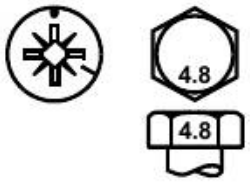
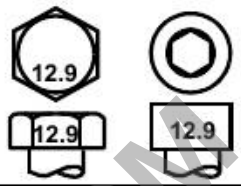
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Property Class	5 	10 	10 	12 

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Tests and Adjustments

Cylinder Compression Test

Reason:

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

Equipment:

- JT01682 Compression Gauge Assembly
- JDG472 Adapter
- (2) 17 mm Open End Wrenches

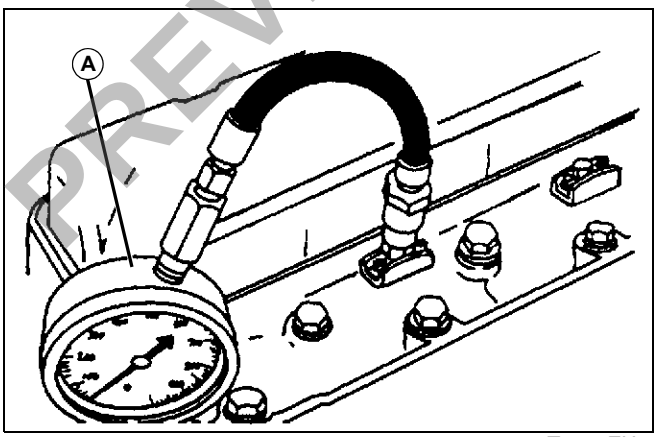
Procedure:

1. Run engine for 5 minutes to bring to operating temperature. Stop engine.

Caution: Avoid Injury! Escaping fluid under pressure can penetrate the skin causing serious injury. Avoid the hazard by relieving pressure before disconnecting high pressure 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 source. Such information is available from the Deere & Company Medical Department in Moline, Illinois, U.S.A.

2. Disconnect wires at fuel solenoid.
3. Remove injection nozzles.



T6333EU

4. Remove heat protector from end of fuel injection nozzle, and install on JDG472 adapter (A).
5. Install JT01682 Compression Gauge Assembly and JDG472 Adapter in injection port.
6. Disconnect fuel shutoff solenoid electrical connector on rear of governor.

Important: Avoid Damage! DO NOT overheat starting motor during test.

7. Crank engine for three seconds with starting motor.
8. Record pressure reading for each cylinder.

Compression Pressure Specifications:

Standard . . . . . 3432 kPa (498 psi)
Minimum Pressure . . . . . 2746 kPa (398 psi)
Maximum Difference Between Cylinders . . 245 kPa (36 psi)
Minimum Cranking Speed . . . . . 250 rpm

Note: Pressure listed is for 300 meters (1000 ft) above sea level. Reduce specification an additional 4% for each 300 meters (1000 ft) of altitude above this level.

Results:

- If pressure reading is below specification, squirt clean engine oil into cylinders through injector ports and repeat test.
- If pressure increases significantly, check piston, rings, and cylinder walls for wear or damage.
- If pressure does not increase significantly after retest, check for leaking valves, valve seats, or cylinder head gasket.

Throttle Cable Adjustment

Reason:

To ensure that throttle cable is allowing throttle lever on governor to reach full high idle and slow idle positions.

Equipment:

- 7 mm and 10 mm Wrenches

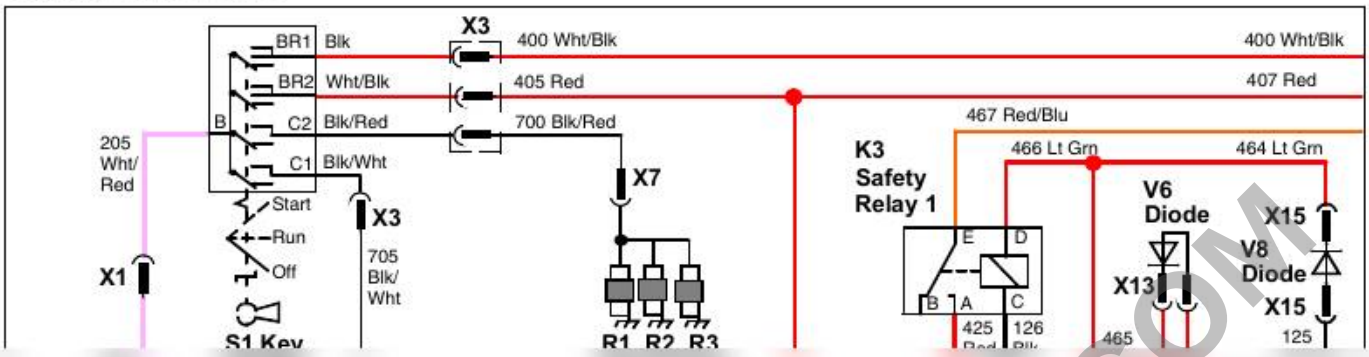
Procedure:

1. Park machine in NEUTRAL safely with park brake LOCKED. See Park Machine Safely in Safety Section.

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Electrical Schematic



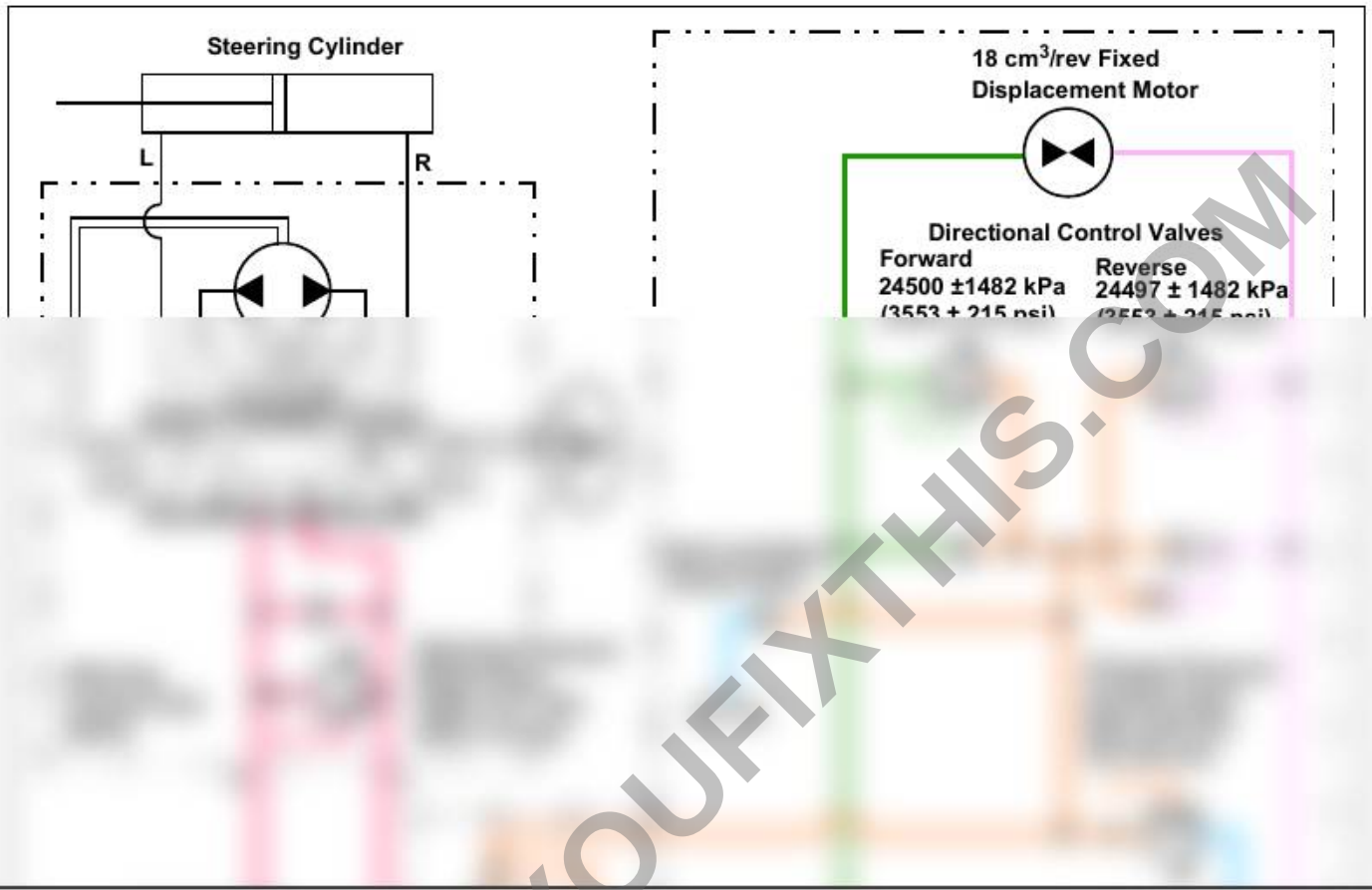
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Schematics and Harnesses

Steering and Drive Hydraulic Schematic



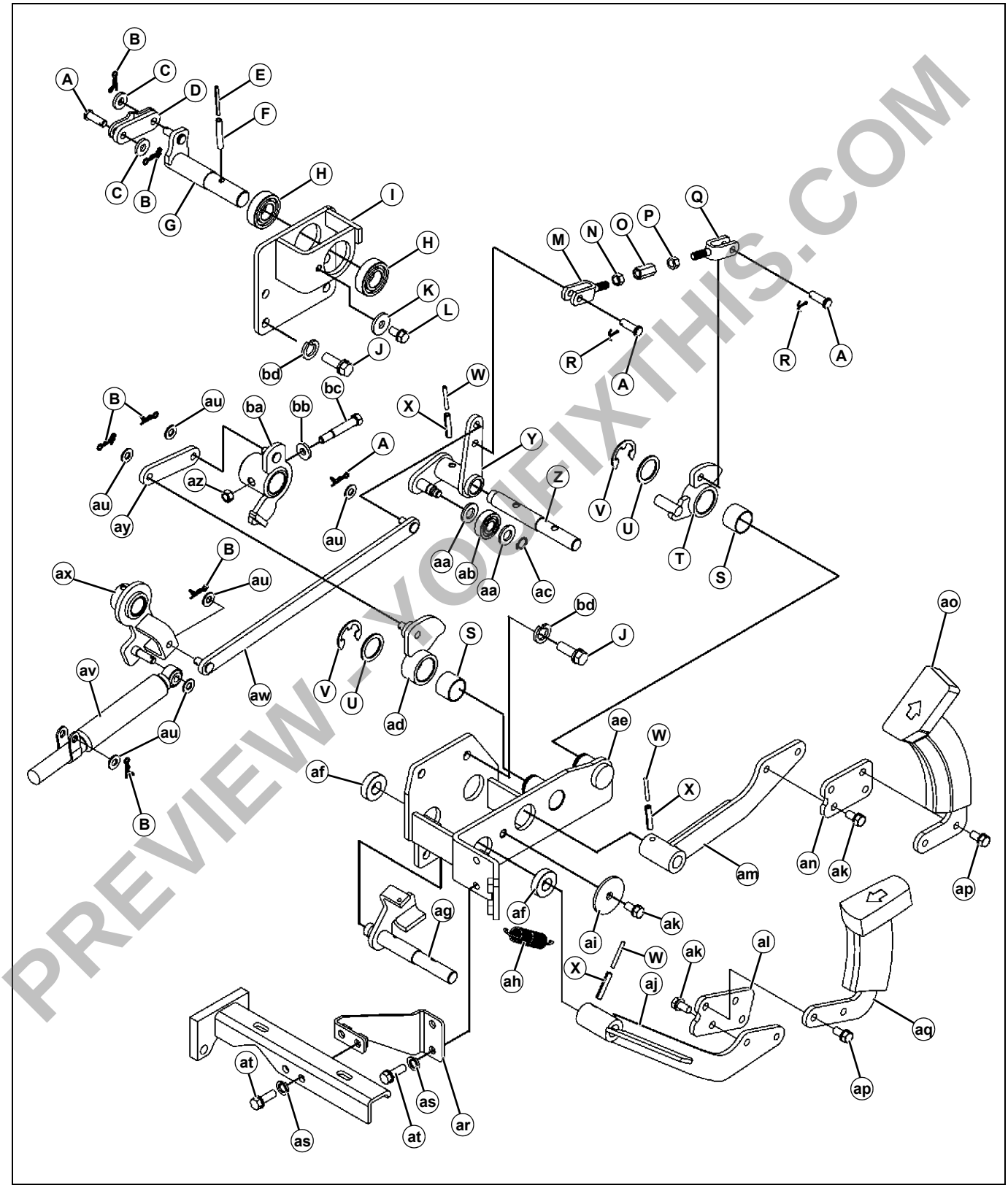
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Component Location

Forward and Reverse Control Pedals and Linkage



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Diagnostics

Engine Starting Problem

Park machine safely before performing diagnostic procedures. See “Parking 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.

Important: Avoid Damage! The slow idle adjustment is the only adjustment that can be made on this engine.

The fast idle and torque capsule adjustments are pre-set by the engine manufacturer to comply with strict EPA/CARB emissions requirements, and are adjustable ONLY by an EPA Authorized Diesel Service (ADS) Center.

Symptom: Engine Does Not Start

Problem	Cause - Solution
1. Starting procedure being used is incorrect for conditions.	a. Use correct procedure for conditions See the Operator’s Manual.
2. Battery voltage low.	a. Recharge battery. See “Battery Voltage and Specific Gravity Test” on page 163 in the Electrical section.
3. Starting motor defective.	a. Replace starting motor.
4. Alternator defective.	a. Repair or replace alternator.
5. Open circuit in wiring.	a. Repair wiring. See “Common Circuit Tests” on page 107 in the Electrical section.
6. Faulty fuel shutoff solenoid circuit or fuel shutoff solenoid.	a. Test electrical circuit, replace fuel shutoff solenoid.
7. Fuel filter clogged.	a. Replace fuel filter.
8. Clogged or cracked fuel lines.	a. Clean or replace fuel lines.
9. Fuel volume to injection pump low.	a. Check or replace fuel transfer pump. See “Fuel Transfer Pump” on page 93.

Symptom: Engine Does Not Start

Problem	Cause - Solution
10. Water in fuel.	a. Check and repair.
11. Improper intake or exhaust valve clearance.	a. Adjust valve clearance.
12. Improper timing between injection pump, intake and exhaust valves.	a. Adjust valve clearance. Check valve timing.
13. Seized intake/ exhaust valve.	a. Replace valve and check valve guide.
14. Broken or seized piston ring.	a. Replace rings and check cylinder.
15. Piston ring, piston or cylinder worn.	a. Bore or hone cylinder and replace piston.
16. Crankshaft pin or bearing seized.	a. Regrind crank and replace bearings.
17. Air entering fuel system.	a. Check and repair fuel supply system.

Symptom: Engine Starts But Does Not Continue Running - Exhaust Smoke Absent

Problem	Cause - Solution
1. Fuel filter clogged.	a. Replace fuel filter.
2. Clogged or cracked fuel lines.	a. Clean or replace fuel lines.
3. Water in fuel.	a. Check and repair.
4. Air entering fuel system.	a. Check and repair fuel supply system.
5. Fuel volume to injection pump low.	a. Check or replace fuel transfer pump. See “Fuel Transfer Pump” on page 93.
6. Improper engine oil viscosity/type.	a. Replace engine oil and filter.
7. Improper intake or exhaust valve clearance.	a. Adjust valve clearance.
8. Crankshaft pin or bearing seized.	a. Regrind crank and replace bearings.
9. Piston ring end gaps not correct.	a. Stagger piston ring gaps.
10. Governor not functioning properly.	a. Repair or replace governor.

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INTRODUCTION

Manual Description

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 and Information
- Identification Numbers
- Tools and Materials
- Component Location
- Schematics and Harnesses
- Theory of Operation
- Operation and Diagnostics
- Diagnostics
- Tests and Adjustments
- Repair
- Other

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

The bleed tabs for the pages of each section will align with the sections listed on this page. Page numbering is consecutive from the beginning of the Safety section through the last section.

We appreciate your input on this manual. If you find any errors or want to comment on the layout of the manual please contact us.

Safety

Specifications and Information

Engine

Electrical

Power Train

Hydraulics

Steering

Brakes

Miscellaneous

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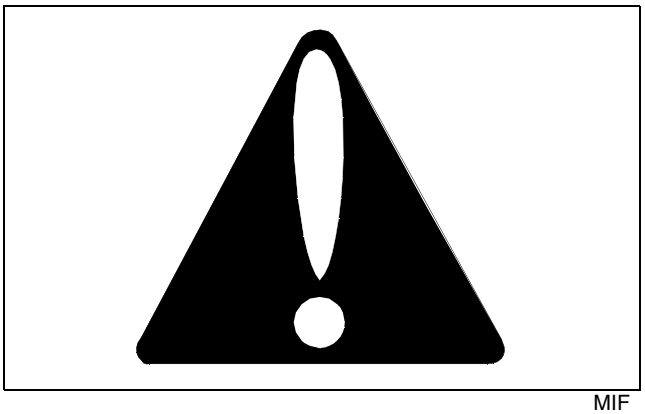
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Safety

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.

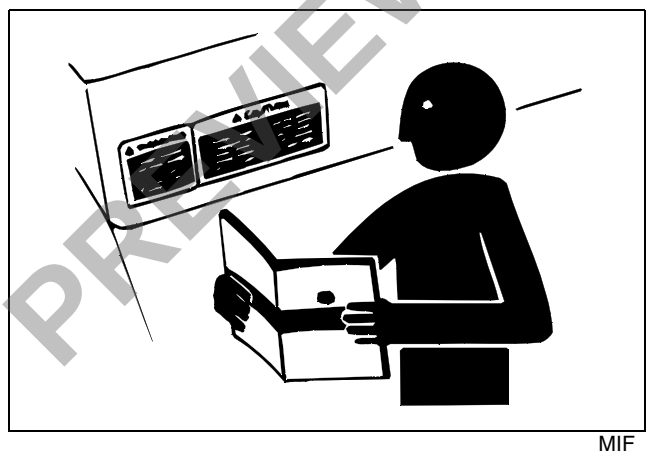
Follow recommended precautions and safe servicing practices.

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

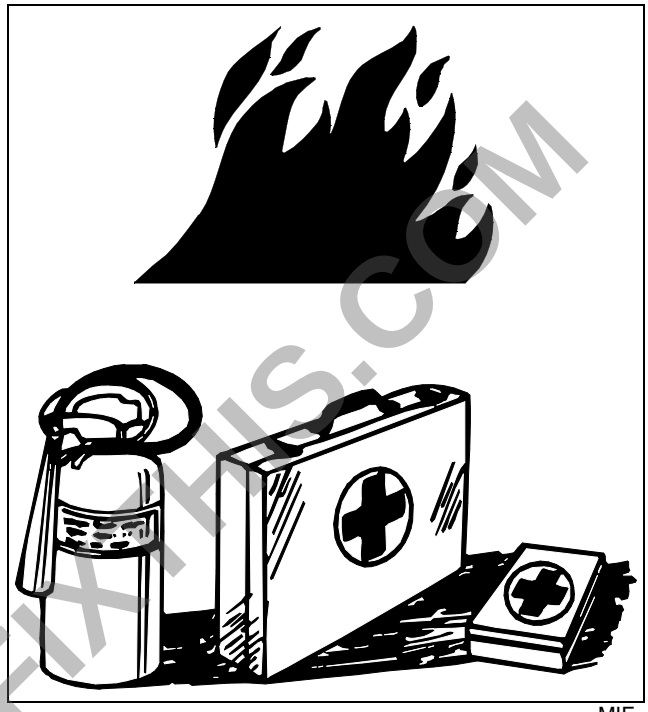


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Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.

Handle Fluids Safely - Avoid Fires

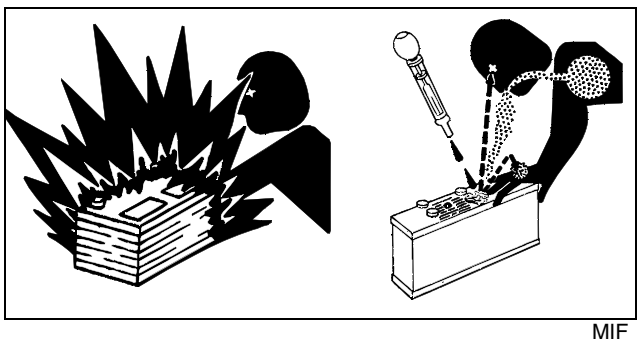
Be Prepared For Emergencies



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

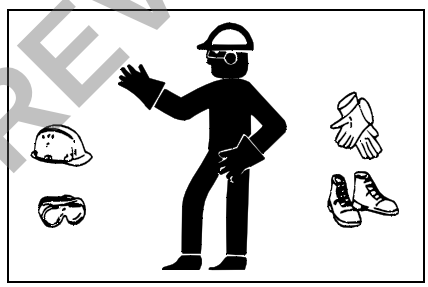
If you spill acid on yourself:

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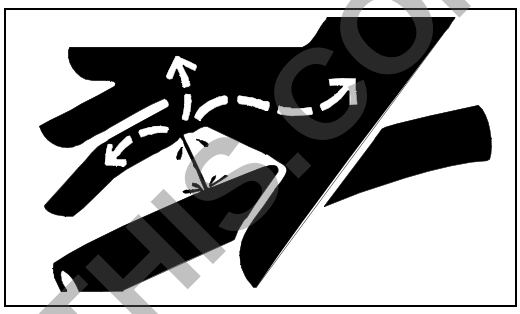
Wear close fitting clothing and safety equipment appropriate to the job.

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.

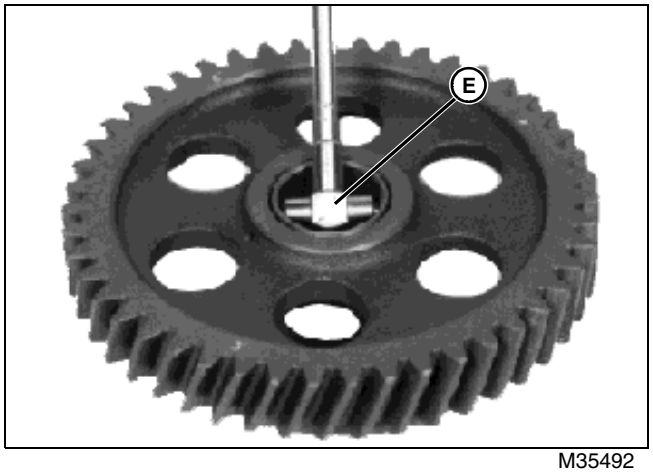
Avoid Heating Near Pressurized Fluid Lines



MIF

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.

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M35492

- Measure idler gear bushing diameter (E).

Idler Gear Bushing Inside Diameter:

Standard . . . . . 20.00 - 20.02 mm (0.787 - 0.788 in.)
Oil Clearance. . . . . 0.02 - 0.06 mm (0.001 - 0.002 in.)
Wear Limit . . . . . 0.15 mm (0.006 in.)

If bushing diameter exceeds wear limit, replace bushing.

To replace bushing:

- Replace bushing using a driver set. Align oil holes in bushing and idler gear. Install bushing flush with surface of idler gear.

If bushing oil clearance (bushing ID minus shaft OD) exceeds specification, replace bushing, shaft or both.

Camshaft Followers

Camshaft Follower Removal and Replacement:

Important: Avoid Damage! Cam followers must be installed in the same bores from which they were removed. Put a mark on each cam follower and cylinder block bore to aid in installation.

1. Remove cylinder head. See “Cylinder Head Removal and Installation” on page 60.

Important: Avoid Damage! Always replace all camshaft followers when installing a new camshaft. Always replace camshaft when installing new followers.

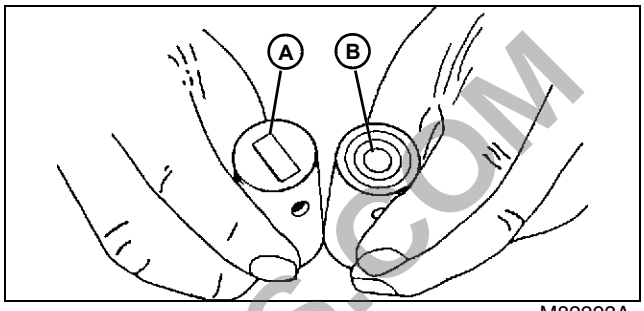
2. Remove cam followers from cylinder block with magnetic pick-up tool.

3. Inspect all parts for wear or damage. (See Inspection procedures below.)

4. Apply clean engine oil on all parts during installation.

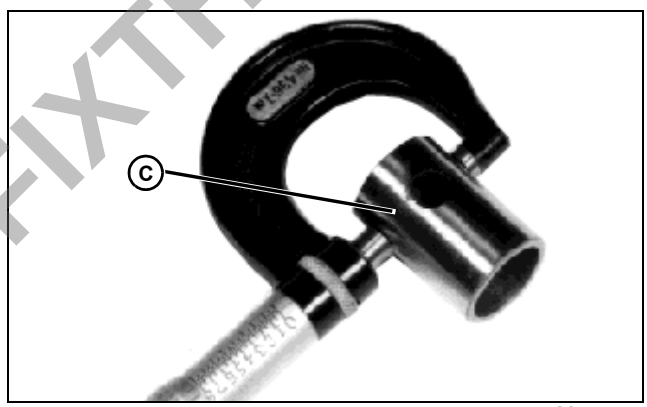
5. Install cam followers after camshaft is installed. Installation is done in the reverse order of removal.

Cam Follower Inspection:



M82293A

- Check cam follower contact surface for abnormal (A) or normal (B) wear.



M35268

- Measure cam follower diameter (C).

Cam Follower Outside Diameter:

Standard 20.93 - 20.96 mm (0.824 - 0.825 in.)
Wear Limit. . . . . 20.90 mm (0.823 in.)

If outside diameter is less than wear limit, replace cam follower.

Measure cam follower bore diameter in cylinder block.

Cam Follower Bore Inside Diameter:

Standard . . . . . 21.00 - 21.02 mm (0.827 - 0.828 in.)
Wear Limit. . . . . 21.05 mm (0.829 in.)

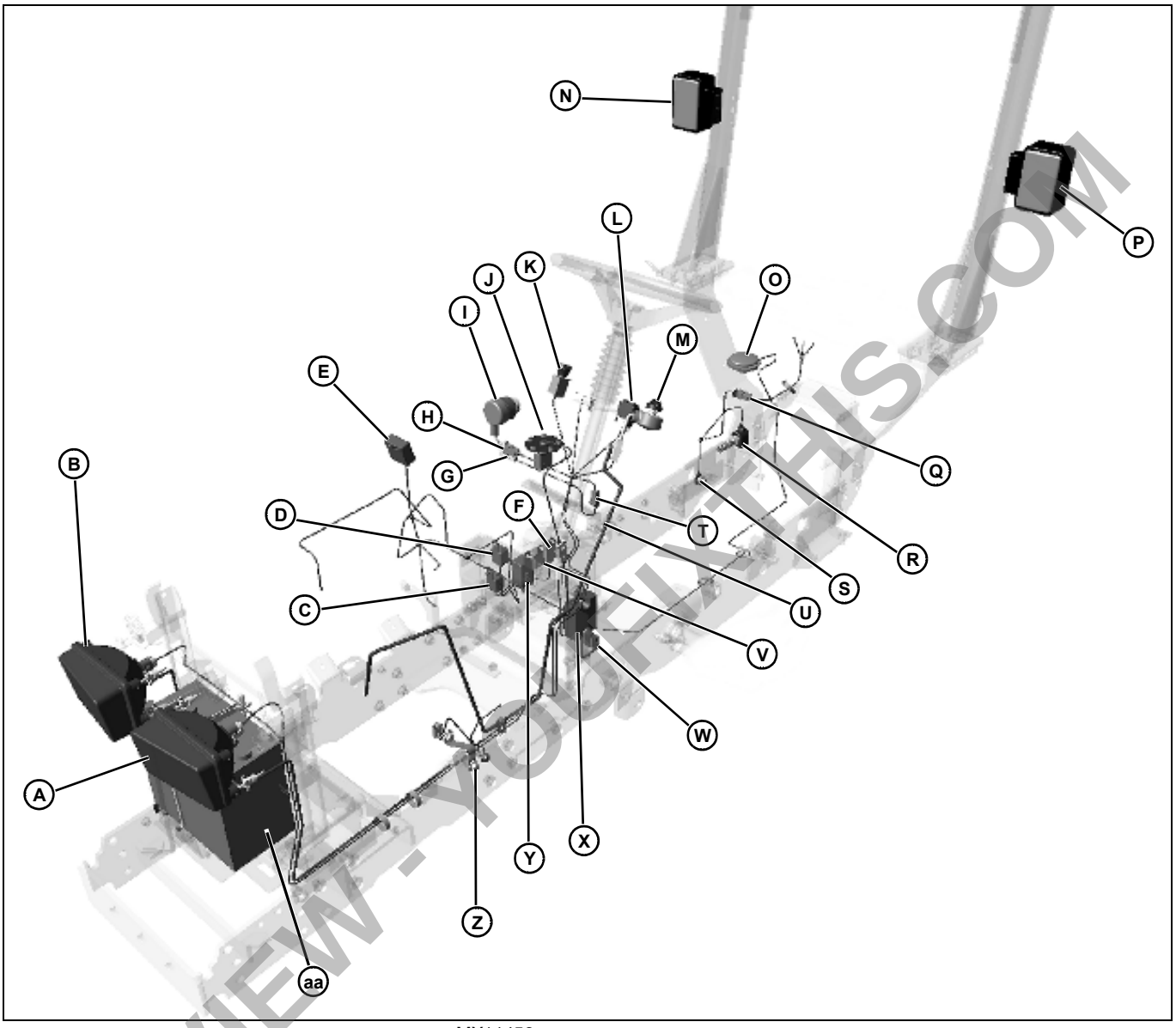
If cam follower bore diameter exceeds wear limit, replace cylinder block.

Follower-to-Bore Oil Clearance:

Standard . . . . . 0.04 - 0.09 mm (0.002 - 0.004 in.)
Wear Limit. . . . . 0.15 mm (0.006 in.)

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Component Location **Front of Machine**

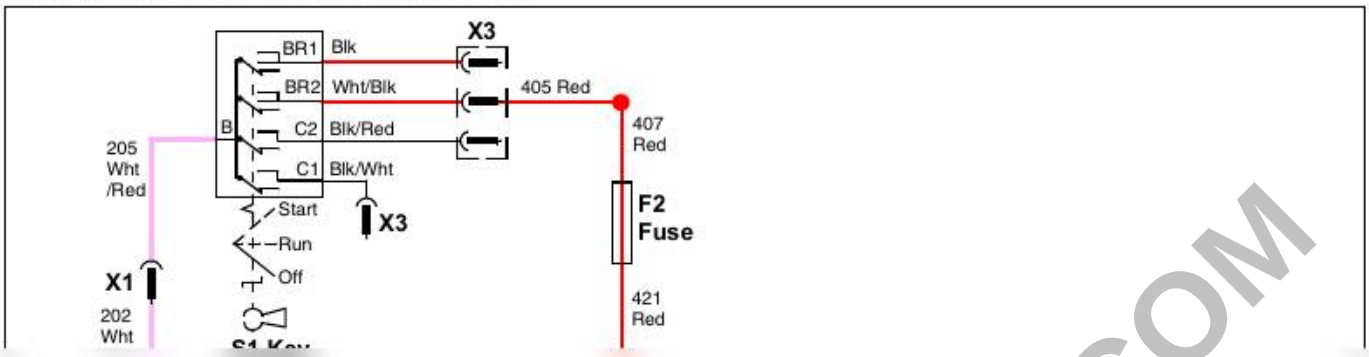


MX11452

A- E2 Left Headlight
B- E1 Right Headlight
C- K2 Fuel Relay
D- K1 Start Relay
E- Fuse Block - F2, F3, F4, F5
F- K4 Safety Relay 2
G- X1 connector
H- X3 Connector
I- S1 Key Switch
J- B3 Fuel gauge Sensor
K- S5 PTO Switch
L- S4 Turn Signal Switch
M- S3 Light Switch
N- E5 Right Hazard Turn
O- S2 Seat Switch
P- E3 Left Hazard Turn
Q- X24 connector
R- S6 Transmission Neutral Switch
S- Y3 PTO Solenoid
T- X5 Connector
U- W1 Main Wiring Harness
V- A1 Timer Module
W- K3 Safety Relay 1
X- N1 Voltage Regulator
Y- K5 Flasher
Z- W1 Frame Ground
AA- G1 Battery

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Charging Circuit Electrical Schematic



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Specifications

General Specifications

Specifications:

Type	Hydrostatic
Number of Speeds	Infinite / 2 Range
Machine Speed Low Range (@ 3200 rpm with 26-12.00-12 Rear Tires)	6.8 kph (4.23 mph)
Machine Speed High Range (@ 3200 rpm with 26-12.00-12 Rear Tires)	13.77 kph (8.56 mph)
Machine Speed Reverse Low Range (@ 2600 rpm with 26-12.00-12 Rear Tires)	6.8 kph (4.23 mph)
Machine Speed Reverse High Range (@ 2600 rpm with 26-12.00-12 Rear Tires)	13.77 kph (8.56 mph)
Mechanical Front Wheel Drive (MFWD)	Standard
MFWD Capability	All Ranges
MFWD Engagement	On The Go
Final Drive	Spur Gear

Oil:

Transmission Capacity	13.0 L (3.4 gal)
Oil Type	J20D

Front Axle:

Oil Capacity	2.5 liters (2.6 quarts)
Oil Type	GL5
King Pin Angle	15°
Camber Angle	2°
Toe In (maximum)	15.0 mm (0.59 in.)

Steering Angle

Inward	61°
Outward	44°

Torque Specifications

Front Axle:

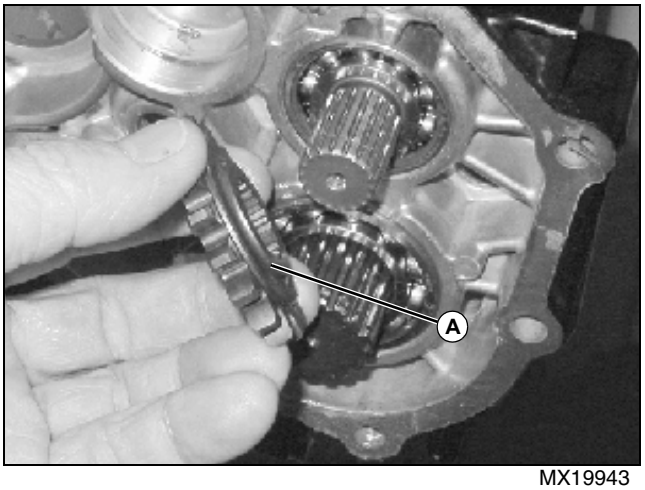
Wheel Bolts	88 N•m (65 lb-ft)
Tie Rod Castle Nuts	24.5 - 32.4 N•m (18 - 24 lb-ft)
Steering Cylinder to Axle Nuts	24.5 - 32.4 N•m (18 - 24 lb-ft)
Differential to Ring Gear Cap Screw	22.6 - 29.4 N•m (200 - 260 lb-in.)
Drain Plugs	39.2 - 49.0 N•m (29 - 36 lb-ft)

Transmission:

PTO Rear Cover to Transaxle Cap Screws	22.5 - 29.4 N•m (200 - 260 lb-in.)
Transaxle Drain Plug	29 N•m (21 lb-ft)
Pump to Divider Valve Hydraulic Line Banjo Bolt	44 N•m (32 lb-ft)
PTO Pressure Hydraulic Line Banjo Bolt	44 N•m (32 lb-ft)
PTO Pressure Relief Valve	19.6 - 24.5 N•m (174 - 217 lb-in.)
PTO Valve to Transaxle	27.5 N•m (243 lb-in.)
PTO Solenoid to PTO Valve Nut	6.8 N•m (60 lb-in.)
Detent Spring Retention Cap Screw	23 - 30 N•m (203 - 265 lb-in.)

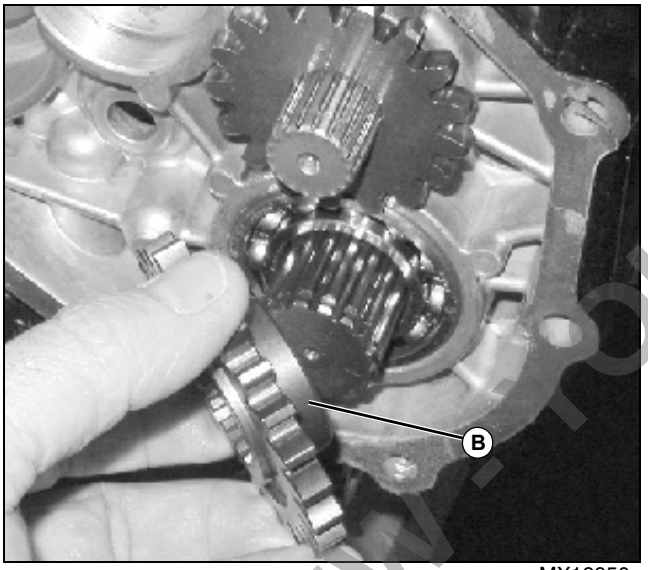
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MX19943

• Install17T gear with raised side of gear hub (A) toward bearing.



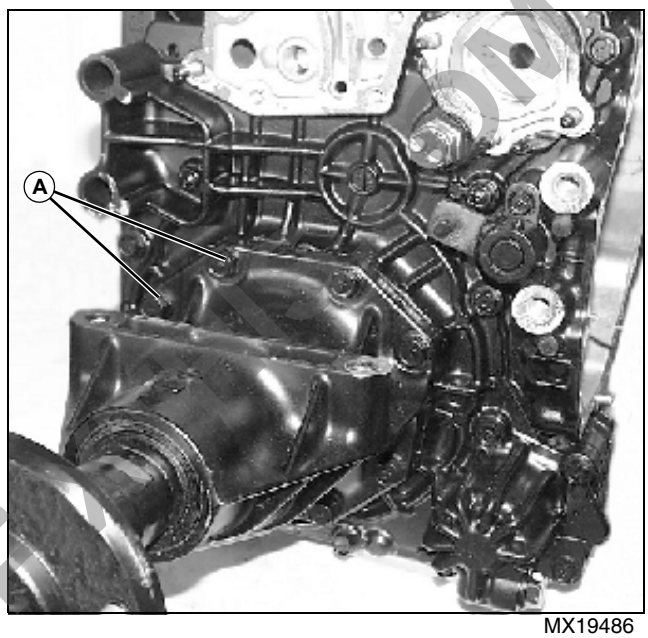
MX19950

• Install MFWD drive gear with raised side of gear hub (B) toward bearing.

Differential Removal, Disassembly, Assembly, and Installation

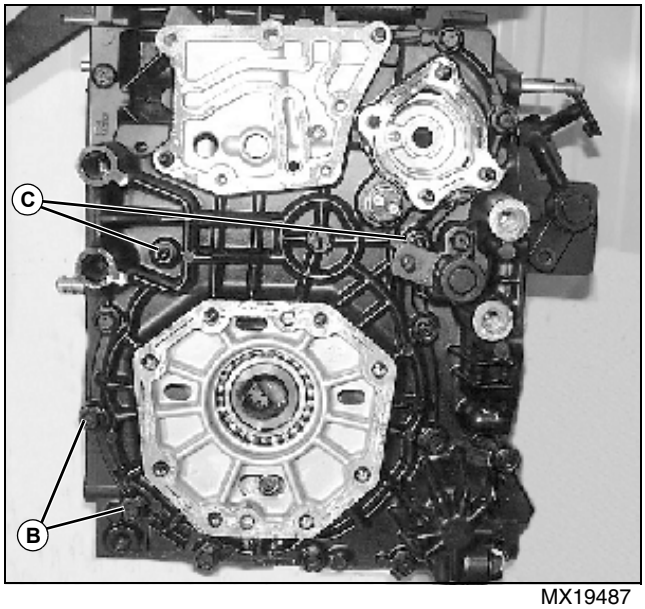
Removal:

Note: Range transmission countershaft must be out in order to remove differential.



MX19486

1. Remove eight cap screws (A) from axle housing and remove housing.



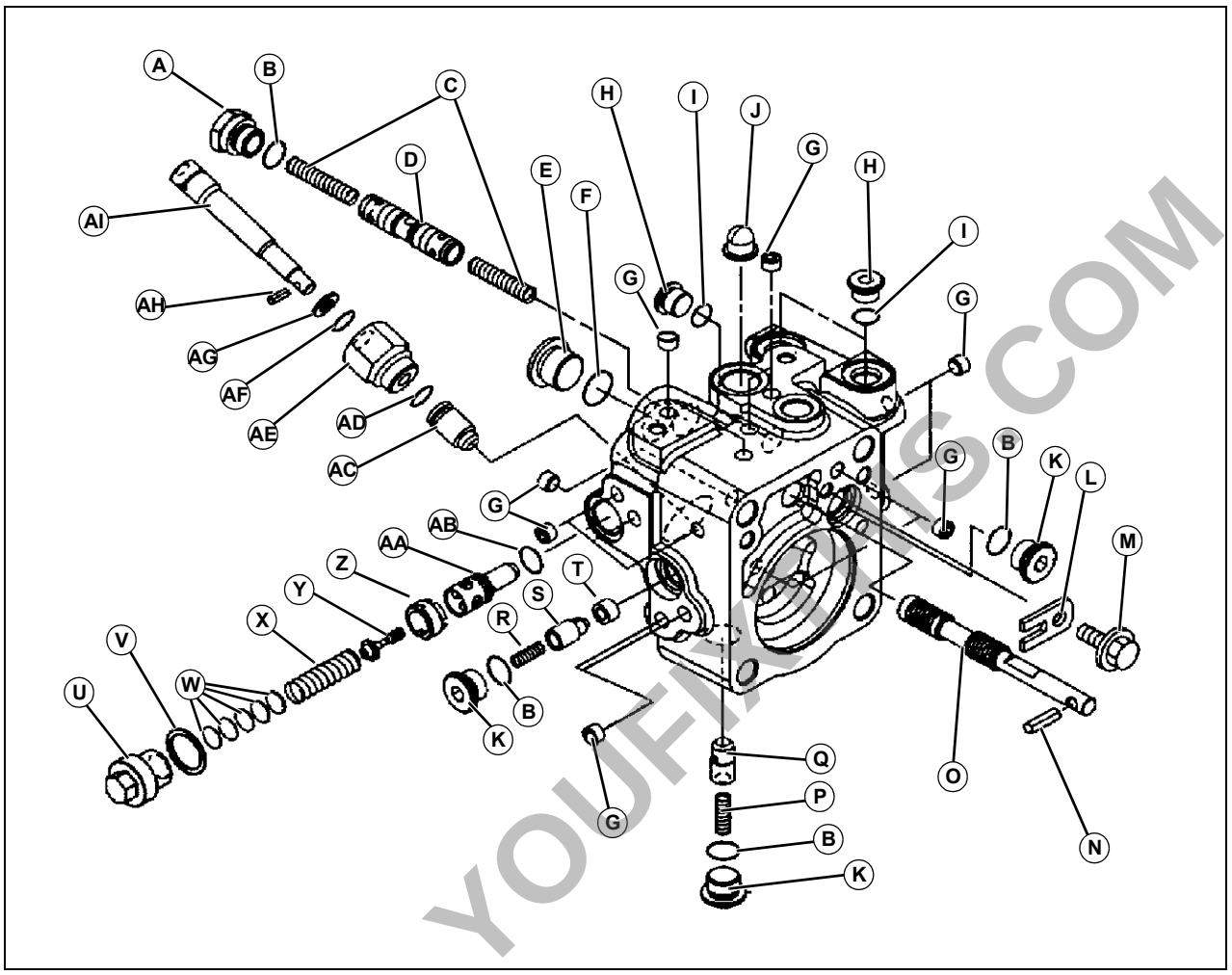
MX19487

2. Remove 14 cap screws (B) and two nuts (C) from transaxle side cover and remove cover.

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Rockshaft Control/Divider Valve



MX19357

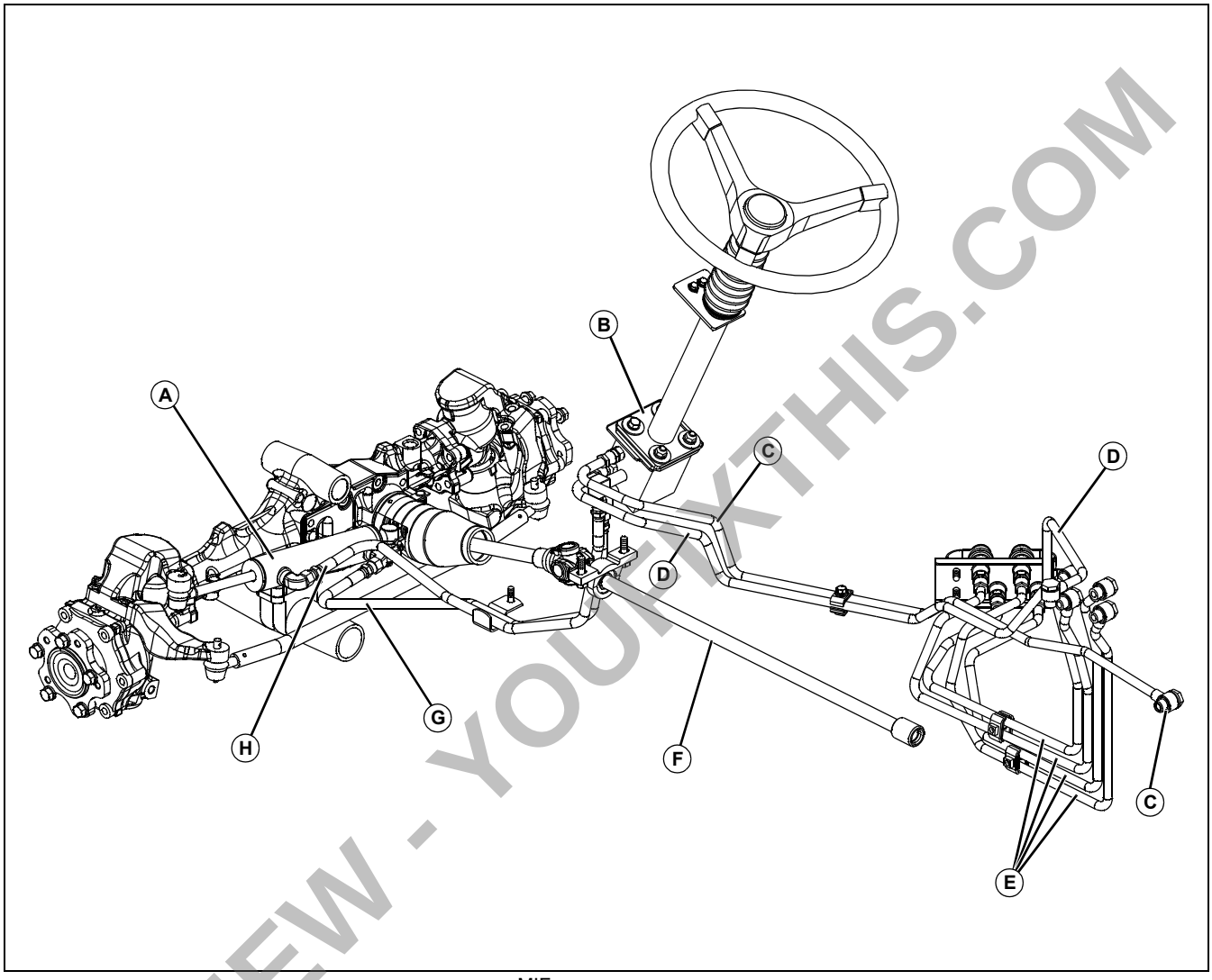
A- Plug
B- O-Ring
C- Spring
D- Spool
E- Plug
F- O-Ring
G- Plug
H- Plug
I- O-Ring
J- Strainer
K- Plug
L- Keeper Plate
M- Bolt
N- Pin
O- Valve
P- Spring
Q- Poppet, Check Valve
R- Spring
S- Valve
T- Seat
U- Cap, Relief Valve
V- Gasket
W- Shims
X- Spring
Y- Holder, Relief Valve
Z- Screw, Valve Seat
AA- Seat, Relief Valve
AB- O-Ring
AC- Valve
AD- O-Ring
AE- Guide
AF- O-Ring
AG- Washer
AH- Pin
AI- Stop Bolt

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Component Location

Steering System Component Location



MIF

A- Steering Cylinder
B- Steering Control Unit (SCU)
C- Return Line
D- Pressure Line (to SCU)
E- Hydraulic Lines
F- MFWD Drive Shaft
G- Right Turn Hose
H- Left Turn Hose

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