Fastener Torques

Metric Fastener Torque Values

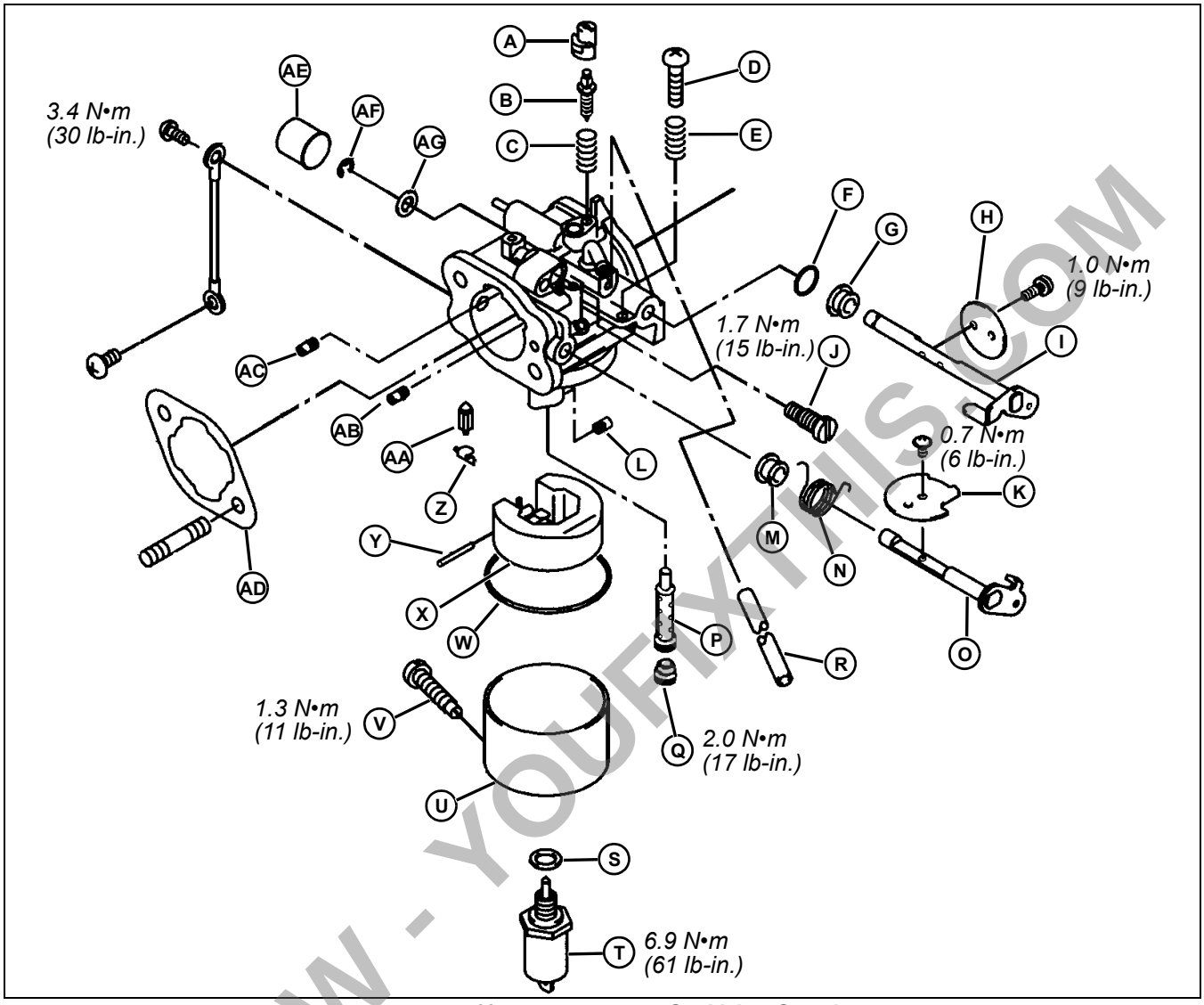
Property Class	4.8	8.8	9.8	10.9	12.9
					

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Carburetor Component Location



M94903

A - Restrictor
B - Screw
C - Compression Spring
D - Screw
E - Compression spring
F - Seal
G - Ring
H - Valve
I - Shaft
J - Main Jet
K - Valve
L - Jet
M - Bushing
N - Torsion spring
O - Shaft
P - Nozzle
Q - Valve Seat Insert
R - Tube
S - Washer
T - Solenoid
U - Float Bowl
V - Screw
W - Gasket
X - Float
Y - Pin
Z - Clip
AA- Valve
AB- Jet
AC- Jet
AD- Gasket
AE- Cap
AF- Clip
AG- Washer

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Specifications

General Specifications

Battery:

Type	BCI Group 51
Voltage	12 VDC
Electrolyte Capacity	1.9 L (2.0 qt)
Specific gravity	1.225 or above
CCA rating - Amps at -18°C (0° F)	500 amps
Battery Reserve Capacity at 27° C (80° F)	90 minutes

Spark Plugs:

FH531V Engine	Champion RCJ8Y
Gap	0.75 mm (0.030 in.)
Torque	15 N•m (132 lb-in.)
FH601V Engine	NGK BPR4ES
Gap	0.75 mm (0.030 in.)
Torque	15 N•m (132 lb-in.)
FD611V Engine	NGK BPR5ES
Gap	0.75 mm (0.030 in.)
Torque	20 N•m (177 lb-in.)

Stator:

Size	15 amps
Regulated amperage at fast idle (minimum)	13 amps
Regulated voltage at fast idle (minimum)	14 - 15 volts DC
Unregulated voltage at fast idle (minimum)	approximately 26 volts AC
Resistance 255/325/335	0.01 - 0.1 ohms
Resistance 345	0.12 - 0.18 ohms

Starting Motor:

Maximum Amperage (loaded)	85 amps at 500 rpm

Ignition Coil (345):

Ignition Primary Coil Resistance	3.4 - 4.6 ohms
Ignition secondary Coil	10,400 - 15,600 ohms
Pulser Coil Resistance	88 - 132 ohms

Coolant Temperature Switch (345):

Closing Temperature	111° C (232° F)

PTO Clutch:

Air Gap	0.31 - 0.46 mm (0.012 - 0.018 in.)
Resistance	2.8 - 3.3 ohms
Amperage Draw	4.0 amps

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Tools and Materials

Tools

NOTE: Order tools according to information given in the U.S. SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).

Special or Required Tools

Tool Name	Tool No.	Tool Use
Hand-Held Digital Tachometer	JT05719	Used to check idle speed and starter performance.
Digital Pulse Tachometer	JT07270	Used to check idle speed and starter performance.
Compression Gauge	JDM59	Used to check engine compression.
U-Tube Manometer Test Kit	JT05698	Used to check engine crankcase vacuum.
Vacuum Gauge	JT03503	Used to check engine crankcase vacuum.
Drill Bit	6.4 mm (0.25 in.)	Throttle and choke adjustment.
Lapping Tool	- - -	Valve lapping
Dial Indicator	- - -	Automatic compression relief test, valve inspection, crankshaft end play.
Spark Plug Ground	JDM74A5	Used to prevent accidental engine starting during tests.
90° Elbow Fitting	JT03338	Used to connect pressure gauge to engine when performing Engine Oil Pressure Test.
Hose Assembly	JT03017	Used to connect pressure gauge to engine when performing Engine Oil Pressure Test.
Pressure Gauge Assembly	JT03344	Used to read engine oil pressure when performing Engine Oil Pressure Test.
Pressure Gauge	JDG356	Used to check fuel pump performance.
Spark Tester	D-05351ST	Used to check overall condition of ignition system.
Valve Spring Compressor	JDM70	Used to remove and install valve springs.
Current Gun	JT05712	Used to check starter performance.

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Tests and Adjustments

Throttle Cable Check and Adjustment

Reason:

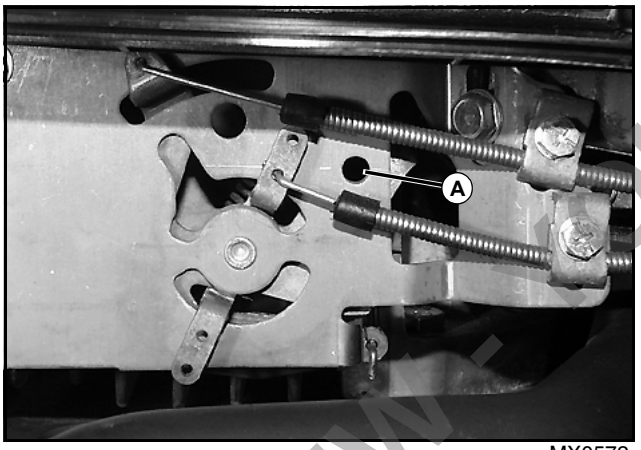
To make sure the throttle control arm contacts the slow idle stop at slow idle.

Equipment:

- 6 mm (1/4-in.) Drill Bit

Check Procedure:

1. Park machine on level surface.
2. Turn key switch OFF.
3. Move forward/reverse pedals to NEUTRAL position. Engage parking brake.
4. Remove hood.
5. Move throttle control lever from SLOW idle to FAST position.



MX0572

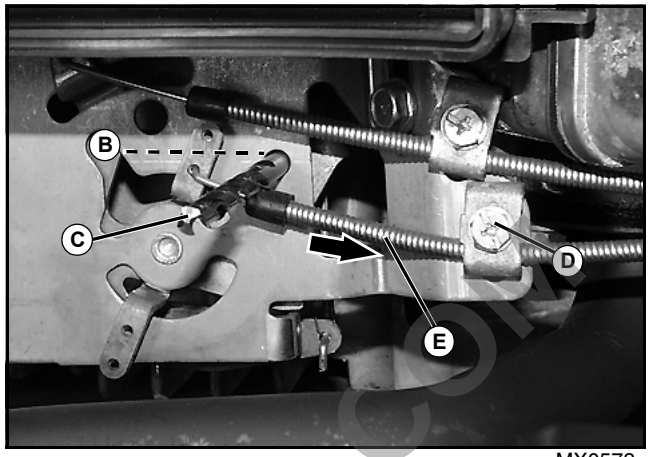
6. Check holes (A) in control panel and throttle arm. They MUST be in visual alignment.
7. Move throttle control lever into SLOW position, then back into FAST idle position. Again, holes in control panel and throttle arm MUST be aligned.

Results:

- If holes align in both positions, throttle cable is OK. Check choke cable for proper adjustment.
- If holes DO NOT align, perform ADJUSTMENT Procedure.

Adjustment Procedure:

1. Move throttle control lever to FAST idle position.



MX0573

2. Align hole in throttle arm (B) with hole in control panel. Insert a **6 mm (1/4 in.)** drill bit (C) through holes to keep throttle arm from moving. Be sure drill bit is perpendicular to the control panel.
3. Loosen screw (D).
4. Pull throttle cable (E) back (arrow) and tighten screw (D).
5. Remove drill bit.
6. Repeat CHECK Procedure.
7. Move throttle control lever through full range several times to be sure linkage is not binding.

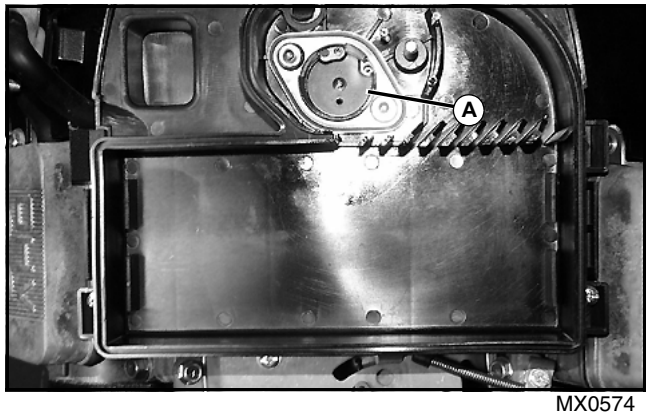
Choke Plate Check and Adjustment

Reason:

To make sure the choke plate fully opens and closes.

Check Procedure:

1. Remove air cleaner cover and air filter.



MX0574

2. Move choke control lever to full CHOKE position. Check that choke valve (A) is fully closed.
3. Move choke control lever to fully open position. Check that choke valve is fully open.

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Specifications

Tests and Adjustments Specifications

Mower Deck Lift Time (Oil Flow and Pressure Check) . . . . . 2 seconds at 2700 - 3000 engine rpm

Repair Specifications

Hydraulic Line Connector Torque . . . . . 30 N•m (22 lb-ft)
Lift Valve - Hydraulic Line Torque . . . . . 30 N•m (22 lb-ft)

Special Tools

Special or Required Tools

Tool Name	Tool No.	Tool Use
	19 kg (42 lb) Weights	Use to check mower hydraulic lift oil flow and pressure

NOTE: Order tools according to information given in the US SERVICE-GARD™ Catalog or in the European Microfiche Tool Catalog (MTC).

Special Materials

Other Material

Part No.	Part Name	Part Use
J20D	John Deere Low Viscosity HY-GARD™	Hydraulic fluid

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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.

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.

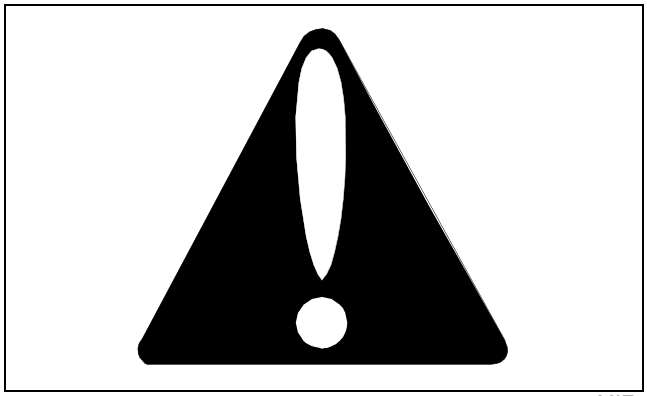
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Hydraulics
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Miscellaneous

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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.

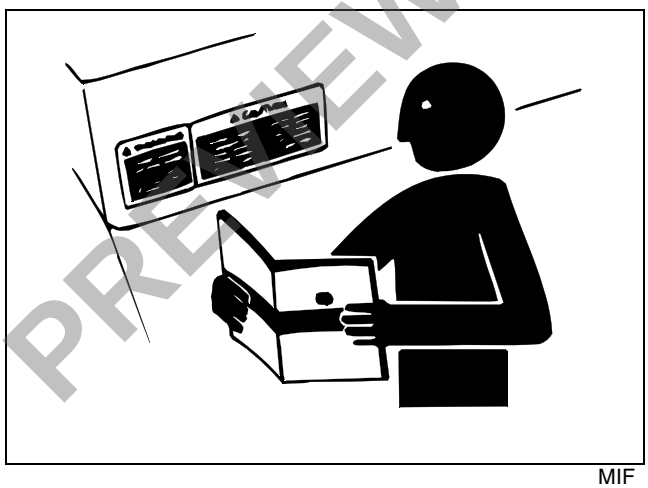
Follow recommended precautions and safe servicing practices.

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

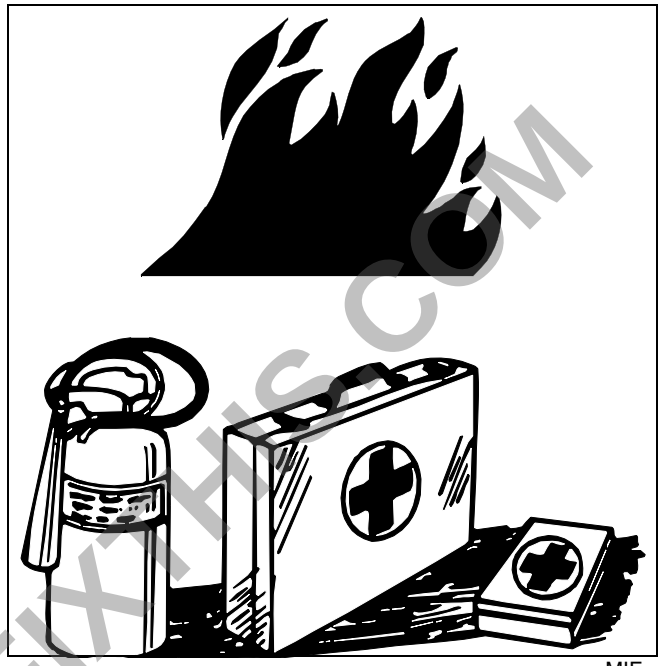


MIF

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

Handle Fluids Safely - Avoid Fires

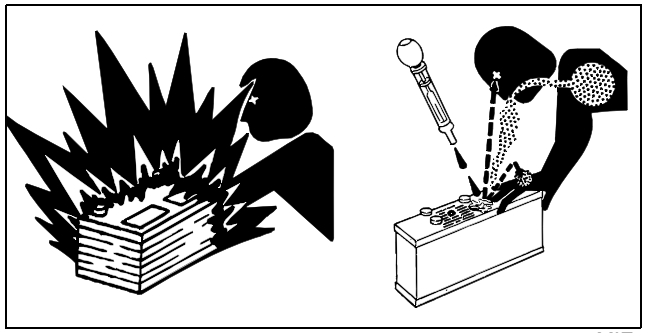
Be Prepared For Emergencies



MIF

- 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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8. Adjust spark tester gap to **4.2 mm (0.166 in.)** (4 turns) with screw (C).

9. Move key switch to RUN position.

10. Spin engine with starter and watch spark (D) at spark tester. If engine will start, watch spark 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

Equipment:

- Feeler Gauge, or
- Wire Gauge

Procedure:

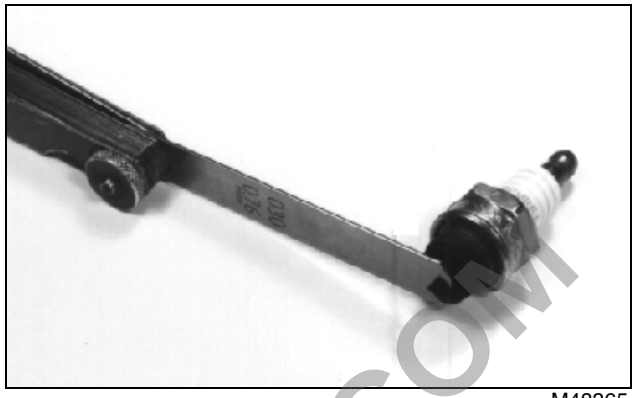
1. Park machine on level surface.
2. Turn key switch OFF.
3. Move forward/reverse pedals to NEUTRAL position. Lock parking brake.
4. Raise hood.

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.

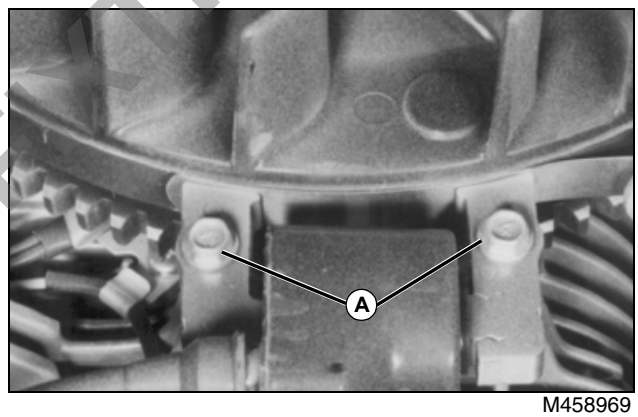
6. Scrape or wire brush deposits from spark plug.
7. Inspect spark plug for:
   - Cracked porcelain
   - Pitted or damaged electrodes



M48365

8. Check spark plug gap using a feeler or wire gauge. Set gap to **0.75 mm (0.030 in.)**.
9. Install and tighten spark plug to **15 N•m (132 lb-in.)**.

Ignition Coil Air Gap Adjustment



M458969

1. Center flywheel magnet under armature.
2. Insert a **0.30 mm (0.012 in.)** feeler gauge between flywheel and armature.
3. Push armature against flywheel and tighten cap screws (A) to **5.9 N•m (52 lb-in.)**.
4. Turn flywheel to remove feeler gauge.

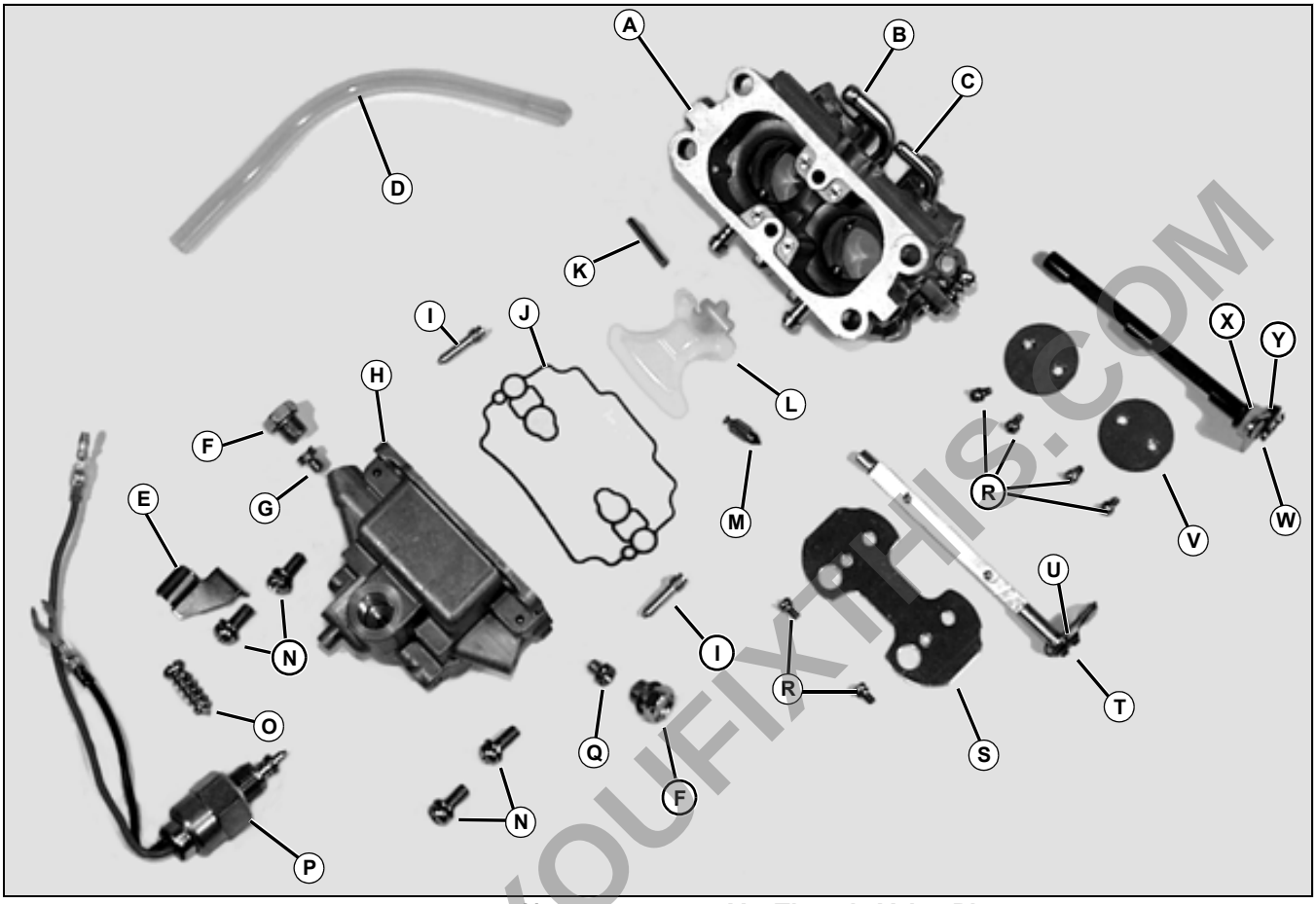
Air Gap Specifications:

Air Gap . . . . . 0.2 - 0.4 mm (0.008 - 0.016 in.)

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Carburetor (Externally Vented)



M99825

A - Carburetor Body
B - Fuel Inlet Tube
C - Vent Tube
D - Vent Hose
E - Vent Hose Guide
F - Plug
G - Left Side Main Jet
H - Float Chamber
I - Slow Speed Jet
J - Rubber Gasket
K - Pin
L - Float
M - Float Valve
N - Screw
O - Drain Screw and Spring
P - Fuel Shutoff Solenoid
Q - Right Side Main Jet
R - Screw
S - Choke Valve Plate
T - Choke Shaft
U - Choke Shaft Seal
V - Throttle Valve Plates
W - Throttle Shaft
X - Throttle Shaft Seal
Y - Collar

NOTE: Main jets (7) and (17) change for altitude ranges: 0 to 1067 m (0 to 3500 ft); 1067 to 2134 m (3500 to 7000 ft); 2134 m (7000 ft) and up.

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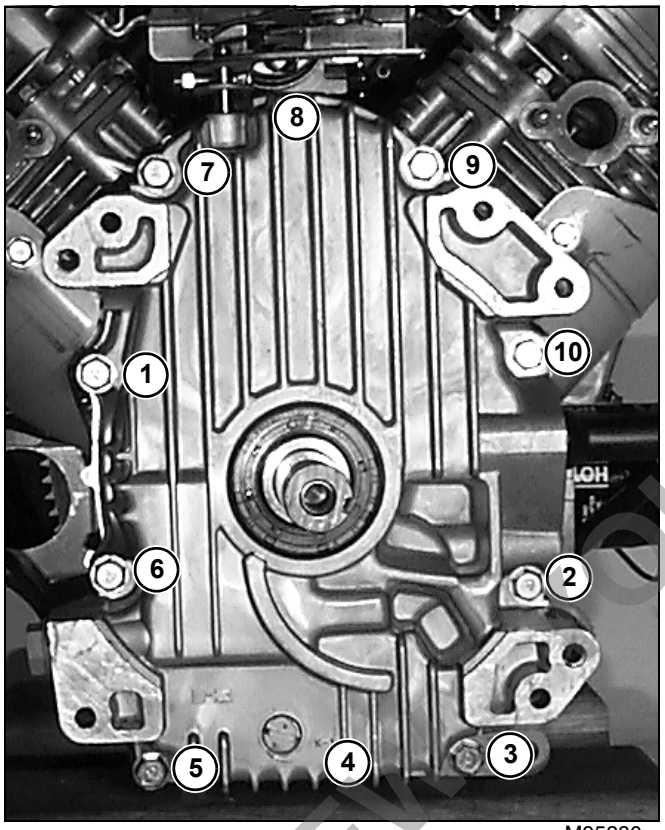
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Crankcase Cover Removal and Installation

Removal and Installation:

1. Drain crankcase. Capacity (with filter) is approximately **1.7 L (1.8 US qt)**.
2. Remove crankcase cover and gasket.
3. Clean crankcase and crankcase cover gasket surfaces.

NOTE: Do not force cover. Gears must mesh for proper positioning.



M95380

4. Install gasket and cover. Tighten cap screws in a two step process to specification. Use the sequence shown above.

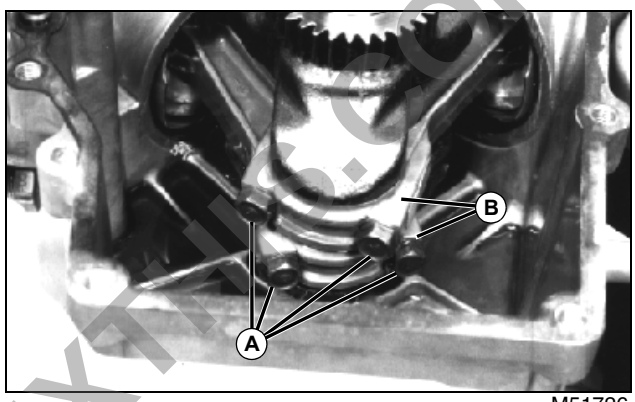
Torque Specifications:

Initial torque . . . . . 10 N•m (88 lb-in.)
Final torque . . . . . 25 N•m (221 lb-in.)

Piston and Connecting Rod

Removal:

1. Remove cylinder head.
2. Split the crankcase.
3. Remove the camshaft.
4. Turn the crankshaft to expose the connecting rod cap screws.



M51726

5. Remove the cap screws (A) and take off the connecting rod caps (B). Note the position of the connecting rod caps for reinstalling the caps.
6. Check cylinder bore for carbon and varnish ridges. These ridges can cause piston damage if not removed.
7. If necessary, remove ridges from top of cylinder bore with a ridge reamer.
8. Push piston and connecting rod into the cylinder and pull out of the cylinder bore.

Disassembly:

- Remove piston rings with a piston ring expander.
- Inspect all parts for wear or damage. Replace as necessary.

NOTE: Location of the arrow match mark on the piston head in relation to "K" mark on the connecting rod. Keep parts together as a set.

1. Remove one of the piston pin snap rings with a needle nose pliers.
2. Remove the piston pin by pushing it out of the side of the piston that has the ring removed.
3. Using a piston ring pliers, remove the top and second rings.
4. Remove the three piece oil ring.

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

12.Run engine at fast idle 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 pump suction screen or oil passages plugged.
- Excessive wear of connecting rod and main bearing journals.

Fuel Pump Test

Reason:

To check condition of fuel pump.

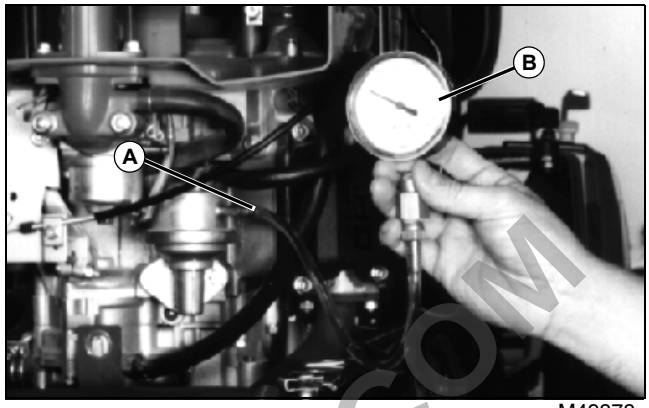
Test Equipment:

- JDG356 Pressure Gauge
- Graduated Container

Procedure:

1. Park machine on level surface.
2. Move forward/reverse pedals to NEUTRAL position.
3. Engage parking brake.
4. Remove hood.
5. Remove muffler heat shield.
6. Start engine and run at slow idle for one minute to fill carburetor with fuel.
7. Stop the engine.

CAUTION: Avoid Injury! Gasoline is extremely flammable. DO NOT SMOKE. Always work in a well ventilated area away from open flame or spark producing equipment; this includes equipment that utilizes pilot lights.



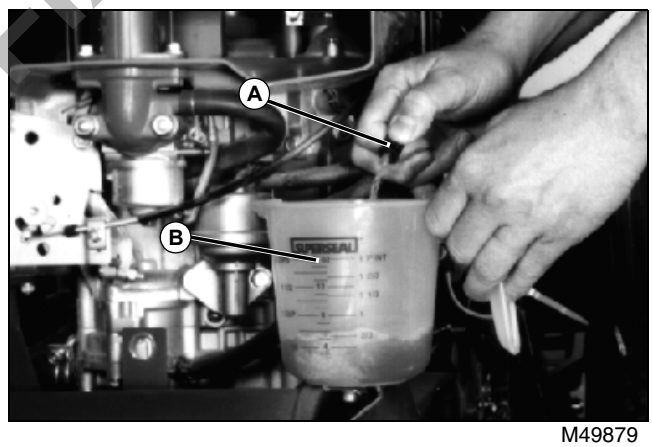
M49878

8. Disconnect fuel pump outlet hose from fitting (A).
9. Connect JDG356 pressure gauge (B) to fuel pump outlet.

10.Start engine and run at slow idle for 15 seconds. Minimum pressure should be **2.45 kPa (0.36 psi)**.

11.Stop engine.

12.Remove pressure gauge and connect fuel pump outlet hose to fuel pump.



M49879

13.Disconnect fuel pump outlet hose (A) from carburetor and place it in graduated container (B).

14.Start and run engine at slow idle for 60 seconds, then stop engine and record container measurement. Minimum flow should be **800 ml/60 seconds (2.71 oz/60 seconds)**.

Results:

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

- Fuel lines, filter and fuel tank cap for restrictions.
- Check crankcase vacuum.
- Replace fuel pump.
- Check camshaft lobe and retest.

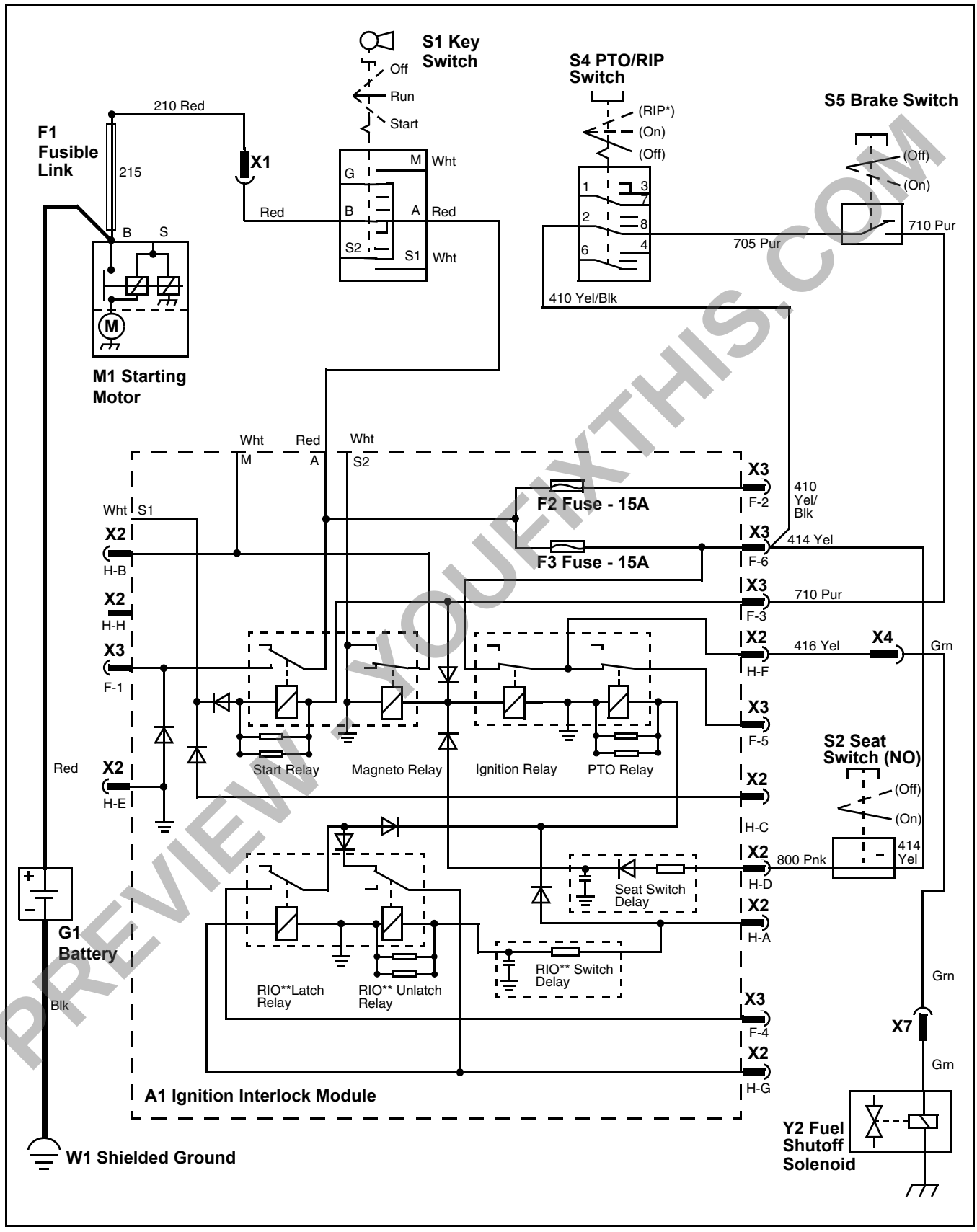
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Fuel Shutoff Solenoid Circuit Schematic - GX255/325/335



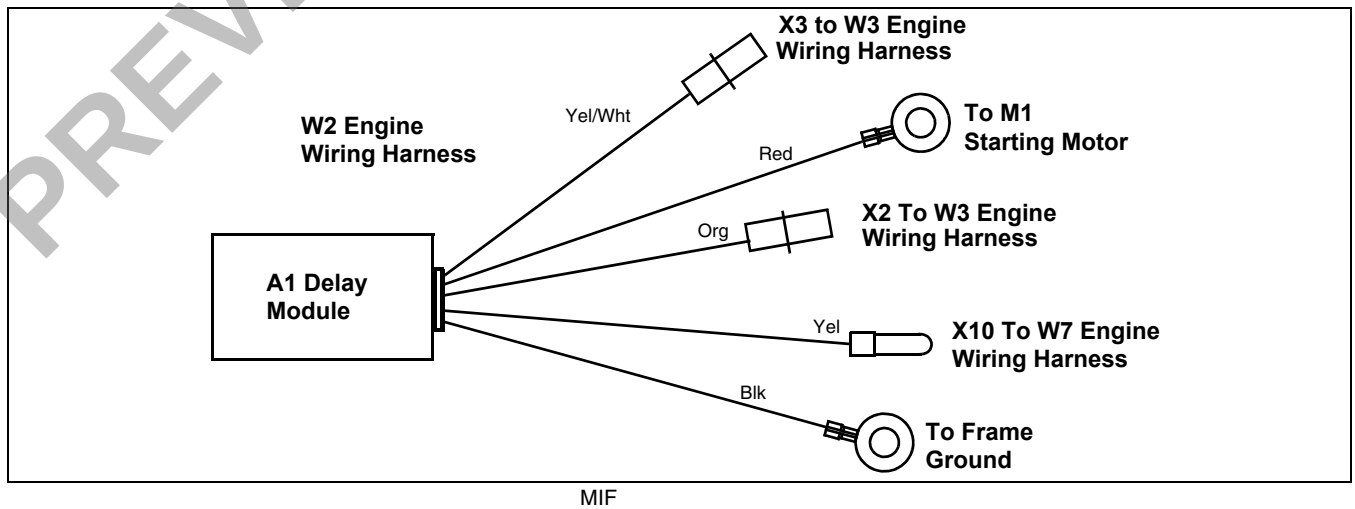
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GX345 Main Wiring Harness Color Codes

Size/No./Color	Wire Connection Points
0.8 100 Blk	X11, H1
0.8 101 Blk	H1, N1
2.0 102 Blk	N1, W1 Shielded Engine Ground
1.0 103 Blk	W1, X12
1.0 104 Blk	W1, X8
0.8 105 Blk	X8, X6
0.8 106 Blk	X13, W1
2.0 205 Red	Splice, N1
2.0 210 Red	Splice, X1
0.8 215 Fuse Link	M1, Splice
0.8 300 Org/Wht	H2, X6
0.8 301 Org/Wht	X6, X9
0.8 320 Org	X13, H4
0.8 405 Org	S4, X11
0.8 410 Yel/Blk	Splice, S4
0.8 411 Yel/Blk	N1, Splice
1.0 412 Yel/Blk	S6, X7
0.8 413 Yel/Blk	X7, Splice
0.8 414 Yel	N1, S2
1.0 450 Yel	X12, S6
0.8 451 Yel/Blk	S4, X6
0.8 452 Yel	Splice, H2
0.8 453 Yel/Blk	H3, H2
0.8 454 Yel	H4, H3
2.0 590 Brn/Yel	N1, X9
2.0 595 Brn/Wht	N1, X9
0.8 600 Brn	N1, H1
0.8 620 Tan	X9, H3
0.8 705 Pur	S5, S4
0.8 710 Pur	S5, X7
1.0 721 Pur	M1, X7
0.8 750 Blu	X7, S4
0.8 751 Blu	S4, S4
0.8 752 Org	X7, S3
0.8 753 Blu	S3, X6
0.8 754 Grn	X6, S4
0.8 755 Blu	S4, X8
0.8 756 Blu	X7, X7
0.8 800 Pnk	X6, S2
0.8 805 Pnk/Blk	X6, X9

W2 Engine Wiring Harness



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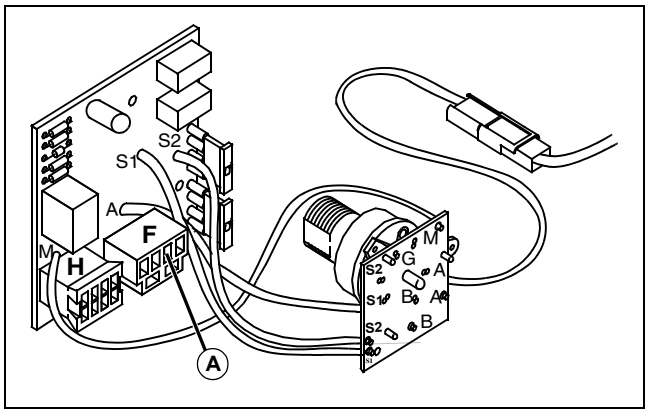
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Test Conditions:

- Operator ON seat
- PTO/RIP switch in momentary RIO position (RIP)
- Transmission in REVERSE
- Key switch in RUN position

System: RIO Circuit - GX345



(1) Is battery voltage present at A3 ignition interlock module connector X7, terminal F-5 750 Blu wire (A)?

No - Place S4 switch in OFF and transmission in NEUTRAL and retest. If still not normal, replace A3 module.

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Specifications

Hydrostatic Transaxle

Drive Train	Belt Drive Transaxle with foot-controlled variable speed drive
Transaxle Control	Twin Touch™ Automatic
Cruise Control	Standard
Transaxle (S/N - 120000)	Kanzaki K71A
Transaxle (S/N 120001 -)	Kanzaki K71C
Travel Speed Forward	0 - 11.2 km/h (0 - 7.0 mph)
Travel Speed Reverse	0 - 6.4 km/h (0 - 4.0 mph)

Adjustment Specifications

Reverse Pedal-to-Foot Mat Height	50 ± 2 mm (1.97 ± 0.08 in.)

Repair Specifications

Transaxle Oil Capacity	4.4 L (4.6 qt)
Reservoir Oil Top Off Capacity	0.3 L (10 oz)

Reduction Gear Assembly

Reduction Pinion Gear ID	15.05 - 15.13 mm (0.592 - 0.597 in.)
Reduction Shaft OD	14.97 - 14.99 mm (0.589 - 0.590 in.)
Reduction Pinion Gear/Shaft Clearance	0.10 - 0.16 mm (0.004 - 0.006 in.)
Clearance Wear Limit (maximum)	0.50 mm (0.020 in.)

Differential Gear Assembly

Pinion Gear ID	17.00 - 17.06 mm (0.669 - 0.672 in.)
Pinion Shaft OD	16.90 - 16.98 mm (0.665 - 0.668 in.)
Pinion Gear/Shaft Clearance (new)	0.10 - 0.16 mm (0.004 - 0.006 in.)
Clearance Wear Limit (maximum)	0.5 mm (0.020 in.)

Axle Shaft (Right and Left)

Axle Bushing ID	25.38 - 25.52 mm (0.999 - 1.005 in.)
Axle Shaft OD	25.57 - 25.37 mm (0.995 - 0.990 in.)
Clearance Wear Limit (maximum)	0.5 mm (0.020 in.)

Brake Shoe to Brake Disk Clearance (maximum)	1.5 mm (0.060 in.)

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Machine Creeps

Test Conditions:

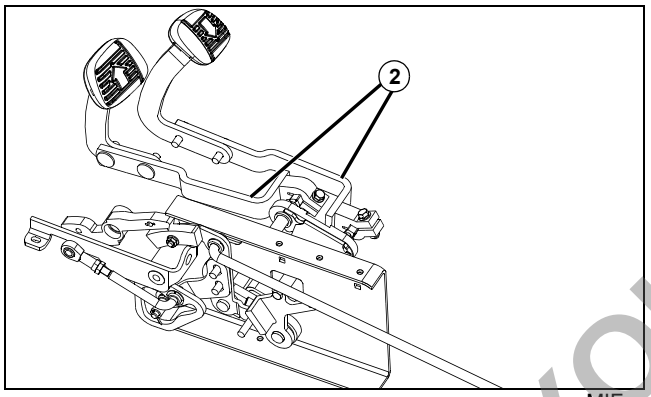
- Machine parked on level surface.
- Key switch in STOP position.
- Park brake DISENGAGED.
- Transaxle in NEUTRAL.

Symptom: Machine Creeps

(1) Is the transaxle reservoir at full mark and the oil at room temperature?

Yes - Go to next step.

No - Fill reservoir to correct level with specified oil.

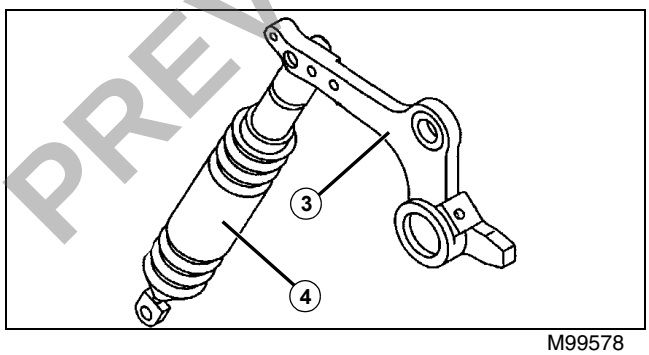


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(2) Are the forward/reverse pedal linkages properly adjusted, not damaged and move freely?

Yes - Go to next step.

No - Adjust linkage. See “Forward and Reverse Pedal Height Adjustment - GX325, GX335, and GX345” on page 378. Eliminate binding, replace faulty or damaged components. See “Control Pedals and Linkage - GX325, GX335, and GX345” on page 385.



M99578

(3) Is the control arm damaged, or the spring pin broken or missing?

Yes - Replace control arm and/or spring pin.

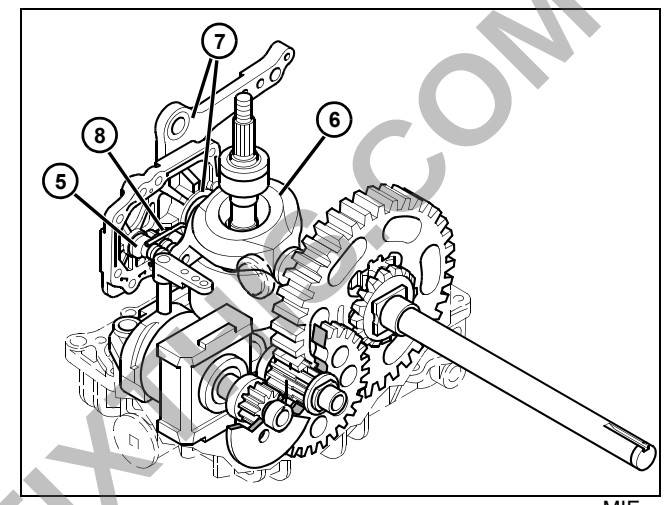
Symptom: Machine Creeps

No - Go to next step.

(4) Is the shock absorber binding or damaged?

Yes - Replace shock absorber.

No - Go to next step.



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(5) Is the neutral eccentric properly adjusted for no wheel movement at fast idle, one wheel off the ground?

Yes - Go to next step.

No - Adjust neutral eccentric. See “Neutral Creep Adjustment” on page 376.

(6) Are the variable swash plate shaft ends and transaxle case bearing surfaces worn or damaged, and/or the thrust washers binding[1]?

Yes - Replace damaged or worn components. See “Transaxle Disassembly and Assembly” on page 402.

No - Go to next step.

(7) Are the swash plate and control lever bent1?

Yes - Replace swash plate control arm. See “Transaxle Disassembly and Assembly” on page 402.

No - Go to next step.

(8) Does the swash plate return to neutral when forward/reverse pedals are released? Is the neutral return spring fatigued or damaged1?

Yes - Replace spring. See “Transaxle Disassembly and Assembly” on page 402.

No - End of diagnosis.

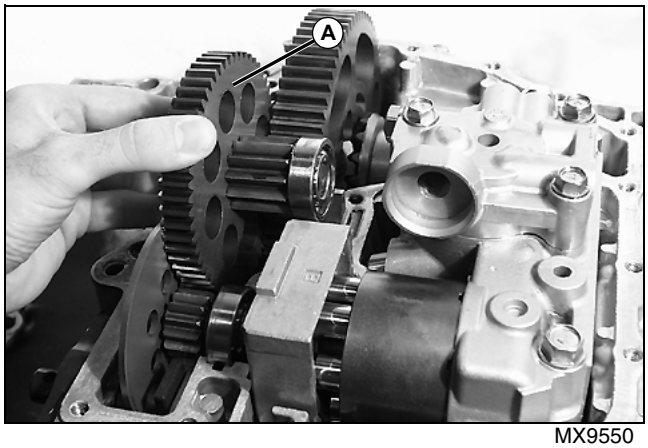
1. Requires removal of transaxle from machine and disassembly.

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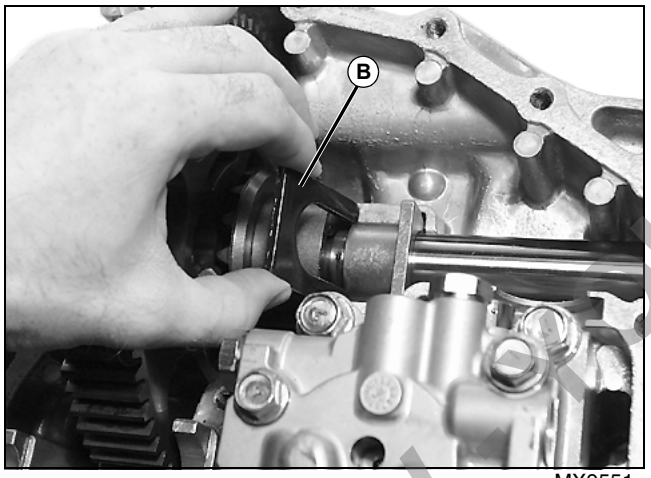
Final Drive and Axle Removal

Procedure:



MX9550

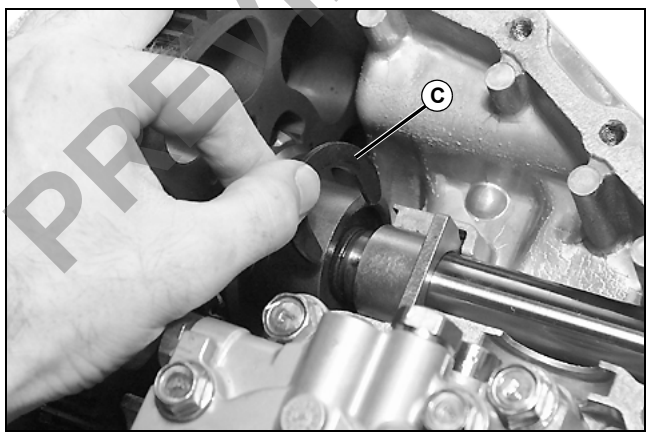
1. Remove reduction gear assembly (A) from case.



MX9551

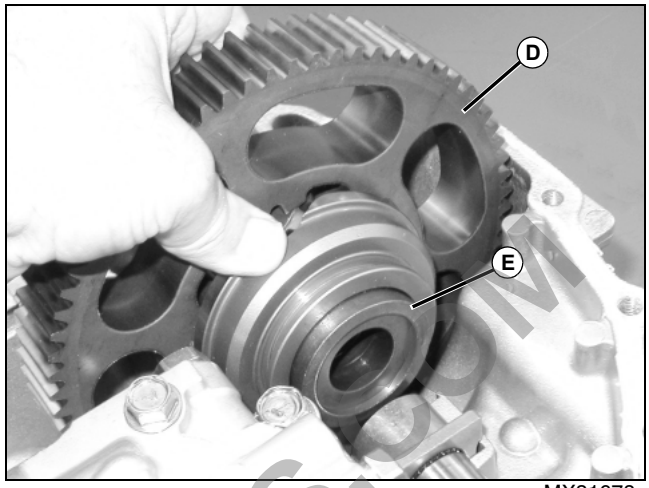
2. Remove thrust washers (B) from left and right axles.

NOTE: To remove the C-rings, pull the axles slightly out of the case.



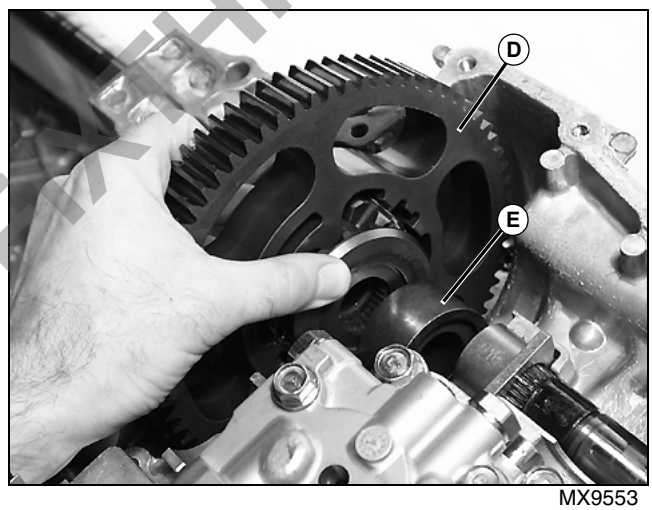
MX9552

3. Remove C-ring (C) from left and right axles.



MX31678

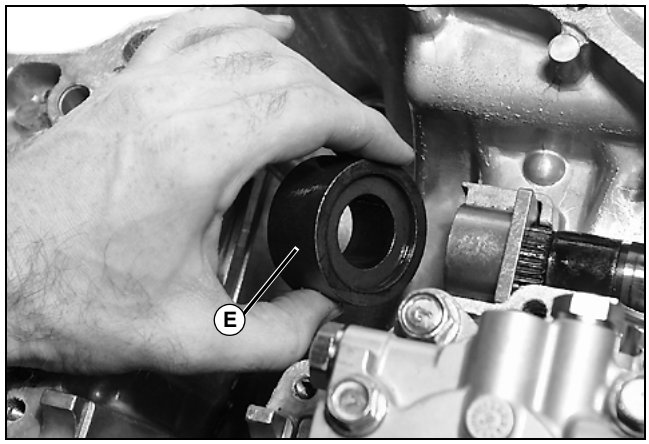
With Traction Assist (S/N 120001 -)



MX9553

Without Traction Assist (S/N - 120000)

4. Remove differential gear assembly (D).



MX9554

5. Remove collar (E).

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Theory of Operation

Hydraulic Lift System Operation

Function:

To lift (or lower) the mower deck.

Theory of Operation:

NOTE: Raise position shown. Pressurized (charge pump) oil is routed through the steering valve before reaching the lift system. See "Steering Valve and System Operation" on page 494 in the Steering - 335/ 345 section for further information.

Pressurized oil is supplied by the hydrostatic transmission and enters the control valve at Port "P" on the control valve housing (A).

Raise:

As the handle is moved to the RAISE position, linkage connected to the actuator (F) causes the control valve spool (E) to change position. This routes the pressurized oil entering the control valve at Port "P" to port "B". The oil then passes through a restrictor (C) to lift side of the lift cylinder (B). The restrictor meters the oil to allow the attachment to be lifted smoothly.

Oil returning from the lift cylinder enters the control valve at Port "A". Oil then is routed through the control valve spool, exiting the control valve through port "T", returning to the hydrostatic transmission case.

Lower:

As the handle is moved to the LOWER position, linkage connected to the actuator causes the control valve spool to change position. This allows pressurized oil entering the control valve at Port "P" to be routed through port "A" to the lower side of the lift cylinder.

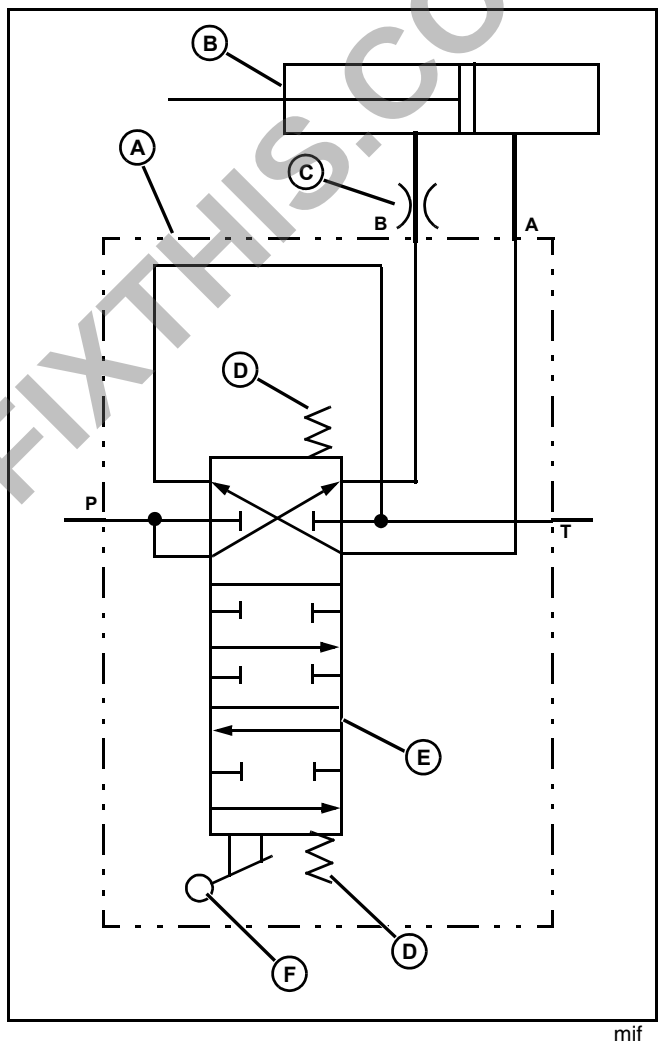
Oil returning from the lift cylinder passes through the restrictor and enters the control valve at Port "B". The restrictor allows the attachment to be lowered smoothly. Oil then is routed through the control valve spool, exiting the control valve through port "T", returning to the hydrostatic transmission case.

Neutral:

As the handle is released, the centering springs (D) return the control valve spool to the neutral position. Oil flow to/ from the lift cylinder is then blocked, holding the cylinder in either the raised or lowered position.

Leak Down:

It is normal for the attachment lift to leak down over a period of time. This leak down can be as much as **5 mm (0.169 in.)** in a 5 minute period with the normal load attached. As the system ages, wear in the lift cylinder and the control valve will contribute to this leak down. If it is believed that a problem exists with the lift system, it should be verified with the "Hydraulic Lift Oil Flow and Pressure Check". This test will verify that the system is capable of lifting the attachment capacity and in the specified time.



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Steering Gearbox Operation

Function:

To convert rotary motion of the steering (input) column to linear motion at the drag link.

Theory of Operation:

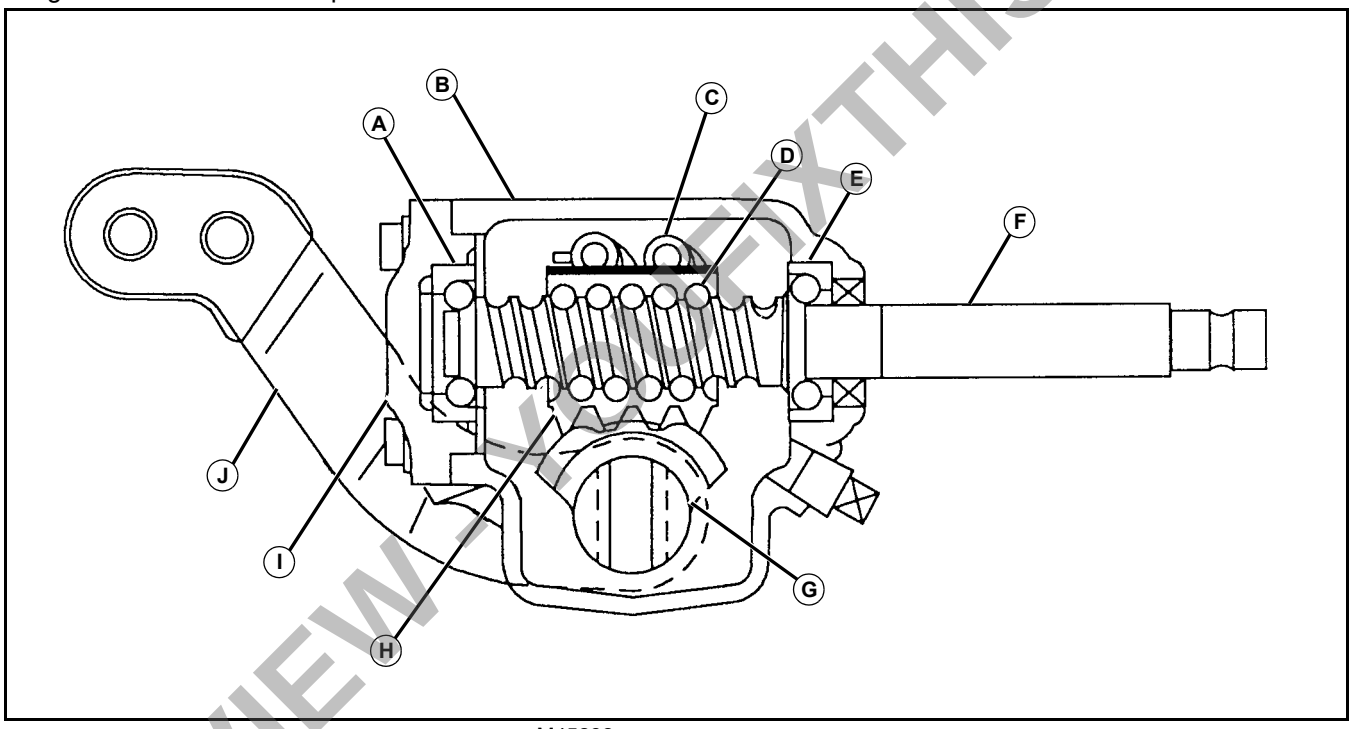
The steering gearbox is a recirculating ball/ball nut type. The ball nut is threaded over the worm portion of the shaft.

The bore of the ball nut (H) has helical grooves corresponding to grooves in the steering (input) shaft (F). These grooves in the ball nut contain recirculating balls (D). To keep the balls from running out at the ends, the ball nuts use guides (C). Each guide deflects the balls from their helical path when they reach the end of the ball nut, thus returning the balls to the helical path at the start of a circuit.

The steering (input) shaft is supported by a bearing (E) at the bottom of the steering shaft and a bearing (A) at the bottom of the steering gear housing (B).

As the steering wheel is turned to the right, the ball nut is threaded upward by the steering shaft worm gear. The gear teeth on the ball nut are in mesh with the gear teeth on the pitman shaft (G). Therefore, as the ball nut moves upward, the pitman arm is rotated moving the steering arm (J). When the steering arm moves, the drag link, steering link, and spindle move the wheels to the right.

Turning the steering wheel to the left threads the ball nut downward, rotating the pitman shaft the opposite direction, turning the wheels to the left.



M45398

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Theory of Operation

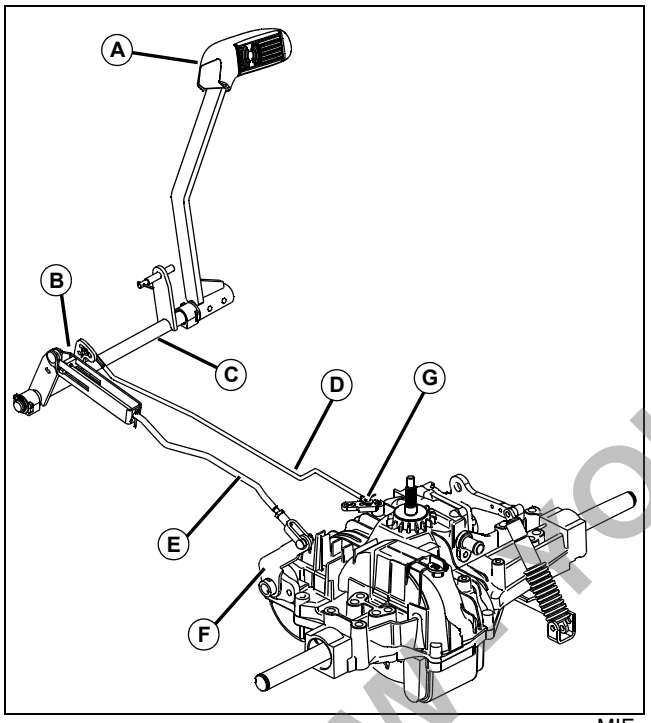
External Brake Linkage

Function:

To activate the internal transmission brake when the brake pedal is depressed.

Theory of Operation:

The brake functions, through a mechanical linkage, to return the transaxle to neutral and release the cruise control.



MIF

A - Brake Pedal
B - Brake Spring Assembly
C - Brake Shaft
D - Freewheeling Interlink Rod
E - Brake Rod
F - Brake Arm (On Transmission)
G - Freewheeling Arm

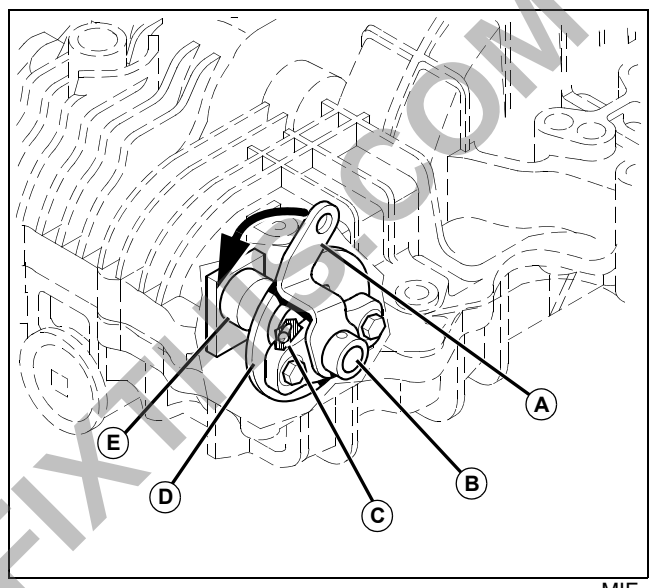
When the break pedal is pressed, it rotates the brake shaft (C) forward. Attached to the brake pedal shaft is the brake rod (E) and spring assembly (B). Movement of the shaft is transferred through the arm to the transmission brake arm (F) to provide braking action.

Transaxle Brake Operation

Function:

The transaxle brake stops the rotation of the transaxle motor shaft. This, in turn, stops machine travel.

Theory of Operation:



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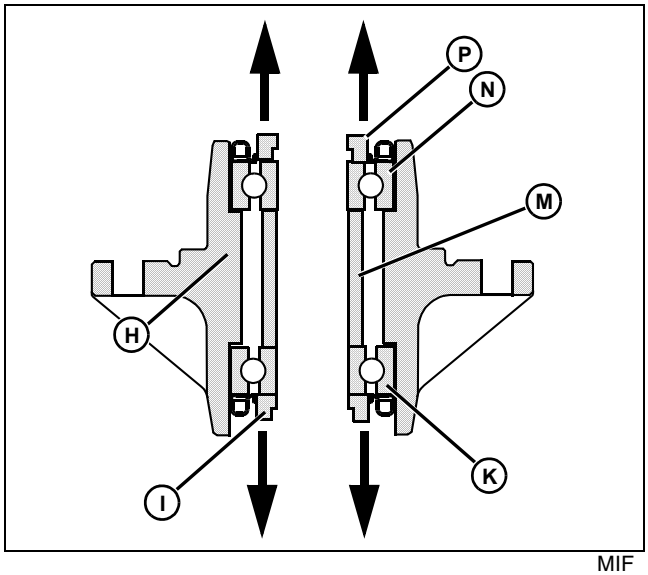
The transaxle brake is an internal wet disk brake. When the brake pedal is depressed, the brake linkage rotates the brake arm (A).

The brake arm rotates the brake shaft (B), which moves four angled ramps against four captive steel balls (C). As the shaft rotates, the balls and ramps force the shaft against the brake disk (D), and in turn the inner brake shoe (E).

The brake disk is splined to the hydrostatic motor output shaft.

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2. Remove seal rings (I and P) noting location of notched sides (down).

3. Push spacer (M) to one side and remove lower bearing (K) with a punch or a press.

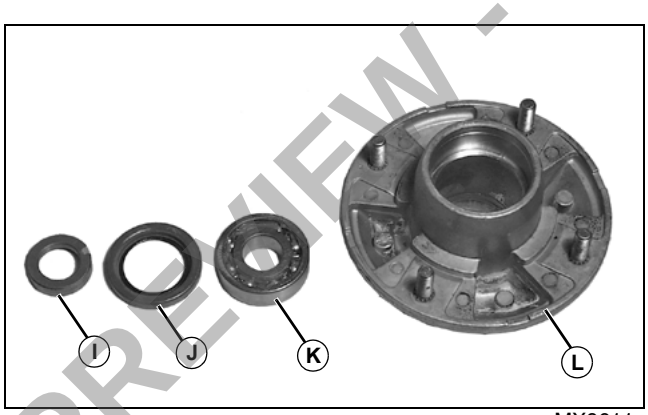
4. Remove spacer (M).

5. Remove upper bearing (N) with a punch or press.

6. Inspect all parts for wear or damage. Replace parts as necessary.

Assembly:

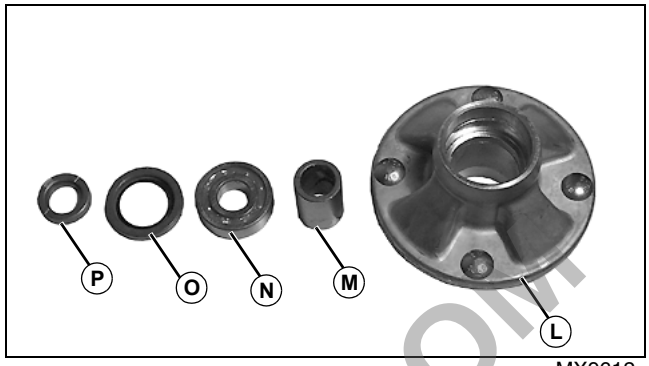
NOTE: Inspect all parts for wear or damage. Replace parts as necessary.



MX9611

1. Install upper bearing (K) tight against spindle hub shoulder (L) using a **1-13/16** disk and press.

IMPORTANT: Avoid damage! When using disk drivers, support both the inner and outer races of the upper and lower bearings when installing the lower bearing.

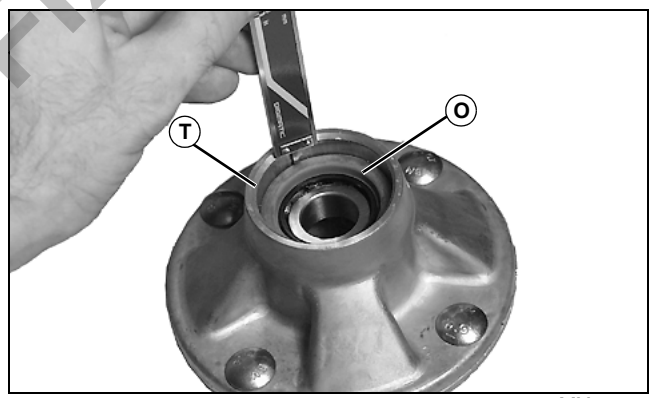


MX9612

2. Turn housing over. Support the assembly using a **1-13/16-in.** disk against the upper bearing and a pipe approximately the same diameter against the disk. Pipe must extend beyond housing so the assembly is supported by the pipe NOT by spindle housing.

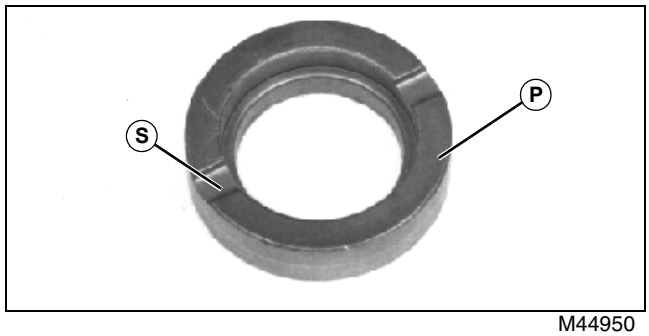
3. Place spacer (M) into housing. Center spacer on upper bearing.

4. Install lower bearing (N) in housing using a **1-13/16 in.** disk and press. Press bearing until it is seated against spacer.



MX9613

5. Install lower seal (O) with lip toward bearing using a **1-13/16 in.** disk and a press. Install to a depth of **7.3 mm (0.29 in.)** below hub flange (T). Refer to cross section for correct seal installation.



M44950

6. Install lower seal ring (P), with grease notch (S) away from bearing, inside seal lip. Be careful not to turn lip of seal inside out when installing seal ring.

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