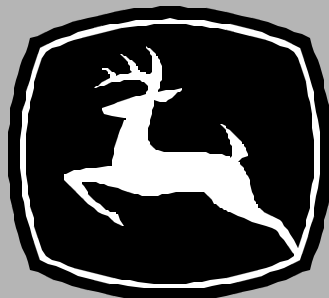


JOHN DEERE
WORLDWIDE CONSTRUCTION AND
FORESTRY DIVISION

Skid Steer
280

TM1749 MAR04

TECHNICAL MANUAL



JOHN DEERE

This technical manual is written for an experienced technician and contains sections that are specifically for this product. It is a part of a total product support program.

The manual is organized so that all the information on a particular system is kept together. The order of grouping is as follows:

- Table of Contents
- Specifications
- Theory of Operation
- Troubleshooting Diagram
- Diagnostics
- Tests & Adjustments
- Repair

Note: Depending on the particular section or system being covered, not all of the above groups may be used.

Each section will be identified with a symbol rather than a number. The groups and pages within a section will be consecutively numbered.

All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

We appreciate your input on this manual. To help, there are postage paid post cards included at the back. If you find any errors or want to comment on the layout of the manual please fill out one of the cards and mail it back to us.

Safety



Specifications and Information



Engine (Diesel)



Electrical



Power Train (Chain Case and Axles)



Power Train (Hydrostatic)



Steering



Brakes



Hydraulics



Miscellaneous



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SAFETY

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 servicing practices.

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.

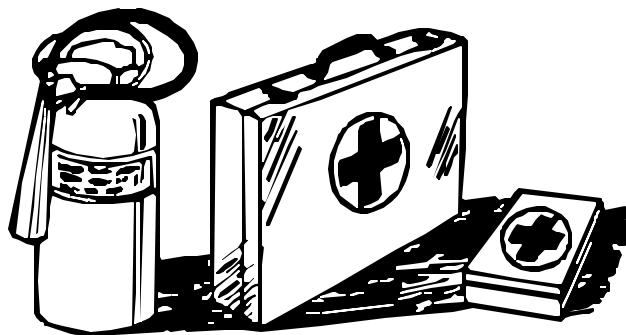
REPLACE SAFETY SIGNS



Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.

HANDLE FLUIDS SAFELY—AVOID FIRES

Be Prepared For Emergencies



When you work around fuel, do not smoke or work near heaters or other fire hazards.

Store flammable fluids away from fire hazards. Do not incinerate or puncture pressurized containers.

Make sure machine is clean of trash, grease, and debris.

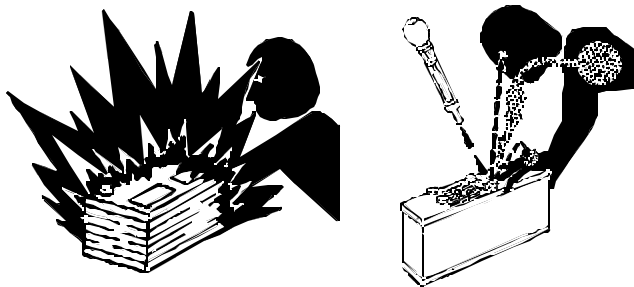
Do not store oily rags; they can ignite and burn spontaneously.

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

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

USE CARE IN HANDLING AND SERVICING BATTERIES



Prevent Battery Explosions

- Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.
- Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.
- Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).

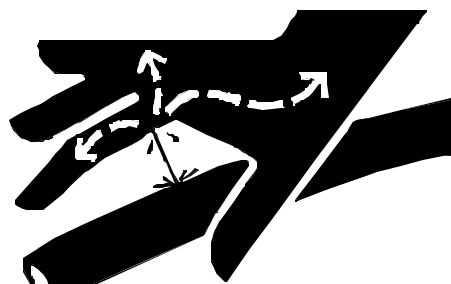
Prevent Acid Burns

- 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 acid burns 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. Using 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.
 4. 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.

USE CARE AROUND HIGH-PRESSURE FLUID LINES



Avoid High-Pressure Fluids



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

Avoid injury from escaping fluid under pressure by stopping the engine and relieving pressure in the system before disconnecting or connecting 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., (1-800-822-8262 U.S.A. or Canada).



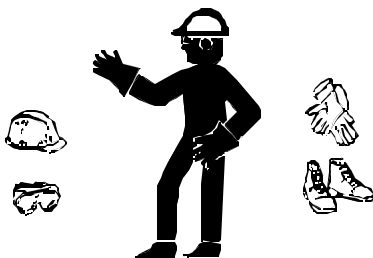
Avoid Heating Near Pressurized Fluid Lines



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.

USE SAFE SERVICE PROCEDURES

Wear Protective Clothing

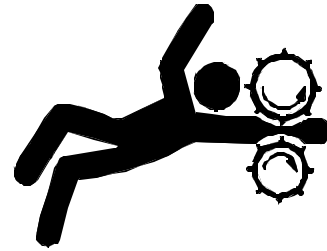


Wear close fitting clothing and safety equipment appropriate to the job.

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.

Service Machines Safely



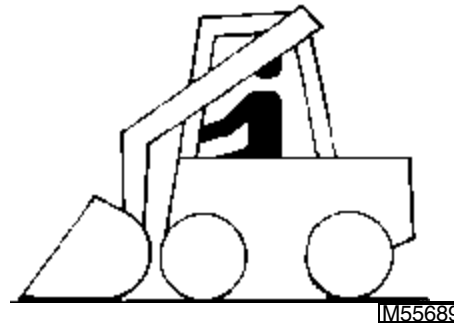
Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.

Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards. Use power tools only to loosen threaded parts and fasteners. For loosening and tightening hardware, use the correct size tools. **DO NOT** use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting John Deere specifications.

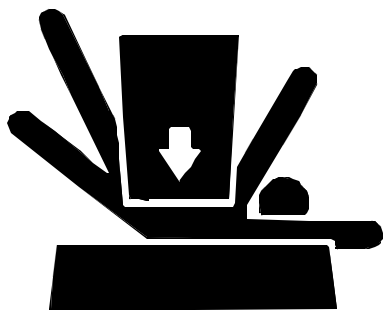
Park Machine Safely



Before working on the machine:

1. Lower all equipment to the ground.
2. Relieve hydraulic pressure.
3. Stop the engine and remove the key.
4. Disconnect the battery ground strap.
5. Hang a "DO NOT OPERATE" tag in operator station.

Support Machine Properly and Use Proper Lifting Equipment



If you must work on a lifted machine or attachment, securely support the machine or attachment.

Do not support the machine on cinder blocks, hollow tiles, or props that may crumble under continuous load. Do not work under a machine that is supported solely by a jack. Follow recommended procedures in this manual.

Lifting heavy components incorrectly can cause severe injury or machine damage. Follow recommended procedure for removal and installation of components in the manual.

Work In Clean Area

Before starting a job:

1. Clean work area and machine.
2. Make sure you have all necessary tools to do your job.
3. Have the right parts on hand.
4. Read all instructions thoroughly; do not attempt shortcuts.

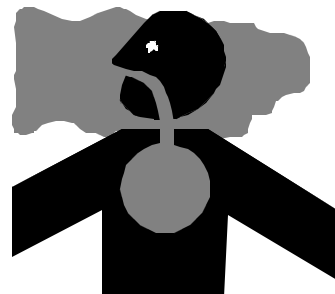
Using High Pressure Washers

Directing pressurized water at electronic/electrical components or connectors, bearings, hydraulic seals, fuel injection pumps or other sensitive parts and components may cause product malfunctions. Reduce pressure and spray component at a 45 to 90 degree angle.

Illuminate Work Area Safely

Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the machine. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.

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 duct system.

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

WARNING: California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

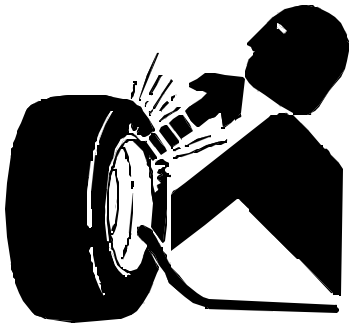
Remove Paint Before Welding or Heating

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.





SERVICE TIRES SAFELY



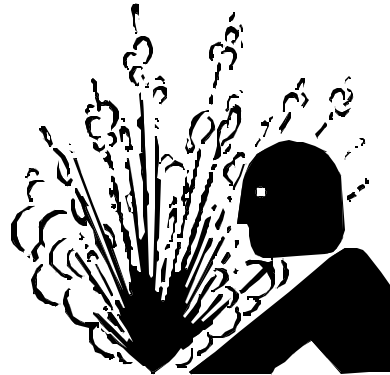
Explosive separation of a tire and rim parts can cause serious injury or death.

Do not attempt to mount a tire unless you have the proper equipment and experience to perform the job. Always maintain the correct tire pressure. Do not inflate the tires above the recommended pressure. Never weld or heat a wheel and tire assembly. The heat can cause an increase in air pressure resulting in a tire explosion. Welding can structurally weaken or deform the wheel.

When inflating tires, use a clip-on chuck and extension hose long enough to allow you to stand to one side and NOT in front of or over the tire assembly. Use a safety cage if available.

Check wheels for low pressure, cuts, bubbles, damaged rims or missing lug bolts and nuts.

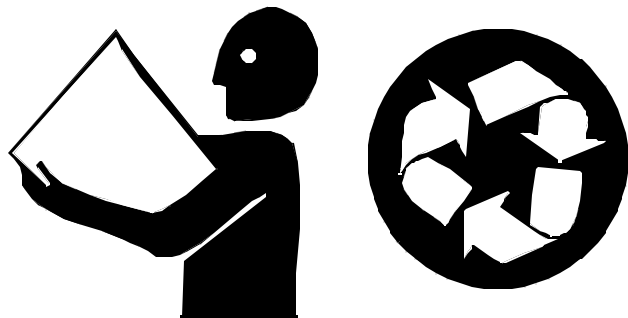
SERVICE COOLING SYSTEM SAFELY



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

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

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.

Dispose of Waste Properly

Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with John Deere equipment include such items as oil, fuel, coolant, brake fluid, filters, and batteries. 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.

LIVE WITH SAFETY



Before returning machine to customer, make sure machine is functioning properly, especially the safety systems. Install all guards and shields.



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DIESEL ENGINE

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SPECIFICATIONS

TESTS AND ADJUSTMENTS SPECIFICATIONS

Engine Model	4045TKV50
Engine Oil Pressure (Min):	
1000 RPM at 93°C (200°F)	105 kPa (15 psi)
Rated Speed (2400 RPM) at 105°C (220°F)	275 kPa (40 psi)
Engine Compression Pressure (Min)	2379 kPa (345 psi)
Difference Between Cylinders (Max)	350 kPa (50 psi)
Fuel Supply Pump Pressure (Min)	25—30 kPa (3.5—4.5 psi)
Engine Speed at Slow Idle:	1000 +50/-25 rpm
Engine Speed at Fast Idle	2575 +50/-25 rpm
Turbo Boost Pressure (at Full Load Speed)	70 kPa (10 psi)



FUEL SYSTEM—OPERATION AND TESTS SPECIFICATIONS

- Fuel supply pump:
- Normal pressure 25—30 kPa (3.5—4.5 psi)
 - Minimum pressure 15 kPa (2.0 psi)
 - Minimum flow at WOT (wide open throttle) or 2400 rpm 1.5 L/min (0.42 gpm)

FUEL INJECTION SYSTEM SPECIFICATIONS

FUEL INJECTION PUMP STATIC TIMING:

STANADYNE DB4 injection. Align marks on pump flange and engine front plate.

FUEL INJECTION PUMP DYNAMIC TIMING:

Model	Pump Part #	Dynamic Timing	Rated Speed (rpm)
280	RE507198	7.5°	2400

STARTING MOTOR SPECIFICATIONS

Starting Motor:	
Type	Gear Reduction
Weight	10.3 kg (22.7 lb)
Brush Length:	
New	18.2 mm (0.72 in.)
Used (Min)	10 mm (0.40 in.)
Number of Pinion Teeth	10

CAPACITIES

Fuel Tank	91 L (24 gal)
Cooling System	13.4 L (14 qt)
Engine Oil (with Filter)	12.0 L (12.7 qt)

TORQUE SPECIFICATIONS

Coolant Heater Lock Nut	35 N•m (26 lb-ft)
Coupling-to-Flywheel Cap Screws	63 N•m (46 lb-ft)
Engine Mount Hardware (Front and Rear)	305 N•m (225 lb-ft)
Exhaust Manifold Attaching Cap Screws	70 N•m (52 lb-ft)
Fan Cap Screws:	
M8 Cap Screw Torque	35 N•m (26 lb-ft)
M10 Cap Screw Torque	70 N•m (52 lb-ft)
Fan Drive Assembly Cap Screws	70 N•m (52 lb-ft)
Fan Finger Guard Cap Screws	26 N•m (19 lb-ft)
Hydrostatic Pump-to-Flywheel Cover Cap Screws	321 N•m (237 lb-ft)
Injection Lines	25 N•m (18 lb-ft)
Injection Pump-to-Front Plate Nuts	27 N•m (20 lb-ft)
Injector Leak-Off Lines	5 N•m (44 lb-in.)
Radiator Mounting Cap Screws	70 N•m (52 lb-ft)
Starter Field Winding Terminal-to-Solenoid Nut	13 N•m (115 lb-in.)
Starter Through Bolts (Gear Reduction Type)	4.8—6.8 N•m (42—44 lb-in.)
Starting Motor-to-Engine	50 N•m (37 lb-ft)



SPECIAL OR ESSENTIAL TOOLS

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

3/4-in. Special Crowsfoot Wrench	JDF22
Timing Pin	JDE81-4
Gauge (0—60 PSI)	JT03092
Female Quick Coupler Adapter	JT01609
TIME TRAC® Kit	JT07158
Engine Repair Stand	D01003AA
Engine Repair Stand Adapter	D05225ST
Engine Lifting Sling	JDG23
Lifting Brackets	JT01748

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TESTS AND ADJUSTMENTS

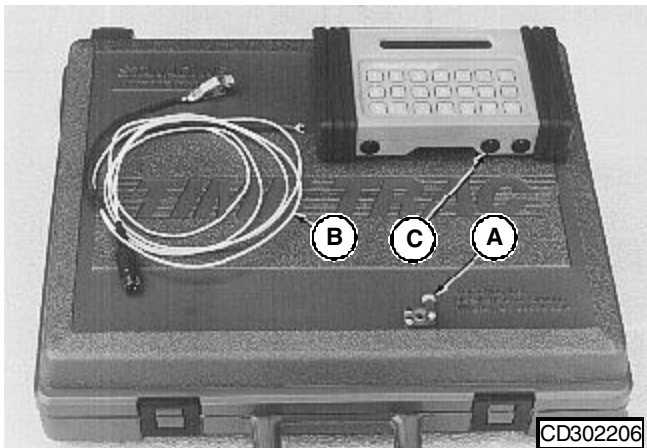
FOR ENGINE REPAIR USE CTM104 AND CTM207

FOR STARTER AND ALTERNATOR REPAIR USE CTM77

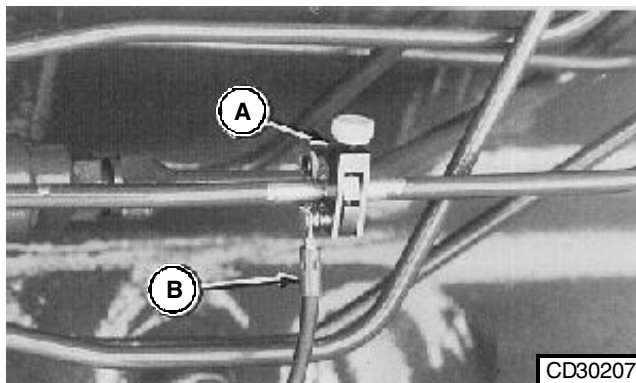
3. Switch on the meter by pressing the "ON/CLEAR" key, then start the engine.



USING THE TIME TRAC METER AS A TACHOMETER



- A. Clamp-On Transducer
- B. Cable
- C. Timing Meter Socket "SR"



The TIME TRAC meter can be used as a tachometer by using clamp-on transducer (A) on any high-pressure line.

Operating Instructions:

1. Remove paint and thoroughly clean the area of the high-pressure line to which the clamp-on transducer is to be attached.
2. Install transducer (A) and connect cable (B) between transducer and socket "SR" (C) on meter. Also connect ground wire.

PRELIMINARY ENGINE TESTING

The following preliminary tests will help determine if the engine can be tuned-up to restore operating efficiency, or if engine overhaul is required.

- After engine has stopped for several hours, loosen crankcase drain plug and watch for any water to drain out. A few drops due to condensation is normal, but more than this would indicate problems which require engine repair.
- With engine stopped, inspect engine coolant for oil film. With engine running, inspect coolant for air bubbles. Either condition would indicate problems which require engine repairs rather than just a tune-up.
- Perform compression test. Pressure below specifications indicates problems which require engine repair.

GENERAL TUNE-UP RECOMMENDATIONS

As a general rule, an engine tune-up is not necessary if all recommended Operator's Manual hourly service procedures are performed on schedule. If your engine performance is not within the rated application guidelines and if engine condition does not require overhaul, the following service procedures are recommended to help restore engine to normal operating efficiency.

1. Change engine oil and filter.
2. Replace fuel filter and water separator.
3. Clean crankcase vent tube.
4. Clean and flush cooling system.
5. Test thermostat and pressure cap.
6. Check condition of coolant hoses and fan belt.
7. Check air intake system. Replace air cleaner elements.
8. Check exhaust system.
9. Inspect turbocharger and check boost pressure.
10. Check fuel injection system:
 - Have injection pump checked by your authorized Stanadyne workshop.
 - Clean injection nozzles and adjust opening pressure.
 - Adjust slow idle speed and perform a dynamic timing.
11. Check engine oil pressure.
12. Check engine valve clearance.
13. Check electrical system.

ENGINE COMPRESSION PRESSURE TEST

Reason:

To determine the condition of the pistons, rings, cylinder walls, and valves.

Equipment:

JT01674 Compression Test Set

Procedure:

IMPORTANT: Compression pressures are affected by the cranking speed of the engine. Before beginning test, ensure that battery is fully charged and injection nozzle area is thoroughly cleaned.

1. Start engine and run at rated speed until it warms up to normal operating temperature. (From a cold start, operate engine 10—15 minutes at slow idle.) Turn engine OFF.
2. Shut off fuel supply and remove fuel injection nozzles.



3. Install JT01679 Adapter with O-ring from JT01674 Compression Test Set in injection nozzle bore. Use JT02017 Holding Clamp to hold JT01679 Adapter in position. Install hold-down screw in clamp and tighten screw to **37 N•m (27 lb-ft)**.
4. Push throttle lever to STOP position. Turn crankshaft for 10—15 seconds with starting motor (minimum cranking speed: 150 rpm cold, 200 rpm hot).
5. Compare readings from all cylinders. Compression pressure must be within specification.

Specifications:**Engine Compression**

Pressure (Min) 2379 kPa (345 psi)

Maximum Difference

between Cylinders 350 kPa (50 psi)

NOTE: Pressure given was taken at 183 m (600 ft) above sea level. A 3.6 percent reduction in gauge pressure will result for each additional 300 m (1000 ft) rise in altitude.

All cylinders within an engine should have approximately the same pressure. There should be less than 350 kPa (50 psi) difference between cylinders.



6. If pressure is much lower than shown, remove gauge and apply oil to ring area of piston through injection nozzle bore. Do not use too much oil. Do not get oil on the valves.
7. Test compression pressure again.

Results:

- If pressure is low, worn or stuck rings are indicated. Replace piston rings or install new piston and liner set as needed. (See CTM104 for procedures.)
 - If pressure is low, valves could be worn or sticking. Recondition cylinder head as required. (See CTM104 for procedures.)
8. Measure compression pressure in all remaining cylinders and compare readings. Recondition cylinders and valves as required.

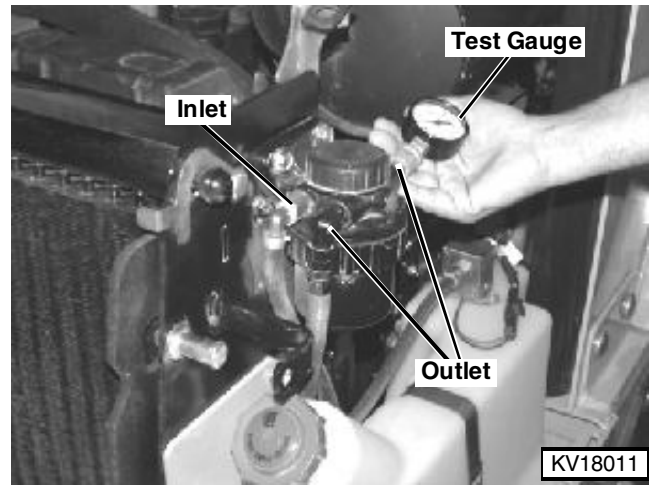
FUEL SUPPLY PUMP PRESSURE MEASUREMENT

Reason:

To determine supply pump operating pressure.

Equipment:

- JT03115 Gauge (0—150 psi) with Male Quick Coupler
- JT01609 Female Quick Coupler Adapter

**Procedure:**

1. Remove plug from auxiliary outlet port on fuel filter base.
2. Install test gauge as shown.
3. Start engine. Fuel pump should maintain positive minimum pressure of **25–30 kPa (3.5–4.5 psi)**. Low pressure can be due to a clogged filter element or a defective supply pump. Replace filter element then recheck pressure. If reading is still below specification, replace supply pump.

NOTE: The fuel supply pump is not repairable and therefore should be replaced when defective.

FAST AND SLOW IDLE ADJUSTMENT

Reason:

To ensure an adequate slow idle rpm that will allow the engine to run smoothly without stalling and to ensure specified fast idle speed setting.

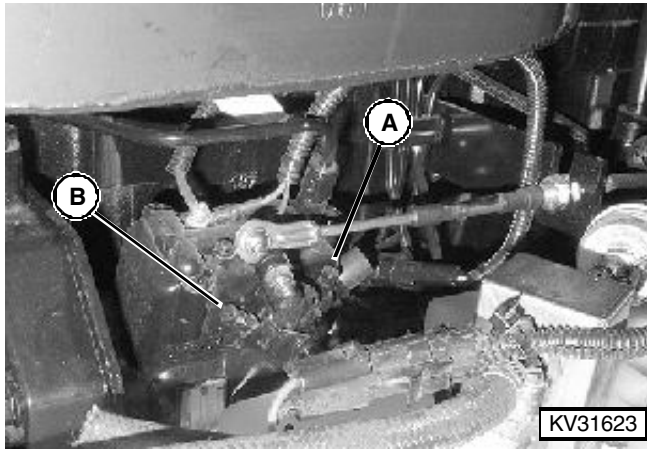
Equipment:

JT05801 Clamp-on Electronic Tachometer

Procedure:

NOTE: Before checking engine speed, make sure engine has reached its normal operating temperature.

All indicated speeds apply to an engine not under load. The maximum permissible speed variation is +50/-25 rpm for slow idle speed and for fast idle speed.



1. Disconnect speed control rod at fuel injection pump.
2. Move pump throttle lever against pump fast idle adjusting screw (A). Check engine speed and compare with specification.

Specification:

Fast Idle Speed 2575 +50/-25 rpm

NOTE: Fast idle is set by the factory, then the fast idle adjusting screw (A) is sealed to prevent tampering. Fast idle adjustment can only be performed by an authorized EPA certified service center.

3. Move pump throttle lever in slow idle position against slow idle adjusting screw (B). Check engine speed and adjust to specification.

Specification:

Slow Idle Speed 1000 +50/-25 rpm

4. Turn screw (B) clockwise to increase and counter-clockwise to decrease engine speed.

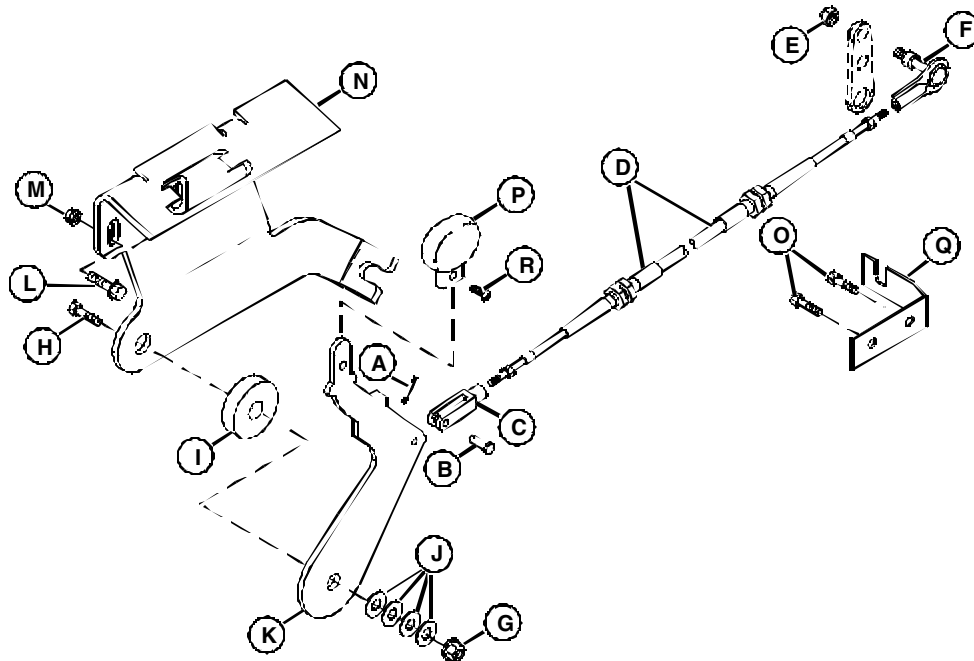
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your reading. Please Click
Here. Then Get COMPLETE
MANUAL. NO WAITING**



NOTE:

**If there is no response to
click on the link above,
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document first and then
click on it.**

THROTTLE CONTROL AND CABLE ADJUSTMENT

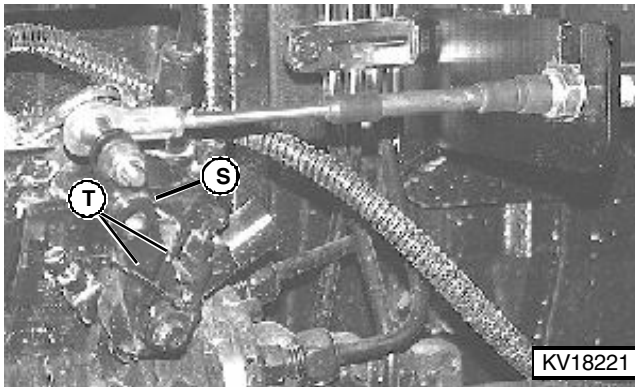


KV18820

- A. Cotter Pin
- B. Pin
- C. Yoke
- D. Cable
- E. Lock Nut
- F. Ball Stud

- G. Lock Nut
- H. Cap Screw
- I. Ring
- J. Washer (4 used)
- K. Control Lever
- L. Cap Screw (2 used)

- M. Nut (2 used)
- N. Bracket
- O. Cap Screw (2 used)
- P. Knob
- Q. Bracket
- R. Screw



KV18221

- S. Throttle Lever
- T. Overtravel Spring

Reason:

To make sure injection pump throttle lever is against the slow idle stop when control lever is in the slow idle position, and against the fast idle stop when control lever is in the fast idle position.

Procedure:

Adjust throttle cable (D) at cable mounting nuts, yoke (C), and ball stud (F), so throttle lever (S) is against one side of the overtravel spring (T) when control lever (K) is in the slow and fast idle positions.

FUEL INJECTION PUMP TIMING ADJUSTMENT

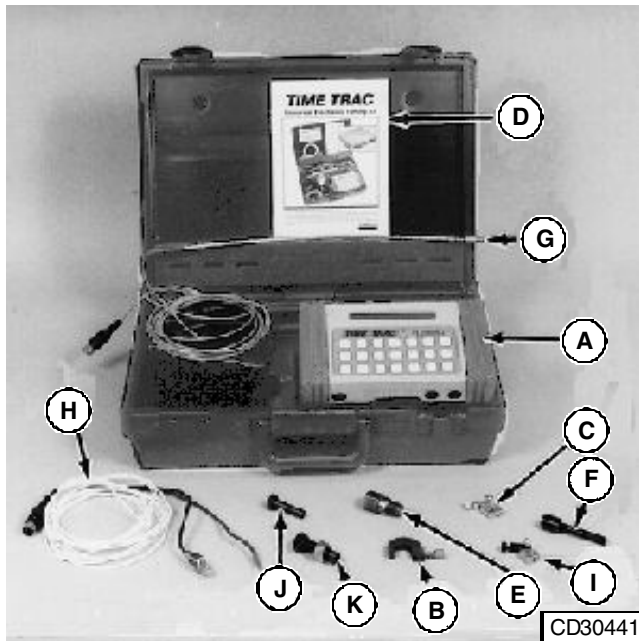
Dynamic Timing

Reason:

To make sure injection pump timing is set to specification.

Equipment:

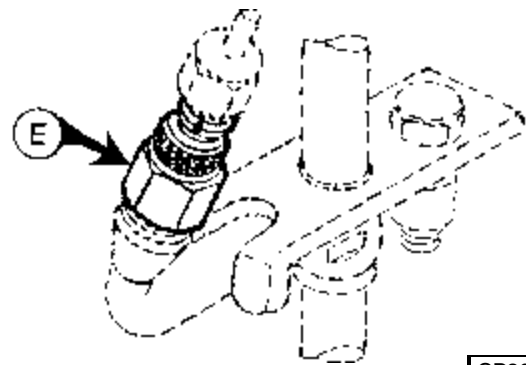
JT07158 TIME TRAC Kit



- A. Meter
- B. Sensor Clamp
- C. 6 mm Clamp-On Transducer
- D. Instruction Manuals
- E. JT07155 9/16 in. SOI Sensor
- F. JDE81-4 Timing Pin
- G. Magnetic Probe
- H. Transducer Cable
- I. 1/4" Clamp-On Transducer
- J. JDG821 Magnetic Probe Adapter
- K. JDG793 Magnetic Probe Adapter

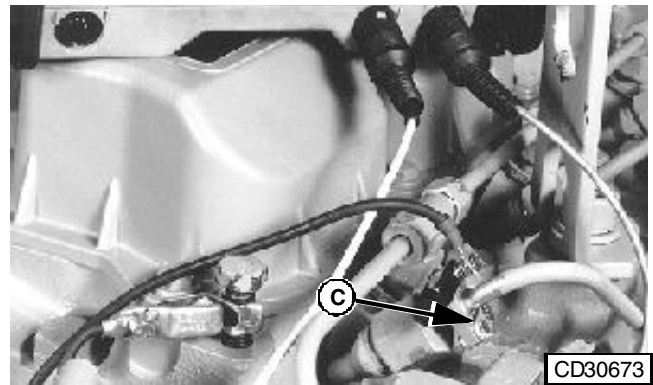
JT07158 TIME TRAC Kit electronically indicates the start of injection with respect to the piston top dead center (TDC), and allows accurate setting of injection pump timing to provide optimum engine performance while complying with exhaust emission regulations.

Timing Sensor Installation:



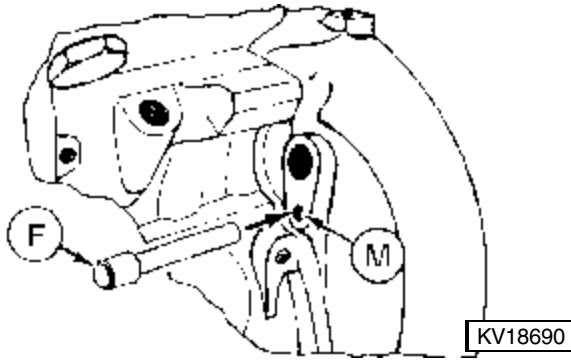
IMPORTANT: SOI sensor must be installed at nozzle end of No. 1 fuel injection line. If access to No. 1 line is restricted, sensor can be installed on No. 4 injection line on 4-cylinder engines.

1. Install JT07155 9/16 in. SOI sensor (E) between No. 1 nozzle and high pressure fuel line.
2. Using two wrenches, tighten sensor and fuel pressure line to 30 N•m (22 lb-ft).

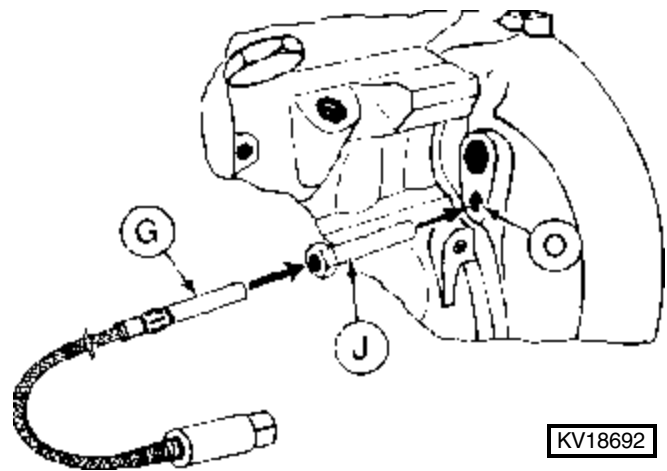


NOTE: If clearance does not allow proper installation of the 9/16 in. SOI sensor (E), JT07178 clamp-on transducer (C) can be installed close to injection nozzle. Remove paint on injection line before installation.

Magnetic Probe Installation:

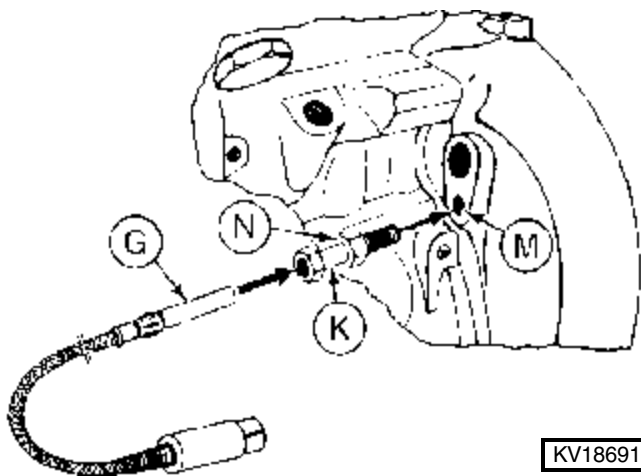


IMPORTANT: Use JDE81-4 timing pin (F) in flywheel housing timing hole (M) to ensure engine is NOT at No. 1 TOP DEAD CENTER. At No. 1 TDC, flywheel timing hole will align with flywheel housing timing hole (M). The magnetic probe (G) would be damaged if installed with flywheel at this location.



Installation of Flywheel Housing with SMOOTH Timing Hole:

1. Install JDG821 Magnetic Probe Adapter (J) into flywheel housing smooth hole (O). Lightly tap adapter to lock into position.
2. Insert magnetic probe (G) into adapter until it contacts flywheel. Pull magnetic probe back out to provide 0.65 mm (0.025 in.) recommended air gap.



Installation of Flywheel Housing with TAPPED Timing Hole:

1. Install JDG793 Magnetic Probe Adapter (K) into flywheel housing tapped hole (M) until it bottoms.
2. Insert magnetic probe (G) into adapter until it contacts flywheel. Back out hex head of adapter two flats and tighten lock nut (N). This will provide the 0.65 mm (0.025 in.) recommended air gap.

Timing Sensor and Magnetic Probe Connection:



1. Connect 9/16 in. SOI sensor (E) or clamp-on transducer (B) to meter socket "SR" (Q) with transducer cable (H). Also connect ground cable wire.

IMPORTANT: Observe correct polarity to avoid possible damage to meter.

2. Connect magnetic probe (G) to meter socket "MP" (P).