JOHN DEERE
WORLDWIDE COMMERCIAL & CONSUMER EQUIPMENT DIVISION

Lightweight Fairway Mower
3215, 3215A, 3215B, 3225B, 3235, 3235A and 3235B

TM1534 FEB03

TECHNICAL MANUAL



JOHN DEERE

North American Version
Litho in U.S.A.

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ENGINE - DIESEL TABLE OF CONTENTS

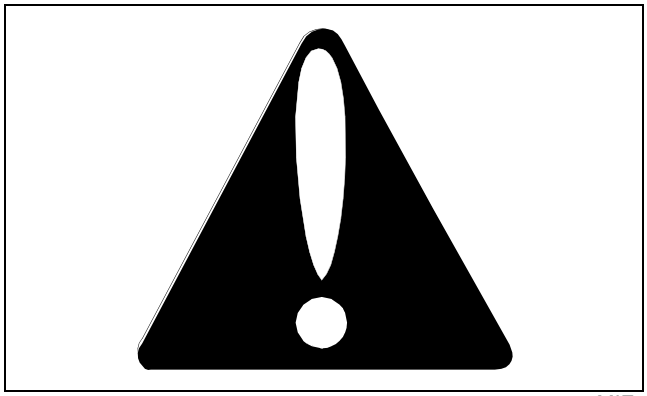
Table of Contents

Specifications 29
3TNE78A and 3TNE82A Engines 29
3TNE84 Engine 35
Torque Specifications (All Engines) 41
Tools and Materials 42
Tools 42
Component Location 43
Alternator Components 43
Starter Components 44
Theory of Operation 45
Fuel and Air System Operation 45
Cooling System Operation 46
Lubrication System Operation 47
Diagnostics 47
Diesel Engine Troubleshooting 47
Tests and Adjustments 56
Test Cylinder Compression 56
Adjust Throttle Lever 57
Adjust Fuel Shutoff Solenoid 57
Adjust Slow Idle 58
Adjust Fast Idle 3TNE78A (Engine S.N.-13510) and 3TNE84 (Engine S.N. -011149) 58
Adjust Fast Idle 3TNE78A (Engine S.N. 013511-), 3TNE82A (All) and 3TNE84 (Engine S.N. 011150-) 59
Adjust Torque Capsule 59
Adjust Injection Pump Timing (3TNE78A-RJFE and 3TNE84-JFE) 59
Adjust Injection Pump Static Timing (3TNE78A-RJFE and 3TNE84-JFE) 60
Adjust Injection Pump Static Timing (3TNE78A-ERJFE, 3TNE82A-EJF and 3TNE84-EJFE) 61
Adjust Valve Clearance 61
Check Valve Lift 63
Check Connecting Rod Side Play 63
Check Connecting Rod Bearing Clearance 64
Check Crankshaft End Play 65
Check Crankshaft Main Bearing Clearance 65
Check Camshaft End Play 66
Check Timing Gear Backlash 67
Test Fuel Injection Nozzles 67
Test Thermostat Opening 69
Adjust Fan/Alternator Drive Belt 70
Test Cylinder Leakdown 70
Test Cooling System Pressure 71
Test Radiator Pressure Cap 71
Test Engine Oil Pressure 72
Test Air Intake System Leakage 72
Adjust Throttle Cable 73
Test Fuel System Leakage 73
Bleed Fuel System 73
Test Coolant Temperature Switch 74
Repair 74
Remove Engine 74
Remove and Install Rocker Cover 75
Remove and Install Rocker Arm Assembly 76
Inspect Rocker Arm Assembly 77
Remove and Install Cylinder Head and Valves 78
Disassemble and Assemble Cylinder Head and Valves 79
Inspect Cylinder Head and Valves 80
Remove and Install Exhaust Manifold 83
Remove and Install Intake Manifold 83
Grind Valve Seats 84
Lap Valves 84
Measure Piston-to-Cylinder Head Clearance 85
Remove and Install Piston and Connecting Rod 85
Disassemble and Assemble Piston and Connecting Rod 87
Inspect Piston and Connecting Rod 88
Inspect Cylinder Bore 92
Inspect Cylinder Bore Taper and Out-of-Round 93
Remove and Install Crankcase Extension Housing 94
Replace Crankshaft Rear Oil Seal 94
Replace Crankshaft Front Oil Seal 94
Remove and Install Crankshaft and Main Bearings 94
Inspect Crankshaft and Main Bearings 96
Remove and Install Crankshaft Gear 97
Remove and Install Flywheel 97
Remove and Install Camshaft 98
Inspect Camshaft 99
Remove and Install Camshaft Gear 101
Remove and Install Cam Followers 101
Inspect Cam Followers 101

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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.

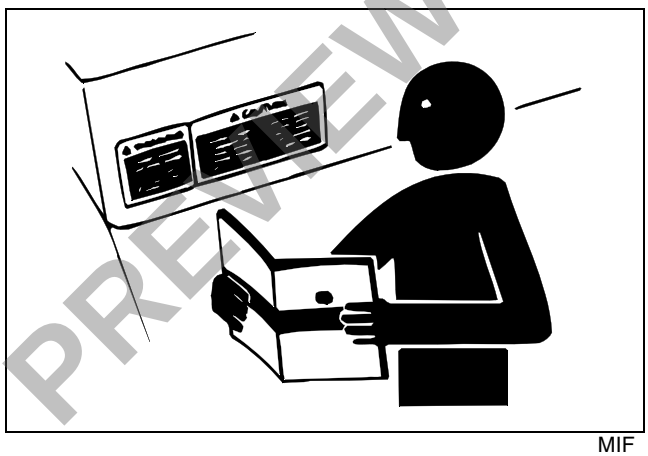
Follow recommended precautions and safe servicing practices.

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.

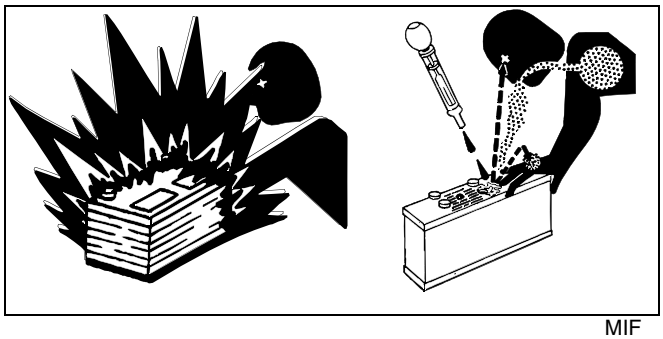
Do not store oily rags; they can ignite and burn spontaneously.

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.

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Diesel Engine Coolant Drain Interval - North America

When using John Deere Pre-Diluted (TY16036) Automobile and Light Duty Engine Service coolants, drain and flush the cooling system and refill with fresh coolant mixture every 36 months or 3,000 hours of operation, whichever comes first.

When using John Deere Concentrate (TY16034) Automobile and Light Duty Engine Service coolants, drain and flush the cooling system and refill with fresh coolant mixture every 24 months or 2,000 hours of operation, whichever comes first.

If above John Deere Automobile and Light Duty Engine Service coolants are not being used, drain, flush, and refill the cooling system according to instructions found on product container or in equipment operator's manual or technical manual.

Diesel Engine Coolant - Europe

The engine cooling system when filled with a proper dilution mixture of anti-freeze and deionized or distilled water provides year-round protection against corrosion, cylinder liner pitting, and winter freeze protection down to -37°C (-34°F).

The following John Deere coolant is **PREFERRED**:

- **COOL-GARD COOLANT CONCENTRATE™.**

If above preferred coolant is not available, use any Automobile and Light Duty Engine Service ethylene glycol base coolant, meeting the following specification:

- ASTM D3306 (JDM H24C1).

Read container label completely before using and follow instructions as stated.

IMPORTANT: Avoid damage! To prevent engine damage, DO NOT use pure anti-freeze or less than a 50% anti-freeze mixture in the cooling system. DO NOT mix or add any additives/conditioners to the cooling system in Lawn and Grounds Care/Golf and Turf Division equipment. Water used to dilute engine coolant concentrate must be of high quality - clean, clear, potable water (low in chloride and hardness-Table 1) is generally acceptable. DO NOT use salt water. Deionized or distilled water is best to use. Coolant that is not mixed to these specified levels and water purity can cause excessive scale, sludge deposits, and increased corrosion potential.

Water Quality	
Property	**Requirements**
Total Solids (Max)	340 ppm (20 grns/gal)
Total Hardness (Max)	170 ppm (10 grns/gal)
Chloride (as Cl) (Max)	40 ppm (2.5 grns/gal)
Sulfate (as SO_4) (Max)	100 ppm (5.8 grns/gal)

Mix 50 percent anti-freeze concentrate with 50 percent distilled or deionized water. This mixture will protect the cooling system down to -37°C (-34°F) and up to 108°C (226°F).

Certain geographical areas may require lower air temperature protection. See the label on your anti-freeze container or consult your John Deere dealer to obtain the latest information and recommendations.

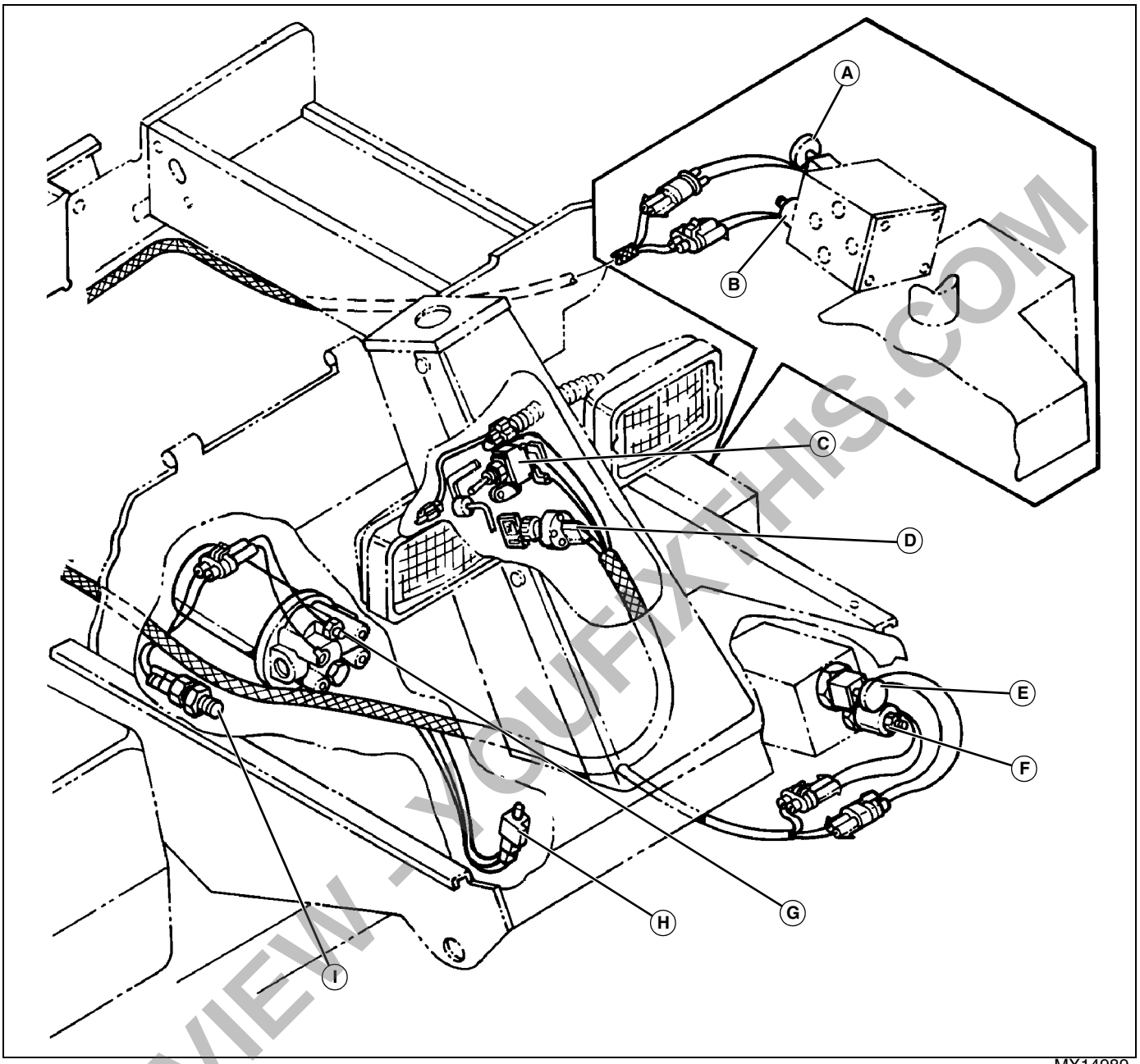
Diesel Engine Coolant Drain Interval - Europe

When using John Deere Cool-Gard Coolant Concentrate for Automobile and Light Duty Engine Service, drain and flush the cooling system and refill with fresh coolant mixture every 24 months or 2,000 hours of operation, whichever comes first.

If above John Deere Automobile and Light Duty Engine Service coolant is not being used, drain, flush, and refill the cooling system according to instructions found on product container or in equipment operator's manual or technical manual.

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Picture Note: 3215 and 3235 Illustrated

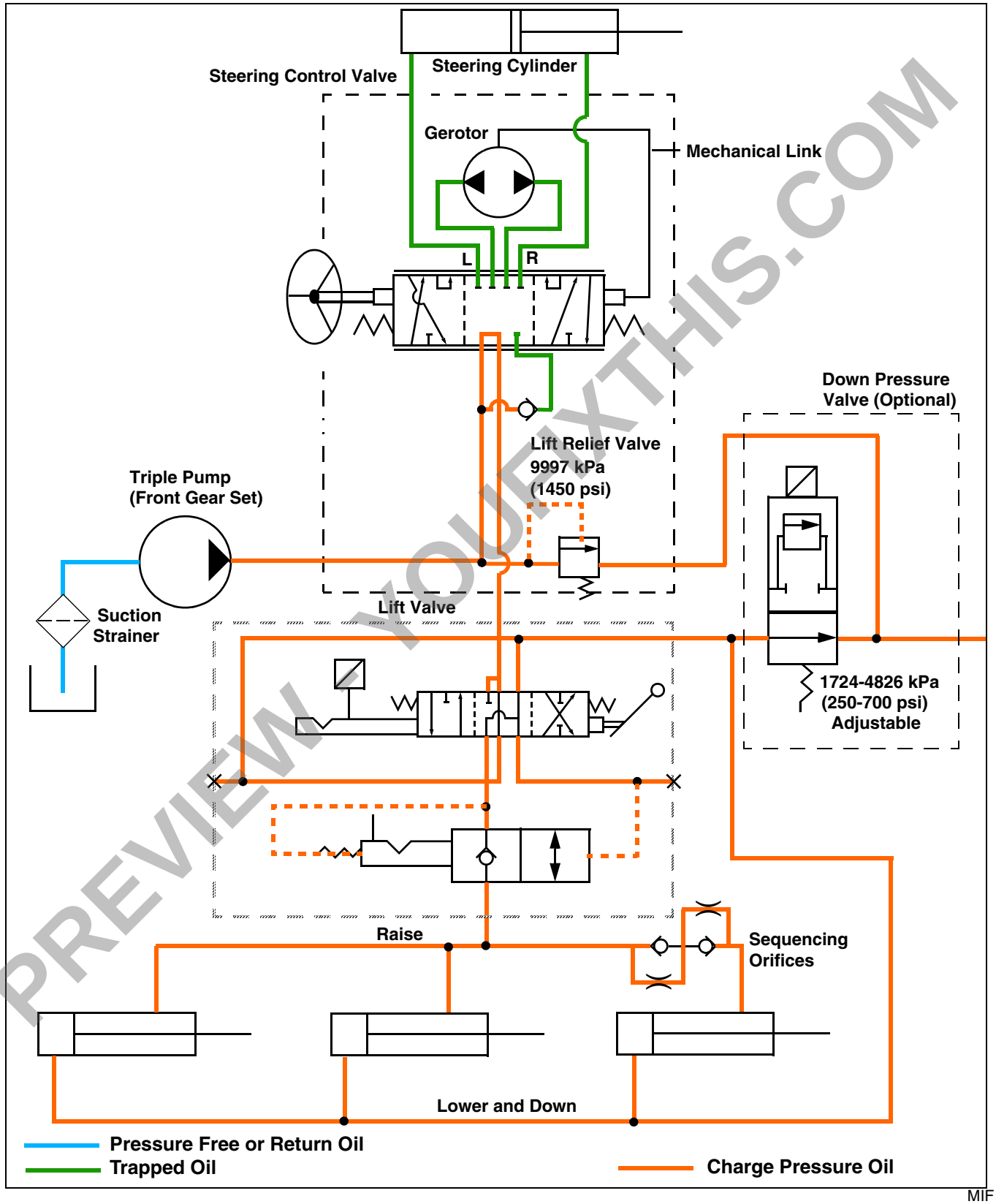
A - Rear Backlap Switch
B - Rear Mow Valve Solenoid
C - Park Lock Switch
D - Ignition Switch
E - Front Backlap Switch
F - Front Mow Valve Solenoid
G - Hydraulic Oil Pressure Switch
H - Brake Switch
I - Hydraulic Oil Temperature Sensor

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Schematics

Hydrostatic Schematic - 3215, 3215A, 3215B, 3225B and 3235

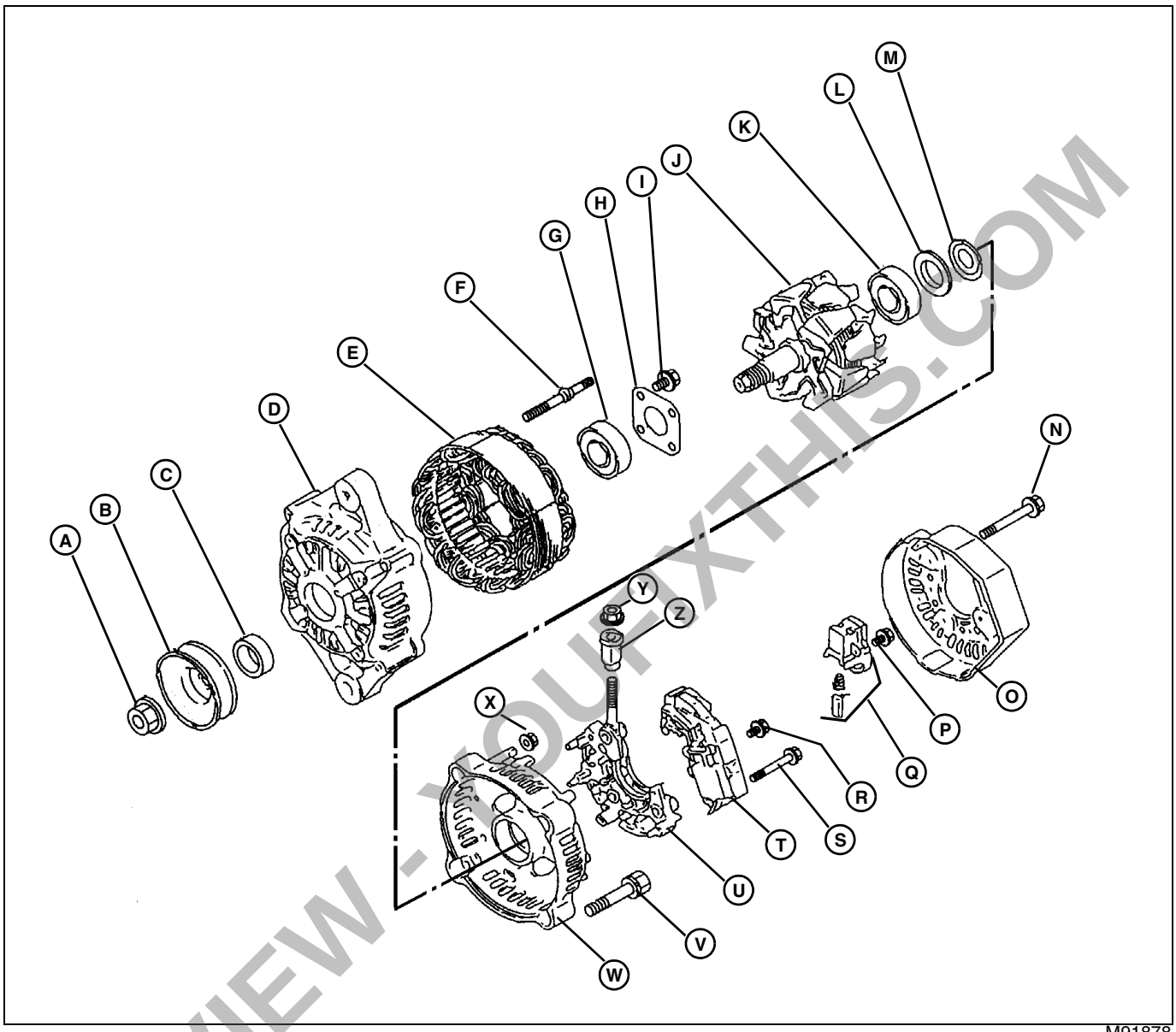


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Component Location **Alternator Components**



M91878

A - Nut
B - Pulley
C - Spacer (40 amp only)
D - Front Frame
E - Stator
F - Stud
G - Bearing
H - Cover
I - Screw
J - Rotor
K - Bearing
L - Cover
M - Thrust Washer (40 amp)
N - Cap Screw
O - Cover
P - Screw
Q - Brush Assembly
R - Screw
S - Screw
T - Regulator
U - Diode Assembly
V - Cap Screw
W - Rear Frame
X - Nut
Y - Nut
Z - Insulator Bushing

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Cylinder Head

Cylinder Head Flatness (Allowable Distortion Without Resurfacing)	0.05 mm (0.002 in.)
Cylinder Head Flatness (Resurface Range)	0.05-0.15 mm (0.002-0.006 in.)
Cylinder Head Flatness (Maximum Distortion)	0.15 mm (0.006 in.)

Flywheel

Flatness	0.02 mm (0.001 in.)

Fuel Injection Nozzles

Nozzle Contact Surface	0.10 mm (0.004 in.)

Idler Gear

Shaft OD	45.950-45.975 mm (1.809-1.810 in.)
Wear Limit	45.93 mm (1.808 in.)
Bushing ID	46.00-46.025 mm (1.811-1.812 in.)
Wear Limit	46.08 mm (1.814 in.)
Shaft and Bushing Clearance	0.15 mm (0.006 in.)

Oil Pressure Regulating Valve

Spring Free Length	46 mm (1.810 in.)
Spring Compressed Length (at 20.5 N (4.6 lb-force))	27.5 mm (1.080 in.)

Oil Pump

Oil Pump Gear Backlash	0.12 mm (0.005 in.)
Rotor Shaft OD-to-Backing Plate ID Clearance	0.013-0.043 mm (0.001-0.002 in.)
Wear Limit	0.20 mm (0.008 in.)
Rotor Recess	0.03-0.09 mm (0.001-0.002 in.)
Wear Limit	0.15 mm (0.006 in.)
Outer Rotor-to-Pump Body Clearance	0.10-0.16 mm (0.004-0.006 in.)
Wear Limit	0.25 mm (0.010 in.)
Inner-to-Outer Rotor Clearance	0.05-0.10 mm (0.002-0.004 in.)
Wear Limit	0.15 mm (0.006 in.)

Piston

Standard Piston OD	83.95-83.98 mm (3.305-3.306 in.)
Wear Limit	83.90 mm (3.303 in.)
Oversize Piston OD	84.20-84.23 mm (3.315-3.316 in.)
Wear Limit	84.10 mm (3.311 in.)

Piston-to-Cylinder Head

Clearance	0.64-0.82 mm (0.025-0.032 in.)

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Tests and Adjustments

Test Cylinder Compression

Reason

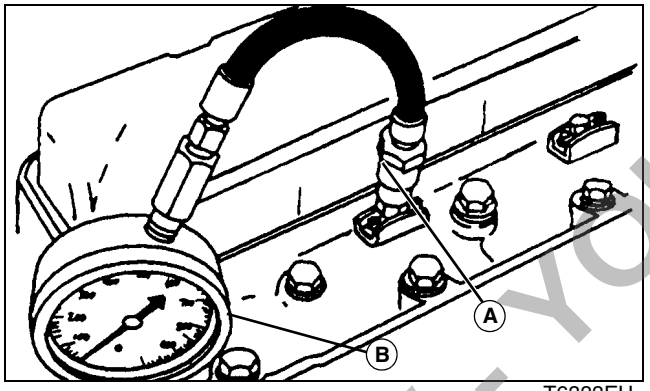
To determine the condition of the pistons, rings, cylinder walls and valves.

Special or Required Tools

Tool Name	Tool No.	Tool Use
Compression Gauge Assembly	JT01682	Used to measure cylinder compression.
Adapter	JDG560	Used to measure cylinder compression.

Procedure

1. Remove the injection nozzles.



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2. Install heat protector from end of injector and install on JDG560 Adapter (A).

3. Install JT01682 Compression Gauge Assembly (B) and JDG560 Adapter.

4. Disconnect fuel control solenoid connector.

IMPORTANT: Avoid damage! DO NOT overheat starting motor during test.

5. Crank the engine for five seconds with the starting motor. Minimum cranking speed is 250 rpm.

6. Record the pressure reading for each cylinder.

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.

Specifications

Cylinder Compression Pressure 3TNE78A - at 250 RPM (Standard) . . . . . 3137 kPa (455 psi)

Cylinder Compression Pressure 3TNE78A - at 250 RPM (Minimum) . . . . . 2551 kPa (370 psi)

Cylinder Compression Pressure 3TNE82A - at 250 RPM (Standard) . . . . . 3040 kPa (441 psi)

Cylinder Compression Pressure 3TNE82A - at 250 RPM (Minimum) . . . . . 2455 kPa (356 psi)

Cylinder Compression Pressure 3TNE84 - at 250 RPM (Standard) . . . . . 3234 kPa (469 psi)

Cylinder Compression Pressure 3TNE84 - at 250 RPM (Minimum) . . . . . 2551 kPa (370 psi)

Difference Between Cylinders All Engines - at 250 RPM (Maximum) . . . . . 296 kPa (43 psi)

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Cam Follower Stem

Stem OD	11.98-11.99 mm (0.471-0.472 in.)
Wear Limit	11.93 mm (0.470 in.)

Camshaft

Camshaft End Play	0.05-0.25 mm (0.002-0.010 in.)
Camshaft Bend (Maximum)	0.02 mm (0.0021 in.)
Camshaft Lobe Height	38.64-38.77 mm (1.521-1.526 in.)
Wear Limit	38.40 mm (01.512 in.)

Camshaft Bushings

Camshaft Bushing ID at Gear Housing	44.990-45.055 mm (1.771-1.774 in.)
Camshaft Bushing ID at Intermediate and Flywheel End	45.00-45.025 mm (1.772-1.773 in.)
Wear Limit	45.10 mm (1.776 in.)
Camshaft Bushing-to-Journal Clearance	0.20 mm (0.008 in.)

Camshaft Journals

Gear Housing and Flywheel End Camshaft Journals OD	44.93-44.95 mm (1.769-1.770 in.)
Intermediate Camshaft Journals	44.91-44.94 mm (1.768-1.769in.)
Wear Limit	44.85 mm (1.766 in.)

Connecting Rod Bearing

Bearing ID	46.00-46.016 mm (1.811-1.812 in.)
Wear Limit	46.07 mm (1.814 in.)
Bearing Oil Clearance	0.038-0.090 mm (0.001-0.004 in.)

Crankshaft and Main Bearings

Crankshaft Bend Variation	0.02 mm (0.001 in.)
Connecting Rod Journal OD	42.95-42.96 mm (1.6909-1.6913 in.)
Wear Limit	42.91 mm (1.689 in.)
Main Bearing Journal OD	46.95-46.96 mm (1.8484-1.8488 in.)
Wear Limit	46.91 mm (1.847 in.)
Main Bearing Oil Clearance	0.038-0.090 mm (0.001-0.004 in.)
Wear Limit	0.25 mm (0.010 in.)

Cylinder Bore (3TNE78A)

Standard Cylinder Bore ID	78.00-78.03 mm (3.071-3.072 in.)
Wear Limit	78.20 mm (3.079 in.)
Oversize Cylinder Bore ID	78.25-78.28 mm (3.081-3.082 in.)
Wear Limit	78.45 mm (3.089 in.)
Piston-to-Cylinder Bore Clearance	0.035-0.065 mm (0.001-0.003 in.)
Cylinder Roundness	0.00-0.01 mm (0.00-0.0004 in.)
Wear Limit	0.03 mm (0.001 in.)
Cylinder Taper	0.00-0.01 mm (0.00-0.0004 in.)
Wear Limit	0.03 mm (0.001 in.)

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Common Circuit Tests

Shorted Circuit

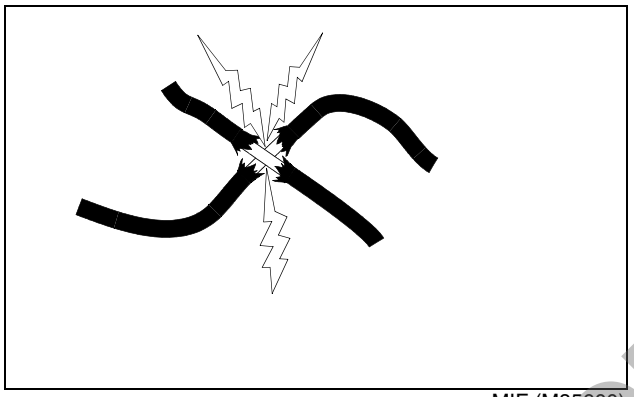
A shorted circuit may result in the wrong component operating (i.e. improper wire-to-wire contact). To test for a shorted or improperly wired circuit:

1. Turn component switch ON.

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

3. Follow the circuit and disconnect wires at connectors until component stops operating.

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



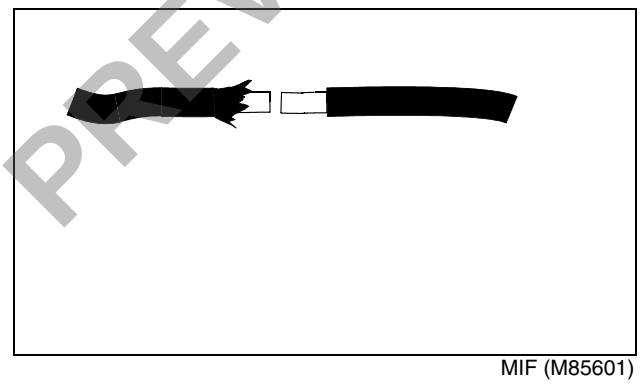
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High Resistance or Open Circuit

High resistance or open circuits usually result in slow, dim, or no component operation (i.e. poor, corroded, or disconnected 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 grounds of the circuit for corrosion.

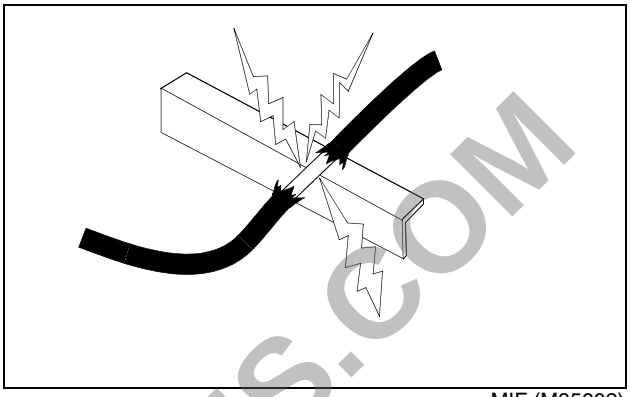
2. If terminals are not corroded or loose, the problem is in the component or wiring.



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Grounded Circuit

Grounded circuits usually result in no component operation or a blown fuse.



MIF (M85602)

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INDEX

Numerics

22-In. Heavy Duty
- Backlapping Procedure 407
- Bearing Replacement, Vertical Cutting Unit 450
- Bed Knife/Support
  - Installation 434
  - Removal 434
- Cutting Reel Pivot Arm
  - Assembly 437
  - Disassembly 436
- Depth-of-Cut Adjustment, Vertical Cutting Unit . . 411
- Fairway Tender Conditioner
  - Disassembly 442
  - Removal 439
- Fairway Tender Conditioner Installation 440
- Front Roller
  - Installation 434
  - Removal 433
- Height-of-Cut Adjustment 408
- Power Brush
  - Disassembly 447
  - Installation 446
  - Removal 444
- Reel
  - Adjustment Washer Installation 438
  - Assemble, Vertical Cutting Unit 449
  - Assembly Installation, Vertical Cutting Unit . . 448
  - Assembly Removal, Vertical Cutting Unit . . . 448
  - Disassemble, Vertical Cutting Unit 449
  - Installation 437
  - Removal 435
- Reel and Bed Knife Inspection 438
- Reel-to-Bed Knife Adjustment 406
- Roller Assembly 433
- Roller Disassembly 433

22-In. Standard
- Backlapping Procedure 402
- Bed Knife/Support
  - Installation 429
  - Removal 429
- Cutting Reel Pivot Arm
  - Assembly 430
  - Disassembly 430
- Cutting Unit Shield Adjustment 406
- Front Roller Installation 428
- Front Roller Removal 426
- Height-of-Cut Adjustment 404
- Reel
  - Adjustment Washer Installation 432
  - Installation 431
  - Removal 430
- Reel and Bed Knife Inspection 432
- Reel-to-Bed Knife Adjustment 402
- Roller Assembly 428
- Roller Bracket
  - Installation 426
  - Removal 426
- Roller Disassembly 427

2500M
- Backlapping Procedure 413
- Bearing Housing
  - Assembly 454
  - Assembly, Vertical Cutting Unit 474
  - Disassembly 454
  - Disassembly, Vertical Cutting Unit 473
- Bearing Replacement, Vertical Cutting Unit 476
- Bed Knife
  - Installation 456
  - Removal 455
- Cutting Unit
  - Removal and Installation 452
  - Shield Adjustment 421
- Depth-of-Cut Adjustment, Vertical Cutting Unit . . . 422
- Fairway Tender Conditioner
  - Adjustment 420
  - Disassembly 465
  - Installation 462
  - Removal 460
- Front Roller
  - Adjustment 416
  - Removal and Installation 456
  - Removal and Installation, Vertical Cutting Unit 474
- Height-of-Cut
  - Adjustment 418
  - Range Adjustment 415
- Power Brush
  - Adjustment 422
  - Disassembly 470
  - Installation 468
  - Removal 467
- Rear Roller
  - Installation 457
  - Installation, Vertical Cutting Unit 476
  - Removal 457
  - Removal, Vertical Cutting Unit 475
- Reel
  - Assemble, Vertical Cutting Unit 472
  - Assembly Installation, Vertical Cutting Unit . . . 471
  - Assembly Removal, Vertical Cutting Unit 470
  - Disassemble, Vertical Cutting Unit 472
  - Installation 453
  - Removal 452
- Reel and Bed Knife Inspection 451
- Reel-to-Bed Knife Adjustment 412
- Roller Disassembly and Assembly 458
- Vertical Cutting Unit Removal and Installation 470

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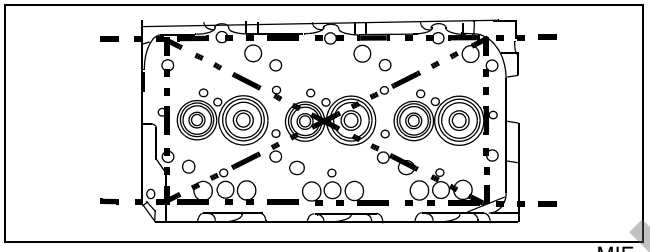
Inspect Cylinder Head and Valves

Special or Required Tools

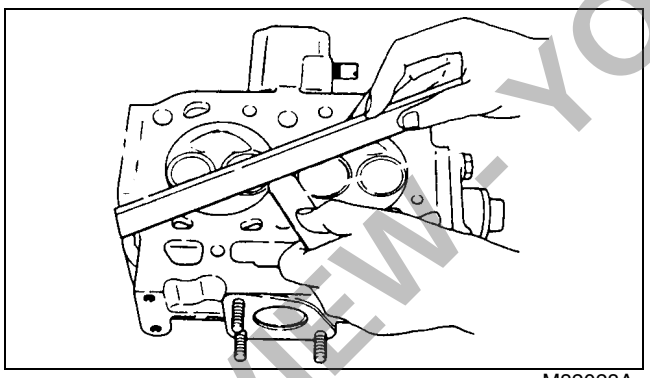
Tool Name	Tool No.	Tool Use
Valve Guide Knurler	D-20019WI	Used to knurl valve guides.
Valve Guide Reamer	D-20021WI	Used to ream valve guides.
Valve Guide Driver	JDE118	Used to install new valve guides.

IMPORTANT: Avoid damage! Before inspection, thoroughly clean all components of carbon or dirt.

Cylinder Head



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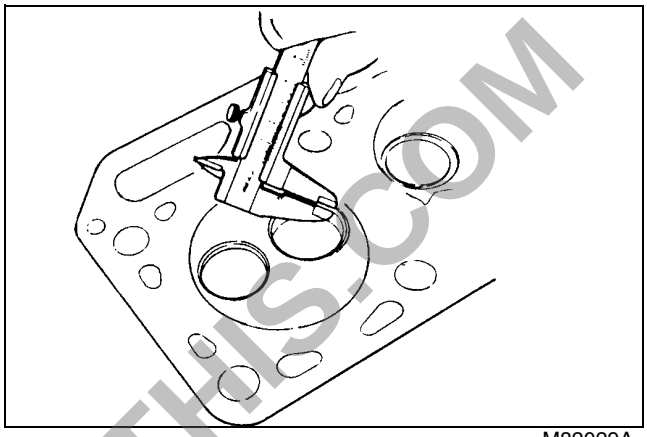
1. To measure cylinder head flatness, place a straightedge along each of the four sides and each diagonal. Measure clearance between straightedge and combustion surface with a feeler gauge and compare with specifications.

2. If the cylinder head was resurfaced:

   - Measure piston-to-cylinder head clearance. See “Measure Piston-to-Cylinder Head Clearance” on page 85.
   - Measure valve recession. See “Inspect Cylinder Head and Valves” on page 80
   - Measure valve seat width in this procedure.

Valve Seats

NOTE: The valve seats are not replaceable. If inspection of the cylinder head reveals valve seats that are damaged or worn beyond repair, the cylinder head must be replaced.

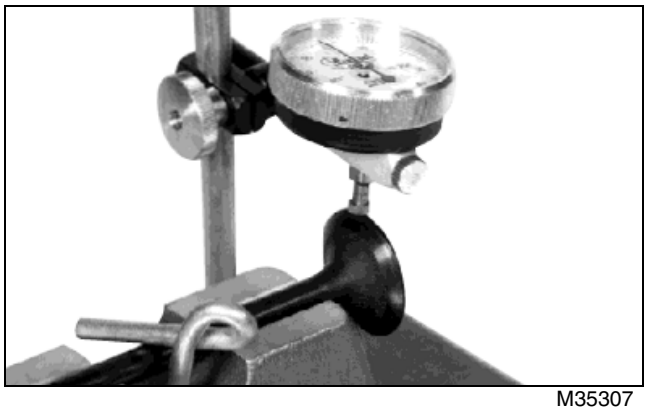


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1. Measure the valve seat widths and compare with specifications.

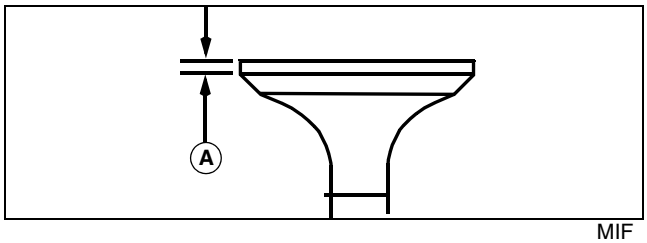
2. If necessary, grind the valve seats to meet specifications. See “Grind Valve Seats” on page 84.

Valves



M35307

1. Check valves for out-of-round, bent or warped condition using a valve inspection center. Replace valve if necessary.



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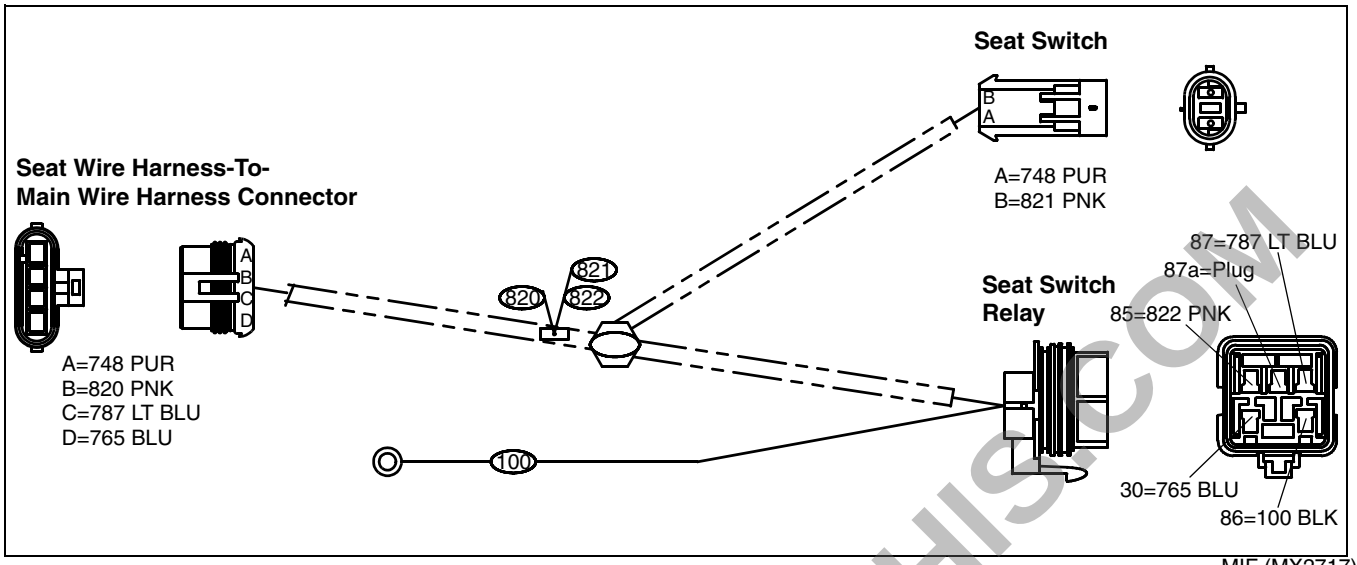
2. If the valve faces are worn, burned or pitted, grind valves to proper face angle.

3. Measure valve head thickness (A). If measurement is less than specifications after grinding, replace valve.

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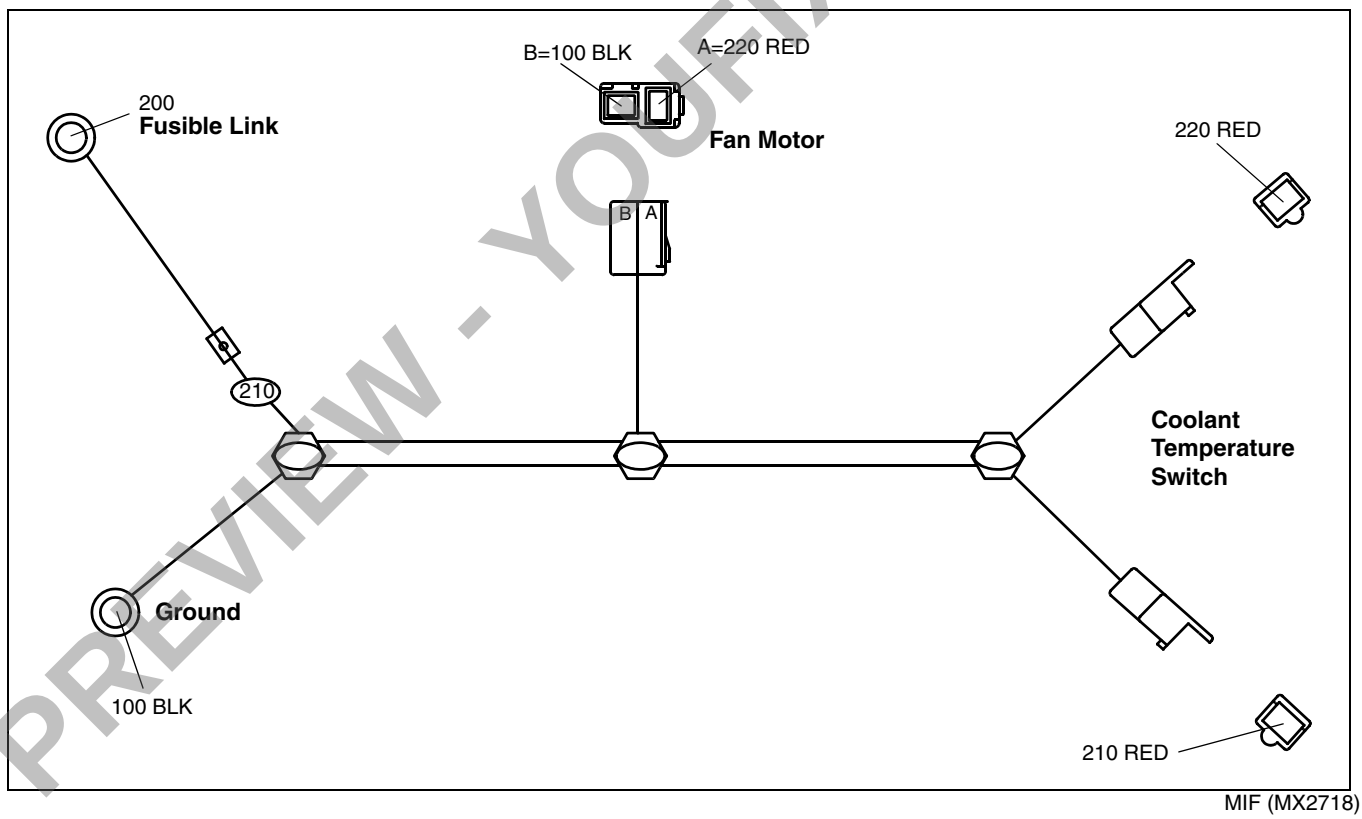
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Seat Wire Harness - 3215B, 3225B, and 3235B



MIF (MX2717)

Fan Wire Harness - 3215B (Serial No. -020243), 3225B (Serial No. -010402), 3235B 2WD (Serial No. -020174), and 4WD (Serial No. -020438)



MIF (MX2718)

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Symptom: Rear Lift Arms Will Not Rise

(2) Is lift system free of air?

Yes - Go to step (3).

No - Start engine and cycle lift arms to purge air from system.

(3) Are lift system hydraulic fittings tight and free from leaks?

Yes - Go to step (4).

No - Tighten fittings and replace O-rings as needed.

(4) Is charge pressure within specification?

Yes - Go to step (5).

No - Perform lift system relief valve pressure test. See “Test Lift System Relief Valve Pressure” on page 331.

(5) Is steering system leakage within specification?

Yes - Go to step (6).

No - Perform steering system leakage test. See “Test Steering System Leakage” on page 370.

(6) Is rear lift cylinder delay orifice free from obstructions?

Yes - Go to step (7).

No - See “Remove and Install Rear Lift Cylinder Flow Restrictor” on page 338.

(7) Is lost motion linkage on rear lift cylinder operating properly?

No - See “Remove and Install Rear Lift Cylinder Lost Motion Linkage” on page 339.

Symptom: Rear Tilt Arms Will Not Lower

(1) Is rear lift cylinder delay orifice free from obstructions?

Yes - Go to step (2).

No - See “Remove and Install Rear Lift Cylinder Flow Restrictor” on page 338.

(2) Is lost motion linkage on rear lift cylinder operating properly?

No - See “Remove and Install Rear Lift Cylinder Lost Motion Linkage” on page 339.

Symptom: Rear Tilt Arms Rise Too High

(1) Is rear lift arm stop in the down position?

No - Move stop into the down position.

Tests and Adjustments

Test Front Reel Motors Pressure Relief

Reason

To ensure that front reel pressure relief valve is operating properly.

Special or Required Tools

Tool Name	Tool No.	Tool Use
Quick Disconnect Fitting	MT1531	Used to attach pressure gauge. Part of BM18319 diagnostic Kit.
Swivel T-Fitting	38H1030	Used to attach pressure gauge. Part of BM18319 diagnostic Kit.
Cover	XPD6-285	Used to attach pressure gauge. Part of BM18319 diagnostic Kit.
Hose	AMT846	Used to attach pressure gauge. Part of BM18319 diagnostic Kit.
Female Quick Coupler	RE48122	Used to attach pressure gauge. Part of BM18319 diagnostic Kit.
Hose 70 000 kPa (10,000 psi)	JT03364	Used to attach pressure gauge.
Gauge 70 000 kPa (10,000 psi)	JT03362	Used to read front reel motor pressure.
Connector 1/4” M NPT x 7/16” M 37°	JT05486	Used to attach pressure gauge.

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Adjust Height-of-Cut (HOC) - 22-In. Standard

Reason

To set desired cutting height.

Special or Required Tools

Tool Name	Tool No.	Tool Use
Height-of-Cut Gauge Bar	NA	Used to adjust cutting height.

Procedure

NOTE: The effective height-of-cut may differ from the bench setting due to the weight of options used, type of roller (grooved or smooth), soil conditions, grass condition and the use of competitive machines in conjunction with one another. When mowing fairways it is best to set the height-of-cut 0.0508-1.016 mm (0.020-0.040 in.) higher for the initial cut and lower it as needed after a test cut.

Adjust Rear Roller Height HOC

		Standard Roll Bracket (AET11306) Height-of-Cut								Low HOC Kit (BM16277) Height-of-Cut			
		2-Inch Roll Forward		2-Inch Roll Rear		3-Inch Roll Forward		3-Inch Roll Rear		3-Inch Roll Forward		3-Inch Roll Rear	
Rear Roller Bracket Hole	Rear Roller Frame Hole	MIN[1]	MAX[2]	MIN[1]	MAX[2]	MIN[1]	MAX[2]	MIN[1]	MAX[2]	MIN[1]	MAX[2]	MIN[1]	MAX[2]
Top	Top	6.7 (0.264)	15.10 (0.594)	8 (0.315)	18.8 (0.740)	11.8 (0.464)	20.2 (0.795)	14.2 (0.559)	25 (0.964)	6.5 (0.256)	13.7 (0.539)	8.8 (0.268)	15.6 (0.614)
Bottom	Bottom	11.2 (0.441)	19.6 (0.772)	11.8 (0.464)	22.7 (0.893)	16.2 (0.638)	24.6 (0.969)	18 (0.709)	28.8 (0.984)	10.6 (0.417)	18.1 (0.713)	10.9 (0.429)	19.6 (0.772)
Top	Middle	15.7 (0.618)	24.1 (0.949)	15.7 (0.618)	26.5 (1.043)	20.7 (0.815)	29 (1.141)	21.8 (0.858)	32.6 (1.283)	15 (0.590)	22.5 (0.886)	14.9 (0.587)	23.6 (0.929)

mm
(inches)

1. Measured with a new bed knife

2. Measured with a worn bed knife

Use the table above to ensure the rear roller mounting brackets are positioned correctly for the front roller HOC range desired. Perform Rear Roller HOC Range procedure to change the (HOC) range (if needed) before performing Rear Roller/Bed Knife adjustment.

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