FILTER ELEMENT

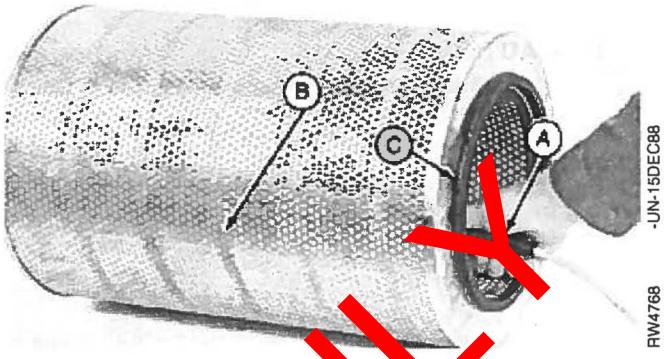
Inspect filter for damage after cleaning or to determine if it is practical to clean filter.

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.

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



RW4768 -UN-15DEC88

S11,OMLM,AH -19-17AUG93

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.

S11,OMLM,AI -19-19MAR91

REPLACE FAN AND ALTERNATOR BELTS

1. Inspect belts for cracks, fraying, or stretched out areas. Replace if necessary. (See FAN AND ALTERNATOR BELT TENSION OR REPLACEMENT in Lubrication and Maintenance/250 Hour Section.)

S11,OMSE,AP -19-09AUG94

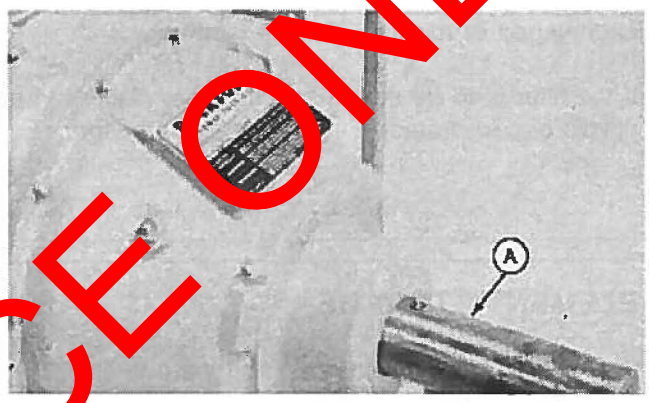
POWER TAKE-OFF (PTO) CLUTCH

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 -UN-23AUG88

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 -UN-14DEC88

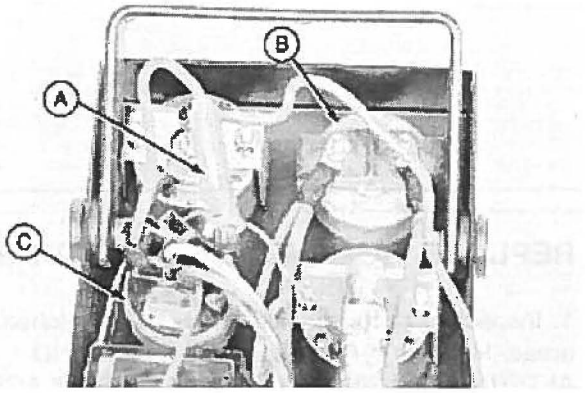
S11,OMSE,U -19-09AUG94

CHECK FUSES

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

On North American Sourced Instrument (Gauge) Panels:

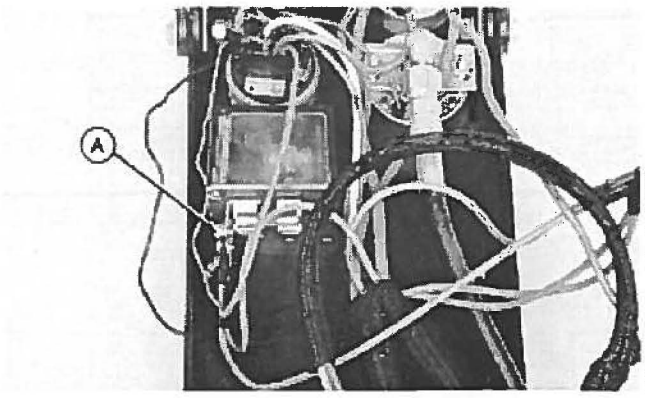
1. Check the fuse (A) between the ammeter (B) and key switch (C) located on back side of instrument panel. If defective replace with an MDL-25 fuse.



RG4493 -UN-14DEC88

S11,OMSE,AA -19-17FEB93

2. Check the fuse (A) mounted on the bottom of the magnetic safety switch. If defective, install an equivalent 14-amp fuse.



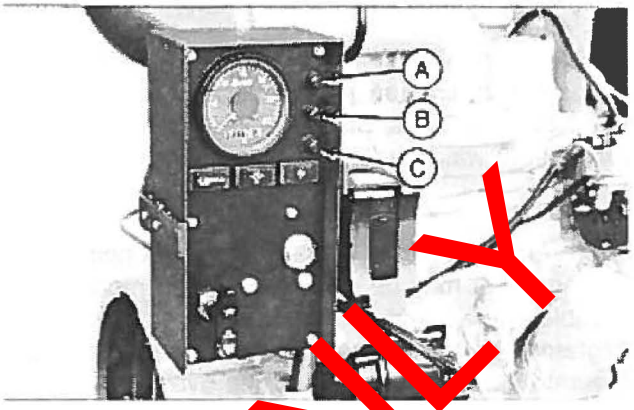
RG4496 -UN-14DEC88

S11,OMSE,W -19-26JUL93

On European Sourced Instrument (Gauge) Panels:

1. Check the following fuses and replace as necessary:

A—25 amp - Starting Circuit
B— 3 amp - Tachometer Light
C—10 amp - Safety Switch



RG18293,8 -19-17FEB93

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.

RG18293,9 -19-02MAR93

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
P2—Oil Pressure Gauge
P3—Crankcase Oil Level Switch/Gauge
P4—Tachometer
P5—Hourmeter
P6—Ammeter
S1—Key Switch
S2—Magnetic Safety Switch—North American Auto Override Module—European (Saran)
Y1—Starter Solenoid
Y2—Fuel Shut-off Solenoid
Y3—Electric Fuel Pump
BLK—Black
BLU—Blue
BRN—Brown
GRN—Gree
ORG—Orange
PUR—Purple
RED—Red
Y—Yellow

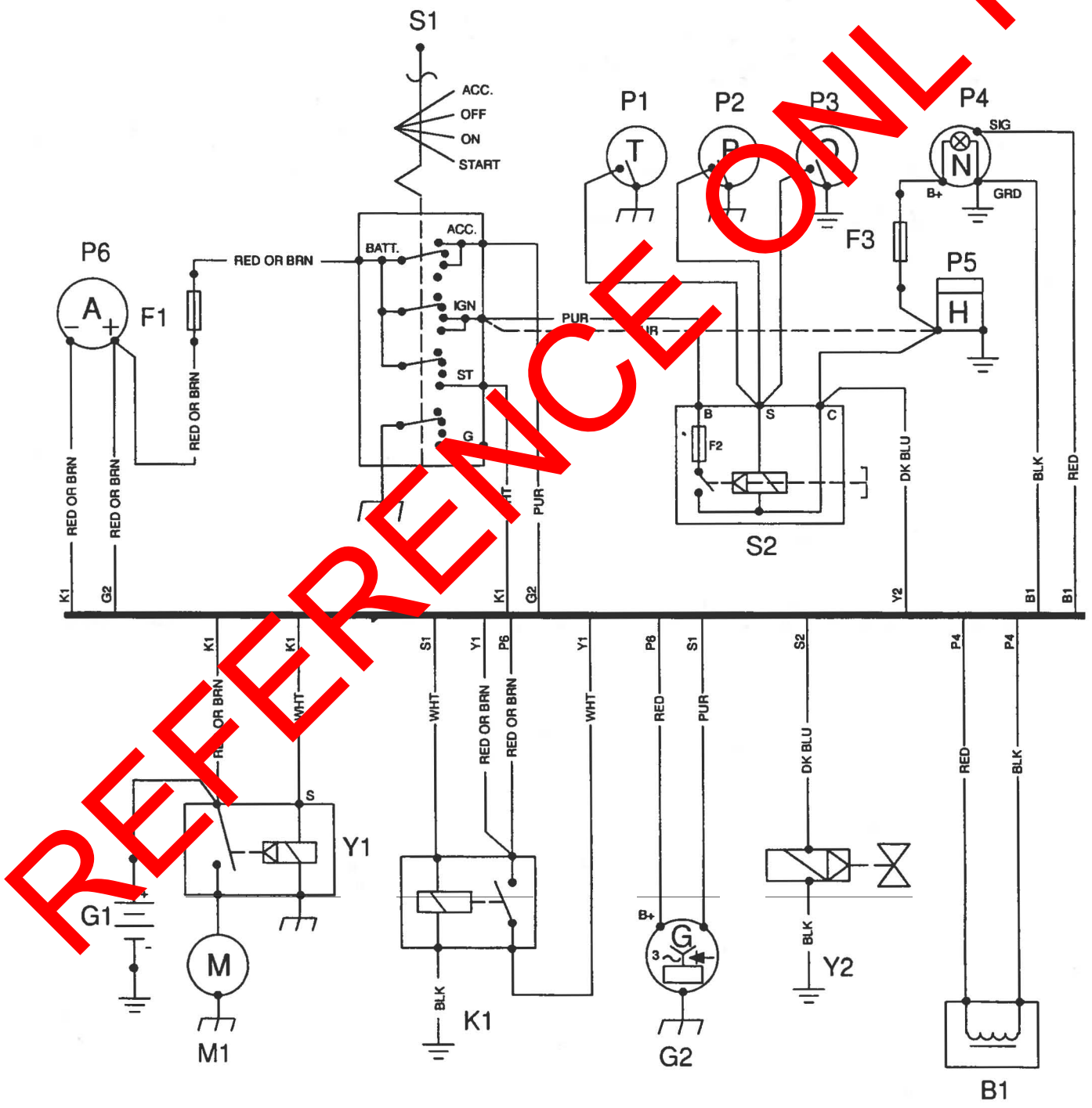
NOTE: On North American Series 300 engines without electronic tachometer:
Early Units —A purple wire (shown as a dashed line in wiring diagram) connects between hourmeter "P5" and key switch "S1".

Later Units —The wire (shown as a solid line) connects between the hourmeter and magnetic safety switch "S2" (C terminal).

RG,18293,WIRE -19-09AUG94

WIRING DIAGRAM—NORTH AMERICAN SERIES 300 ENGINES

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



RG,DIAG,CTM67 -19-03AUG94

ENGINE WIRING DIAGRAM LEGEND

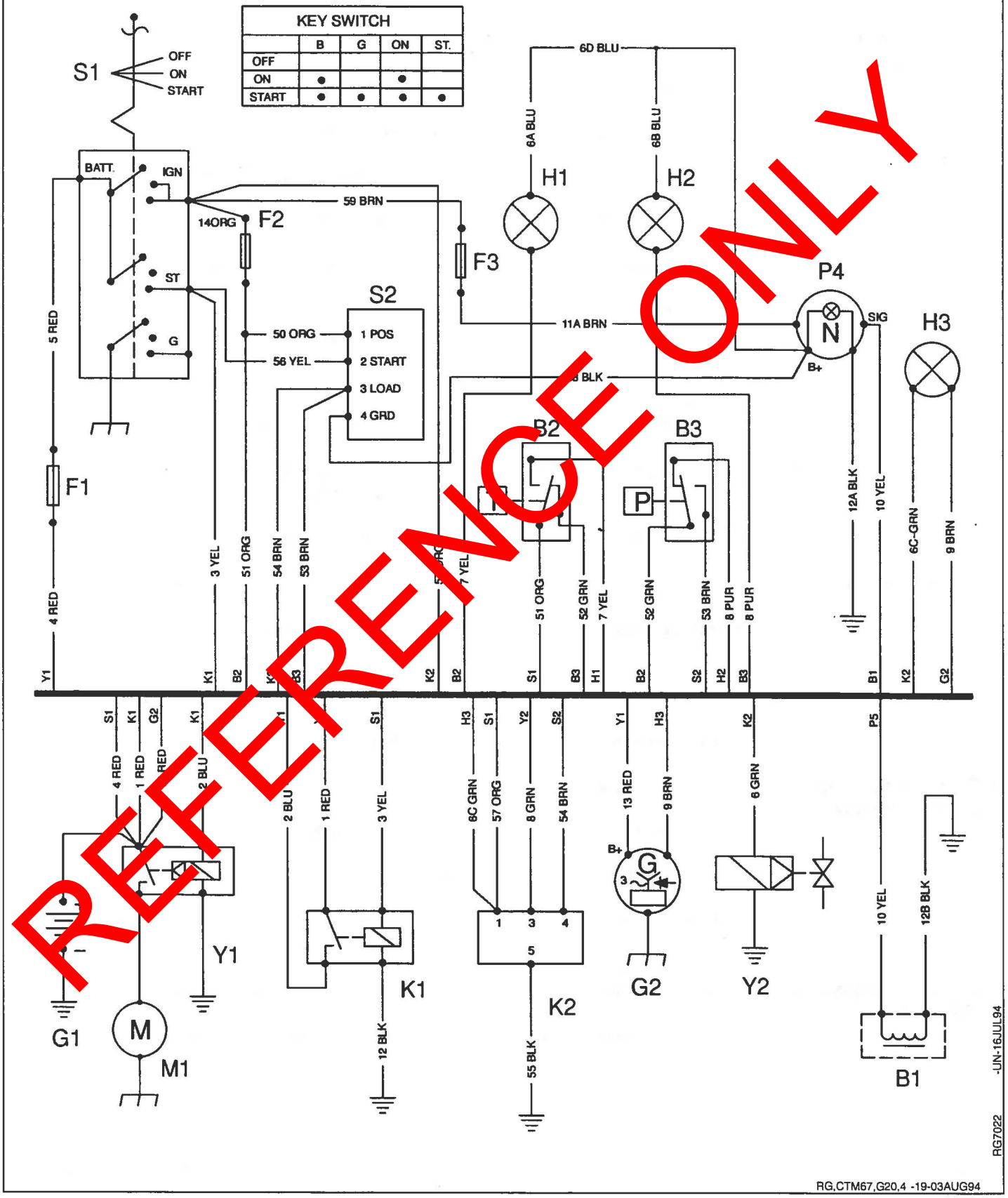
A1—Speed Control Unit
B1—Magnetic Speed Sensor
B2—Coolant Temperature Sensor
B3—Oil Pressure Sensor
F1—Starting Circuit Fuse (25 amp)
F2—Safety Switch Fuse (10 amp)
F3—Tachometer Fuse (3 amp)
G1—Battery
G2—Alternator
H1—Coolant Temperature Indicator Lamp
H2—Oil Pressure Indicator Lamp
H3—Alternator Indicator Lamp
K1—Starter Relay
K2—Fuel Shut-off Relay
M1—Starter Motor
P1—Coolant Temperature Gauge
P2—Oil Pressure Gauge
P3—Crankcase Oil Level Switch/Gauge
P4—Tachometer
P5—Hourmeter
P6—Ammeter
S1—Key Switch
S2—Magnetic Safety Switch—North American Auto Override Module—European (Saran)
Y1—Starter Solenoid
Y2—Fuel Shut-off Solenoid
Y3—Electric Fuel Pump
BLK—Black
BLU—Blue
BRN—Brown
GRN—Green
ORG—Orange
PUR—Purple
RED—Red
YEL—Yellow

NOTE: On North American Series 300 engines without electronic tachometer:
Early Units —A purple wire (shown as a dashed line in wiring diagram) connects between hourmeter "P5" and key switch "S1".

Later Units —The wire (shown as a solid line) connects between the hourmeter and magnetic safety switch "S2" (C terminal).

RG,18293,WIRE -19-09AUG94

WIRING DIAGRAM—EUROPEAN (SARAN) SERIES 300 ENGINES



RG,CTM67,G20,4 -19-03AUG94

DIAGNOSING ENGINE MALFUNCTIONS

Symptom	Problem	Solution
Engine hard to start or will not start	Improper starting procedure.	Review starting procedure.
	No fuel.	Check fuel tank.
	Air in fuel line.	Bleed fuel line.
	Cold weather.	Use cold weather starting aids.
	Slow starter speed.	See "Starter Cranks Slowly".
	Crankcase oil too heavy.	Use oil of proper viscosity.
	Improper type of fuel.	Consult fuel supplier; use proper type fuel for operating conditions.
	Water, dirt, or air in fuel system.	Drain, flush, fill and bleed system.
	Clogged fuel filter.	Replace filter element.
	Dirty or faulty injection nozzles.	Have authorized dealer or engine distributor check injectors.
	Injection pump shut-off not reset.	Turn key switch to "OFF" then to "ON".
Engine knocks	Low engine oil level.	Add oil to engine crankcase.
	Injection pump out of time.	See your authorized servicing dealer or engine distributor.
	Low coolant temperature.	Remove and check thermostat.
	Engine overheating.	See "Engine Overheats".
Engine runs irregularly or stalls frequently	Low coolant temperature.	Remove and check thermostat.
	Clogged fuel filter.	Replace filter element.
	Water, dirt, or air in fuel system.	Drain, flush, fill, and bleed system.
	Dirty or faulty injection nozzles.	Have authorized dealer or engine distributor check injectors.
Below normal engine temperature	Defective thermostat.	Remove and check thermostat.
	Defective temperature gauge or sender.	Check gauge, sender, and connections.

Continued on next page

Symptom	Problem	Solution
Lack of power	Engine overloaded.	Reduce load.
	Intake air restriction.	Service air cleaner.
	Clogged fuel filter.	Replace filter elements.
	Improper type of fuel.	Use proper fuel.
	Overheated engine.	See "Engine Overheat".
	Below normal engine temperature.	Remove and check thermostat.
	Improper valve clearance.	See your authorized servicing dealer or engine distributor.
	Dirty or faulty injection nozzles.	Have authorized servicing dealer or engine distributor check injectors.
	Injection pump out of time.	See your authorized servicing dealer or engine distributor.
	Turbocharger not functioning. (Turbocharged engines only.)	See your authorized servicing dealer or engine distributor.
	Leaking exhaust manifold gasket.	See your authorized servicing dealer or engine distributor.
	Defective anti-boid control line.	See your authorized servicing dealer or engine distributor.
	Restricted fuel hose.	Clean or replace fuel hose.
	Low fast idle speed	See your authorized servicing dealer or engine distributor.
Low oil pressure	Low oil level.	Add oil.
	Improper type of oil.	Drain, fill crankcase with oil of proper viscosity and quality.
High oil consumption	Crankcase oil too light.	Use proper viscosity oil.
	Oil leaks.	Check for leaks in lines, gaskets and drain plug.
	Restricted crankcase vent tube.	Clean vent tube.
	Defective turbocharger.	See your authorized servicing dealer or engine distributor.

Continued on next page

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.
	Loose or defective fan belts.	Adjust belt tension. 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.

S11,OMTS,Z -19-17FEB93

DIAGNOSING ELECTRICAL SYSTEM MALFUNCTIONS

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 Uses 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.
	Loose or defective alternator belt.	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

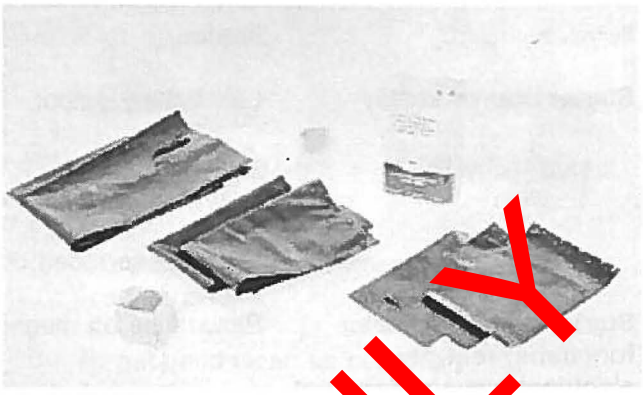
Symptom	Problem	Solution
Starter cranks slowly	Low battery output.	See your authorized servicing dealer or engine distributor.
	Crankcase oil too heavy.	Use proper viscosity oil.
	Loose or corroded connections.	Clean and tighten loose connections.
Starter and hour meter functions; rest of electrical system does not function	Blown fuse on magnetic switch	Replace fuse. (14 amp)
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.

S11,OMTS,AB -19-02MAR93

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.

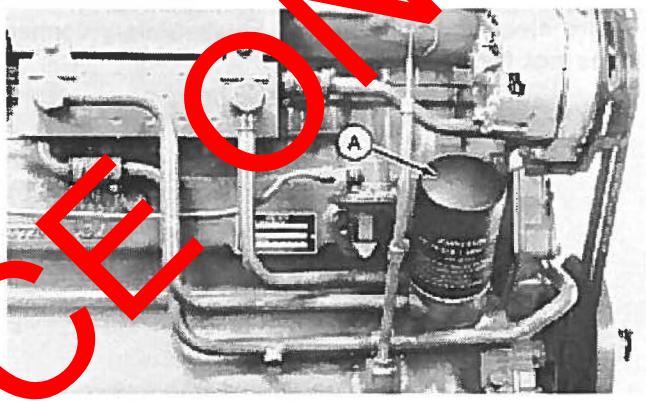
IMPORTANT: Inhibitors can easily change to gas. Seal or tape each opening immediately after adding inhibitor.



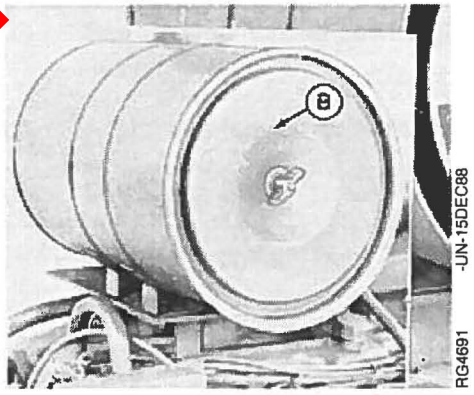
-19-25JAN93

STORING THE ENGINE

IMPORTANT: Any time your engine will not be used for several 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 (A). Used oil will not give adequate protection. (See CHANGE ENGINE OIL AND FILTER in Lubrication and Maintenance/50 Hour Service.)



2. Service air cleaner (B). (See REMOVE AND INSPECT AIR CLEANER ELEMENTS in Service As Required section.)

3. Draining and flushing of cooling system is not necessary if engine is to be stored for only several months. However, for extended storage periods of a year or longer, it is recommended that the cooling system be drained, flushed, and refilled with proper coolant solution. (See RECOMMENDED ENGINE COOLANT in Fuels, Lubricants, and Coolant Section and ADDING COOLANT in Service As Required Section.)

S11,OMST,H1 -19-09AUG94

4. Drain fuel tank and add 30 ml (1 oz) of inhibitor to the fuel tank for each 15L (4 U.S. gal) of tank capacity.

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. Loosen fan and alternator belts to relieve tension. Remove belts if desired.

9. Remove and clean batteries. Store them in a cool, dry place and keep them fully charged.

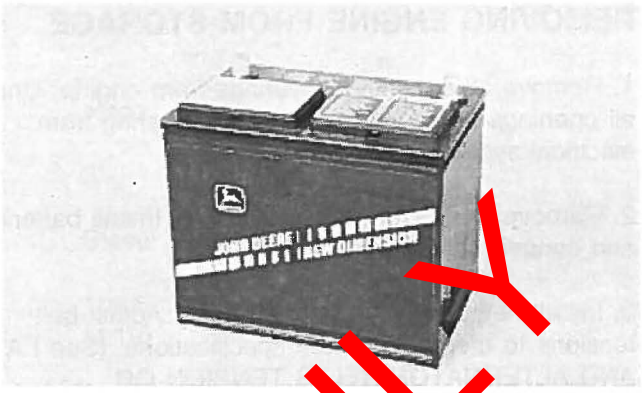
10. Disengage the PTO clutch.

11. Seal all openings on engine with plastic bags and tape supplied in storage kit. Follow instructions supplied in kit.

12. Coat all exposed metal surfaces with grease or corrosion inhibitor.

13. Clean the exterior of the engine and touchup any scratched or chipped painted surfaces.

14. Store the engine in a dry protected place. If engine must be stored outside, cover with a waterproof canvas or other suitable protective material and use a strong waterproof tape.



RG4694 -UN-15DEC88

S11,OMST,G1 -19-19MAR91

REMOVING ENGINE FROM STORAGE

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 and connect the cables.

3. Install new fan and alternator belts. Adjust belt tensions to their appropriate specifications. (See FAN AND ALTERNATOR BELTS TENSION OR REPLACEMENT in Lubrication and Maintenance/250 Hour Section.)

4. Fill fuel tank.

5. Perform all appropriate prestarting checks. (See PRESTARTING CHECKS in Engine Operating Guidelines Section.)

6. Crank engine for 20 seconds with starter (do not allow the engine to start). Then start engine.

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

7. Operate engine at slow idle for several minutes. Warm up carefully and check all gauges before placing engine under load.

S11,OMST,J -19-09AUG94

GENERAL OEM ENGINE SPECIFICATIONS

Item	Unit Of Measure	3029D	3029T
Number of Cylinders	——	3	3
Fuel	——	Diesel	Diesel
Bore	mm (in.)	106.5 (4.19)	106.5 (4.19)
Stroke	mm (in.)	110.0 (4.33)	110.0 (4.33)
Displacement	L (cu.in.)	2.9 (179)	2.9 (179)
Compression Ratio	——	17.8:1	17.8:1
Rated Speed: Std. Governor 3—5% Governor	 RPM RPM	 2500 1500/1800	 2500 1500/1800
Fast Idle Speed	RPM	2710	2710
Slow Idle Speed (factory)	RPM	800—850	800—850
Industrial Power Rating— (maximum intermittent) @ Rated Speed w/o Fan	 kW (HP)	 43 (58)	 59 (79)
Basic Weight (dry)	kg (lb)	315 (694)	330 (728)
Flywheel and Housing (SAE No.)	——	4	4
Injection Nozzles	mm	9.5	9.5
Fuel Filter Area	cm^2 ($in.^2$)	5162/2581 (800/400)	5162/2581 (800/400)
Physical Dimensions: Width	 mm (in.)	 519 (20.4)	 519 (20.4)
Height	mm (in.)	820 (32.3)	927 (36.5)
Length	mm (in.)	716 (28.2)	716 (28.2)

See ENGINE CRANKCASE OIL FILL QUANTITIES with filter change later in this group.

RG18293,11 -19-09JUN94

GENERAL OEM ENGINE SPECIFICATIONS—CONTINUED

Item	Unit Of Measure	4039D	4039T	4045D	4045T
Number of Cylinders	——	4	4	4	4
Fuel	——	Diesel	Diesel	Diesel	Diesel
Bore	mm (in.)	106.5 (4.19)	106.5 (4.19)	106.5 (4.19)	106.5 (4.19)
Stroke	mm (in.)	110.0 (4.33)	110.0 (4.33)	127.0 (5.00)	127.0 (5.00)
Displacement	L (cu.in.)	3.9 (239)	3.9 (239)	4.5 (276)	4.5 (276)
Compression Ratio	——	17.8:1	17.8:1	17.2:1	17.2:1
Rated Speed: Std. Governor 3—5% Governor	 RPM RPM	 2500 1500/1800	 2500 1500/1800	 2400 1500/1800	 2400 1500/1800
Fast Idle Speed	RPM	2700	2700	2600	2600
Slow Idle Speed (factory)	RPM	800—850	800—850	800—850	800—850
Industrial Power Rating— (maximum intermittent) @ Rated Speed w/o Fan	 kW (hp)	 60 (80)	 82 (110)	 63 (85)	 86 (115)
Basic Weight (dry)	kg (lb)	422 (929)	437 (962)	474 (1043)	487 (1071)
Flywheel and Housing (SAE No.)	 ——	 2,3,4	 2,3,4	 2,3,4	 2,3,4
Injection Nozzles	mm	9.5	9.5	9.5	9.5
Fuel Filter Area	cm^2 ($in.^2$)	5162/2581 (800/400)	5162/2581 (800/400)	5162/2581 (800/400)	5162/2581 (800/400)
Physical Dimensions: Width	 mm (in.)	 519 (20.4)	 536 (21.1)	 519 (20.4)	 512 (20.1)
Height	mm (in.)	818 (32.2)	993 (39.1)	818 (32.2)	1029 (40.5)
Length	mm (in.)	844 (33.2)	869 (34.2)	844 (33.2)	869 (34.2)

See ENGINE CRANKCASE OIL FILL QUANTITIES with filter change later in this group.

S11,OMSP,K1 -19-17FEB93

GENERAL OEM ENGINE SPECIFICATIONS—CONTINUED

Item	Unit Of Measure	6059D	6059T	6068D	6068T
Number of Cylinders	——	6	6	6	6
Fuel Type	——	Diesel	Diesel	Diesel	Diesel
Cylinder Bore	mm (in.)	106.5 (4.19)	106.5 (4.19)	106.5 (4.19)	106.5 (4.19)
Engine Stroke	mm (in.)	110.0 (4.33)	110.0 (4.33)	127.0 (5.00)	127.0 (5.00)
Engine Displacement	L (cu.in.)	5.9 (359)	5.9 (359)	6.8 (414)	6.8 (414)
Compression Ratio	——	17.8:1	17.8:1	17.8:1	17.2:1
Rated Speed: Std. Governor 3—5% Governor	 RPM RPM	 2500 1500/1800	 2500 1500/1800	 2400 1500/1800	 2400 1500/1800
Fast Idle Speed	RPM	2700	2700	2600	2600
Slow Idle Speed (factory)	RPM	800—850	800—850	800—850	800—850
Industrial Power Rating— (maximum intermittent) @ Rated Speed w/o Fan	 kW (hp)	 89 (119)	 123 (165)	 97 (130)	 129 (173)
Flywheel and Housing (SAE No.)	 ——	 2,3,4	 2,3,4	 2,3,4	 2,3,4
Injection Nozzles	mm	9.5	9.5	9.5	9.5
Fuel Filter Area	cm^2 ($in.^2$)	5162/2581 (800/400)	5162/2581 (800/400)	5162/2581 (800/400)	5162/2581 (800/400)
Basic Weight (dry)	kg (lb)	518 (1140)	525 (1155)	588 (1294)	602 (1324)
Physical Dimensions: Width	 mm (in.)	 569 (22.4)	 569 (22.4)	 513 (20.2)	 513 (20.2)
Height	mm (in.)	936 (36.8)	1033 (40.7)	1017 (40.0)	1070 (42.1)
Length	mm (in.)	1125 (44.3)	1125 (44.3)	1125 (44.3)	1125 (44.3)

See ENGINE CRANKCASE OIL FILL QUANTITIES with filter change later in this section.

RG,18293,GNSPEC-19-11AUG94

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)
3029DF	1602,1650	43 (58)	2500	800	2750
	1603,1644	35 (47)	1800		1890
	1620,1641,1648	31 (41)	1500		1575
	1632	37 (50)	2200	800	2420
3029TF	1602,1632,1634,1640	59 (79)	2500	800	2750
	1633	46 (62)	2200	800	2420
	1645	48 (64)	2100	800	2310
4039DF	1602,1615,1623	60 (80)	2500	800	2750
	1603,1620,1621	49 (66)	1800	800	1890
	1609	58 (78)	2300	800	2530
	1614	60 (80)	2900	800	3190
	1641,1645	40 (54)	1500		1575
	1664	60 (80)	2500	1600	2750
4039TF	1601	69 (92)	1800	800	1890
	1602,1615,1619,1650,1651	82 (110)	2500	800	2750
	1603,1620	76 (102)	1800		1890
	1605	82 (110)	2900	800	3190
	1610	71 (95)	2300	800	2530
	1611	78 (105)	2200	800	2420
	1635,1641	63 (85)	1500		1575
4045DF	1602	63 (85)	2400	800	2640
	1623	55 (74)	2100	900	2310
	1626	61 (82)	2200	800	2420
4045TF	1601,1629,1630,1631,1632	90 (120)	2400	800	2640
	1602,1619	86 (115)	2400	800	2640
	1609,1628	84 (113)	1800		1890
	1620	70 (94)	1500		1575
	1625,1627	84 (113)	2200	800	2420
6059DF	1602,1615,1623	89 (119)	2500	800	2750
6059TF	1602,1615,1619,1622,1623	123 (165)	2500	800	2750
	1603,1624	111 (149)	1800		1890
	1636,1641	94 (126)	1500		1575
	1644,1645	123 (165)	1800		1890
	1646,1647	104 (139)	1500		1575
6068DF	1602,1615,1622,1623	97 (130)	2400	800	2640
6068TF	1610	94 (126)	2200	850	2420
	1602,1619,1642,1643	129 (173)	2400	800	2640

[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 (50Hz) or 1800 rpm (60Hz) 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.

RG,OPTCD,16 -19-11AUG94

ENGINE CRANKCASE OIL FILL QUANTITIES

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J O H N   D E E R E                                  11/05/94

Commande: 182838760    Base code: 147AA    Load: 654150
   -     18   1101- 1202- 1301- 1406- 1501- 1603- 1701-
1902- 2004- 2109- 2204- 2403- 2802- 2902- 3001- 3115-
3519- 3601- 3703- 3901- 4005- 4199- 4398- 4499- 4529-
4603- 4708- 47AA  4802- 4901- 5001- 5101- 5299- 5523-
5601- 5906- 6206- 6699- 6903- 7699- 9801-
Controle par (inspected by):                    * *
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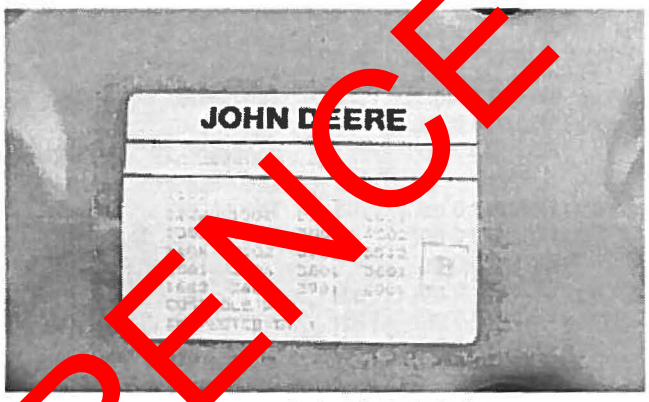
RG7222 -UN-21JUN94

Saran Option Code Label



RG4907 -UN-15DEC88

Dubuque 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:

"T0" indicates the engine was built in Dubuque, Iowa
"CD" indicates the engine was built in Saran, France

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.

On Saran-built engines, the engine option code label includes an engine base code. This base code must also be recorded along with the option codes. At times it will be necessary to furnish this base code to differentiate two identical option codes for the same engine model.

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 (40) identify the dipstick tube group. The last two digits of each code identify the specific dipstick and tube assembly on your engine.

RG,OMSP,1 -19-10AUG94

Listed below are engine crankcase oil fill quantities:

• Saran-Built Engines

OEM Engine Model	Dipstick Tube Option Code(s)	Crankcase Oil Capacity
CD3029DF	4001,4002	6.0 L (6.5 qt)
CD3029DF	4003,4022	6.0 L (6.5 qt)
CD3029TF	4001,4003,4023	8.0 L (8.5 qt)
CD3029TF	4002	6.0 L (6.5 qt)
CD3029TF	4021	8.5 L (9.0 qt)
CD4039DF	4001,4002,4005	8.5 L (9.0 qt)
CD4039DF,TF	4003	12.0 L (12.5 qt)
CD4039DF	4004*	9.0 L (9.5 qt)
CD4039DF	4004	14.5 L (15.5 qt)
CD4039DF	4006,4010,4019	8.5 L (9.0 qt)
CD4039DF	4011	13.0 L (14.0 qt)
CD4039TF	4002	13.5 L (14.5 qt)
CD4039TF	4004,4013	14.5 L (15.5 qt)
CD4039TF	4005,4006,4020	12.5 L (13.0 qt)
CD4039TF	4007	13.0 L (14.0 qt)
CD4039TF	4008,4012	11.5 L (12.0 qt)
CD4045DF,TF	4003	12.0 L (12.5 qt)
CD4045DF	4004	9.0 L (9.5 qt)
CD4045TF	4007	15.0 L (16.0 qt)
CD4045TF	4020	12.5 L (13.0 qt)
CD6059DF,TF	4001,4004	17.0 L (18.0 qt)
CD6059DF,TF	4010,4012	17.0 L (18.0 q
CD6059DF	4005	14.0 L (15. qt)
CD6059DF,TF	4006,4008	20.0 L (.0 qt)
CD6059DF,TF	4007,4011,4015	15.0 L (16.0 q
CD6059TF	4009	14.0 L (15. qt)
CD6068DF,TF	4010	17.0 L (18.0

• Dubuque-Built Engines

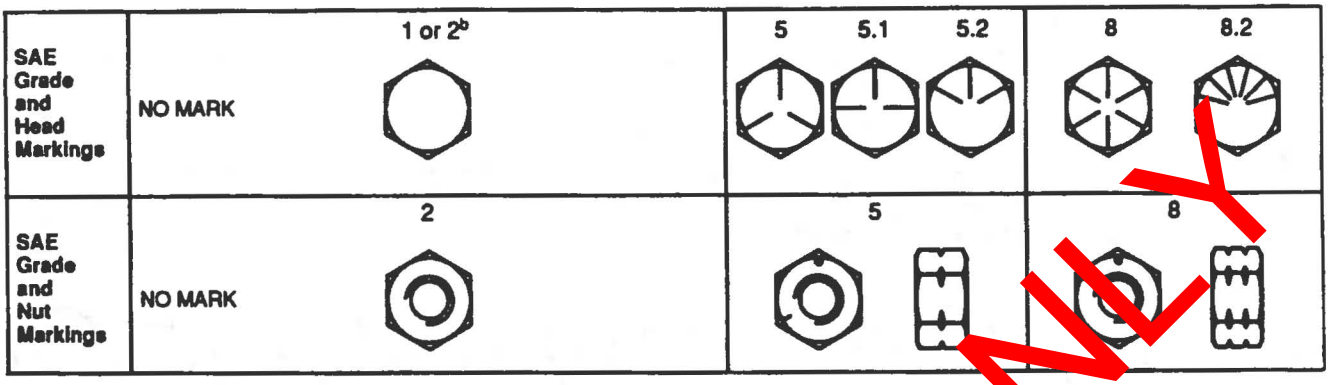
OEM Engine Model	Dipstick Tube Option Code(s)	Crankcase Oil Capacity
T04039DF	4001	9.5 L (.0 qt)
T04039DF	4002	9.0 L (5 qt)
T04039DF,TF	4004	13.5 L (1 .5 qt)
T04039DF,TF	4006	13.0 L (.0 qt)
T04039DF	4007	8.5 L (9.0 q
T04039DF	4012	13.0 L (14.0 qt)
T04039DF,TF	4013,4014	11.5 L (12.0 qt)
T04039TF	4001	13.0 L (14.0 qt)
T04039TF	4007	12. L (13.0 qt)
T04045DF	4001,4002	9.0 L (9.5 qt)
T04045DF	003	13.0 L (14.0 qt)
T04045DF,TF	4004	13.5 L (14.5 qt)
T04045TF	005	13.0 L (14.0 qt)
T06059D TF	4001	19.5 L (21.0 qt)
T0605 F	4002	11.5 L (12.0 qt)
T06 DF,T	4004	19.0 L (20.0 qt)
T0605 TF	4005	24.5 L (26.0 qt)
T06059T	4007	17.0 L (18.0 qt)
T06068 ,TF	4001	19.0 L (20.0 qt)
T0606 F,TF	4004	19.0 L (20.0 qt)
T 8DF	4005	24.5 L (26.0 qt)

** For engine base code 1476F only*

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

RG,OMSP,2 -19-03AUG94

UNIFIED INCH BOLT AND CAP SCREW TORQUE VALUES



TS1162 -19-04MAR91

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		7	12	9	13.5	10	17	12.5
5/16	7.7	5.5	10	7	12	9	15		20		25	18	28	21	35	26
3/8	14	10	17	13	22	16	27	20	35		44	33	50	36	63	46
7/16	22	16	28	20	35	26				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			70	125	90	155	115	175	130	225	160
5/8	67	50	85	62	105	78		100	170	125	215	160	240	175	300	225
3/4	120	87	150	110			24	175	300	225	375	280	425	310	550	400
7/8	190	140	240	175	190		240	175	490	360	625	450	700	500	875	650
1	290	210	360				360	270	725	540	925	675	1050	750	1300	975
1-1/8	400	300	510			300	510	375	900	675	1150	850	1450	1075	1850	1350
1-1/4	570	425	725		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		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.

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.

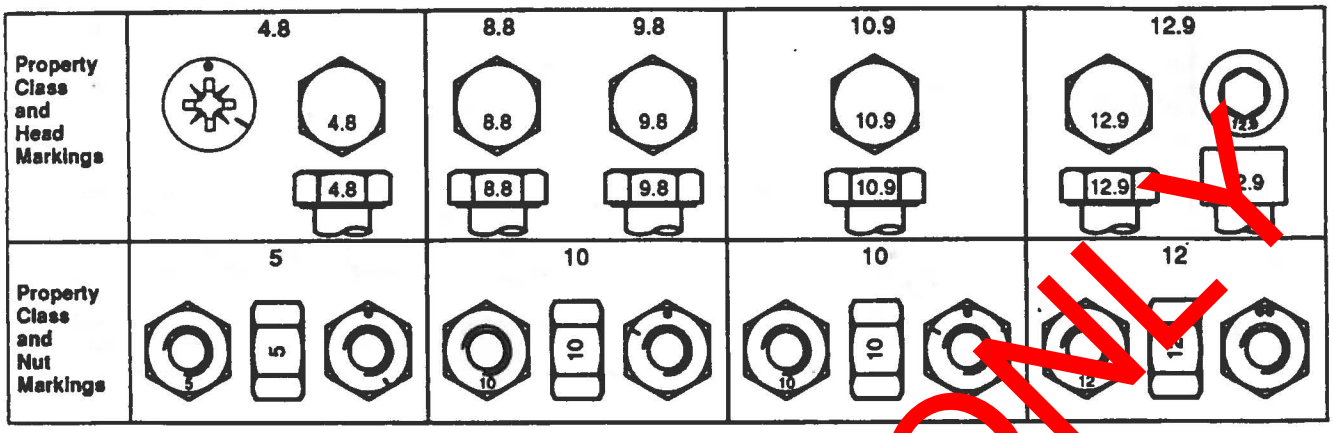
Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.

[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.

[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.

DX,TORQ1 -19-20JUL94

METRIC BOLT AND CAP SCREW TORQUE VALUES



TS1163 -19-04MAR91

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	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 property class.

Fasteners should be replaced with the same or higher property class. If higher property class 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.*

DX,TORQ2 -19-20JUL94

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.

RG21891,65 -19-09AUG94

DAILY (PRESTARTING) SERVICE

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

- Check engine oil level.
- Check coolant level.
- Lubricate PTO release bearing
- Check air cleaner dust unloader valve.
- Cecck fuel filter glass bowl for water.

S11,OMMR,I1 -19-17FEB93

100 HOUR SERVICE

- Lubricate PTO clutch shaft bearings.
- Service fire extinguisher

Hours									
Date									
Hours									
Date									
Hours									
Date									
Hours									
Date									

S11,OMMR,A1 -19-26JUL93

250 HOUR SERVICE

- *Change engine oil and filter.
- Service battery
- Check PTO clutch adjustment
- Check fan and alternator belt tension

Hours									
Date									
Hours									
Date									

If TORQ-GARD SUPREME PLUS-50 oil is used along with a John Deere oil filter, the oil change interval maybe extended by 50 hours.

S11,OMMR,AB -19-17FEB93

400 HOUR SERVICE

- *Initial valve clearance adjustment

Hours									
Date									

**Have your authorized servicing dealer or engine distributor adjust valve clearance after the first 400 hours of operation. Thereafter, have the valve clearance adjusted at 1200 Hour/2-Year intervals.*

S55,OMMR,AB -19-17FEB93

600 HOUR/1-YEAR SERVICE

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

Hours									
Date									
Hours									
Date									

S11,OMMR,AD -19-17FEB93

1200 HOUR/2-YEAR SERVICE

NOTE: An engine tune-up is recommended every 1200 hours or two years, whichever comes first. If the engine tune-up is not performed at 1200 hours, the following checks must take place:

- Have your authorized servicing dealer or engine distributor check and adjust engine speeds
- Have you authorized servicing dealer or engine distributor adjust valve clearance
- Have you authorized servicing dealer or engine distributor check fuel injection system
- Have you authorized servicing dealer or engine distributor inspect turbocharger
- Check crankshaft vibration damper
- Flush cooling system
- Change thermostats
- Have your authorized servicing dealer or engine distributor test radiator and cap
- Perform engine tune-up

Hours									
Date									
Hours									
Date									

S11,OMMR,J -19-17FEB93

SERVICE AS REQUIRED

- Service air cleaner
- Replace V-belts

Hours									
Date									

S11,OMMR,Z -19-22FEB93

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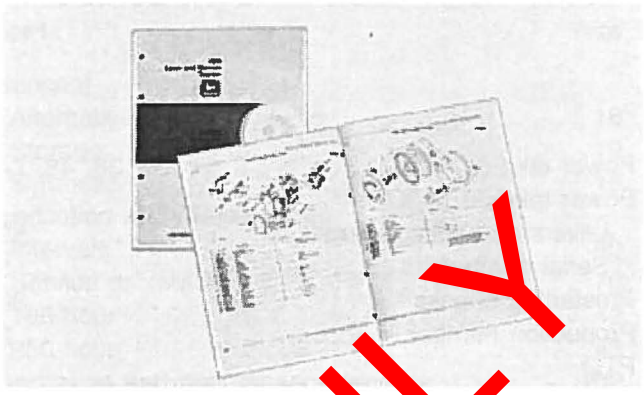
John Deere Service Literature Available

PARTS CATALOG

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



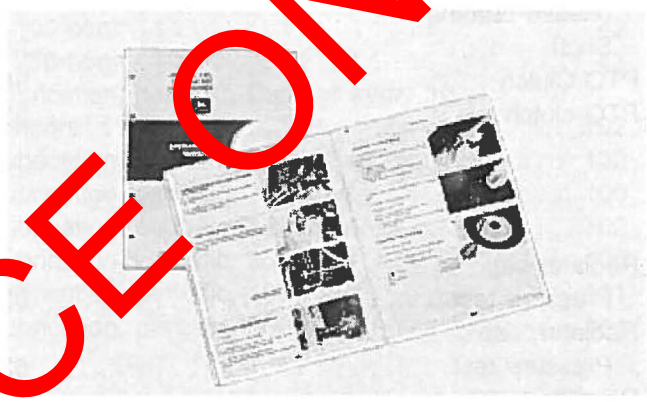
TS189 -UN-17JAN89

DX,PARTS -19-03MAR93

OPERATOR'S MANUAL

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

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



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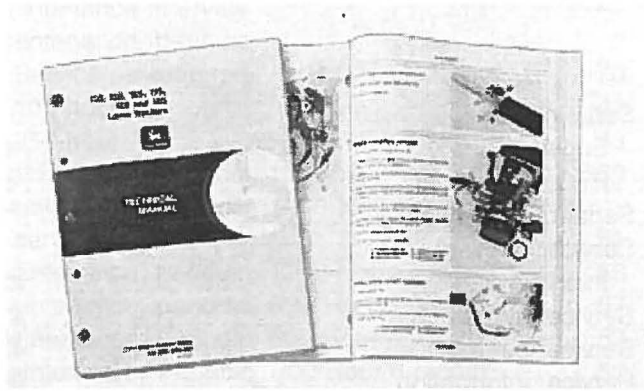
DX,OM -19-03MAR93

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 required for some products. These supplemental manuals cover specific components.



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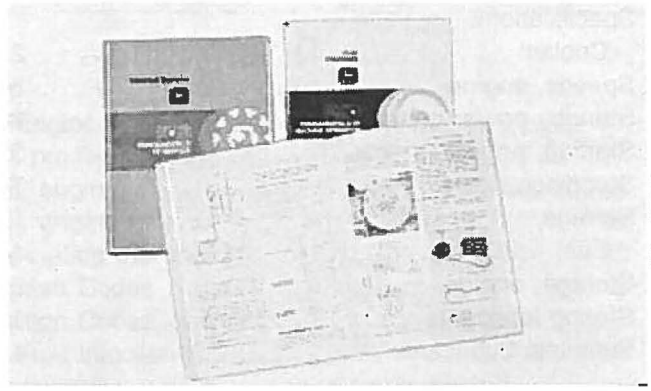
DX,TM -19-03MAR93

FMO AND FOS MANUALS

These are basic manuals covering most types and makes of machinery. FMO manuals tell you how to OPERATE agricultural machinery; FOS manuals tell you how to SERVICE machine systems. Each manual starts with basic theory and is fully illustrated with colorful diagrams and photographs. Both the "whys" and "hows" of adjustments and repairs are covered in this reference library.



TS195 -UN-02DEC88

DX,FMOFOS -19-03MAR93

John Deere Service Literature Available

John Deere Distribution Service Center
Service Publications Department
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To order, fill out this form and mail it to the address above. Check for prices with your John Deere dealer or call **1-800-522-7448**. You may also place credit card orders by calling this number. Make checks payable to Deere & Co. Service Publications. Allow three weeks for delivery. No COD orders. Do not send cash or stamps. If you want manuals or catalogs for equipment not shown on this list, provide the model number, serial number, and name of the product.

Title	Order Number	Price Each	x Quantity	= Total
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4039 and 4045 Dubuque-Built Engines	PC2305		x	
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6059 and 6068 Dubuque-Built Engines	PC2294		x	=
6059 Saran-Built (100000—) Engines	PC3192		x	=
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Component Technical Manuals: 3029, 4039, 4045, 6059, and 6068 Engines	CTM8			=
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FOS Manual—Air Conditioning	FOS5707B		x	=
FOS Manual—Fuels, Lubricants & Coolants	FOS5807B		x	=
FOS Manual—Fasteners	FOS6004B		x	=
FOS Manual—Identification of Failures	FOS6104B		x	=
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Total Shipping & Handling

Amount Due in U.S. Dollars (Prices subject to change without notice. MAY-94)

RG,SLIT,1 -19-11AUG94

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.

TS100 -UN-23AUG88

IBC,A -19-04JUN90

THE RIGHT TOOLS

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

TS101 -UN-23AUG88

DX,IBC,B -19-04JUN90

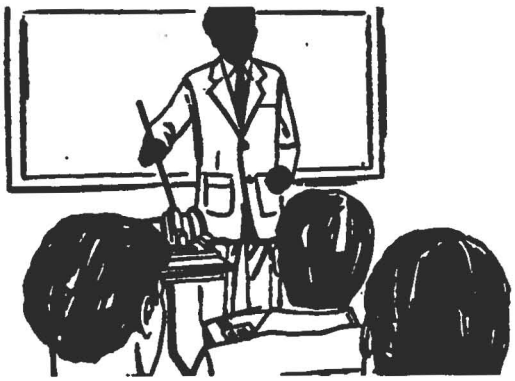
WELL-TRAINED TECHNICIANS

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!



TS102 -UN-23AUG88

DX,IBC,C -19-04JUN90

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.

TS103 -UN-23AUG88

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