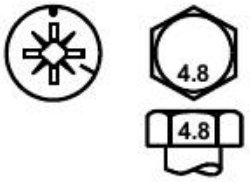
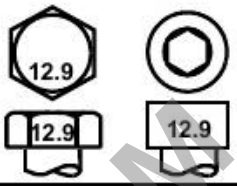
Specifications

Metric Fastener Torque Values

Property Class and Head Markings	4.8	8.8	9.8	10.9	12.9
					
Property Class	5	10		10	12
					

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M35913

1. Connect fuel injection nozzle to D01109AA Diesel Fuel Injection Nozzle Tester using parts from D01110AA Adapter Set and 23622 Straight Adapter.

Procedure 1:

Test fuel injection nozzle opening pressure following the Nozzle Tester manufacturer's instructions.

Specification:

Opening Pressure. . . . . 12300 - 13300 kPa (1784 - 1929 psi)

Results:

- If pressure reading does not meet specification, disassemble injection nozzle and inspect nozzle assembly for contamination or stuck valve. If necessary, add or remove shims to change opening pressure.

Procedure 2:

Test fuel injection nozzle leakage following the Nozzle Tester manufacturer's instructions.

1. Dry nozzle completely using a lint-free cloth.
2. Pressurize nozzle to 11032 kPa (1600 psi).
3. Watch for leakage from nozzle spray orifice. Leakage time should be a minimum of 5 seconds.

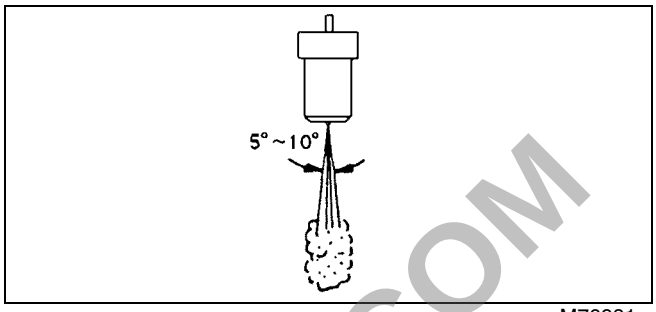
Results:

- If leakage time does not meet specification, disassemble injection nozzle and inspect nozzle assembly for contamination. Inspect valve seating surface. Replace nozzle assembly if necessary.

Procedure 3:

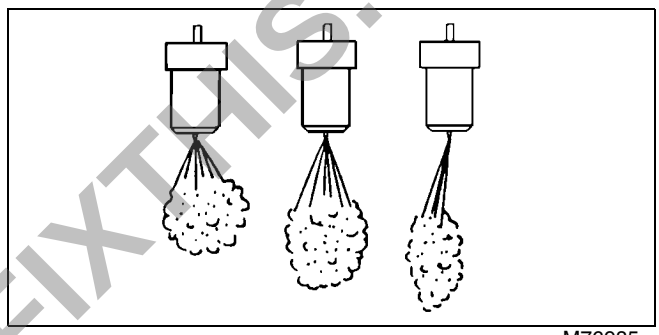
Test fuel injection nozzle chatter and spray pattern following the Nozzle Tester manufacturer's instructions.

1. Pressurize nozzle to 12300 - 13300 kPa (1784 - 1929 psi).



M76981

Picture Note: Correct spray pattern



M76985

Picture Note: Poor spray patterns

2. Listen for “chatter” sound and watch spray pattern.

Specifications:

Slow Hand Lever Movement . . Chatter Sound with Fine Stream Spray Pattern

Fast Hand Lever Movement . . . . . Fine Atomized Spray Pattern

Results:

- If nozzle chatter or spray pattern does not meet specifications, disassemble injection nozzle and inspect nozzle assembly for contamination. See “Fuel Injection Nozzle” on page 97 for inspection procedure.
- Inspect valve seating surface. Replace nozzle assembly if necessary.
- If there is excessive difference in spray angle or injection angle, incomplete atomization or sluggish starting/stopping of injection, disassemble injection nozzle and inspect nozzle assembly for contamination. See Fuel Injection Nozzle Repair section. Replace nozzle assembly if necessary.

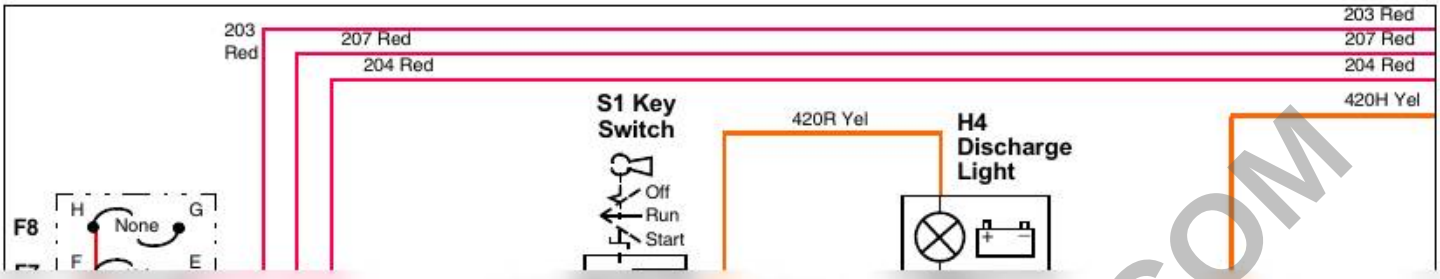
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Schematics and Harnesses

Schematic 1 of 3

Main Schematic



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Air System Theory of Operation

Function:

The air intake system filters air needed for combustion. The system components include: air inlet tube, air cleaner housing and cover, unloader valve (and rubber clean-out valve), primary air filter element, secondary (or safety) air cleaner element, air cleaner restriction indicator, and outlet tube.

Theory of Operation:

Air enters the air cleaner inlet tube and into the air cleaner housing, and is directed into the side of a shield. This starts a high-speed centrifugal motion of air which continues around the element until it reaches the far end of the air cleaner housing, to an unloader valve.

Most of the dust is separated from the air by centrifugal force that causes heavy dust particles to enter the opening at the top of the unloader valve. The air flows through the primary air filter element. The primary filter element filters the larger dirt particles before the air enters the secondary air filter element. The finer dirt particles are filtered out by the secondary air filter before the air enters the intake manifold/rocker cover.

The dirt that is deposited in the unloader valve is removed through the rubber diaphragm at the base of the air cleaner. When the engine is running, a pulsing action is created in the intake system by each intake stroke of the engine. This pulsing action causes the rubber diaphragm to open and close, thus emptying the unloader valve. The operator can squeeze the valve to let the large particles out.

The difference in pressure between the intake manifold and air cleaner is monitored by the Air Cleaner Restriction Indicator. As the air filters become clogged, and intake manifold vacuum increases, the restriction indicator piston is pulled down against spring tension, and it shows when it's time to change air cleaner.

Diagnostics

Engine Troubleshooting and Diagnostics

Park machine safely before performing diagnostic procedures. See "Park Machine Safely" in the Safety section.

Caution: Avoid Injury! Engine coolant is extremely hot during operation.

Caution: Avoid Injury! The engine may start to rotate at any time. Keep hands away from all moving parts when testing.

Engine Oil Diagnostics

Symptom: Crankcase Contamination

Problem	Cause - Solution
1. Fuel in crankcase.	a. Broken or seized piston ring - replace rings and check cylinder.
	b. Seized intake/exhaust valve - replace valve and check valve guide.
	c. Piston ring, piston or cylinder worn - bore or hone cylinder and replace piston.
2. Water in crankcase.	a. Leaking cylinder head gasket - replace head gasket.
	b. Cracked water jacket - repair or replace water jacket.

Symptom: Low Oil Pressure

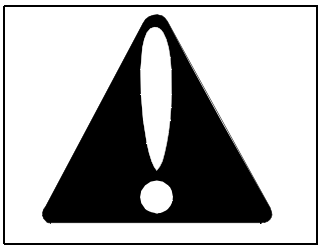
Problem	Cause - Solution
1. Oil level low.	a. Add oil.
2. Oil filter clogged.	a. Replace oil filter.
3. Incorrect viscosity	a. Check oil for too low viscosity, or coolant-or-fuel-diluted engine oil.
	b. Change engine oil.
4. External oil leaks	a. Repair as necessary
5. Oil pressure relief valve worn.	a. Clean, adjust or replace relief valve.
6. Oil pump defective.	a. Remove and inspect oil pump.

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Safety

Recognize Safety Information



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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

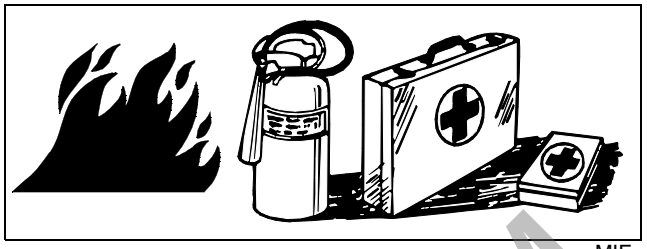


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Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.

Handle Fluids Safely - Avoid Fires

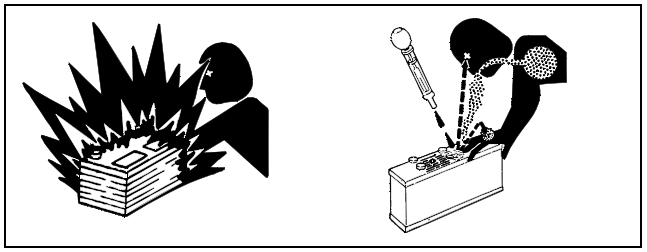
Be Prepared For Emergencies



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- 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



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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.

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Table of Contents

Specifications 7
Metric Fastener Torque Values 7
Inch Fastener Torque Values 8
O-Ring Seal Service Recommendations 9
Face Seal Fittings With Inch Stud Ends Torque 9
Face Seal Fittings With Metric Stud Ends Torque 10
O-Ring Face Seal Fittings 11
O-Ring Boss Fittings 11
Straight Fitting or Special Nut Torques 11
Metric Fastener Torque Value - Grade 7.....12
General Information.....12
Diesel Fuel 12
Diesel Fuel Lubricity 12
Diesel Fuel Storage.....13
4 - Cycle Diesel Engine Oil.....13
Break-In Engine Oil - Diesel 13
Transaxle Oil 14
EMFWD Differential Oil 14
Alternative Lubricants.....14
Synthetic Lubricants 14
Lubricant Storage 14
Mixing of Lubricants 14
Oil Filters 14
Brake Fluid 15
Chassis Grease.....15
Coolant 15
Recommended Engine Coolant 15
Engine Coolant Drain Interval 16
Serial Number Locations 16
Product Serial Number 16
Engine Serial Number Location.....16

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3. Avoiding breathing fumes when electrolyte is added.
4. Avoiding spilling or dripping electrolyte.
5. Use proper jump start procedure.

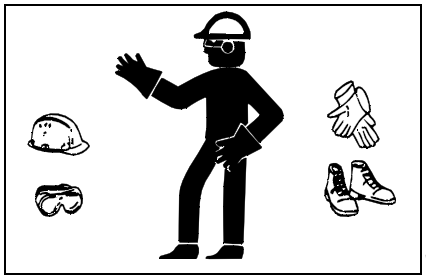
If you spill acid on yourself:

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.
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.

Wear Protective Clothing



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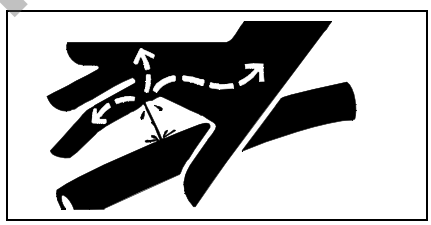
Wear close fitting clothing and safety equipment appropriate to the job.

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.

Use Care Around High-pressure Fluid Lines

Avoid High-Pressure Fluids



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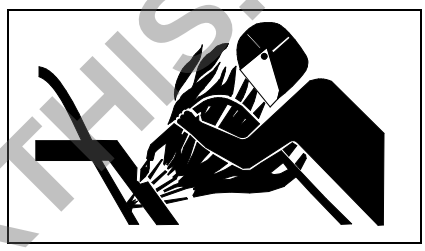
Escaping fluid under pressure can penetrate the skin causing serious injury.

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.

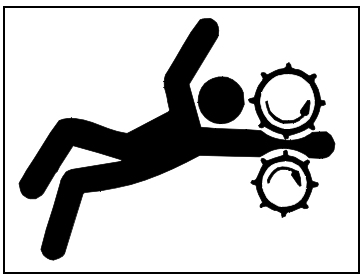
Avoid Heating Near Pressurized Fluid Lines



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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.

Service Machines Safely



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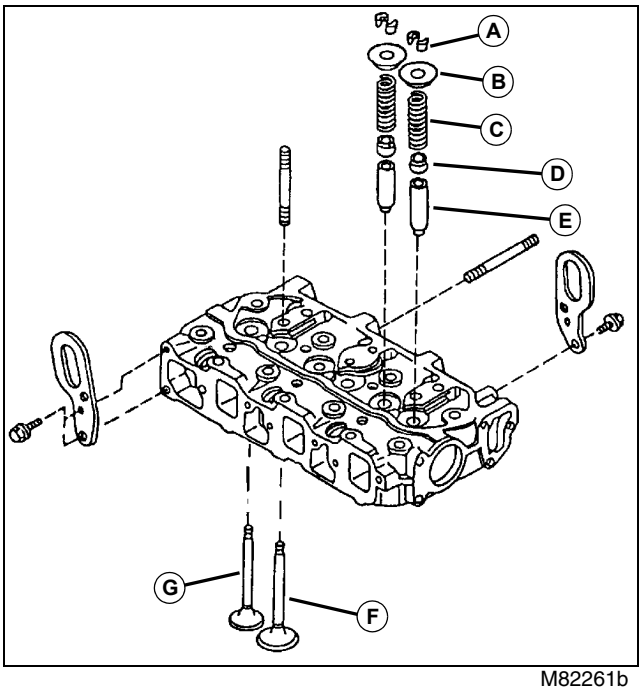
Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

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

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Disassembly:



M82261b

1. Compress valve springs (C) using JDE138 valve spring compressor.

Note: It may be necessary to tap on valve spring retainer (B) while initially operating compressor to break retainer free from collets.

2. Remove collet halves (A) from retainer (B).

3. Slowly release compressor and valve spring.

4. Remove valve spring (C), stem seal (D), and valve (G or F) from head.

5. Intake and exhaust valve guides (E) and seats are press fit. Remove guides only if replacement is necessary. See "Valve Guides:" later in this procedure.

6. Inspect all parts for wear or damage. Clean all carbon deposits and measure all parts for proper clearances.

Assembly:

Important: Avoid Damage! Do not reuse valve stem seals. Used seals will leak.

1. Apply clean engine oil on intake and exhaust valve stems during assembly.

2. Install springs with smaller pitch end or paint mark toward cylinder head.

Note: If new valves are installed, measure valve recession. See "Valve Recession Measurement".

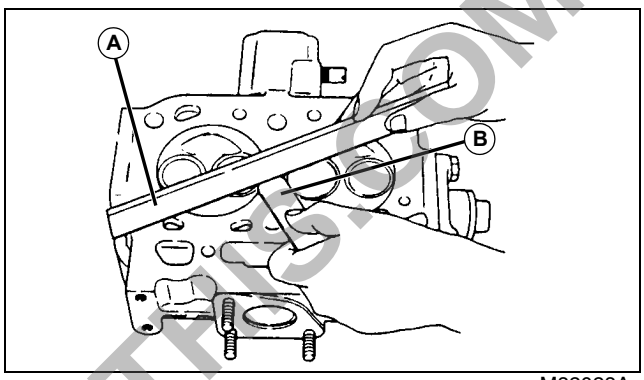
3. Use valve spring compressor to compress spring and retainer, and install collets as removed.

4. After each valve has been assembled, tap on top of valve stem with a plastic hammer to seat retainer.

Inspection/Replacement:

Before inspection, thoroughly clean all components of carbon or dirt.

Cylinder Head:



M82028A

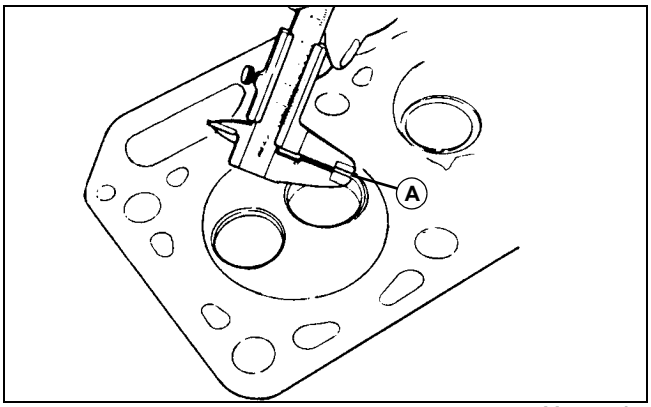
- Measure cylinder head flatness. Place a straight-edge (A) along each of the four sides and each diagonal. Measure clearance between straight edge and combustion surface with a feeler gauge (B).

Cylinder Head Distortion:

Standard . . . . . 0.05 mm (0.002 in.) or less
Wear Limit . . . . . 0.15 mm (0.006 in.)

If distortion exceeds the wear limit, replace the cylinder head.

- Measure valve recession. See procedure in this group.



M82029A

- Measure valve seat width (A).

Intake Valve Seat Width Specifications:

Standard . . . . . 1.028 - 1.202 mm (0.041 - 0.047in.)

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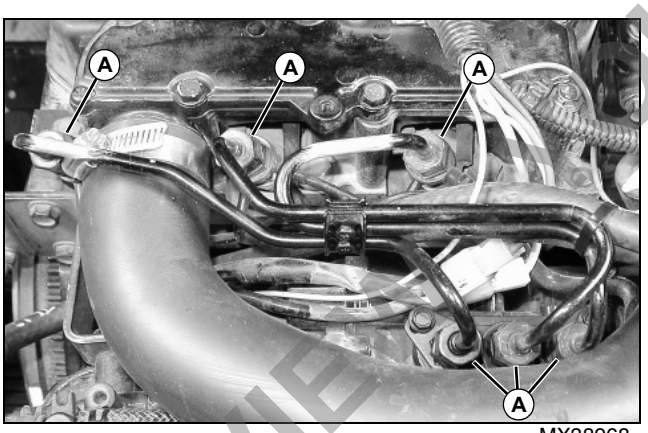
Important: Avoid Damage! Never steam clean or pour cold water on injection pump while the pump is running, or engine is warm. Doing so can damage the pump.

When removing injection lines, DO NOT turn pump delivery valve fittings. Turning fittings may damage pump internally. Always use a backup wrench when removing lines.

1. Park machine safely. See "Park Machine Safely" in the Safety section.
2. Allow engine to cool.
3. Raise and lock cargo box.
4. Clean the injection pump lines and area around the pump using a parts cleaning solvent or steam cleaner.

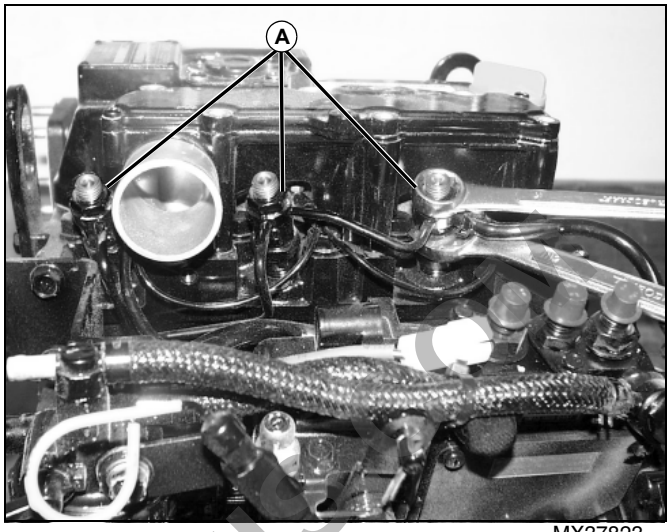
Important: Avoid Damage! When removing injection lines, Do not turn pump delivery valve fittings. Turning fittings may damage pump internally. Always use a backup wrench when removing lines.

Note: Nozzles are matched to the cylinders. If removing more than one nozzle, tag nozzles, according to the cylinder from which it was removed.



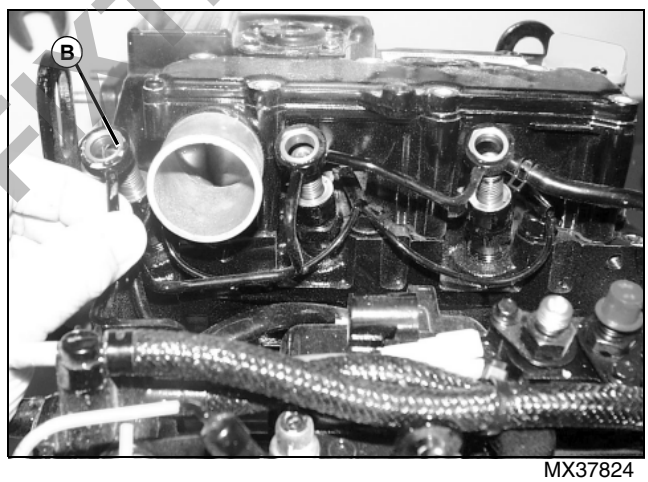
MX38968

5. Loosen fuel line connectors (A) at injection pump and injector nozzles.
6. Remove fuel lines and cap all openings to prevent dirt from entering system.



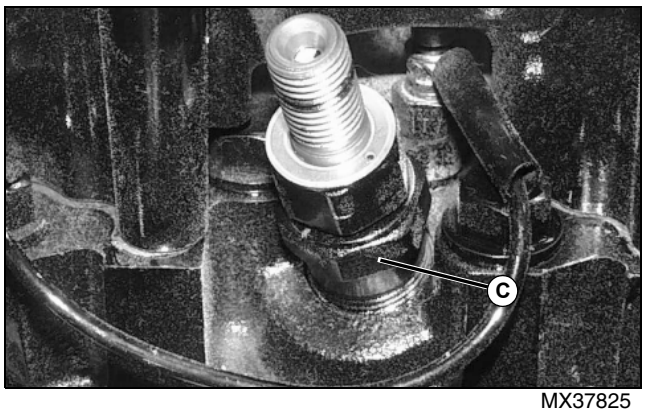
MX37823

7. Use a backup wrench on injector body and remove three nuts (A).



MX37824

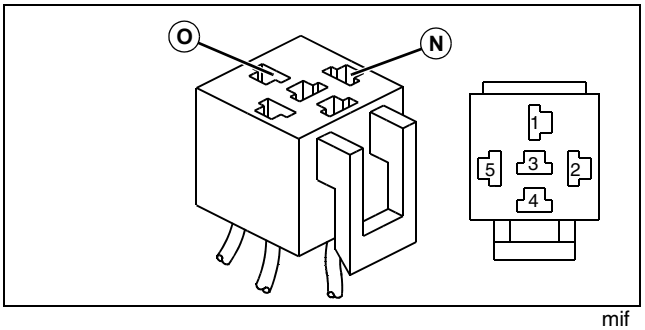
8. Remove return fuel line (B).



MX37825

9. Place a wrench on the larger hex (C) of the nozzle housing and remove injector.

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14. Remove relay. Is battery voltage present at terminal 2 (85) of K3 4WD interlock relay connector, 420Q Yel wire (N)?

Yes: Go to next step.

No: Check 420Q and 420D Yel wires.

15. Is battery voltage present at terminal 1 (30) of K3 4WD interlock relay connector, 420X Yel wire (O)?

Yes: Install relay. Test complete or go to static switched power tests.

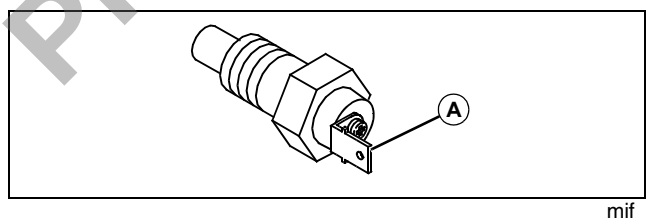
No: Check 420X Yel wire and connections.

Test Procedure C:

Test Conditions

- Machine parked safely. See “Park Machine Safely” in the Safety section.
- Unswitched power circuits OK.
- Switched power circuits OK.
- Key switch in run position with engine not running.
- Open hood and remove storage tray.
- Negative (Blk) lead of voltmeter placed on battery negative (-) terminal or suitable frame ground.
- Voltmeter positive (Red) placed on designated test point.
- Ensure that frame, harness, and engine grounds are clean and secure with good continuity.
- Check wires and connections for looseness and corrosion.

Static Switched Circuits

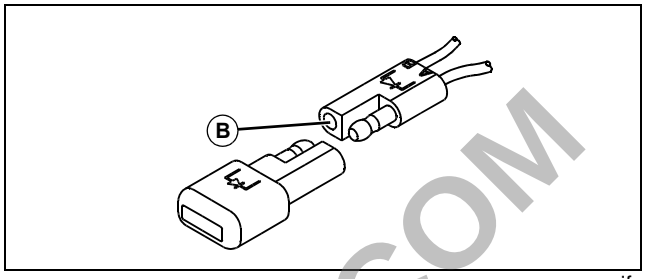


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1. Is battery voltage present at B2 engine coolant temperature switch, 300 Org wire (A)?

Yes: Go to next step.

No: Test H2 engine coolant temperature bulb. Check 300 Org wire and Yel engine wire and connections.

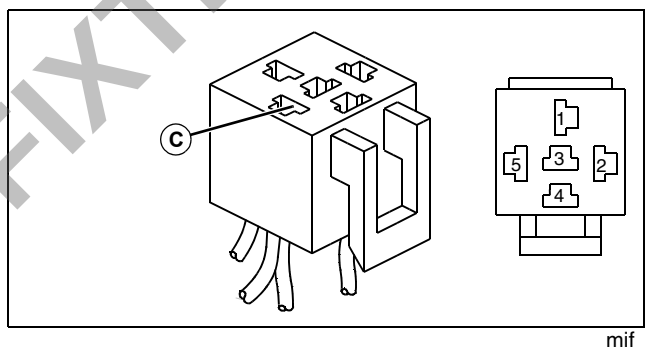


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2. Disconnect V1 diode. Is battery voltage present at V1 diode 301 Org wire (B)?

Yes: Install diode. Go to next step.

No: Test H2 engine coolant temperature bulb. Check 301 Org wire and connections.

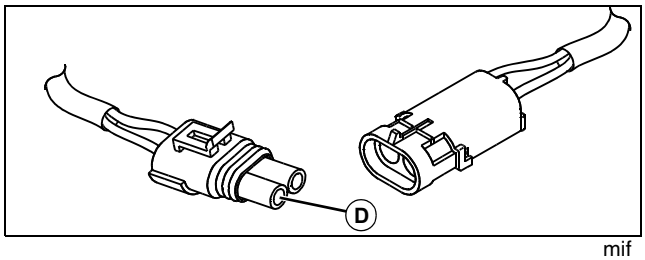


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3. Remove relay. Is battery voltage present at terminal 5 (86) of K1 start relay connector, 705 Pur wire (C)?

Yes: Install relay. Go to next step.

No: Test V1 diode. Check 302 Org and 705 Pur wires.



mif

4. Disconnect B1 radiator temperature switch connector. Is battery voltage present at pin B of main wire harness, 310 Org wire (D)?

Yes: Connect switch. Go to next step.

No: Test K2 fan relay. Check 310 Org wire and connections.

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Tests and Adjustments

Common Circuit Tests

Shorted/Grounded Circuit:

A shorted circuit on the ground side of a component (i.e. improper wire-to-wire or wire to ground contact) may result in improper component operation.

A shorted circuit on the power side of a component or contact of two power circuits (i.e. improper wire-to-wire or wire to ground contact) may result in blown fusible link and fuses.

To test for a shorted or improperly wired circuit:

1. Turn component switch on.

2. Start at the controlling switch of the component that is not be operating.

3. Follow the circuit and disconnect wires at connectors until components stop operating.

4. Shorted or improper connections will be the last two wires disconnected.

High Resistance or Open Circuit:

High resistance or open circuits usually result in slow, dim, or no component operation (i.e. poor, corroded, or severed connections). Voltage at the component will be low when the component is in operation. To test for high resistance and open circuits:

1. Check all terminals and ground connections of the circuit for corrosion.

2. If terminals are not loose or corroded, the problem is in the component or wiring.

Ground Circuit Tests

Reason:

To check for open circuits, loose terminal wire crimps, poor connections, or corrosion in the ground circuit.

Equipment:

- Ohmmeter or Voltmeter

Note: The voltmeter method checks ground connections under load.

Procedure - Ohmmeter Method:

1. Park machine safely. See “Park Machine Safely” in the Safety section.

2. Raise and lock cargo box.

3. Connect ohmmeter red lead to ground terminal of circuit or component to be tested that is closest to the battery negative terminal. Work backward from the battery on the ground side of the problem circuit until the resistance reading increases above 0.1 ohms. If the reading is above 0.1 ohms, the problem is between the last two test points. If a problem is indicated, disconnect the wiring harness connector to isolate the wire or component and check resistance again. Maximum allowable resistance in the circuit is 0.1 ohms. Check both sides of the connectors closely, as disconnecting and connection may temporarily solve problem.

Procedure - Voltmeter Method:

1. Park machine safely. See “Park Machine Safely” in the Safety section.

2. Turn key switch to on position.

3. Raise and lock cargo box.

4. Connect voltmeter negative (black) lead to negative (-) terminal of battery.

5. Connect voltmeter positive (Red) lead to ground terminal of circuit or component to be tested. Be sure that the component circuit is activated (key on, switch(es) closed) so that voltage will be present at the component. Record voltage. Voltage must be greater than 0, but less than 1 volt. Some components will have a very small voltage reading on the ground side and still be operating correctly.

Results:

- If voltage is 0, the component is open.
- If voltage is greater than 1 volt, the ground circuit is bad. Check for open wiring, loose terminal wire crimps, poor connections, or corrosion in the ground circuit.

Charge Battery

Reason:

To increase battery charge after the battery has been discharged.

Equipment:

- Battery charger (variable rate)

Procedure:

Note: See “Battery Test” on page 164 before charging battery.

1. Park machine safely. See “Park Machine Safely” in the Safety section.

2. Raise and lock cargo box.

3. Clean cable ends, battery terminals and top of battery.

4. Remove battery to workbench.

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Cargo Box Lift Wiring Harness

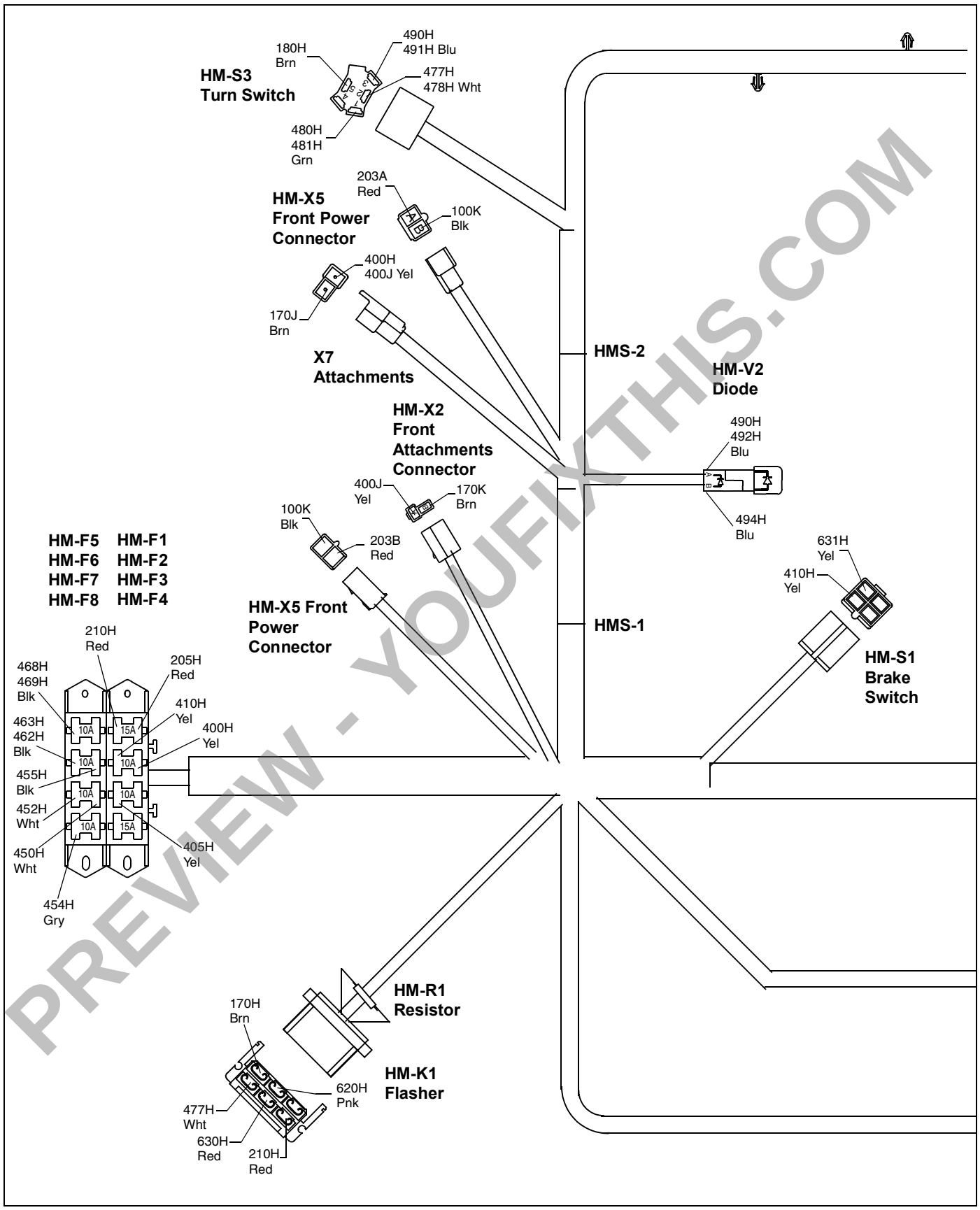


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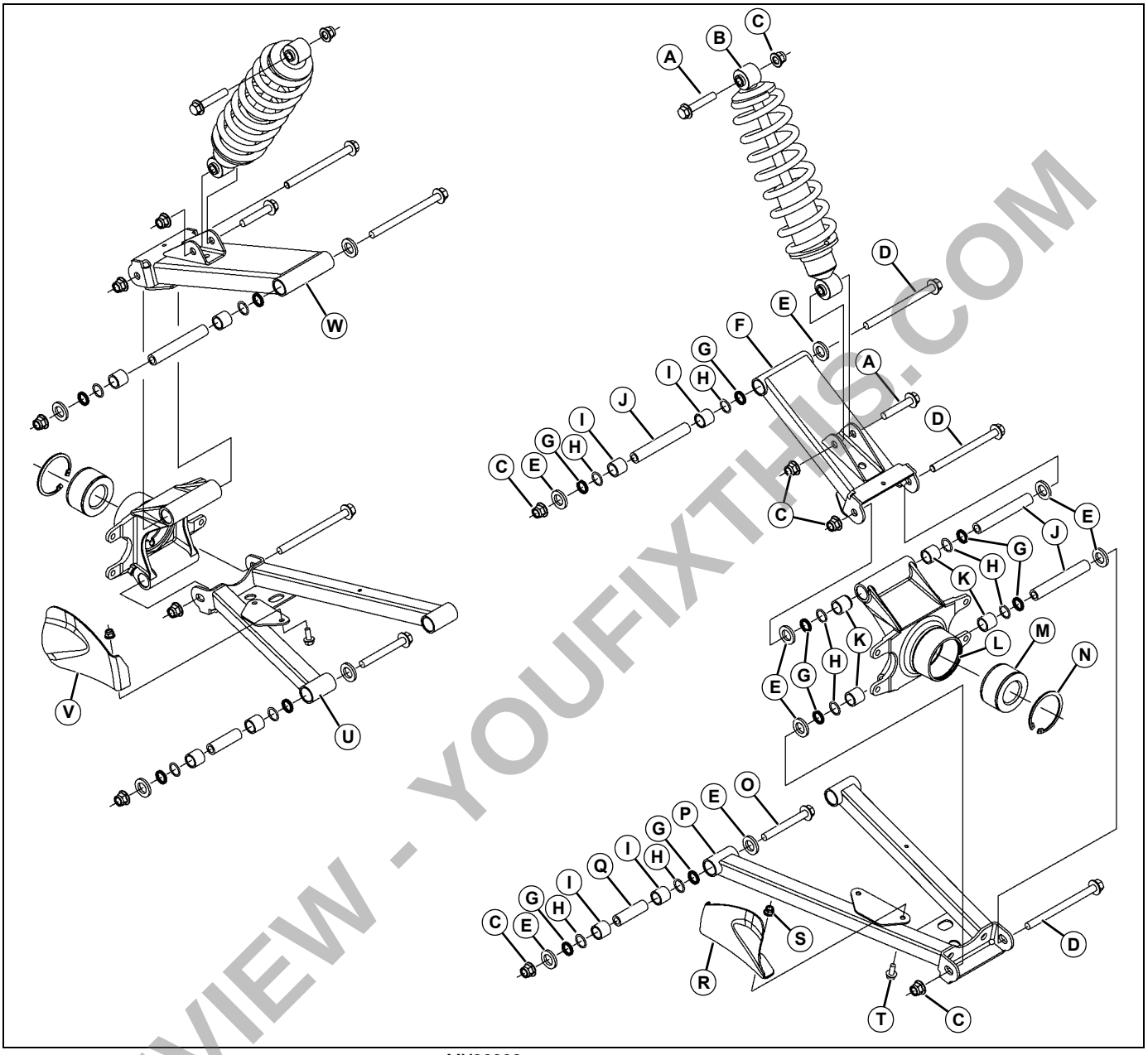
Homologated Light and Horn Wiring Harness



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Rear Suspension

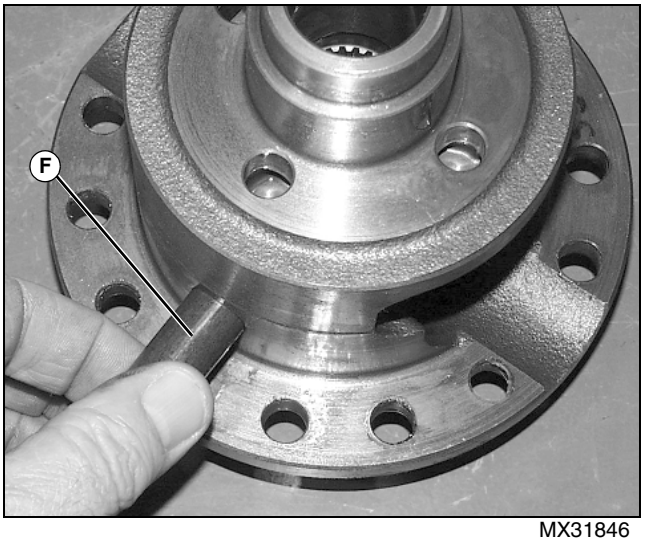


MX38923

A- Screw (4 used)
B- Shock Absorber (2 used)
C- Nut (14 used)
D- Screw (6 used)
E- Washer (20 used)
F- Arm, LH Upper
G- Seal (20 used)
H- O-Ring (20 used)
I- Bushing (12 used)
J- Sleeve (6 used)
K- Bushing (4 used)
L- Housing (2 used)
M- Bearing (2 used)
N- Snap Ring (2 used)
O- Screw (4 used)
P- Arm, LH Lower
Q- Sleeve (4 used)
R- Shield, LH
S- Nut (4 used)
T- Screw (4 used)
U- Arm, RH Lower
V- Shield, RH
W- Arm, RH Upper

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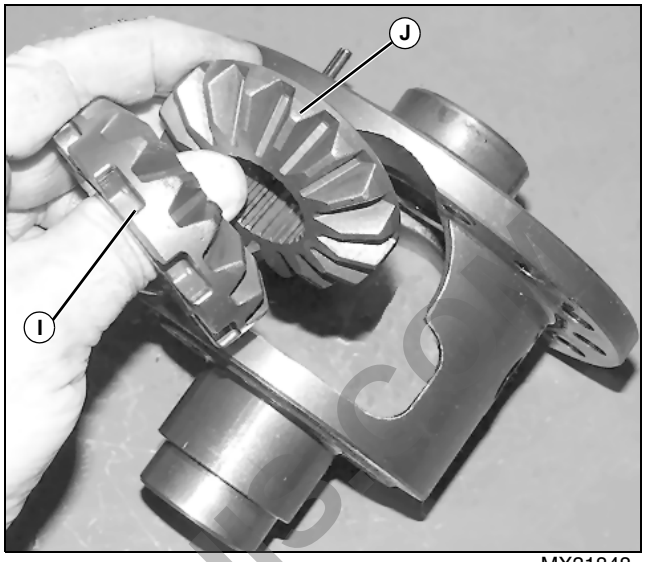
MX31846

6. Remove pinion shaft (F) from case.



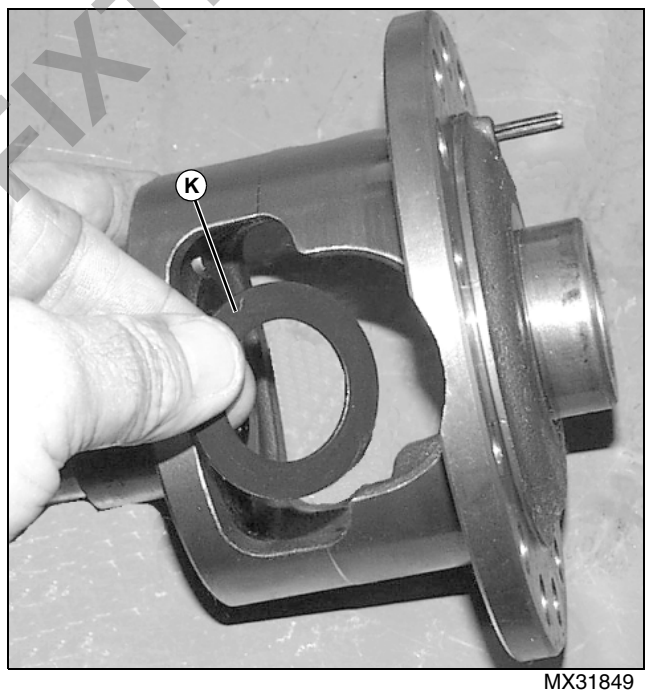
MX31847

7. Turn differential gears to line up with openings in case. Remove pinion gears (G) and washers (H)



MX31848

8. Remove differential side gears (I and J).



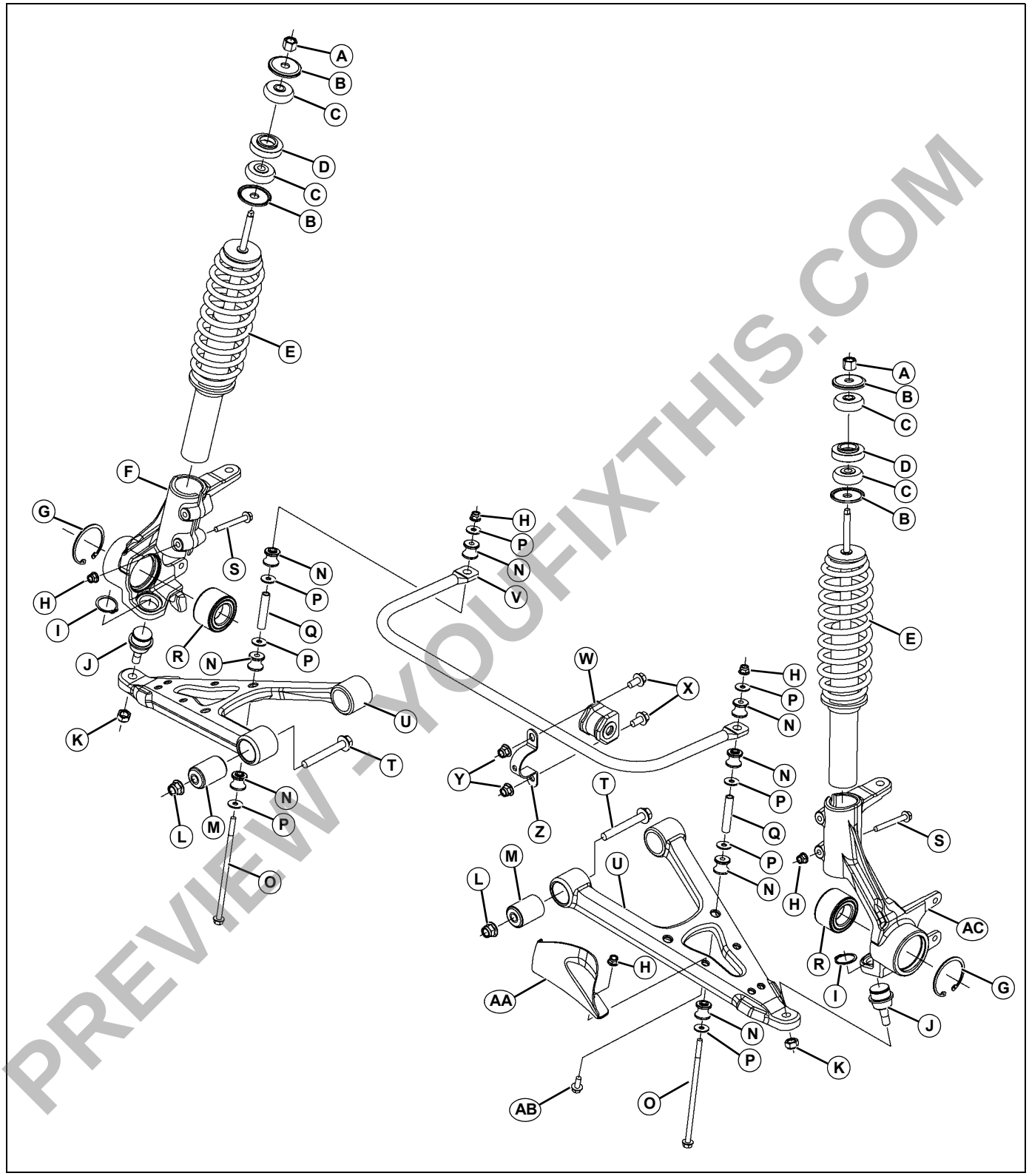
MX31849

9. Remove two side gear thrust washers (K) from case.

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Front Suspension



MX38922

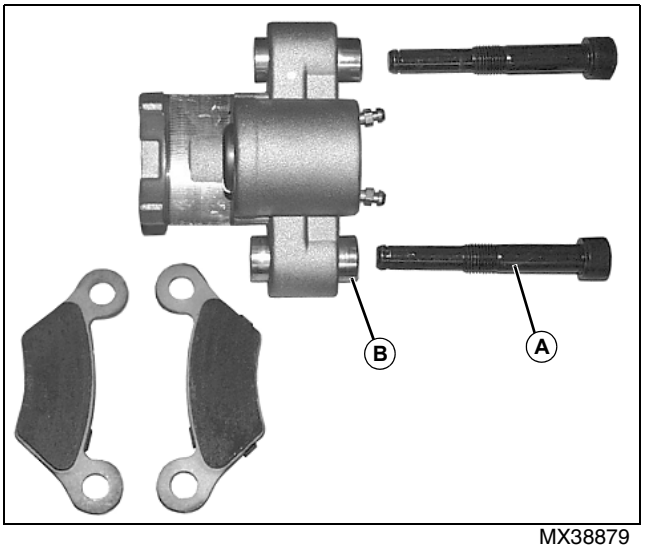
A- Nut (2 used)
B- Washer (4 used)
C- Isolator (4 used)
D- Spacer (2 used)
E- Shock Absorber (2 used)
F- Knuckle, RH
G- Snap Ring (2 used)

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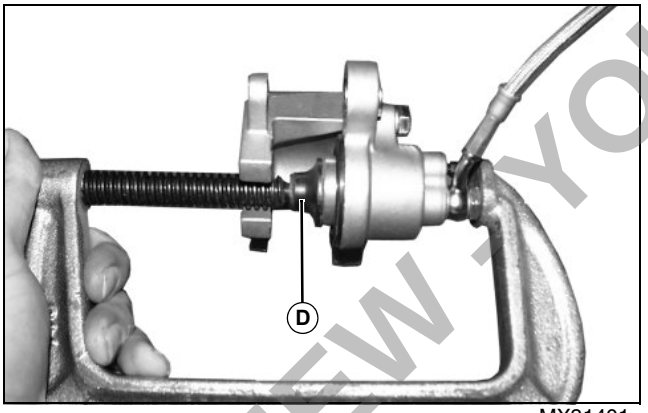
8. Measure the thickness or the brake rotors at the wear area. Minimum thickness is 4.76 mm (0.187 in.). Replace rotors if worn below minimum specification.

Note: Sleeves should move in brake caliper housing.



MX38879

9. Lubricate brake sliding pins (A) and sleeves (C) with ANTI-SEIZE compound.



MX31401

10.Install brake calipers onto disc. It may be necessary to press caliper piston into it's bore with a C-clamp (D) to allow clearance for brake pads.

11.Insert new brake pads, friction material sides toward disc.

12.Install sleeves, sliding pins, and C-clips. Tighten sliding pins to specification.

13.Bleed brake lines if necessary. See "Bleeding Brakes" on page 357.

14.Install wheels.

Specification:

Caliper Sliding Pins . . . . . 41 - 52 N•m (30 - 38 lb-ft)

Master Cylinder Removal and Installation

Important: Avoid Damage! Avoid contamination of the brake fluid. Thoroughly clean area around the filler cap before removing. Do not open the brake fluid reservoir cap unless absolutely necessary.

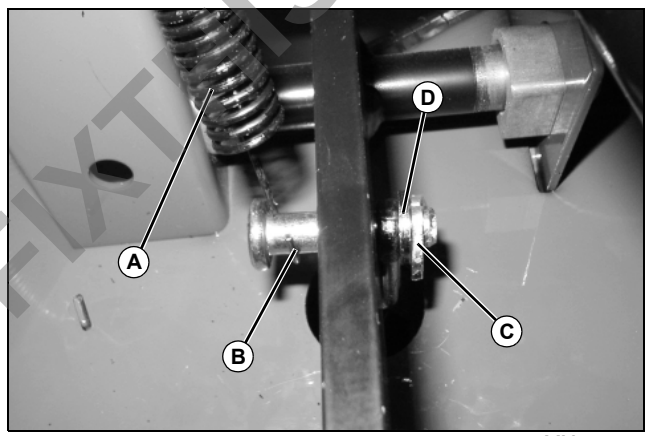
Use extreme care when filling the reservoir. Fluid spilled on painted surfaces can cause damage.

Use only DOT3 brake fluid from a sealed container.

Removal:

1. Park machine safely. See "Park Machine Safely" in the Safety section.

2. Remove hood.

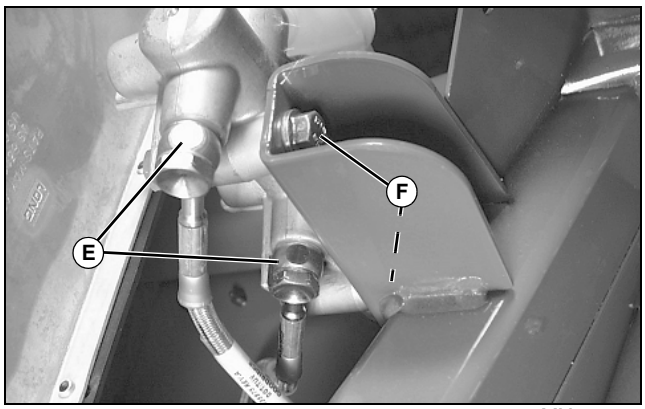


MX31460

Picture Note: Under dash

3. Disconnect brake pedal return spring (A) from pivot pin (B).

4. Remove cotter pin (C), clevis pin, and washer (D) from master cylinder rod clevis.



MX38880

Picture Note: View from bottom.

5. Disconnect brake lines (E) from the master cylinder.

6. Turn the master cylinder rod counter-clockwise to

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