JOHN DEERE
WORLDWIDE COMMERCIAL & CONSUMER EQUIPMENT DIVISION

John Deere Tractors
100 Series

TM2328 NOVEMBER 2005

TECHNICAL MANUAL



JOHN DEERE

North American Version
Litho in U.S.A.

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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 (B&S - Single Cylinder)
Engine (B&S - V-Twin)
Electrical
Power Train (Gear)
Power Train (Hydrostatic)
Steering
Brakes
Attachments
Miscellaneous

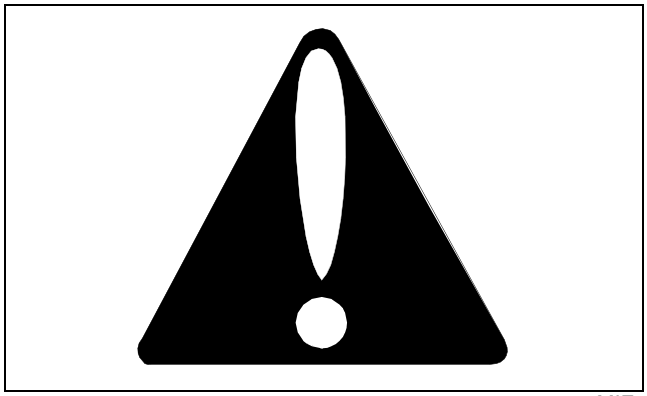
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Recognize Safety Information



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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.

Special Messages

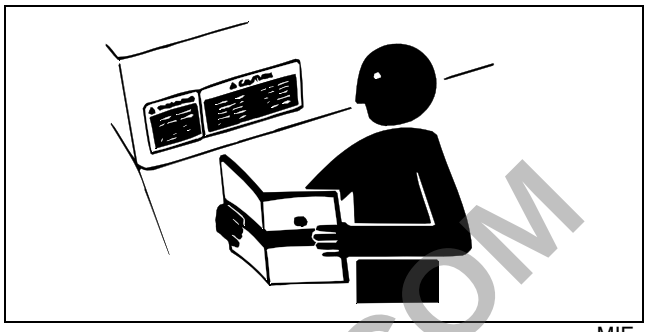
Your manual contains special messages to bring attention to potential safety concerns, machine damage as well as helpful operating and servicing information. Please read all the information carefully to avoid injury and machine damage.

CAUTION: Avoid injury! This symbol and text highlight potential hazards or death to the operator or bystanders that may occur if the hazards or procedures are ignored.

IMPORTANT: Avoid damage! This text is used to tell the operator of actions or conditions that might result in damage to the machine.

NOTE: General information is given throughout the manual that may help the operator in the operation or service of the machine.

Replace Safety Signs



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

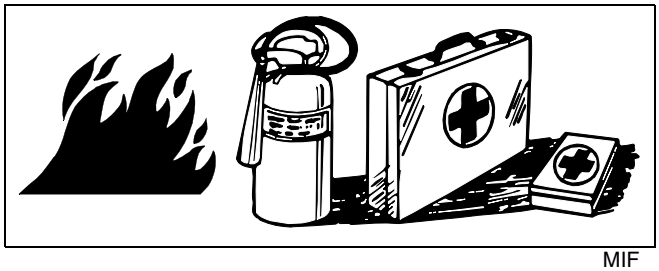
Understand Signal Words

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.

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.

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General Information

Reading Electrical Schematics

The schematic is made up of individual circuits laid out in a sequence of related functions. It is formatted with all power wires (A) across the top and all ground wires (B) across the bottom. Current flow is generally from top to bottom through each circuit and component. All components are shown in the OFF position. The diagram does not list connector (C) information unless needed to avoid confusion. If the connector is shown, the number next to it is the terminal pin location (D) in the connector.

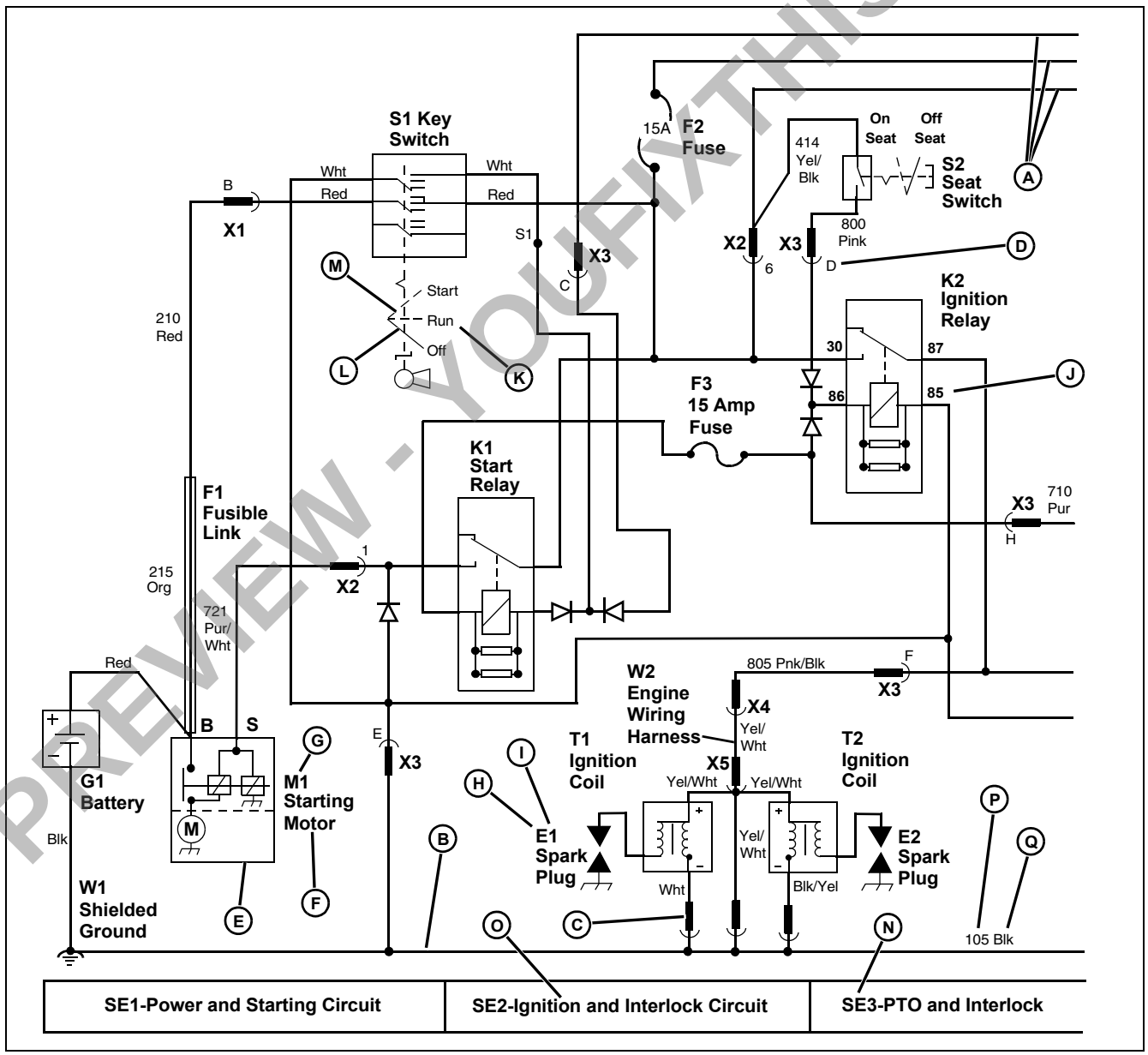
Each component is shown by a symbol (E), its name (F), and an identification code (G). The identification code contains a device identifying letter (H) and number (I).

The identifying letter is always the same for a specific component, but the identifying numbers are numbered consecutively from upper left to lower right. The terminal designation (J) is placed directly outside the symbol next to the connecting wire path. Switch positions (K) are also placed directly outside the symbol. The solid line (L) shows the position the switch is currently in and dash lines (M) represent other switch positions.

Each circuit is identified at the bottom of the drawing by a section number (N) and section name (O).

The circuit number (P) and wire color (Q) of the wires are shown directly next to the wire path.

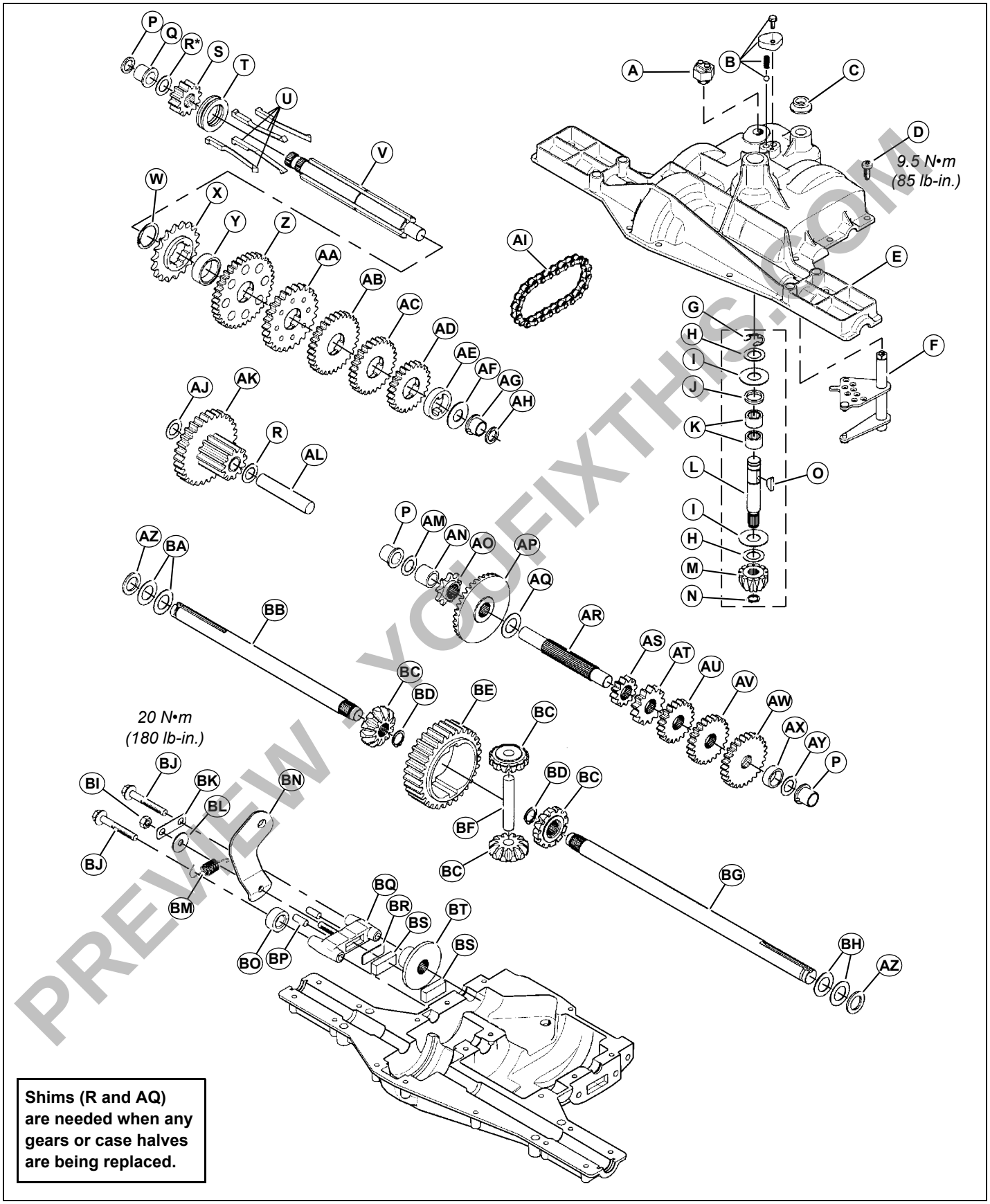
The same component name and identification code are used consistently on all diagrams in this section. Components can be easily cross-referenced.



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Transaxle Components



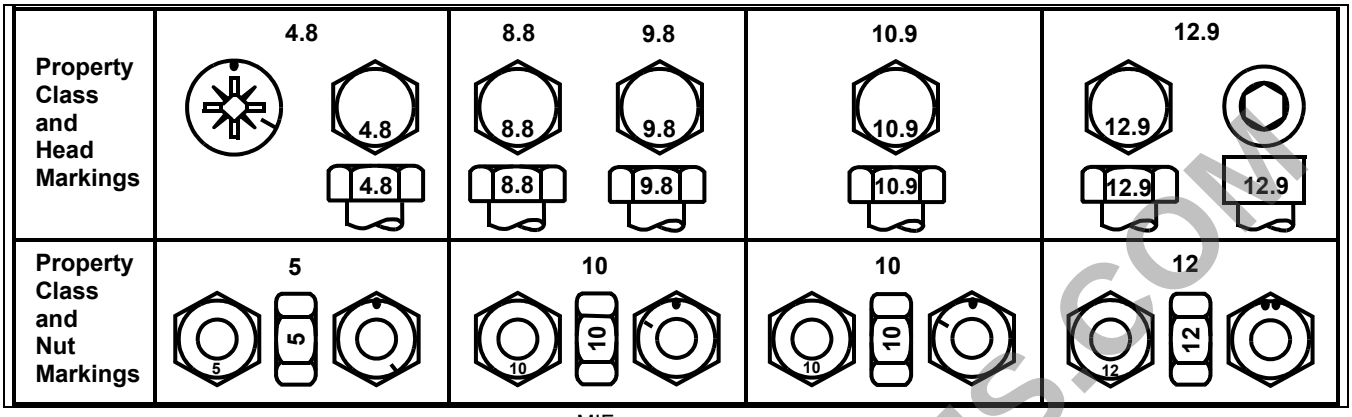
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Fastener Torques

Metric Fastener Torque Values



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	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

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 class. 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

Metric Fastener Torque Value - Grade 7

Size	Steel or Gray Iron Torque		Aluminum Torque	
	N•m	lb-ft	N•m	lb-ft
M6	11	8	8	6
M8	24	18	19	14
M10	52	38	41	30

Size	Steel or Gray Iron Torque		Aluminum Torque	
	N•m	lb-ft	N•m	lb-ft
M12	88	65	70	52
M14	138	102	111	82

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Tests and Adjustments

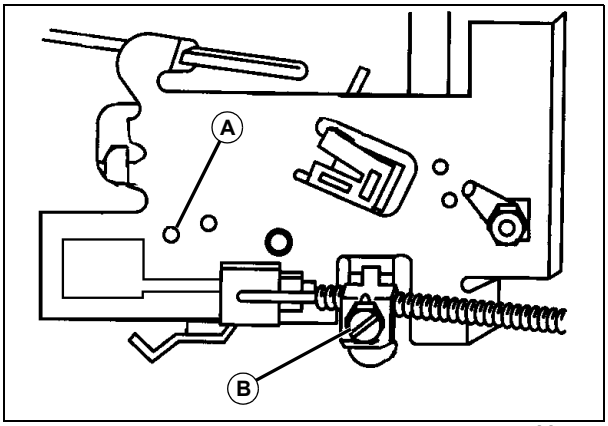
Throttle Cable Adjustment

Reason:

To make sure the throttle cable moves the throttle through its full range of movement.

Procedure:

1. Move throttle lever to FAST idle position (detent).



M95232

2. Hole in governor control lever must align with hole (A) in governor control plate.
3. Loosen throttle cable clamp (B).
4. Slide the throttle cable left or right to align holes.
5. Tighten throttle cable clamp (B).

Fuel Shutoff Solenoid Test

Reason:

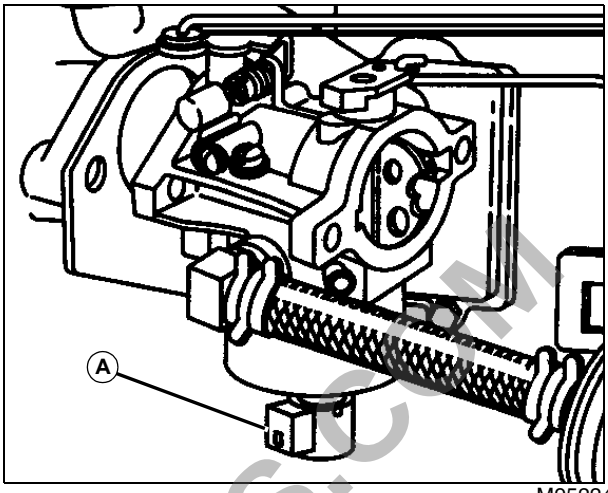
To test proper operation of fuel shutoff solenoid.

Required Tools:

- Jumper wire

Procedure:

1. Listen for an audible click when ignition switch is turned from OFF to ON.
2. If solenoid does not click, problem could be in machine wiring.



M95224

3. Disconnect wire from solenoid (A).
4. Momentarily place a jumper wire from solenoid terminal to battery positive terminal.

NOTE: If battery voltage drops below 9 volts when cranking engine or while engine is running, the solenoid will not function.

5. If solenoid clicks, the solenoid is working properly.

Results:

- Solenoid is operating properly if a click is heard when ignition switched from OFF to ON.

Governor Adjustment - Static

(Engine OFF)

CAUTION: Avoid Injury! Before starting or running engine, static adjustment of the governor must be made. Failure to make static adjustments first, could result in engine overspeeding, and may result in engine or equipment damage, personal injury and/or property damage.

NOTE: All linkage must be installed to make adjustment.

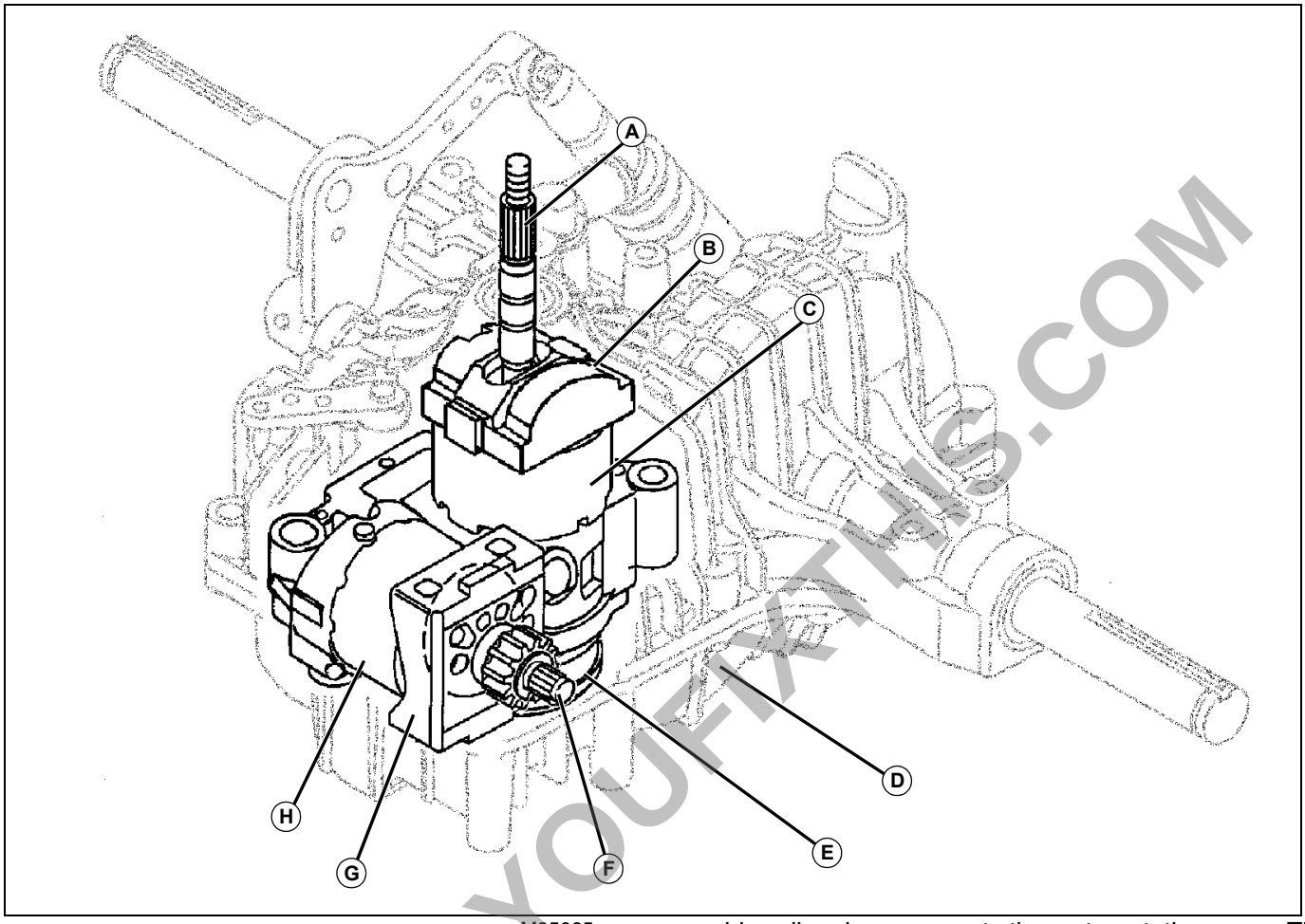
Reason:

To set the initial engine speed limits.

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Hydrostatic System Operation



M95065

- **A - Pump Input Shaft**
- **B - Variable Displacement Swash Plate**
- **C - Pump Rotating Group**
- **D - Reservoir**
- **E - Filter**
- **F - Motor Output Shaft**
- **G - Fixed Displacement Swash Plate**
- **H - Motor Rotating Group**

Function:

The hydrostatic transaxle provides a means of transferring power from the input sheave to the axle shafts of the transaxle. It also provides infinitely variable speed control and the capability of forward or reverse directional travel of the machine.

Theory of Operation:

As the input sheave is rotated by the traction drive belt it rotates the pump input shaft. The pump input shaft is splined to the pump rotating group. The pump rotating group is composed of an axial piston pump and a variable displacement swash plate. The pump rotating group provides oil under pressure to the motor rotating group. The motor rotating group is composed of an axial piston motor with a fixed position swash plate, and converts hydraulic energy into rotary motion, which is output through the motor output shaft. This rotary motion of the motor output shaft is the beginning of the gear power flow.

Neutral:

With the transmission in the neutral position, the swash plate is held perpendicular to the piston. Springs in the pump cylinder block force the pump pistons against the swash plate. Since the variable displacement swash plate is perpendicular to the axis of the pistons, there is no reciprocating motion of the pistons in the cylinders, and no oil is displaced. Because there is no demand for oil in the pump, both directional check valves are closed, and the machine remains stationary.

Forward:

As the direction control arm is moved to the forward position, the variable displacement swash plate is rotated from its neutral position.

Springs inside the pistons force them against the swash plate. As the swash plate angle increases, the pistons are

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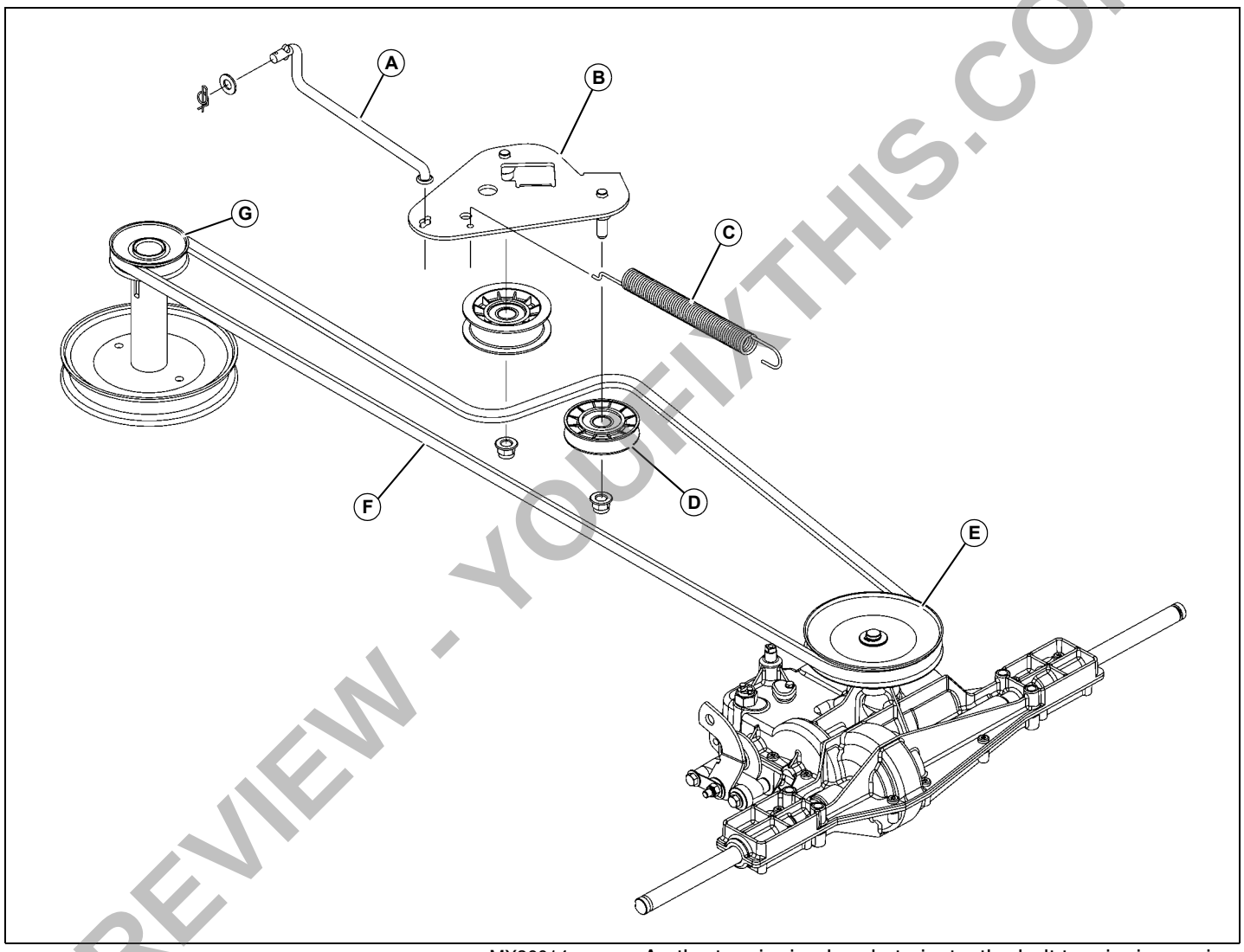
Theory of Operation

Clutch Pedal And Belt Traction Drive Operation

Function:

To transfer power from the engine to the 5-speed transaxle. This system also allows the power transfer to be interrupted in order to stop in gear, change to a different gear or direction, engage power again, or shift to neutral and push the unit with the engine on or off.

Theory of Operation:



MX36014

With engine running and clutch engaged (clutch/brake pedal released), the engine drive sheave (G) pulls the drive belt (F) and transmits power to the transaxle drive sheave (E). As clutch/brake pedal is depressed by the operator, the clutch rod (A) rotates the tensioning bracket assembly (B) clockwise. As the tensioning bracket assembly pivots, the tensioning sheave (D) moves to the left and rearward, releasing drive belt tension. This allows the engine drive sheave (G) to rotate without transferring any power through the slackened drive belt.

As the tensioning bracket pivots, the belt tensioning spring (C) is stretched, building additional tension in the spring. As the operator begins to ease-up on the clutch/brake pedal, the tensioning spring pulls the tensioning sheave (D) into the drive belt, tightening the belt and seating it in the grooves of the transaxle drive sheave (E) and the engine drive sheave (G). This interaction of components results in turning the transaxle drive sheave rapidly in a clockwise direction, transferring power from the engine to the 5-speed transaxle.

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Specifications

General Specifications

Engine Use	102 and 105
Make	Briggs & Stratton
Series	Intek™
Type	Gasoline
Stroke/Cycle	4
Model	31F707
Cylinders	1
Valves	Overhead Valves
Displacement	502 cm^3 (30.63 cu in.)
Bore	90.68 mm (3.57 in.)
Stroke	77.72 mm (3.06 in.)
Cooling System	Air Cooled
Lubrication	Oil Slinger
Crankcase Oil Capacity	1.4 L (1.5 qt)
Air Cleaner	Paper with outer foam element
Muffler	Horizontal discharge below frame
Fuel Filter	Replaceable (In-Line Type)
Aspiration	Normal
Alternator	9 amp regulated

Tests and Adjustments Specifications

Valve Clearance:

Slow Idle (governed)	1750 rpm
Fast Idle	3350 ± 100 rpm
Spark Plug Gap	0.76 mm (0.030 in.)
Spark Plug Torque	20 N•m (180 lb-in.)
Valve Clearance - Intake	0.08 - 0.13 mm (0.003 - 0.005 in.)
Valve Clearance - Exhaust	0.13 - 0.18 mm (0.005 - 0.007 in.)
Valve Guide Depth	0.12 - 0.15 mm (0.005 - 0.006 in.)
Magneto Air Gap	0.25 - 0.35 mm (0.010 - 0.014 in.)

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Specifications

Specifications

NOTE: The T40 and K46 transaxles have no internal serviceable components. Be certain that all diagnostic procedures are performed and that the oil level is correct before replacing the transaxles.

Transaxle

Type (115/125/135)	**Tuff Torq® T40J Transaxle**
Type (145/155C)	**Tuff Torq® K46AC Transaxle**
Type (190C)	**Tuff Torq® K62V Transaxle**
Travel Speed-Forward	**0 - 9.2 km/h (0 - 5.7 mph)**
Travel Speed-Reverse	**0 - 5.5 km/h (0 - 3.4 mph)**

Brake

Brake Type	**Wet Disk**
Brake Capacity	**351.5 N•m (259 lb-ft) with 11.3 N•m (100 lb-in.) on brake arm**
Brake Lever Travel (Maximum)	**30°**

Adjustment Specifications

Forward Pedal-to-Frame Height	**76 - 80 mm (3.00 - 3.15 in.)**

Repair Specifications - K62V

Transaxle Oil Capacity (approximately)	**2.5 L (2.7 qt)**
Reservoir Oil Top Off Capacity	**0.47 L (0.5 qt)**
Reduction Gear Assembly Pinion Gear ID	**15.04 mm (0.592 in.)**
Reduction Gear Assembly Reduction Shaft OD	**14.99 mm (0.590 in.)**
Reduction Gear Assembly Reduction Pinion Gear/Shaft Clearance	**0.09 - 0.19 mm (0.003 - 0.007 in.)**
Reduction Gear Assembly (Wear Limit)	**0.50 mm (0.020 in.)**
Differential Gear Assembly Pinion Gear ID (New)	**15.03 - 15.13 mm (0.592 - 0.596 in.)**
Differential Gear Assembly Pinion Shaft OD (New)	**14.90 - 14.98 mm (0.587 - 0.590 in.)**
Differential Gear Assembly Pinion Gear/Shaft Clearance	**0.05 - 0.23 mm (0.002 - 0.009 in.)**
Differential Gear Assembly (Wear Limit)	**0.50 mm (0.020 in.)**
Axle Shaft Case Bushing ID (Press Fit in Upper Case)	**25.51 - 25.59 mm (1.004 - 1.007 in.)**
Axle Shaft Axle Bushing ID	**25.38 - 25.53 mm (0.999 - 1.005 in.)**
Axle Shaft Axle Shaft OD	**25.30 - 25.36 mm (0.996 - 0.998 in.)**
Axle Shaft Clearance Wear Limit (Maximum)	**0.50 mm (0.020 in.)**
Swash Plate/Shift Block Clearance Standard	**0.01 - 0.11 mm (0.001 - 0.004 in.)**
Swash Plate/Shift Block Clearance Wear Limit	**0.15 mm (0.006 in.)**
Thrust Bearing Thickness	**1.45 - 1.55 mm (0.057 - 0.061 in.)**
Thrust Bearing Thickness (Wear Limit)	**1.30 mm (0.051 in.)**
Brake Shoe to Brake Disk Clearance	**0.80 - 1.30 mm (0.031 - 0.051 in.)**

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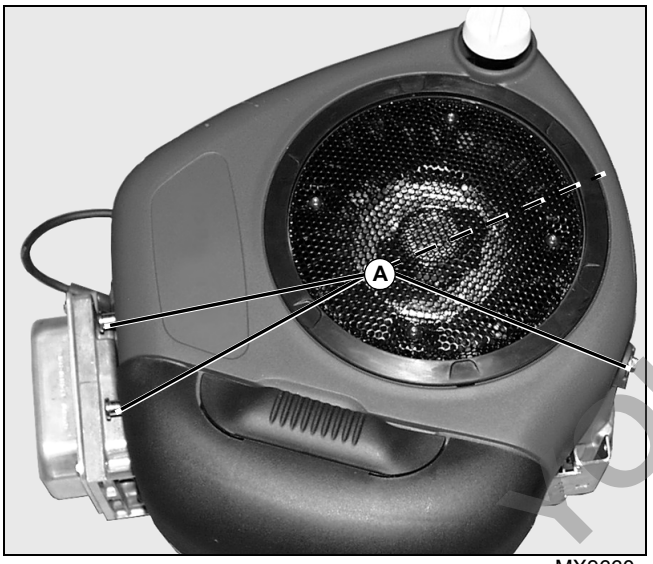
compression. (Less than 25% is considered normal.)

- Gauge reading in the Yellow (moderate) area indicates borderline compression. The engine is still usable but an overhaul should be considered.
- Gauge reading in the Red (high) area indicates excessive compression loss. Engine overhaul is necessary.

Fuel and Air Repair

Upper Blower Housing Removal and Installation

Procedure:



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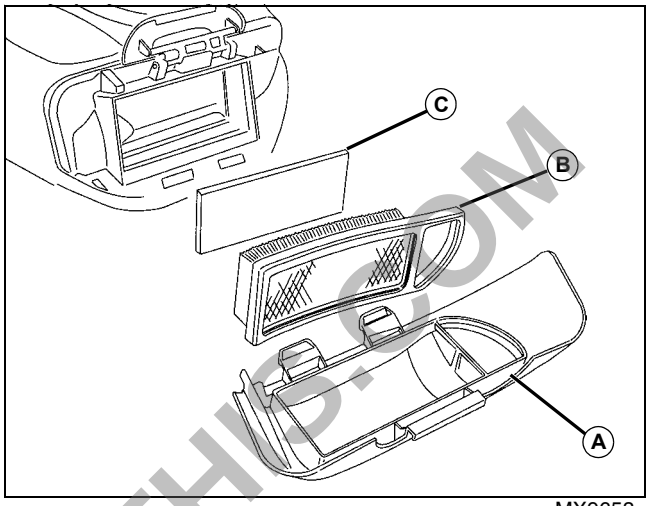
1. Remove four screws (A) holding the outer blower housing in place.
2. Lift outer blower housing up and off of engine.
3. Remove the screw holding the dipstick tube in place.
4. Install in reverse order of removal.

Specification:

Blower Housing Screws. . . . . 10 N•m (85 lb-in.)

Air Cleaner Service

Procedure:



MX9653

IMPORTANT: Avoid damage! DO NOT use petroleum solvents, such as kerosene, to clean paper cartridge. They may cause cartridge to deteriorate. DO NOT oil paper cartridge. DO NOT use pressurized air to clean or dry paper cartridge.

1. Remove cover (A) to service dual element air cleaner.
2. Remove cartridge (B) and foam pre-cleaner (C).
3. Wash pre-cleaner in liquid detergent and water and squeeze it dry in a clean cloth. Saturate it in engine oil. Wrap it in a clean absorbent cloth and squeeze to remove excess oil.
4. Clean cartridge by tapping gently on a flat surface. Replace if dirty.
5. Reinstall pre-cleaner, cartridge, and cover.

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Ignition Armature Air Gap Adjustment

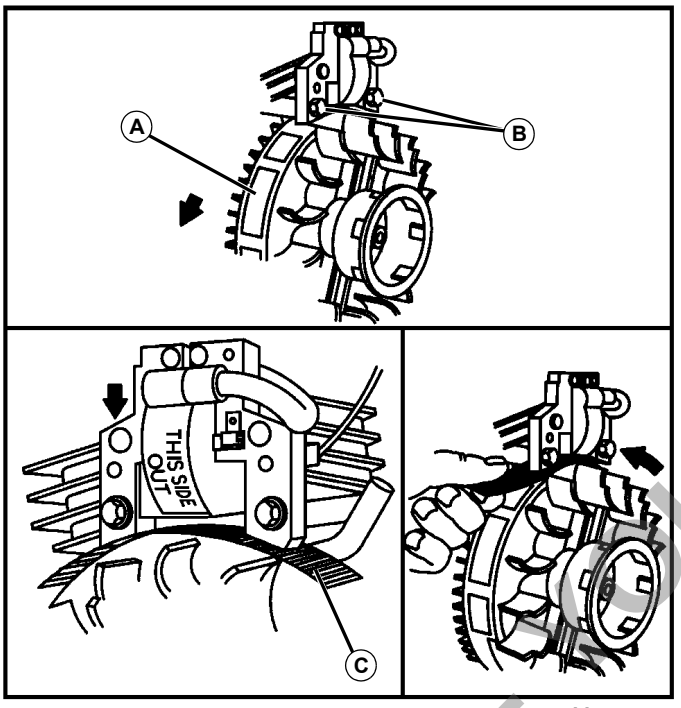
Reason:

To set the ignition air gap for proper operation and timing of the ignition system.

Equipment:

- 0.25 mm (0.010 in.) Thickness Gauge

Procedure:



M95220

1. Rotate flywheel until magnet (A) is away from armature laminations.
2. Loosen the armature mounting screws (B) and slide armature away from flywheel as far as possible.
3. Tighten one screw enough to hold the armature in place.
4. Rotate flywheel until magnet is directly under armature laminations.
5. Place a **0.25 mm (0.010 in.)** thickness gauge (C) between armature and magnet.
6. Loosen the mounting screw so magnet will pull armature against thickness gauge.
7. Tighten both mounting screws (B) to specification.
8. Rotate flywheel while pulling thickness gauge out from between the armature and the magnet.
9. Repeat procedure for the remaining ignition armature.

Specifications:

Armature Air Gap . . . . 0.20 - 0.30 mm (0.008 - 0.012 in.)

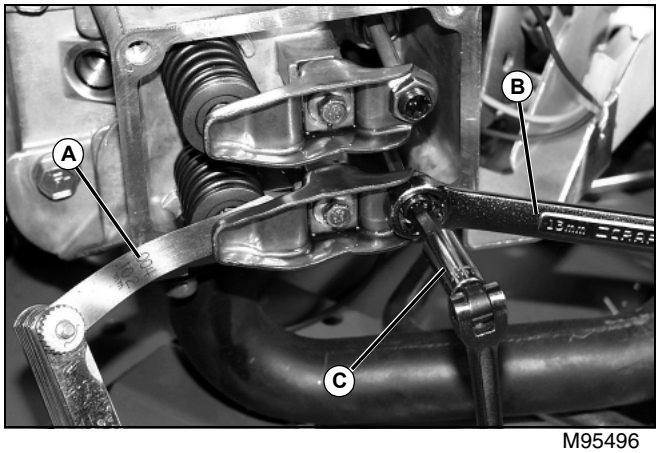
Armature Mounting Screws . . . . . 3 N•m (25 lb-in.)

Valve Clearance Adjustment

NOTE: Correct position of crankshaft is necessary to eliminate interference by the compression release mechanism when adjusting valve clearance.

Procedure:

1. Key switch must be OFF.
2. Engine must be cold for accurate adjustment.
3. Remove both valve covers.
4. Remove spark plugs.
5. Identify cylinder #1. It is the cylinder on the starting motor side.
6. Turn crankshaft until cylinder #1 piston is at top-dead-center (TDC) on the compression stroke.
   - Rotate the flywheel clockwise and watch the action of the valves. The compression stroke is after the intake valve closes and the piston is approaching the top of the cylinder.
   - Insert a dowel or blunt pencil through the spark plug opening until it touches the top of the piston. Slowly turn the flywheel and find the TDC of the piston travel.
   - Using a paint pen, make a small mark on the flywheel and the blower housing to indicate cylinder #1 TDC.
   - Using the dowel or pencil, rotate the flywheel so that the piston travels 6.4 mm (o.25 in.) downward and past TDC.
   - Mark the blower housing with this location. This is where the valve settings must be performed. This ensures that the automatic compression release lobes on the camshaft do not affect the adjustment



M95496

7. Start with the #1 cylinder. Loosen the valve adjusting nut.
8. Check valve clearance with a 0.10 mm (0.004 in.) feeler

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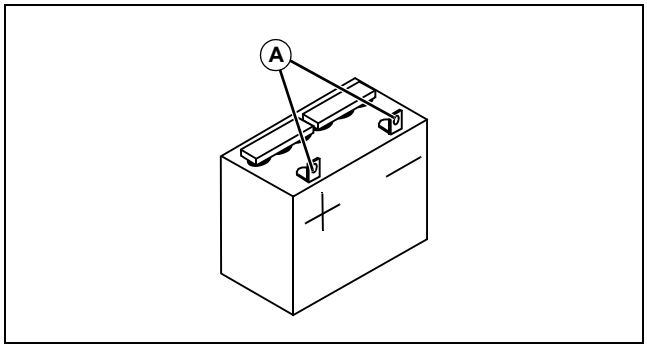
Power Circuit Diagnosis - 102/115/125/135

Test Procedure A

Test Conditions:

- Park machine safely. See “Parking Safely” on page 2.
- Park brake engaged.
- Battery fully charged.
- Key switch in off position.

System: Power Circuit



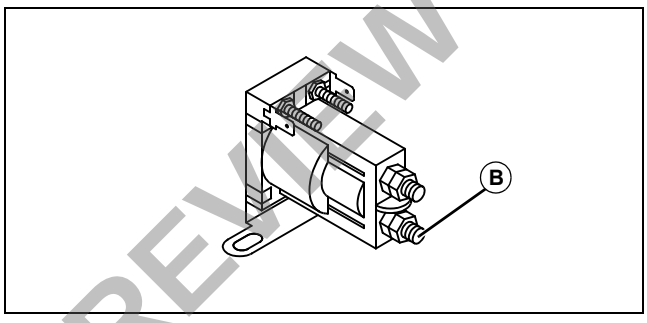
(1) Is battery voltage, measured between the posts (A), 12.4 VDC or greater?

Yes - Go to next step.

No - Clean battery terminals and retest.

No - Charge battery and retest.

No - Replace battery.



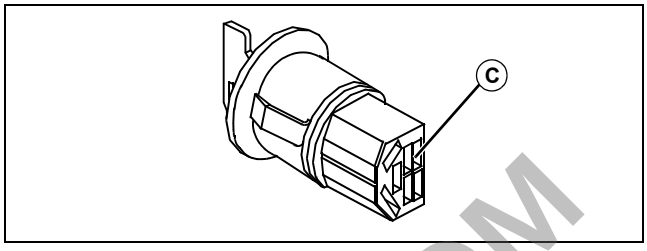
(2) Is battery voltage present at starting motor solenoid battery terminal (B)?

Yes - Go to next step.

No - Clean, check, and tighten connections for battery cable.

No - Replace battery cable.

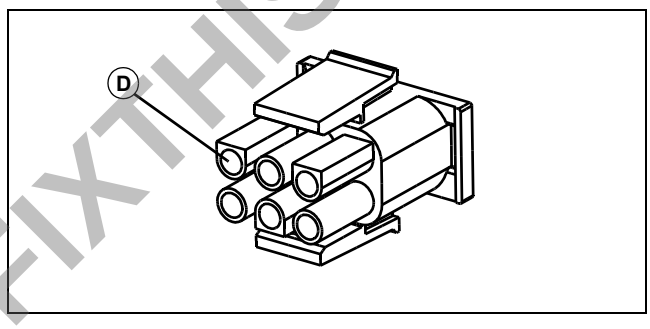
System: Power Circuit



(3) Is battery voltage present at key switch, 200 Red wire (C)?

Yes - Go to next step.

No - Check 200 Red wire and connections.

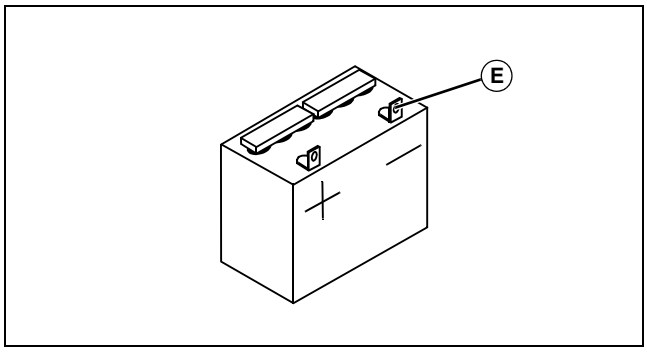


(4) Is battery voltage present at 220 Red/Blk wire of X6 engine connector (D)?

Yes - Go to next step.

No - Check 220 Red/Blk wire and connections.

No - Check F1 fuse, 220 Red/Blk wire, and connections.



(5) Is the resistance, measured between battery negative post (E) and frame ground connection, 0.1 ohm or less?

Yes - See “Test Procedure B” on page 141.

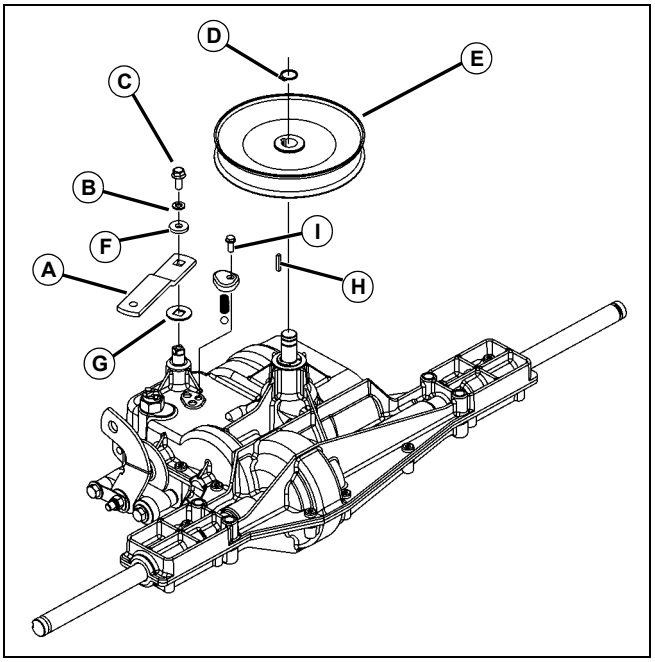
No - Clean and check battery negative cable. Replace if necessary.

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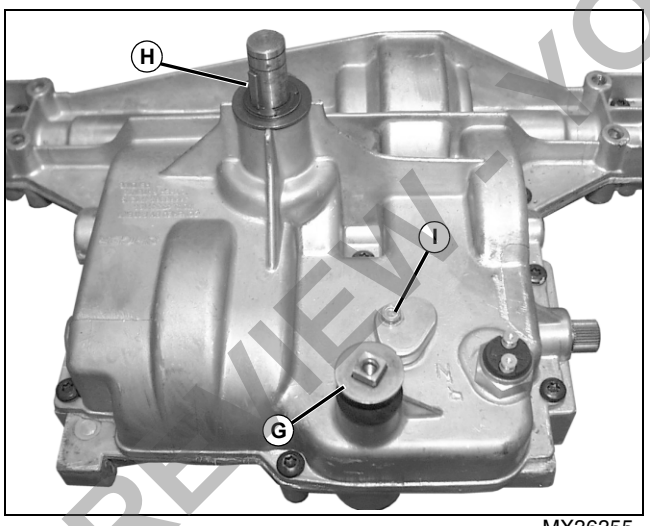
Transaxle Disassembly

Remove Drive Sheave/Shift Arm:



MX36012

1. Remove drive sheave snap ring (D).
2. Remove drive sheave (E).



MX36355

3. Remove woodruff key (H) from input shaft, and inspect for damage. Replace, if necessary.
4. Remove cap screw (C), lock washer (B), washer (F), shift arm (A) and square hole washer (G).
5. Remove cap screw (I), plate, spring and detent ball.

IMPORTANT: Avoid damage! DO NOT drop or lose detent balls (D).

- Use a magnet or place a shop cloth over holes and turn transaxle upside-down to catch both detent balls in cloth.
- Inspect detent balls and springs for wear or damage. Replace components as necessary, but do not install until assembly, much later in this section.

Remove Brake And Repair Gear Assembly:

IMPORTANT: Avoid damage! Check brake components for wear. Check for brake disc (A) contacting the case and/or brake lever contacting its mounting bracket (B), top or bottom. If so, all three components must be replaced.

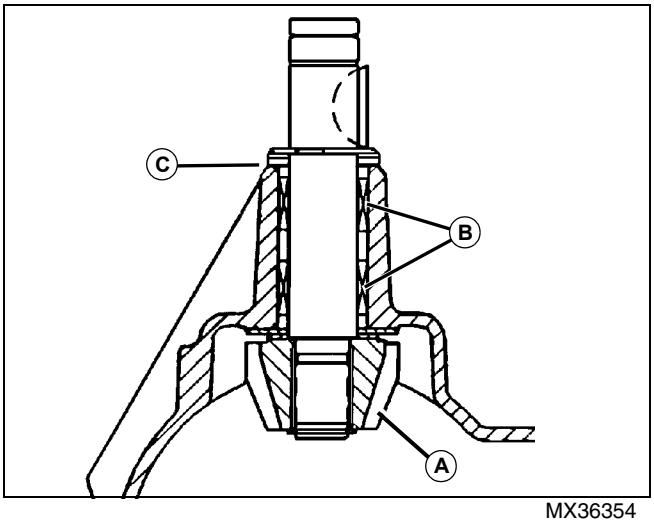
1. Remove brake assembly. See “Brake Removal and Installation - Gear” on page 301 in the Brakes section.

Separate Transaxle Housing Case Halves:

NOTE: Brake assembly should be removed already.

1. Remove all transaxle housing socket head screws.
2. Carefully separate transaxle housing into upper and lower case halves.
3. Inspect overall condition of components without removing any of them. Visually target worn or damaged parts for replacement.
4. Remove most of the grease without removing any components.

Inspect Input Shaft/Pinion Gear Assembly:



MX36354

1. Visually check overall condition of assembly, including the key, keyway, and drive sheave hub keyway.
2. Check condition of pinion gear (A), look for wear, pitting, broken teeth, etc.
3. Grasp the input shaft and try to rock it left or right inside case housing. If movement is noticeable, needle bearings (B) inside diameters will need to be measured once shaft is

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