JOHN DEERE
WORLDWIDE COMMERCIAL & CONSUMER EQUIPMENT DIVISION

Garden Tractors
G100 and G110

TM2020 FEBRUARY 2004

TECHNICAL MANUAL

PREVIEW - YOUFIXTHIS.COM

JOHN DEERE

North American Version
Litho in U.S.A.

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INTRODUCTION

Manual Description

This technical manual is written for an experienced technician and contains sections that are specifically for this product. It is a part of a total product support program.

The manual is organized so that all the information on a particular system is kept together. The order of grouping is as follows:

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

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

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

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

Safety

Specifications and Information

Engine (Kohler)

Electrical

Power Train

Steering

Attachments

Miscellaneous

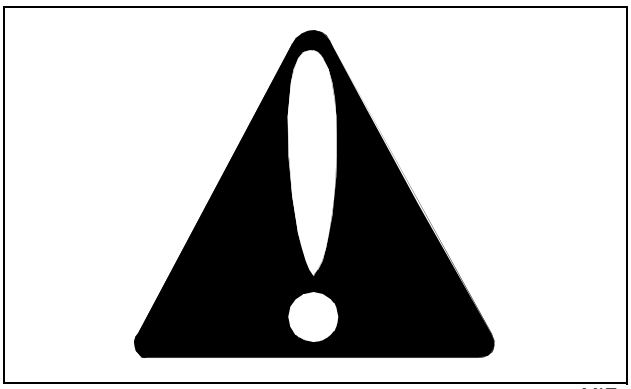
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Recognize Safety Information



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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.

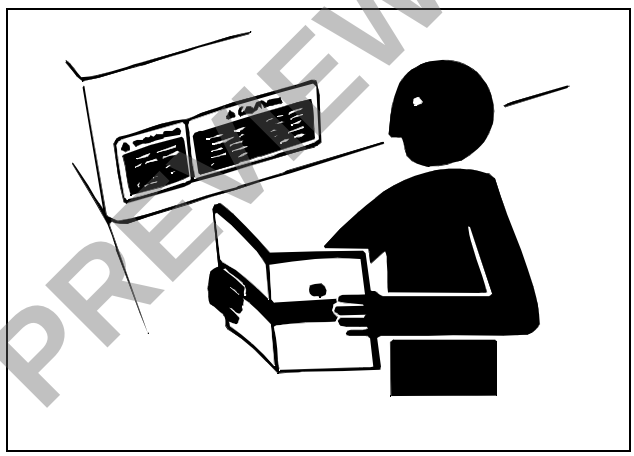
Follow recommended precautions and safe servicing practices.

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

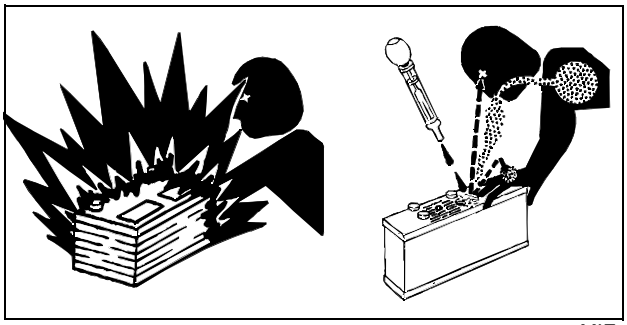
Be Prepared For Emergencies



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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



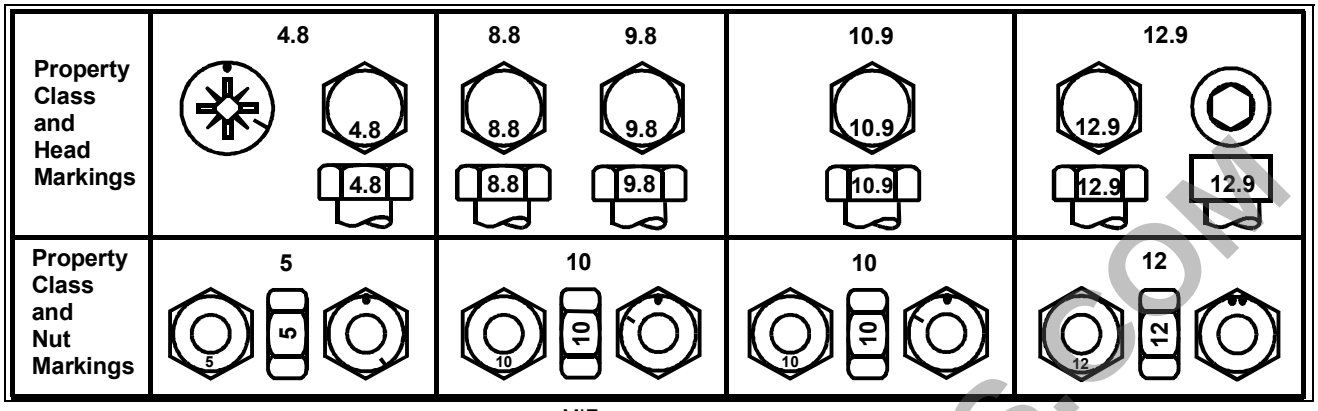
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Fastener Torques

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
M16	100	73	125	92	190	140	240	175	275	200	350	225	320	240	400	300
M18	135	100	175	125	260	195	330	250	375	275	475	350	440	325	560	410
M20	190	140	240	180	375	275	475	350	530	400	675	500	625	460	800	580
M22	260	190	330	250	510	375	650	475	725	540	925	675	850	625	1075	800
M24	330	250	425	310	650	475	825	600	925	675	1150	850	1075	800	1350	1000
M27	490	360	625	450	950	700	1200	875	1350	1000	1700	1250	1600	1150	2000	1500
M30	675	490	850	625	1300	950	1650	1200	1850	1350	2300	1700	2150	1600	2700	2000
M33	900	675	1150	850	1750	1300	2200	1650	2500	1850	3150	2350	2900	2150	3700	2750
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2750	4750	3500

DO NOT use these hand torque values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only and include a ±10% variance factor. Check tightness of fasteners periodically. DO NOT use air powered wrenches.

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

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

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

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

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

Reference: JDS - G200.

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ENGINE - GAS SPECIFICATIONS

Specifications

General Specifications

G100 Engine:

Make	Kohler
Model Number	CV23S-75569
Horsepower	17.2 kW (23 hp)
Displacement	674 cc (41.1 cu in.)
Bore	80.0 mm (3.15 in.)
Stroke	67 mm (2.64 in.)

G110 Engine:

Make	Kohler
Model Number	CV730-0040
Horsepower	18.6 kW (25 hp)
Displacement	725 cc (44.0 cu in.)
Bore	83.0 mm (3.27 in.)
Stroke	67 mm (2.64 in.)

All Engines:

Cylinders	2
Stroke/Cycle	4
Valves	Overhead Valves
Compression Ratio - G100	8.5:1
Compression Ratio - G110	9.0:1
Compression Release	Automatic/Centrifugal
Crankshaft Type	Vertical
Lubrication	Fully Pressurized 0 - 413 kPa (0 - 60 psi)
Oil Filter	Single Element, Full Flow, Spin-On Filter
Crankcase Oil Capacity - G100: w/o Oil Filter)	1.8 L (1.9 qt)
w/ Oil Filter	1.9 L (2.0 qt)
Crankcase Oil Capacity - G110: w/o Oil Filter	1.9 L (2.0 qt)
w/ Oil Filter	2.0 L (2.1 qt)
Cooling System	Air Cooled
Air Cleaner	Dual Stage
Muffler	Horizontal Discharge Below Frame
Fuel Capacity	7.9 L (2.1 gal)
Fuel Filter	Replaceable (In-Line Type)
Fuel Shut-Off Solenoid	Replaceable (Below Carburetor Float Bowl)
Spark Plug-Type	Champion® RC12YC or Equivalent

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Special or Required Tools

Special or Required Tools

Tool Name	Tool No.	Tool Use
Reaming Tool (7.05 mm)	D20020WI	Used to clean or size valve guides
Reaming Tool (7.30 mm)	JDG705	Used to bore oversize valve guide
Valve Spring Compressor	JDM70	Used to remove and install valve springs
Drill Bit	6.4 mm (0.25 in.)	Throttle and choke adjustment
Dial Indicator		Automatic compression relief test, valve inspection, crankshaft end play
Digital Pulse Tachometer	JT07270	Slow and/or fast idle adjustment
Photo Tachometer	JT05719	Slow and/or fast idle adjustment
Spark Plug Ground	JDM74A5	Used to prevent accidental engine starting during tests
Cylinder Leak Tester	JT035029	Cylinder leak test
U-Tube Manometer Test Kit; or, Crankcase Vacuum Test Kit	JT05697 JT03503	Crankcase vacuum check
Oil Pressure Test Adapter w/ O-ring (required only on engines without test ports) Connector Hose Assembly Coupler Gauge, 0 - 700 kPa (0 - 100 psi)	JT07262 JT05487 JT03017 JT03262 JT07034	Oil pressure test
Lapping Tool		Valve lapping

Other Materials

Other Materials

Part No.	Part Name	Part Use
M79292	MPG-2® Multipurpose Grease	Apply to engine crankshaft
	SCOTCH-BRITE® Abrasive Sheets/Pads	Clean cylinder head
	Valve Guide Cleaner	Clean valve guides
	Lithium Base Grease	Pack oil seals
	Mineral Spirits	Clean armature
	Valve Lap Compound	Lap valves
TY15130 / 395	LOCTITE® Form-in-Place Gasket	Rocker arm cover mating surfaces

MPG-2® is a registered trademark of DuBois USA

SCOTCH-BRITE® is a registered trademark of the 3M Co.

LOCTITE® is a registered trademark of the Loctite Corp.

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Piston CV23:

Maximum Ring Groove Clearance CV23:

Top Compression Ring	**0.03 - 0.08 mm (0.001 - 0.003 in.)**
Middle Compression Ring	**0.03 - 0.08 mm (0.001 - 0.003 in.)**
Oil Control Ring	**0.05 - 0.20 mm (0.002 - 0.008 in.)**

Top and Center Compression Ring End Gap CV23:

Used Bore (Maximum)	**0.80 mm (0.032 in.)**
New Bore (Maximum)	**0.18 - 0.46 mm (0.007 - 0.018 in.)**

Distance from Bottom of Piston Skirt
Height of Piston OD measurement . . . . . **6 mm (0.236 in.)**

Piston OD CV23:

New	**79.96 - 79.98 mm (3.148 - 3.149 in.)**
Wear Limit	**79.83 mm (3.143 in.)**
Piston-to-Cylinder Bore Clearance	**0.02 - 0.06 mm (0.001 - 0.002 in.)**
Piston Pin Bore ID	**17.01 mm (0.670 in.)**
Maximum Wear Limit	**17.03 mm (0.670 in.)**
Piston Pin OD	**17.00 mm (0.669 in.)**
Maximum Wear Limit	**16.99 mm (0.669 in.)**

Cylinder Bore CV730:

Standard ID	**83.01 - 83.03 mm (3.268 - 3.269 in.)**
Maximum Wear Limit	**83.07 mm (3.271 in.)**

Piston CV730:

Maximum Ring Groove Clearance:

Top Compression Ring	**0.03 - 0.05 mm (0.001 - 0.002 in.)**
Middle Compression Ring	**0.02 - 0.04 mm (0.001 - 0.002 in.)**
Oil Control Ring	**0.03 - 0.18 mm (0.001 - 0.007 in.)**

Top and Center Compression Ring End Gap CV730:

Used Bore (Maximum)	**0.75 mm (0.030 in.)**
New Bore (Maximum)	**0.25 - 0.56 mm (0.010 - 0.022 in.)**

Distance from Bottom of Piston Skirt
Height of Piston OD Measurement . . . . . **6 mm (0.236 in.)**

Piston OD CV730:

New	**82.96 - 82.97 mm (3.266 - 3.267 in.)**
Wear Limit	**82.84 mm (3.262 in.)**
Piston-to-Cylinder Bore Clearance	**0.03 - 0.07 mm (0.001 - 0.003 in.)**
Piston Pin Bore ID	**17.01 mm (0.670 in.)**
Maximum Wear Limit	**17.03 mm (0.670 in.)**
Piston Pin OD	**17.00 mm (0.669 in.)**
Maximum Wear Limit	**16.99 mm (0.669 in.)**

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Tests and Adjustments

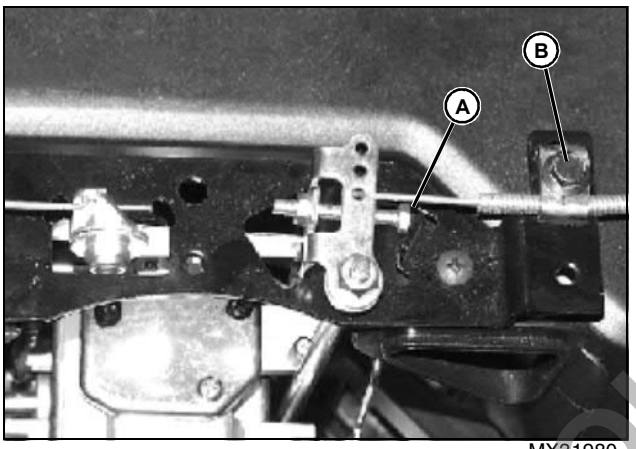
Governor Adjustment

Reason:

To make sure the governor is operating correctly.

Procedure for Initial Check and Adjustment:

1. Park machine safely. See Parking Safely in the Safety section.
2. Disconnect headlight wiring harness and remove hood.
3. Place throttle in fast idle position.



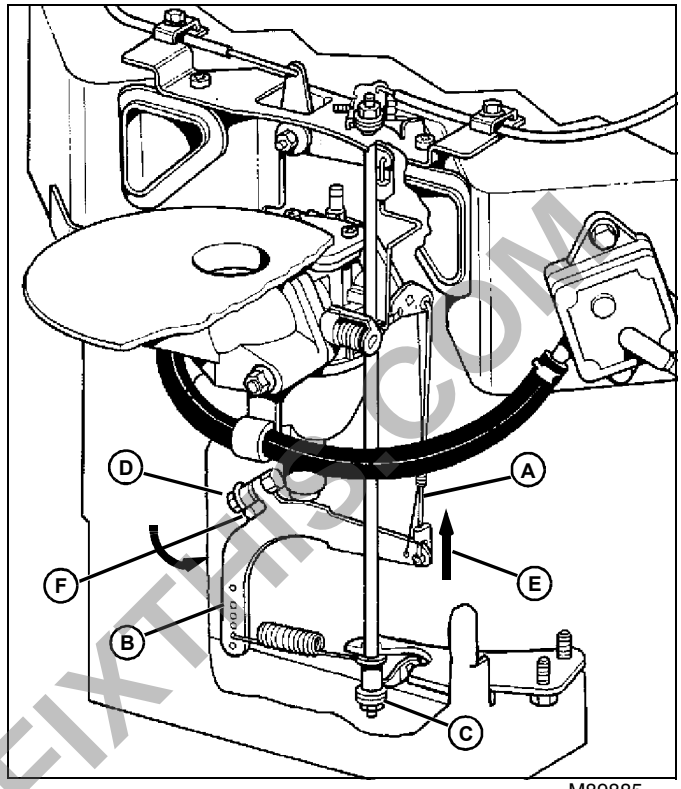
MX31980

4. Check that the fast stop screw (A) contacts the stop tab without keeping the throttle from being in the full fast idle position.

- If the stop screw contacts the stop tab, proceed to "Adjustment Procedure" below.
- If the screw does not contact the stop tab or prevents the throttle from fully moving to the fast idle position, loosen the throttle cable clamp (B) enough to allow the throttle cable to slide freely through the clamp.
- Slide the throttle cable so the stop screw contacts the stop tab with the throttle lever in the fast idle position.
- Tighten the cable clamp screw to 3.4 N•m (30 lb-in.).
- Proceed to: Adjustment Procedure" below.

Adjustment Procedure:

1. Remove the air filter and backing plate.



M89885

2. Make sure the throttle linkage (A) is connected to the governor arm (B) and the throttle lever (C) on the carburetor.
3. Loosen the nut (D) holding the governor arm to the governor shaft. Move the governor arm towards (E) the carburetor as far as it will move and hold.
4. Insert a pin or small punch into the hole on the governor shaft and rotate the shaft counterclockwise (F) as far as it will turn, then tighten nut (E).
5. Remove the pin or punch.

CAUTION: Avoid injury! Do not run engine without replacing air filter backing plate, or using nuts to secure carburetor to manifold.

6. Replace air filter backing plate.

NOTE: If the fast idle tab interferes with adjusting the fast idle screw adjust the throttle cable. See: "Procedure for Initial Check and Adjustment" above.

7. Start engine and use fast idle screw to adjust fast idle to specification.
8. Perform sensitivity adjustment.

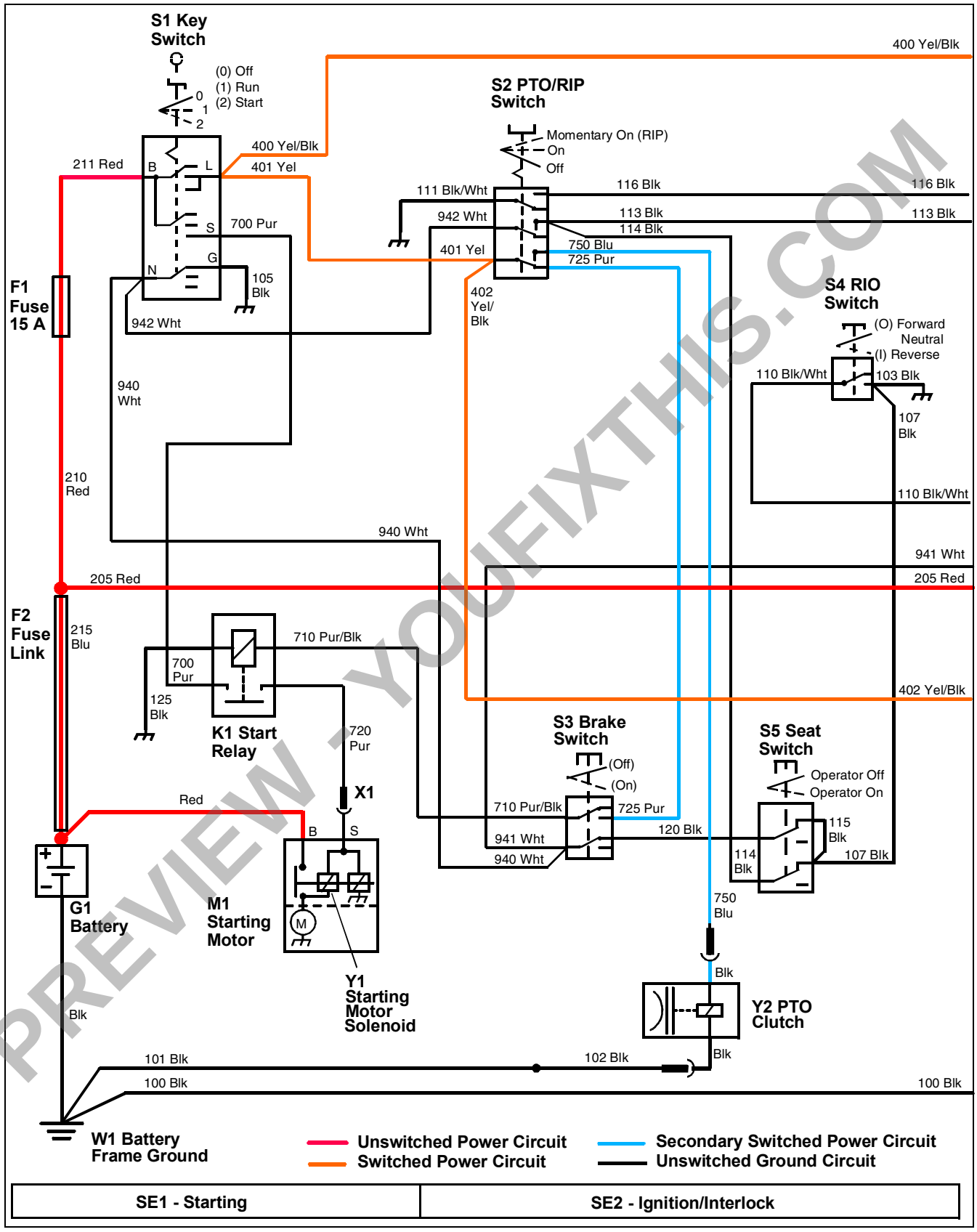
Specification:

Engine rpm . . . . . 3350 ± 75 rpm

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Electrical Schematic - G100

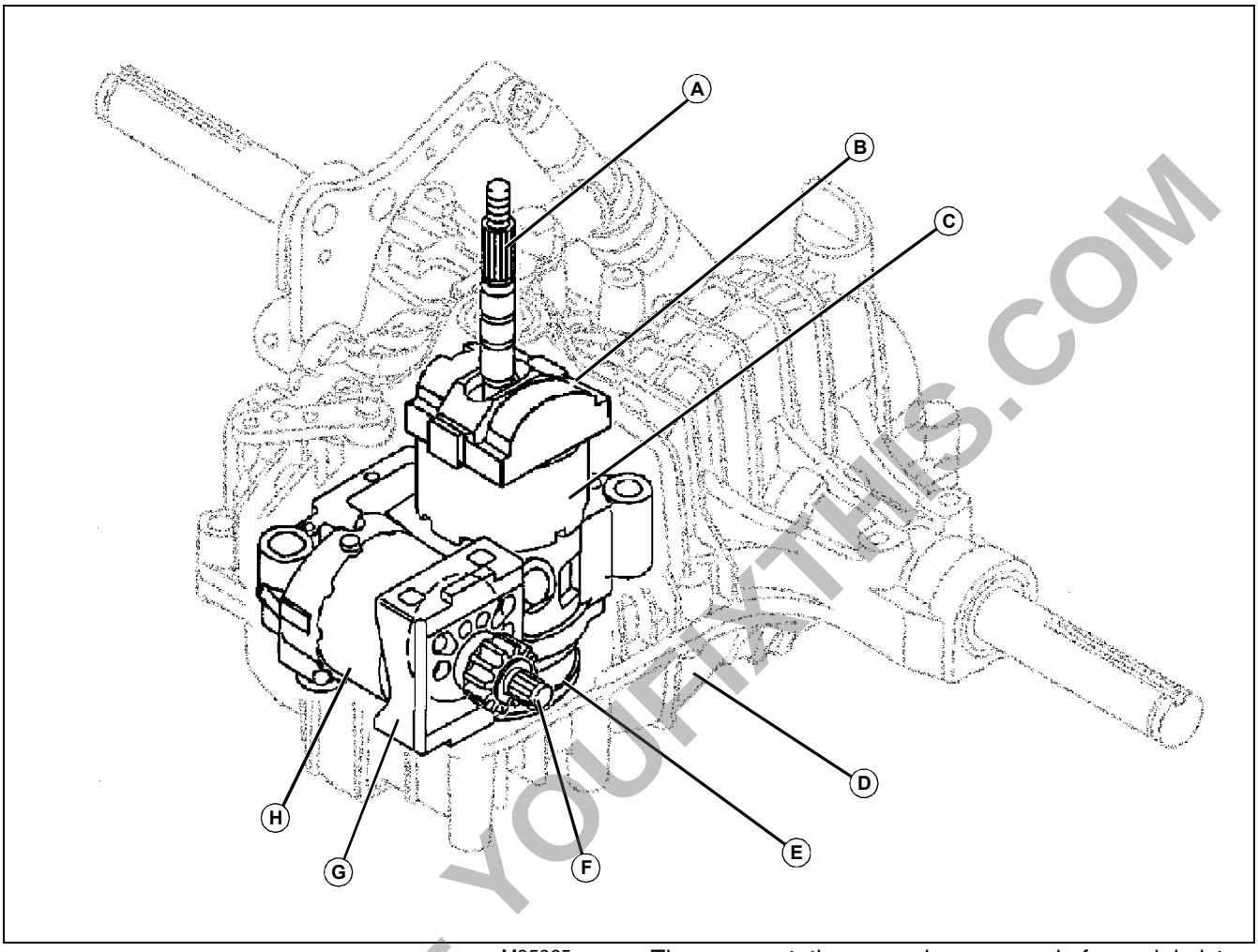


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Hydrostatic System Operation



M95065

A - Pump Input Shaft
B - Variable Displacement Swash Plate
C - Motor Rotating Group
D - Reservoir
E - Filter
F - Motor Output Shaft
G - Fixed Displacement Swash Plate
H - Pump 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 and the charge pump. The pump rotating group is composed of an axial piston pump and a variable displacement swash plate. The charge pump is composed of a Gerotor pump that draws pressure-free oil from the reservoir through the filter and supplies oil to the pump rotating group. 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.

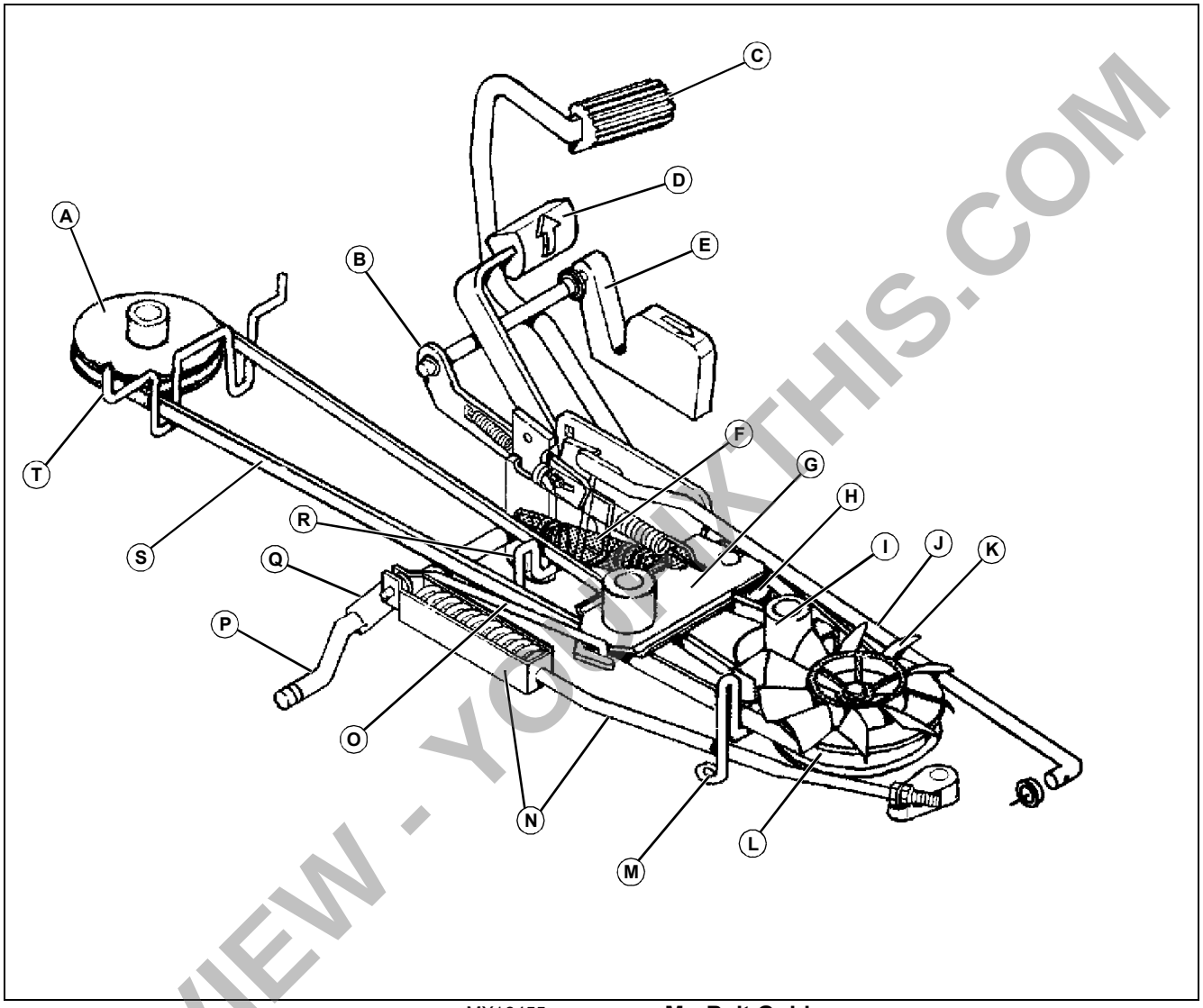
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POWER TRAIN - HYDROSTATIC COMPONENT LOCATION

Component Location

Power Train Components - G100



MX19455

A - Engine Drive Sheave
B - Reverse Link
C - Brake Pedal
D - Forward Pedal
E - Reverse Pedal
F - Belt Tension Spring
G - Bellcrank/Idler Assembly
H - V-Idler
I - Flat Idler
J - Control Rod
K - Cooling Fan
L - Transaxle Input Sheave
M - Belt Guide
N - Brake Actuating Arm and Spring Assembly
O - Belt Tension Release Rod
P - Brake Pedal Shaft
Q - Lever
R - Belt Guide
S - Drive Belt
T - Belt Guide

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ENGINE - GAS SPECIFICATIONS

Tests and Adjustments Specifications

Valve Adjustment	None (Hydraulic Lifters)
Automatic Compression Release Minimum Lift (Engine Cold)	0.25 mm (0.01 in.)
Oil Pressure (Minimum at 1250 rpm)	124 kPa (18 psi)
Crankcase Vacuum (Minimum At Operating Temp.)	15 cm (6.0 in.)
Ignition Module Air Gap	0.20 - 0.30 mm (0.008 - 0.0012 in.)
Maximum Compression Pressure Variation Between Cylinders	138 kPa (20 psi)
Cylinder Compression Pressure (minimum)	1125 kPa (160 psi)
Oil Pressure Sensor Activates	21 - 35 kPa (3 - 5 psi)
Carburetor Slow Idle Mixture Screw Initial Setting	Lightly Seat, Then 1 Turn Out
Fuel Pressure (minimum)	2 kPa (0.3 psi)
Fuel Flow (minimum)	7.5 L/hr (2 gph)
Slow Idle Speed	1700 ± 75 rpm
Fast Idle Speed	3350 ± 75 rpm
Spark Plug-Gap	0.76 mm (0.030 in.)

Repair Specifications

Cylinder Head:	
Cylinder Head Flatness (Maximum Warp)	0.08 mm (0.003 in.)
Push Rod:	
Maximum Bend	0.76 mm (0.030 in.)
Valves and Valve Lifters:	
Hydraulic Lifter to Crankcase Running Clearance	0.02 - 0.05 mm (0.001 - 0.002 in.)
Intake Valve-to-Guide Clearance	0.04 - 0.08 mm (0.002 - 0.003 in.)
Intake Valve Stem OD	6.98 - 7.00 mm (0.275 - 0.276 in.)
Oversize	7.23 - 7.25 mm (0.284 - 0.285 in.)
Intake Valve Guide ID:	
New	7.04 - 7.06 mm (0.277 - 0.278 in.)
Maximum	7.13 mm (0.281 in.)
Oversize	7.29 - 7.31 mm (0.287 - 0.288 in.)
Exhaust Valve-to-Guide Clearance	0.05 - 0.09 mm (0.002 - 0.004 in.)
Exhaust Valve Stem OD	6.97 - 6.99 mm (0.274 - 0.275 in.)
Oversize	7.22 - 7.24 mm (0.284 - 0.285 in.)
Exhaust Valve Guide ID:	
New	7.04 - 7.06 mm (0.277 - 0.278 in.)
Maximum	7.16 mm (0.282 in.)
Oversize	7.24 - 7.31 mm (0.285 - 0.288 in.)
Valve Guide Reamer:	
Standard	7.05 mm (0.278 in.)
Oversize (0.25 mm)	7.30 mm (0.287 in.)
Intake Valve Lift (Minimum - Engine Cold)	8.07 mm (0.318 in.)
Exhaust Valve Lift (Minimum - Engine Cold)	8.07 mm (0.318 in.)
Valve Face Angle	45°
Valve Seat Angle	44.5°
Valve Margin (Minimum)	1.50 mm (0.06 in.)

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Valve Stem Bend (Maximum)	**0.08 mm (0.003 in.)**
Rocker Arms:	
Rocker Arm Flange Screws	**14 N•m (124 lb-in.)**
Crankshaft:	
End Play	**0.07 - 0.48 mm (0.003 - 0.019 in.)**
Crankshaft Bore ID (Crankcase Half):	
New	**40.97 - 41.00 mm (1.613 - 1.614 in.)**
Maximum	**41.02 mm (1.615 in.)**
(Clearance (New)	**0.03 - 0.09 mm (0.001 - 0.004 in.)**
Crankshaft Bore (Oil Pan Half):	
New	**40.97 - 40.99 mm (1.613 - 1.614 in.)**
Maximum	**41.03 mm (1.615 in.)**
Clearance (New)	**0.04 - 0.07 mm (0.002 - 0.003 in.)**
Main Bearing Journal OD (Flywheel End):	
New	**40.91 - 40.94 mm (1.611 - 1.612 in.)**
Minimum	**40.84 mm (1.608 in.)**
Maximum Taper	**0.02 mm (0.001 in.)**
Maximum Out-of-Round	**0.03 mm (0.001 in.)**
Main Bearing Journal OD (PTO End):	
New	**40.91 - 40.94 mm (1.611 - 1.612 in.)**
Minimum	**40.84 mm (1.608 in.)**
Maximum Taper	**0.02 mm (0.001 in.)**
Maximum Out-of-Round	**0.03 mm (0.001 in.)**
Connecting Rod Journal OD:	
New	**35.96 - 38.97 mm (1.416 in.)**
Minimum	**35.94 mm (1.415 in.)**
Maximum Taper	**0.02 mm (0.001 in.)**
Maximum Out-of-Round	**0.03 mm (0.001 in.)**
Crankshaft Total Indicated Runout (TIR):	
PTO End (In Engine)	**0.15 mm (0.006 in.)**
Entire Crankshaft (In Bench V-Blocks)	**0.10 mm (0.004 in.)**
Camshaft:	
End Play (with shims)	**0.08 - 0.13 mm (0.003 - 0.005 in.)**
Clearance	**0.03 - 0.06 mm (0.001 - 0.003 in.)**
Bore ID:	
New	**20.00 - 20.03 mm (0.787 - 0.788 in.)**
Maximum	**20.04 mm (0.789 in.)**
Bearing OD:	
New	**19.96 - 19.98 mm (0.786 in.)**
Minimum	**19.96 mm (0.786 in.)**
Cylinder Bore CV23:	
Standard ID	**80.00 - 80.03 mm (3.150 - 3.151 in.)**
Maximum Wear Limit	**80.07 mm (3.152 in.)**

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Tests and Adjustments

Ground Circuit Tests

Reason:

To check for opens, loose terminal wire crimps, poor connections, or corrosion in the ground circuit.

Equipment:

- Ohmmeter or Voltmeter.

The voltmeter method checks ground connections under load.

Procedure, Ohmmeter Method:

1. Park machine safely. See Parking Safely in the Safety section.

2. Raise hood.

3. Connect ohmmeter negative (black) lead to negative terminal of battery. Put meter positive (red) lead on negative terminal of battery and record reading. Reading should be 0.1 ohm or less.

4. Put meter red lead on ground terminal of circuit or component to be tested that is closest to the battery negative terminal. Resistance reading must be very close to or the same as the battery negative terminal reading. Work backwards from the battery on the ground side of the problem circuit until the resistance reading increases above 0.1 ohms. The problem is between the last two test points. If a problem is indicated, disconnect the wiring harness connector to isolate the wire or component and check resistance again. Maximum allowable resistance in the circuit is 0.1 ohms. Check both sides of connectors closely as disconnecting and connecting may temporarily solve problem.

Procedure, Voltmeter Method:

1. Park machine safely. See Parking Safely in the Safety section.

2. Raise hood.

3. Place key switch in ON position.

4. Connect voltmeter negative (black) lead to negative terminal of battery.

5. Put meter positive (red) lead on ground terminal of circuit or component to be tested. Be sure the component circuit is activated (key on, switches closed) so voltage will be present at the component.

6. Record voltage. Voltage must be greater than 0 but less than 1 volt. Some components will have a very small voltage reading on the ground side and still be operating correctly.

Results:

- If voltage is 0, the component is open.
- If voltage is greater than 1 volt, the ground circuit is bad. Check for open wiring, loose terminal wire crimps, poor connections, or corrosion in the ground circuit.

Battery Test

Reason:

To check condition of battery and determine battery voltage.

NOTE: Battery is maintenance free.

Equipment:

- Voltmeter or JT05685 Battery Tester

Procedure:

CAUTION: Avoid injury! Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into the eyes.

Avoid the hazard by:

Filling batteries in a well-ventilated area.
Wearing eye protection and rubber gloves.
Avoiding breathing fumes when electrolyte is added.
Avoid spilling or dripping electrolyte.
Use proper jump-start procedure.

If you spill acid on yourself:

Flush your skin with water,
Apply baking soda or lime to help neutralize the acid.
Flush your eyes with water for 10 - 15 minutes.
Get medical attention immediately.

If acid is swallowed:

Drink large amounts of water or milk, then drink milk of magnesia, beaten eggs, or vegetable oil.
Get medical attention immediately.

1. Park machine safely. See Parking Safely in the Safety section.

2. Raise hood.

3. Clean cable ends, battery terminals and top of battery.

4. Inspect battery terminals and case for breakage or cracks.

5. Use a voltmeter or JTO5685 Battery Tester to check for a minimum battery voltage of 12.4 volts.

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ELECTRICAL SPECIFICATIONS

Specifications

General Specifications

Battery

Voltage	12VDC
BCI Group	U1
Specific Gravity (Minimum)	1.225 points

Ignition

Air gap	0.2 - 0.3 mm (0.008 - 0.012 in.)

Spark Plugs G100 and G110

Type	Champion RC12YC
Spark Plug Gap	0.76 mm (0.030 in.)
Spark Plug Torque	26 N•m (240 lb-in.)

Starting Motor

Type	Solenoid Shift
Starting motor amp draw (on machine)	90 - 100 amps at 750 rpm
Starting motor no-load amp draw (free running)	20 amps (maximum) at 2500 rpm

Stator

Size	15 amps
Regulated Amperage (Minimum) at Fast Idle	3 - 15 amps
Regulated Voltage (Minimum) at Fast Idle	12.2 - 14.7 volts DC
Unregulated Voltage (Minimum) at Fast Idle	28 volts AC

Electric PTO Clutch - G100

Resistance	2.4 - 2.7 ohms
Current Draw	4 amps
PTO Clutch to Engine Crankshaft Cap Screw	115 N•m (85 lb-ft)

Electric PTO Clutch - G110

Resistance	2.84 ohms ± 5%
Current Draw	4.23 amps
PTO Clutch to Engine Crankshaft Cap Screw	68 N•m (50 lb-ft)

Lights

Headlights	GE 1156 or equivalent

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IMPORTANT: Avoid damage! Perform following procedure within 15 seconds to prevent damage to tester and/or machine components.

8. Crank the engine and read the starting motor amperage draw.

Results:

IMPORTANT: Avoid damage! If starting motor is good, check internal engine components for binding, wear, or damage.

- Maximum starting motor draw should be at or below specification.
- If amperage is above specification check starting motor for binding or damaged wires or windings.
- If amperage is above specification, perform Starting Motor No-Load Amperage and RPM Test to determine if starting motor is binding or damaged.
- If starting motor is good, check internal engine and PTO drive for binding or damage.

Specifications:

Starting Motor . . . . . .90 - 100 amps
Maximum starting motor amp draw . . . . . 180 amps

Starting Motor No-load Amperage and RPM Tests

Reason:

To determine starting motor condition under no-load conditions.

Required Tools:

- JT05791 Multitester
- JT02153 Current Clamp
- 12 Volt Battery
- JT07270 Hand-Held Digital Tachometer
- Jumper Cables
- Jumper Wire (To connect the starting motor POS post and the solenoid shift connector)

Procedure:

IMPORTANT: Avoid damage! Do not clamp starting motor housing in vise or strike with a hammer. Clamp only on the mounting bracket. Starting motor contains two ceramic magnets that can be broken or cracked if the motor housing is hit, deformed or dented.

NOTE: Check that battery is fully charged and of proper size to ensure accuracy of test.

1. Park machine safely. See Parking Safely in the Safety section.
2. Raise hood.
3. Remove starting motor.

IMPORTANT: Avoid damage! When connecting wires and meter, ensure connections are not touching any surface where a ground short may occur. Wrap connections with electrical tape if necessary. Clamp the starting motor mounting bracket in a vise.

4. Connect the NEG jumper cable to the battery NEG (-) post and the frame of the starting motor.
5. Connect the POS jumper cable to the POS (+) post of the battery.
6. Connect current clamp RED lead to the VOLTS jack of the multitester and the BLACK lead of the current clamp to the COM jack on the multitester.
7. Clamp jaws of current clamp around the positive jumper cable.

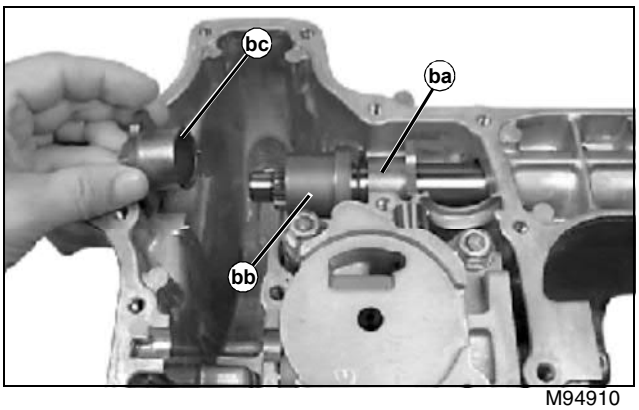
IMPORTANT: Avoid damage! Adjust the DCA ZERO ADJUST dial on the current clamp for a zero reading on the multitester.

NOTE: If using a multitester other than JT05791, use a meter that will read millivolts.
Millivolts = current in amps; 1mV = 1 amp.

8. Set the current clamp to 2000A and the multitester to 300mV.

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M94910

61.Install longer axle through seal, case and bushing (ba).

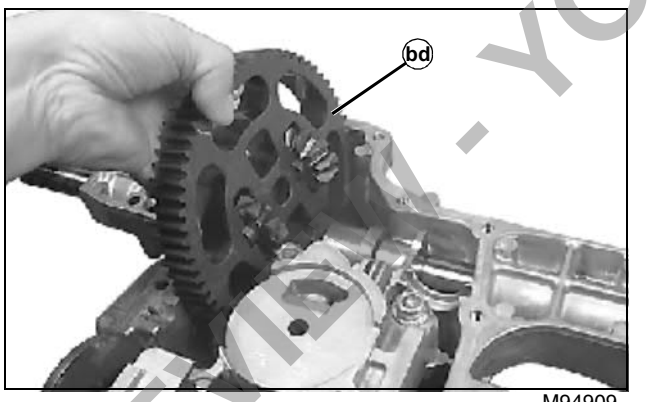
62.Install collar (bb) on axle. Do not insert axle fully.

63.Install bushing (bc) for shorter axle.

64.Install axle though seal, case and bushing. Do not insert axle fully.

65.Install differential bevel gears onto axles. Slide axles slightly toward each other to set bevel gears on axle splines.

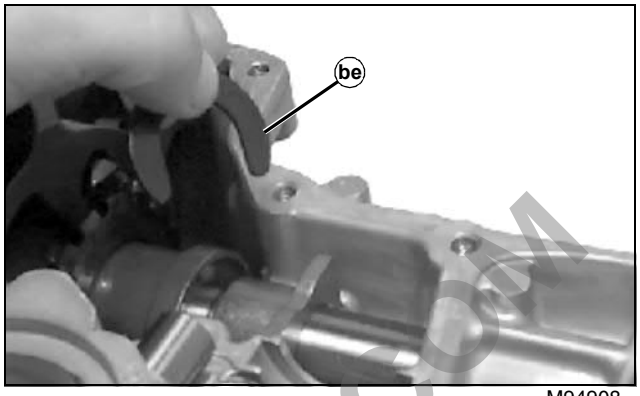
IMPORTANT: Avoid damage! ***Transaxle has thrust washer located between right axle side pinion gear and differential gear. Install thrust washer (not shown).***



M94909

66.Assemble differential gear assembly (bd) and set between axles.

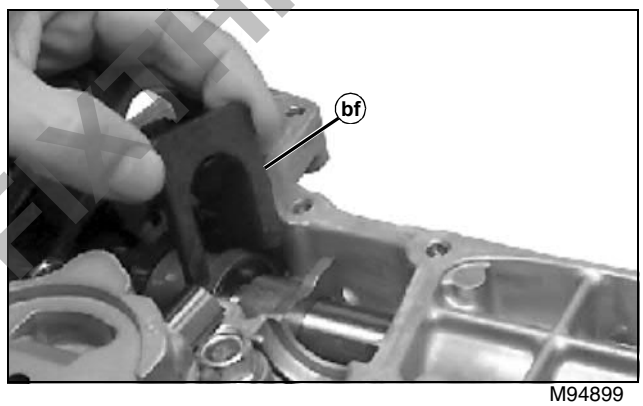
67.Rotate differential gears and axles until all gears mesh.



M94908

68.Install C-ring (be) on each axle.

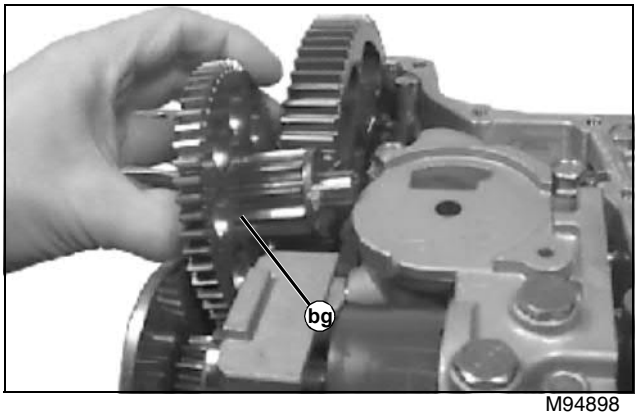
69.Push axles fully into transaxle case. Rotate differential gear to assure freedom of movement.



M94899

70.Install thrust washer (bf) on left hand and right hand axles.

IMPORTANT: Avoid damage! Note flat on outer end of reduction shaft. Flat surface must be fully seated in upper case, and flat surface must be 90° to case mating surfaces to allow seating of lower case on upper case.



M94898

71.Install reduction gear assembly (bg) in upper case. Rotate gears if needed to fully seat gear assembly.

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