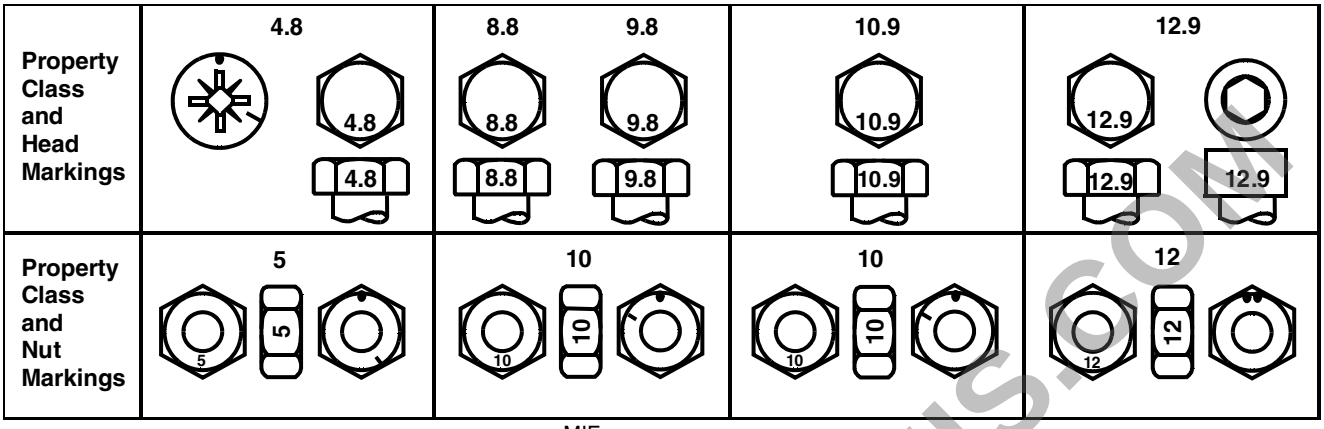
Fastener Torques

Metric Fastener Torque Values



MIF

	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	
SIZE	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
M6	4.8	3.5	6	4.5	9	6.5	11	8.5	13	9.5	17	12	15	11.5	19	14.5
M8	12	8.5	15	11	22	16	28	20	32	24	40	30	37	28	47	35
M10	23	17	29	21	43	32	55	40	63	47	80	60	75	55	95	70
M12	40	29	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	47	80	60	120	88	150	110	175	130	225	165	205	150	260	109
M16	100	73	125	92	190	140	240	175	275	200	350	225	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 hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ±10% variance factor. Check tightness of fasteners periodically. DO NOT use air powered wrenches.

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

Fasteners should be replaced with the same grade. Make sure fastener threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

When bolt and nut combination fasteners are used, torque values should be applied to the NUT instead of the bolt head.

Tighten toothed or serrated-type lock nuts to the full torque value.

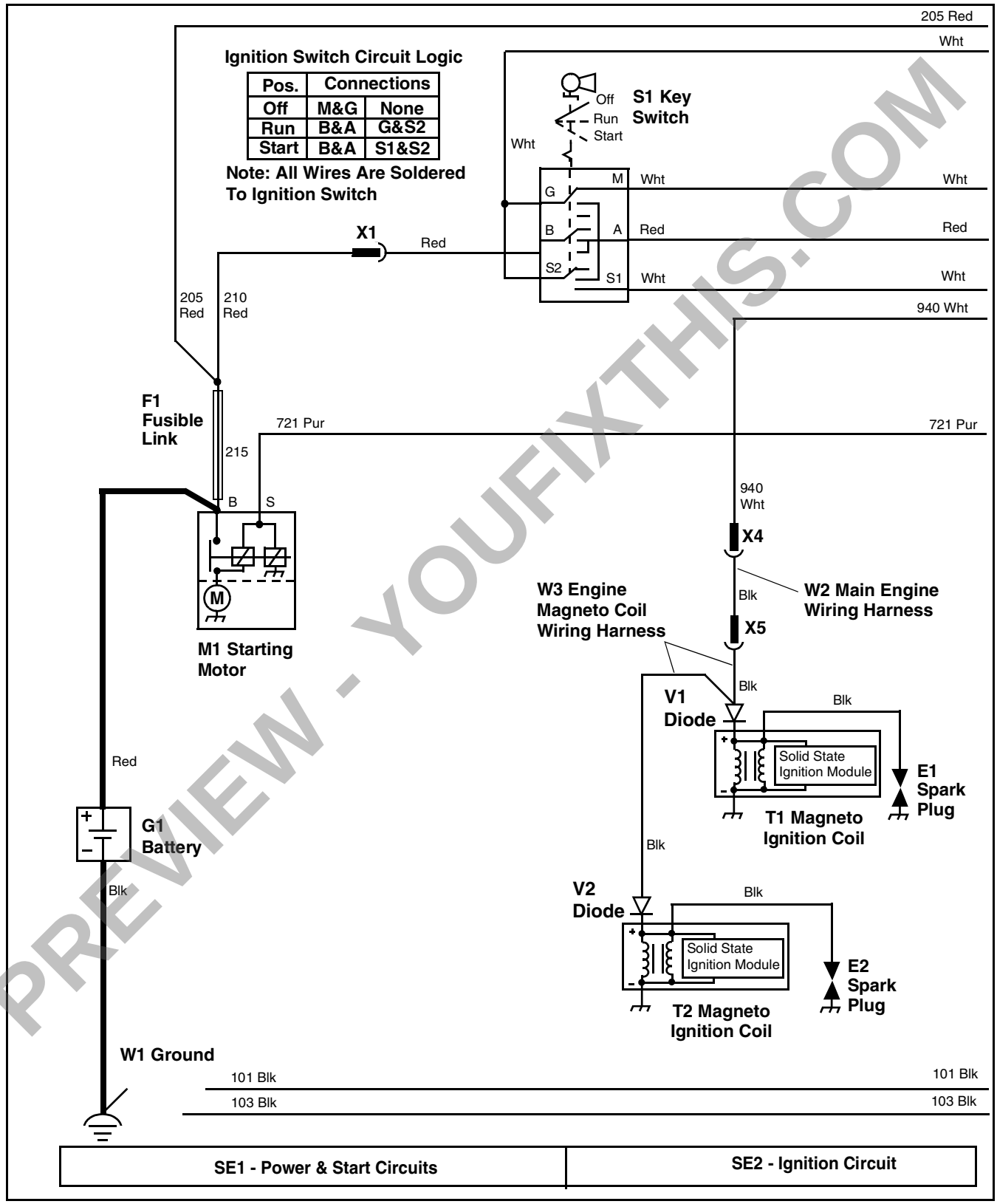
a *"Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings. "Dry" means plain or zinc plated (yellow dichromate - Specification JDS117) without any lubrication.*

Reference: JDS - G200.

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Schematics and Harnesses

LX280 (FH580V) Main Electrical Schematic



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Crankcase Vacuum Test

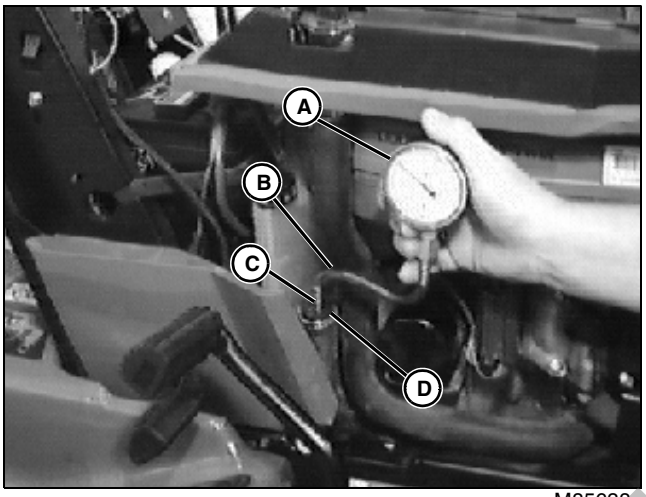
Reason:

To check operation of the breather and condition of seals, gaskets, rings, pistons, and cylinder walls.

Test Equipment:

- JT03503 Crankcase Vacuum Test Kit

Procedure:



M85638

1. Park machine safely.
2. Raise hood.
3. Remove dipstick and install appropriate size plug (D).

IMPORTANT: Avoid damage! DO NOT make connection between test gauge and rubber plug BEFORE engine is running at FAST idle or gauge damage may result.
After test reading is made, disconnect test gauge WHILE engine is running at FAST idle to prevent damage to gauge.

4. Assemble gauge (A), clear line (B), and barbed fitting (C) on workbench.
5. Hold finger over rubber plug hole to keep oil from spraying out. Start engine and run at FAST idle.
6. Connect gauge, clear line, and barbed fitting to rubber plug (D).
7. Record crankcase vacuum reading. Gauge should show a minimum of 15 cm (6 in.) of vacuum.
8. Disconnect barbed fitting, clear line, and gauge from rubber plug WHILE engine is running at FAST idle. Hold finger over rubber plug hole to keep oil from spraying out.
9. Move throttle to SLOW idle and turn engine OFF.
10. Remove rubber plug and install dipstick.

Results:

If crankcase vacuum is BELOW specification, check the following:

- Breather reed valve clearance and condition.
- Breather port is obstructed.
- Rings, piston, and cylinder bore for wear or damage.

Engine Oil Pressure Test

Reason:

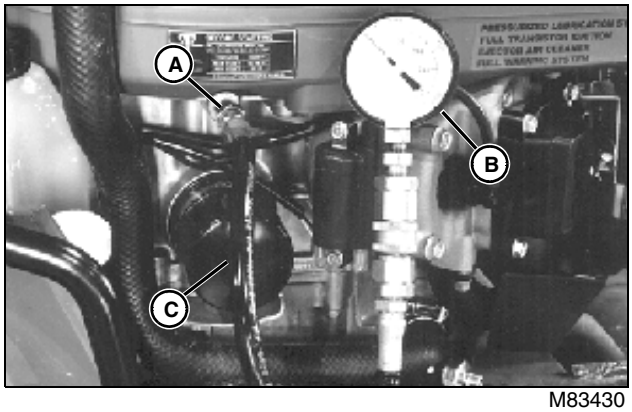
To verify if the engine has enough oil pressure to lubricate internal components.

Test Equipment:

- JT03344 Pressure Gauge Assembly
- JT03017 Hose Assembly
- JT03349 Connector

Procedure:

1. Park machine safely.
2. Turn key switch OFF. Allow engine to cool.
3. Raise engine hood.
4. Check engine oil level, bring level to full mark if necessary.
5. Disconnect oil pressure switch wiring lead.
6. Remove oil pressure switch.



M83430

7. Install JT03349 Connector (A).
8. Connect JT03017 Hose Assembly (C) and JT03344 Pressure Gauge Assembly (B).
9. Start engine and immediately monitor oil pressure. If no or low oil pressure is present, shut off engine. Determine and correct cause before running engine.

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Specifications

General Specifications

Engine Use	LX289
Make	Kawasaki V-Twin
Model Number	FD501V-DS04
Horsepower	12.7 kW (17 hp)
Bore	67 mm (2.64 in.)
Stroke	71.19 mm (2.80 in.)
Displacement	501 cm3 (30.6 cu in.)
Cylinders	2 (V-twin)
Stroke/Cycle	4
Valves	Overhead Valves
Lubrication	Fully Pressurized
Crankcase Oil Capacity without Oil Filter	1.5 L (1.6 qt)
with Oil Filter	1.8 L (1.9 qt)
Oil Filter	Single Element, Full Flow, Spin-On Filter
Cooling System	Liquid Cooled
Cooling System Capacity	2.6 L (2.8 qt)
Air Cleaner	Dry Replaceable with Foam Pre-cleaner
Muffler	Horizontal Discharge Below Frame
Spark Plug Gap	0.7 mm (0.028 in.)
Spark Plug Torque	20 N•m (15 lb-ft)

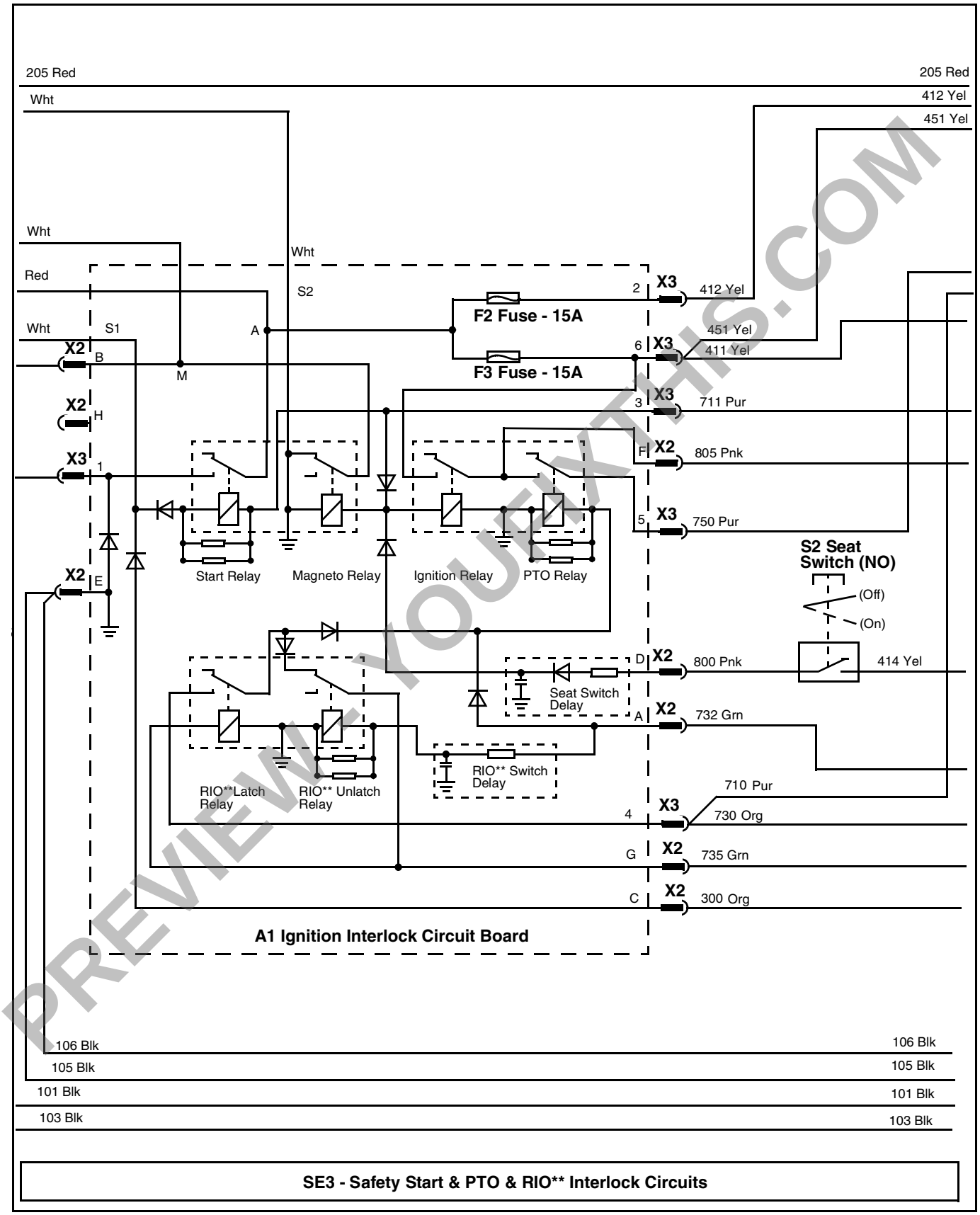
Test and Adjustment Specifications

Slow Idle	1550 ± 150 rpm
Fast Idle	3550 ± 50 rpm
Choke Arm Gap	0.25 - 3.0 mm (0.01 - 0.12 in.)
Ignition Air Gap	fixed position no adjustment
Cylinders:	
Compression Pressure (Minimum)	1171 kPa (170 psi)
Difference Between Cylinders (Maximum)	97 kPa (14 psi)
Valve Clearance (Cold)	0.15 mm (0.006 in.)
Crankcase Vacuum	1.27 - 38.1 cm (0.5 - 15.0 in.)
Engine Oil Pressure at Fast Idle (Minimum)	276 kPa (40 psi)
Engine Oil Pressure at Fast Idle (Maximum) - Relief Valve Pressure	296 kPa (43 psi)
Fuel Pump:	
Pressure at Slow Idle (Minimum)	2.45 kPa (0.36 psi)
Flow Volume at Slow Idle (Minimum)	800 mL/60 seconds (0.8 qt/60 seconds)
Fuel Pump Push Rod Bend (Maximum)	0.05 mm (0.002 in.)

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LX280 (FH580V) Main Electrical Schematic (2 of 4)



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IMPORTANT: Avoid damage! If pressure reading is below 69 kPa (10 psi), STOP ENGINE IMMEDIATELY and determine cause.

10.Start and run engine at Medium idle for five minutes to heat engine oil to normal operating temperature.

CAUTION: Avoid injury! Engine components are HOT. Be careful not to touch, especially the exhaust pipe or muffler while making adjustments. Wear protective eye glasses and clothing.

11.Run engine at FAST idle (3550 ± 75 rpm) and check oil pressure. Gauge should read a minimum oil pressure of 276 kPa (40 psi).

Results:

If oil pressure is BELOW specifications, inspect or replace the following:

- Oil pressure relief valve for broken or worn spring.
- Oil pressure relief valve for stuck or damaged valve.
- Worn or damaged oil pump.
- Oil filter plugged.
- Oil pump suction screen or oil passages plugged.
- Excessive wear of connecting rod and main bearing journals.

Fuel Pump Tests

Reason:

To check condition of fuel pump.

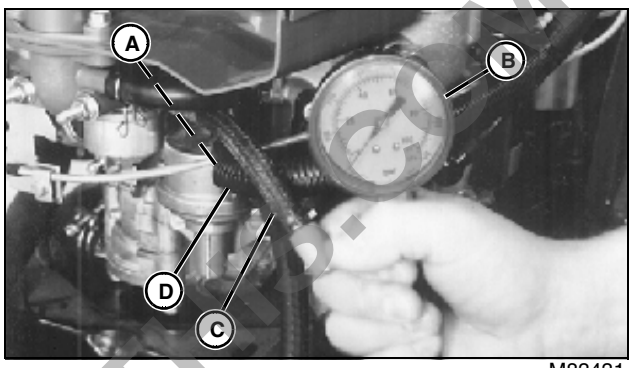
Test Equipment:

- JDG356 Pressure Gauge
- Graduated Container

Procedure:

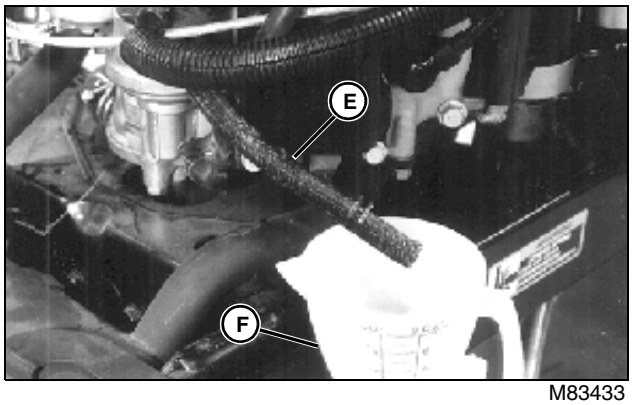
1. Park machine safely.
2. Remove engine hood. See “Hood Removal and Installation” on page 427 in the Miscellaneous section.
3. Remove muffler heat shield.
4. Start engine and run at SLOW idle for one minute to fill carburetor with fuel.
5. Stop the engine.

CAUTION: Avoid injury! Gasoline is extremely flammable. Do not smoke. Always work in a ventilated area away from open flame or spark producing equipment; including equipment that utilizes pilot lights. Wipe-up any spills IMMEDIATELY.



M83431

6. Disconnect fuel pump outlet hose (C) from fuel pump.
7. Connect JDG356 Pressure Gauge (B) hose (D) to fuel pump outlet (A).
8. Start and run engine at SLOW idle for 15 seconds. Minimum pressure should be 2.45 kPa (0.36 psi).
9. Stop engine and remove pressure gauge and connect fuel pump outlet hose to fuel pump outlet.



M83433

10.Disconnect fuel pump outlet hose (E) from carburetor and place it in graduated container (F).

11.Start and run engine at SLOW idle (1550 ± 150 rpm) for 60 seconds, then stop engine and record container measurement. Minimum Flow should be 800 mL/60 seconds (0.8 qt/60 seconds).

Results:

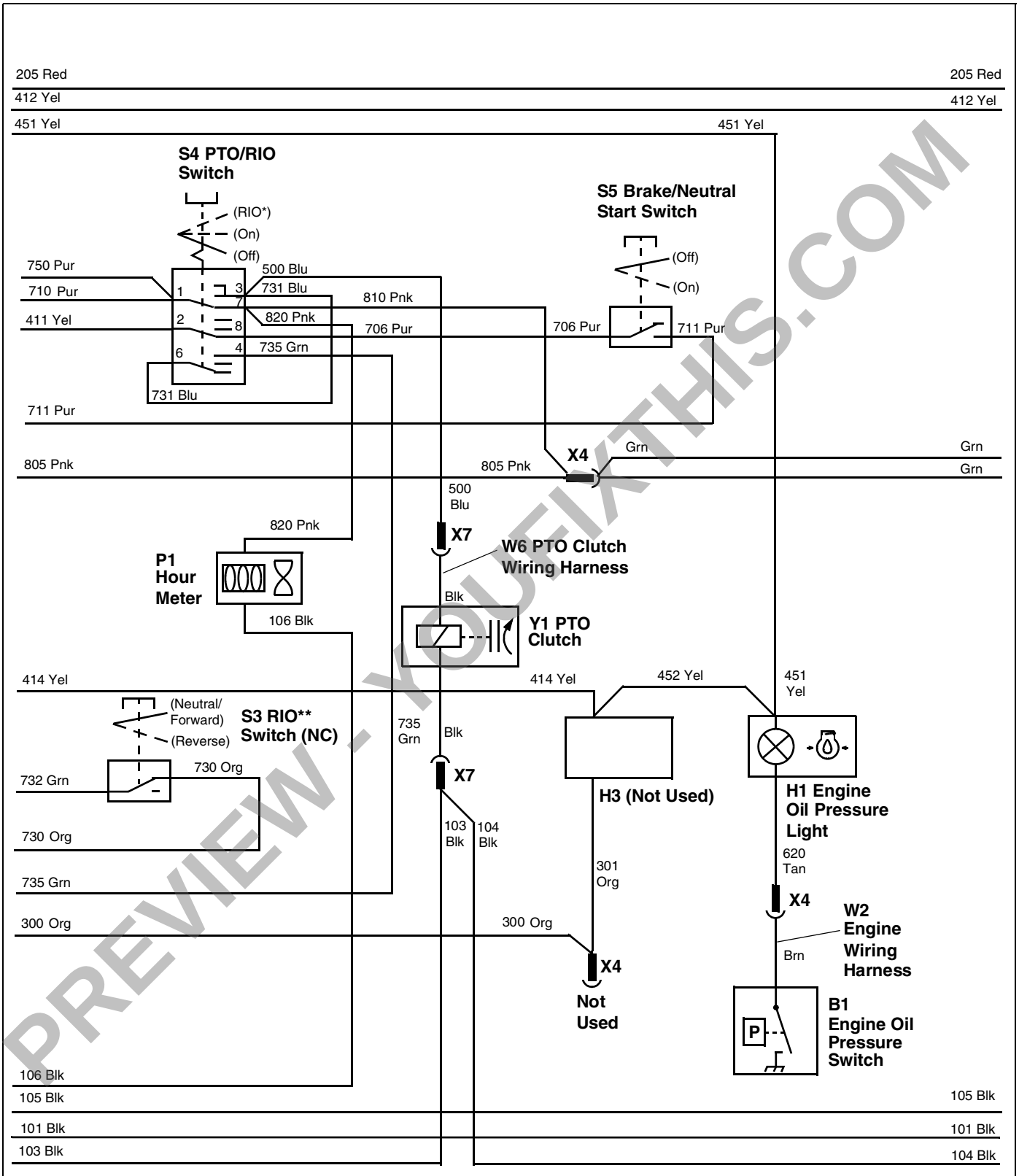
If fuel pressure and/or flow does not meet specifications, check the following:

- Fuel lines, filter, shut-off valve, and fuel tank cap for restrictions.

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LX280 (FH580V) Main Electrical Schematic (3 of 4)



SE4 - PTO & Instrumentation Circuit

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- Replace fuel pump.
- Check camshaft lobe and retest.

Spark Test

Reason:

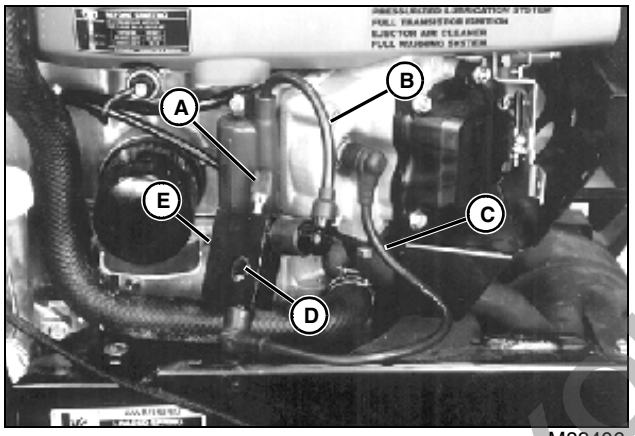
To check overall condition of ignition system.

Test Equipment:

- D-05351ST Spark Tester

Procedure:

1. Park machine safely.
2. Raise engine hood.



M83406

3. Disconnect high tension lead (B) from spark plug.
4. Connect D-05351ST Spark Tester (E) lead (C) to spark plug.
5. Connect high tension lead to Spark Tester.

IMPORTANT: Avoid damage! DO NOT adjust Spark Tester gap beyond 5.0 mm (0.200 in.) (5 turns), as damage to ignition components could occur.

6. Adjust spark tester gap to 4.2 mm (0.166 in.) (4 turns) with adjustment screw (A).
7. Spin engine with starter and watch spark at Spark Tester. If engine will start, watch spark (D) with engine running. A steady, strong, blue spark should be observed.

Results:

- If spark is weak, or no spark is present, install a new spark plug and repeat test.
- If spark is still weak, or no spark is present, run tests on individual components to find the cause of the malfunction.

Spark Plug Gap Adjustment

Test Equipment:

- Wire Feeler Gauge

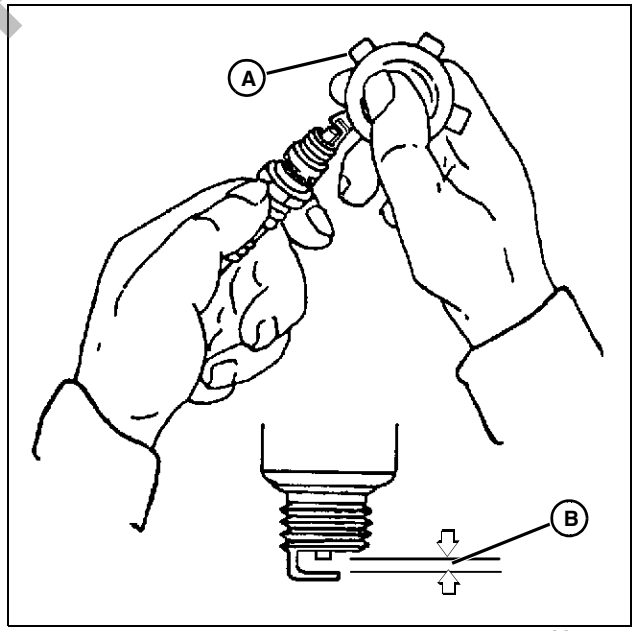
Procedure:

1. Park machine on level surface.
2. Turn key switch OFF.
3. Move forward/reverse pedals to NEUTRAL position.
4. Lock park brake.

CAUTION: Avoid injury! Engine components are HOT. Be careful not to touch, especially the exhaust pipe or muffler while making adjustments. Wear protective eye glasses and clothing.

5. Remove spark plug.

IMPORTANT: Avoid damage! Do not clean spark plug with sand paper or abrasives. Engine scoring can result.



M85608

6. Inspect spark plug for:.
   - Cracked porcelain
   - Pitted or damaged electrodes
7. Check spark plug gap using a wire feeler gauge (A).
8. Set gap to 0.7 mm (0.028 in.) (B).
9. Install and tighten spark plug to 20 N•m (15 lb-ft).

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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 - FD501V
Engine - FH580V
Electrical
Power Train
Steering
Attachments
Miscellaneous

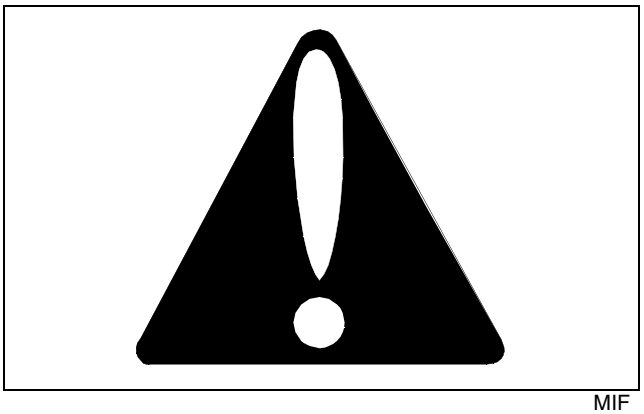
All information, illustrations and specifications in this manual are based on the latest information at the time of publication. The right is reserved to make changes at any time without notice.

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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.

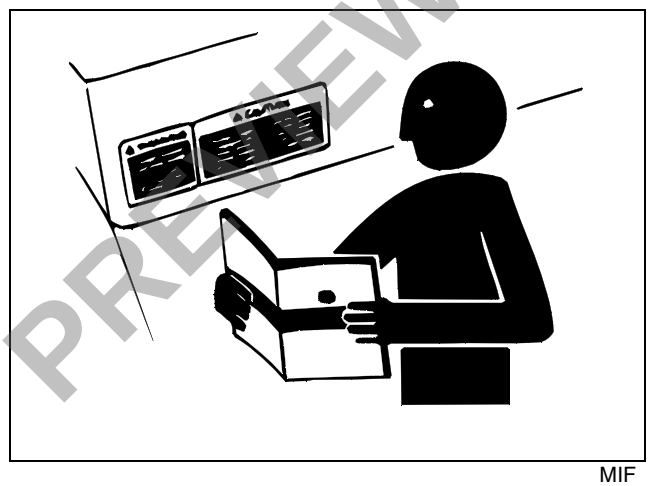
Follow recommended precautions and safe servicing practices.

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

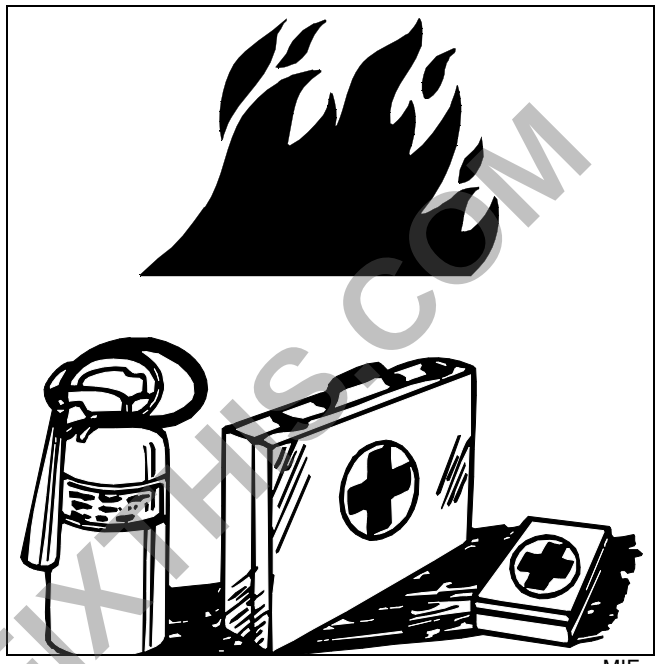


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Replace missing or damaged safety signs. See the machine operator's manual for correct safety sign placement.

Handle Fluids Safely - Avoid Fires

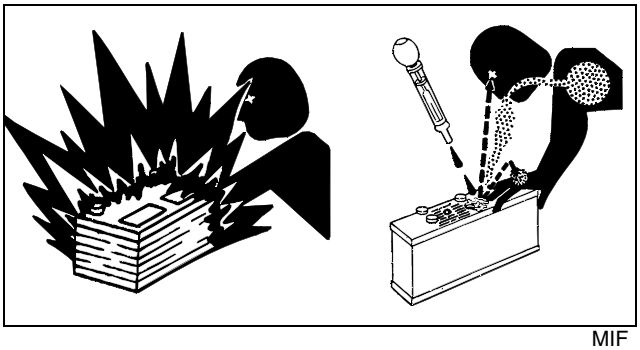
Be Prepared For Emergencies



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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.

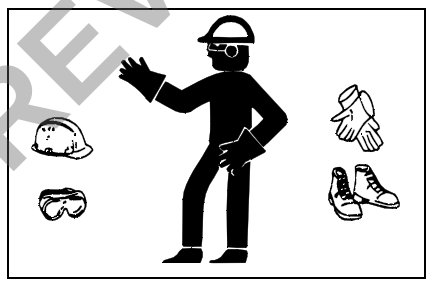
If you spill acid on yourself:

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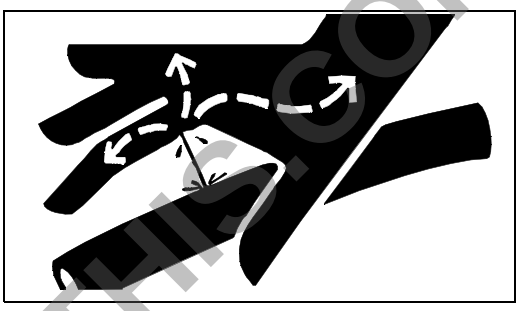
Wear close fitting clothing and safety equipment appropriate to the job.

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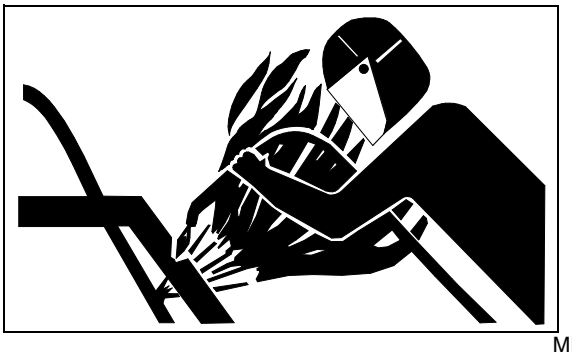
Escaping fluid under pressure can penetrate the skin causing serious injury.

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

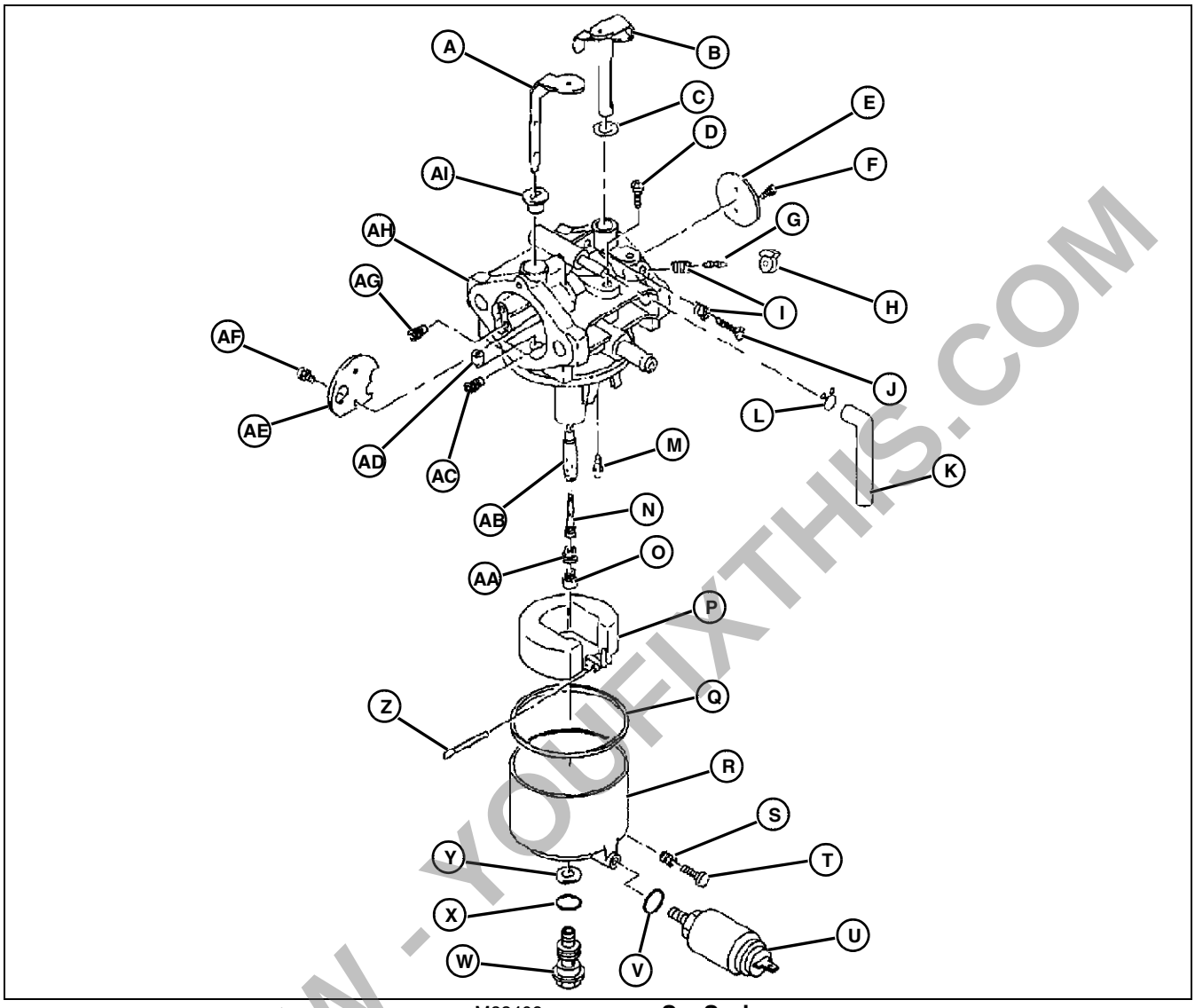


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Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders. Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials. Pressurized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

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M83409

A - Choke Shaft
B - Throttle Shaft
C - Seal
D - Pilot Jet
E - Throttle Plate
F - Screw (Apply Thread Lock and Sealer)
G - Slow Idle Mixture Screw
H - Black Limiter (CARB/EPA)
I - Springs
J - Slow Idle Stop Screw
K - Vent Hose
L - Clamp
M - Inlet Needle
N - Nozzle
O - Main Jet
P - Float
Q - Gasket
R - Fuel Bowl
S - Spring
T - Drain Screw
U - Fuel Shutoff Solenoid (9.8 N•m (7 lb-in.))
V - Gasket
W - Bowl Screw
X - O-Ring
Y - Washer
Z - Float Pin
AA- Main Jet Holder
AB- Main Nozzle
AC- Pilot Air Jet
AD- Bushing
AE- Choke Plate
AF- Screw (Apply Thread Lock and Sealer)
AG- Main Air Jet
AH- Carburetor Body
AI - Bushing

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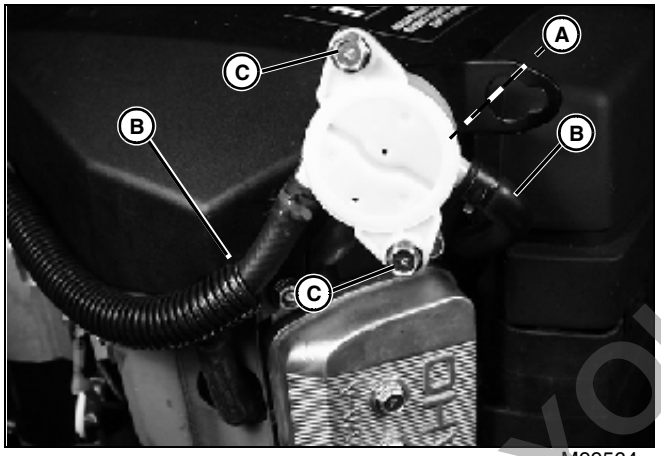
Air Cleaner Body
Mounting Screws . . . . . 3.4 N•m (30 lb-in.)

Fuel Pump Replacement

Removal:

1. Park machine safely.
2. Raise hood.

CAUTION: Avoid Injury! Gasoline is extremely flammable. Do not smoke. Always work in a ventilated area away from open flame or spark producing equipment, this includes equipment that utilizes pilot lights.



M99564

3. Disconnect vacuum line (A) (hidden from view) and fuel lines (B).
4. Remove two mounting screws (C).

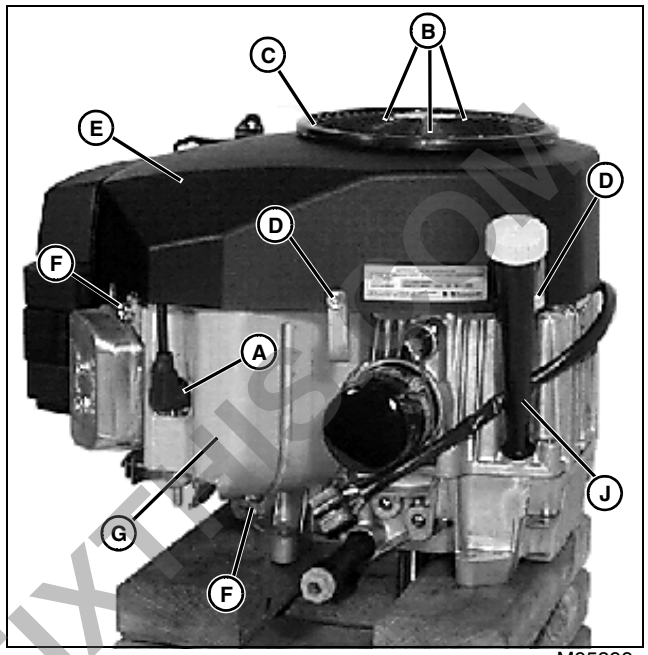
Installation:

Installation is done in the reverse order of removal.

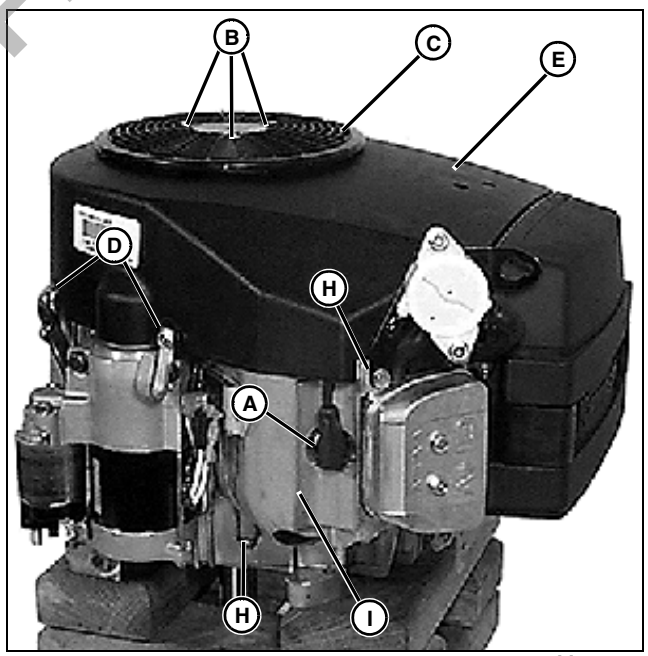
- Replace fuel pump.
- Tighten mounting screws to 16 N•m (142 lb-in.).

Blower Housing Removal and Installation

Removal:



M95399



M95400

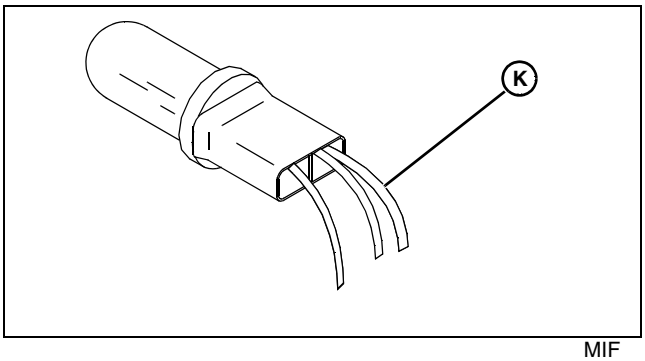
1. Disconnect spark plug caps (A).
2. Remove three screws (B) securing the flywheel screen (C) to the flywheel. Remove flywheel screen.
3. Remove four screws (D) (two on each side) securing the upper blower housing (E) to the block and lower housings. Remove upper blower housing.
4. Remove two screws (F) (upper photo) and remove left side lower blower housing (G).

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System: Power Circuit

No - Check 451 Yel wire and connections.

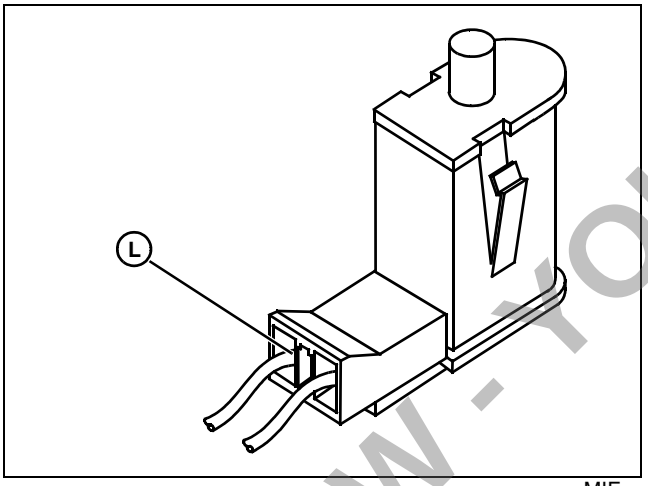


MIF

(6) Is battery voltage present at H3 Coolant Temperature Light 452 Yel wire (K)?

Yes - Go to next step.

No - Check 452 Yel wire and connections.



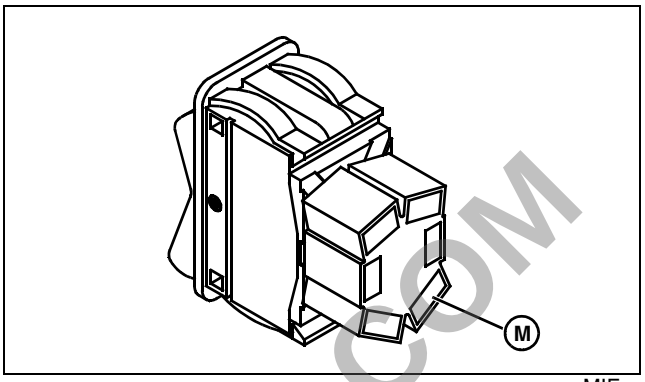
MIF

(7) Is battery voltage present at S2 Seat Switch 414 Yel wire (L)?

Yes - Go to next step.

No - Check 414 Yel wire and connections.

System: Power Circuit



MIF

(8) Is battery voltage present at S6 Headlight Switch 412 Yel wire (M)?

No - Check 412 Yel wire and connections.

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Results:

- If the battery does not indicate 9.6 volts or more, replace battery.

Regulated Amperage Test

Reason:

To determine charging output of rectifier/regulator.

Test Equipment:

- JT05712 Current Gun
- JT05685 Battery tester

Procedure:

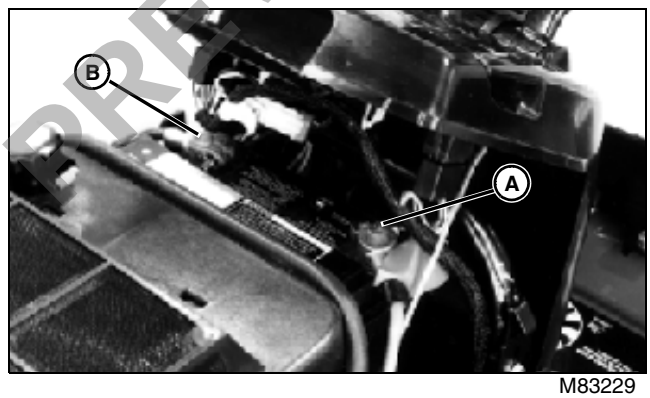
1. Park machine on a level surface.
2. Turn key switch OFF.
3. Move forward/reverse pedals to neutral position.
4. Lock parking brake.
5. Raise hood.



M83227

Picture Note: LX289

6. Put JT05712 Current Gun over small wire (A).
7. Set Current Gun for DC current.
8. Turn load knob (B) to maximum counterclockwise position.



M83229

Picture Note: LX289

9. Connect JT05685 Battery Tester to battery:

Connect tester positive (Red) cable to battery positive (+) terminal.

Connect tester negative (black) cable to battery negative (-) terminal.

IMPORTANT: Avoid damage! Perform this test quickly to prevent damage to the battery tester. DO NOT apply full load to battery for more than 5 - 10 seconds.

10. Start engine and run at fast idle.

11.Turn load knob clockwise until voltage read on tester voltage scale is 11 volts. Also read amperage. Amperage should read a minimum of 13 amps.

Results:

- If reading does not meat specifications, test unregulated voltage output. See “Unregulated Voltage Output Test” on page 220.
- If unregulated voltage meets specifications and voltage and ground to the regulator/rectifier is verified, replace the regulator/rectifier.

Regulated Voltage Test

Reason:

To determine regulated voltage output of the regulator/ rectifier.

Test Equipment:

- Voltmeter

Procedure:

1. Park machine on a level surface.
2. Turn key switch OFF.
3. Lock parking brake.
4. Raise hood.
5. Remove surface charge from battery by placing a small load on the battery for 15 seconds.
6. Set voltmeter for 25 of 50 volt DC scale

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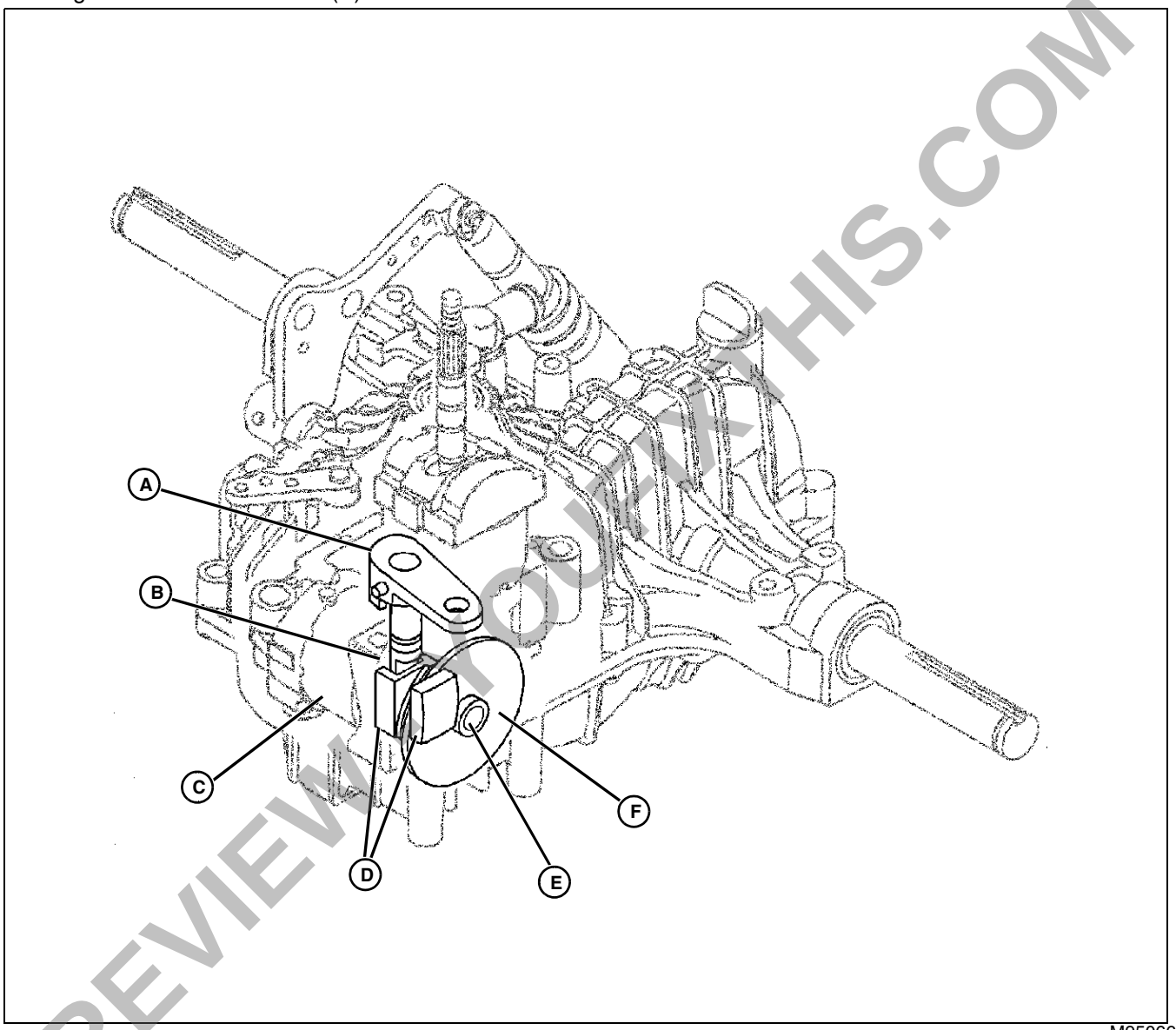
Transaxle Brake

NOTE: K62A transaxle shown below. K62B arm (A) rotated 180°.

The transaxle brake is an internal wet disk brake. When the brake pedal is depressed or the parking brake is set, the brake linkage rotates the brake arm (A).

The brake arm rotates the brake shaft and the brake shaft, acting as a cam (B), presses the brake shoes (D) against the brake disk (F).

The brake disk is splined to the hydrostatic motor (C) output shaft (E).



M95066

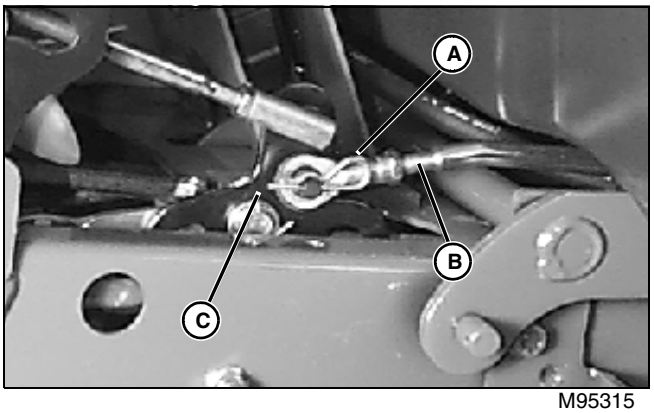
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Control Pedals and Linkage

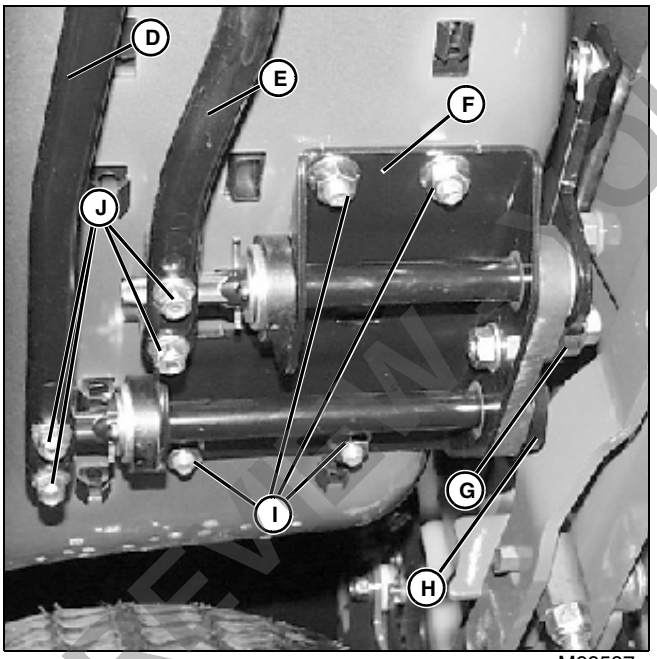
Pedal Assembly Removal:

1. Remove mower deck. See the appropriate Mower Deck Removal and Installation procedure in the Attachments section.



M95315

2. Behind right rear wheel, locate and remove spring clip pin (A), and disconnect forward/reverse control rod (B) from control lever (C).



M99587

3. Loosen four locknuts (J) attaching forward (E) and reverse (D) pedals to control shafts. Remove pedals.

4. Remove four nuts (I) securing bracket (F) to fender deck.

5. Lower pedal assembly and move toward front of machine. Remove pedal assembly.

6. Inspect components for wear or damage. Replace parts as needed.

Pedal Assembly Installation:

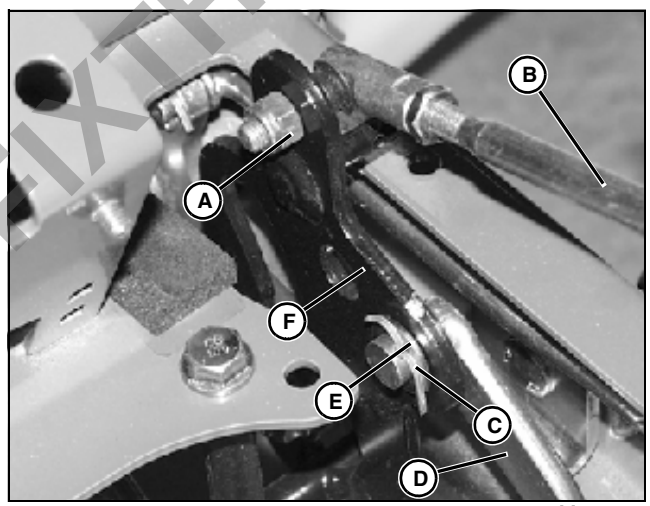
Installation is the reverse of removal.

- When installing bracket and control shafts, be sure that arm (H) on end of reverse pedal shaft is in contact with bearing (G) on forward pedal shaft.
- When installing forward and reverse pedals, be sure pedals do not rub against foot mat or fender deck. Check entire range of pedal motion for interference.
- Perform pedal height adjustment. See “Forward and Reverse Pedal Height Adjustment” on page 295.

Intermediate Shaft

Removal:

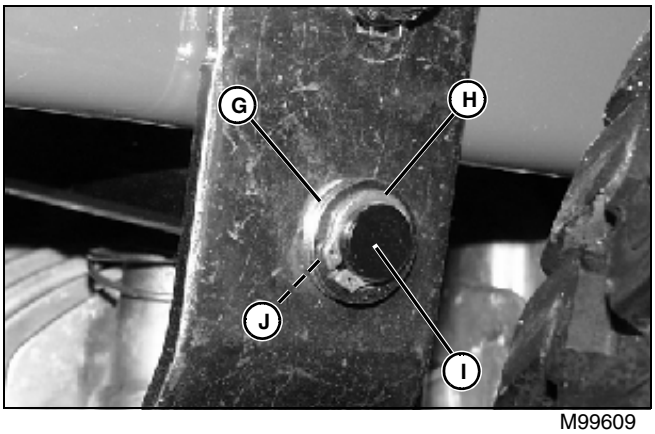
1. Remove fender deck. See “Fender Deck Removal and Installation” on page 427 in the Miscellaneous section.



M99607

2. Remove locknut (A) attaching hand lever rod (B) to intermediate shaft plate (F). Disconnect rod.

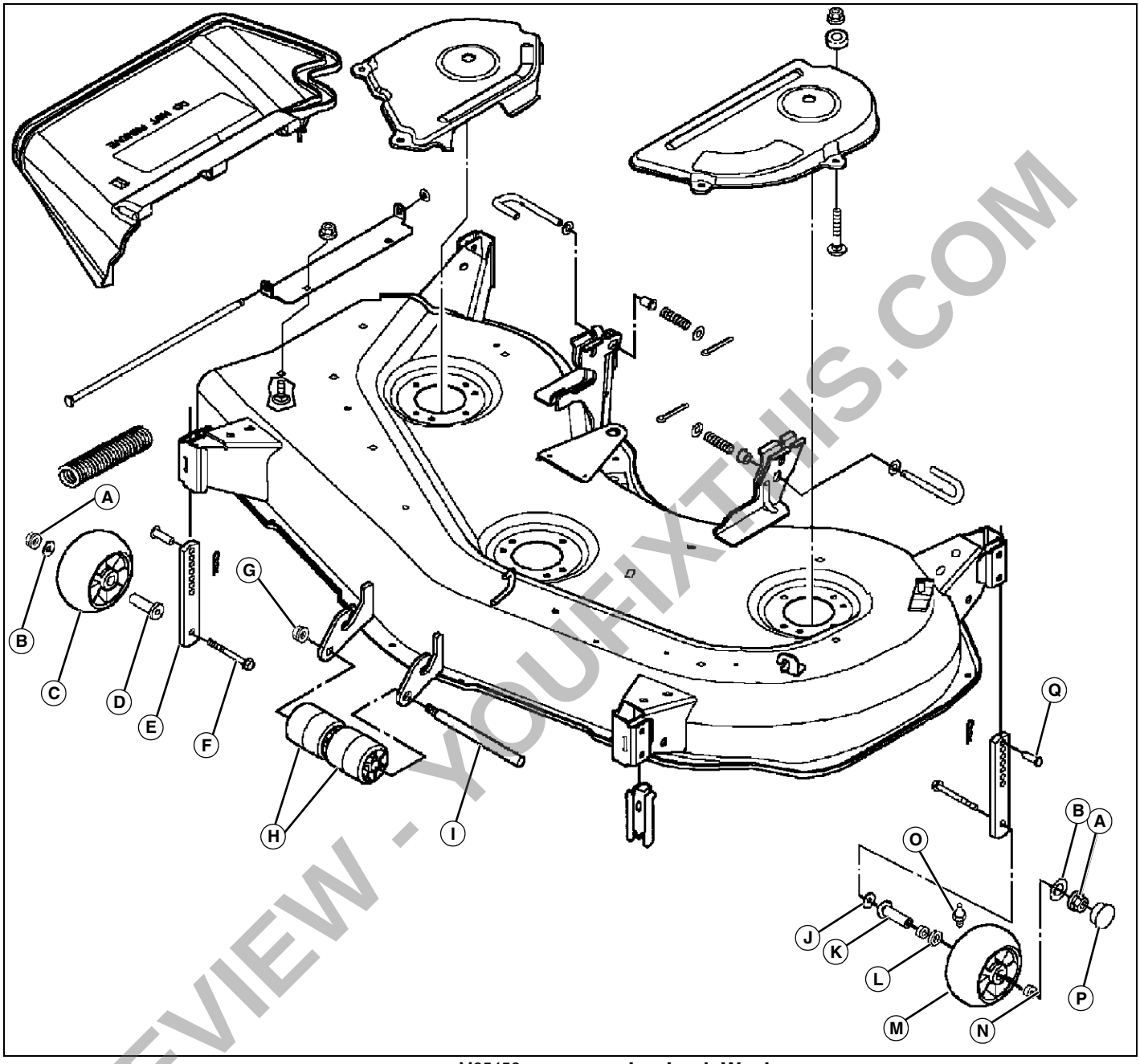
3. Remove cotter pin (C) and washer (E) attaching transaxle control rod (D) to intermediate shaft plate. Disconnect rod.



M99609

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Gauge Wheels



M95458

A - Flange Nut (4 used)
B - Washer (4 used)
C - Front Gauge Wheel (2 used)
D - Bushing (2 used)
E - Gauge Wheel Bar (4 used)
F - Carriage Bolt
G - Nut
H - Front Rollers
I - Roller Shaft
J - Washer
K - Bushing (2 used)
L - Lock Washer
M - Rear Gauge Wheel (2 used)
N - Bushing
O - Grease Fitting
P - Cap
Q - Pin (4 used)

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