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

General Diagnostic Information

Specifications

Electrical Wiring Harness Legend

Component Location

System Schematic

Wiring Harness

Troubleshooting Chart

Theory of Operation

Diagnostics

Tests & Adjustments

Repair

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

Each section will be identified with a symbol rather than a number. The groups and pages within a section will be consecutively numbered.

We appreciate your input on this manual. To help, there are postage paid post cards included at the back. If you find any errors or want to comment on the layout of the manual please fill out one of the cards and mail it back to us.

Safety

Specifications and Information

Engine - Briggs & Stratton

Engine - Kohler

Electrical

Power Train - Gear Transmission

Power Train - Hydro Transmission

Steering

Brakes

Attachments

Miscellaneous

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

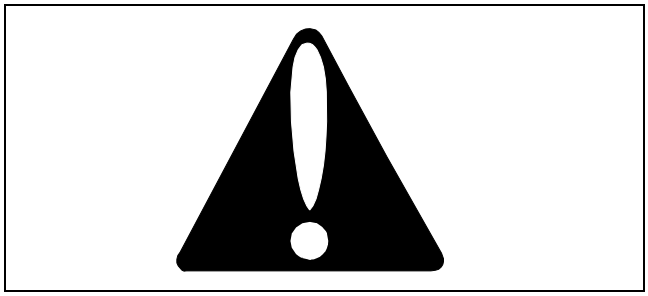
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Recognize Safety Information



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.

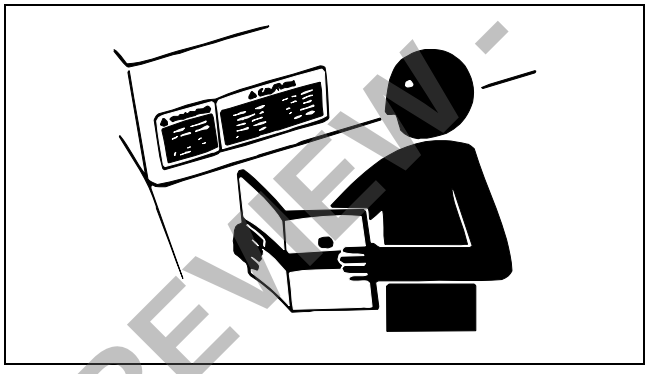
Follow recommended precautions and safe servicing practices.

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.

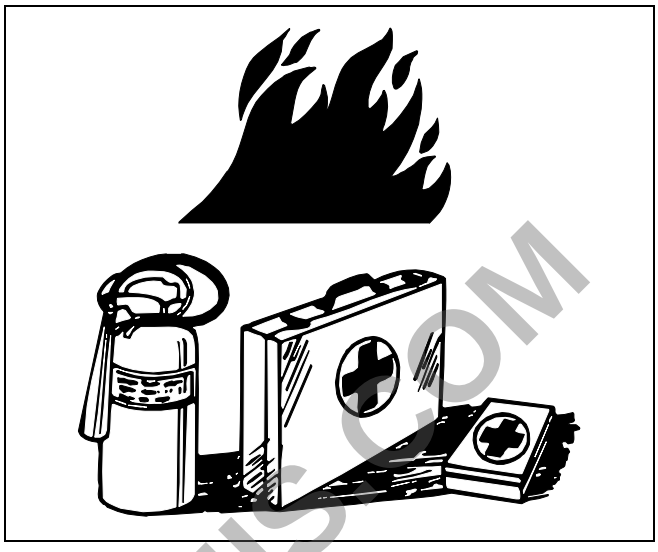
Replace Safety Signs



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

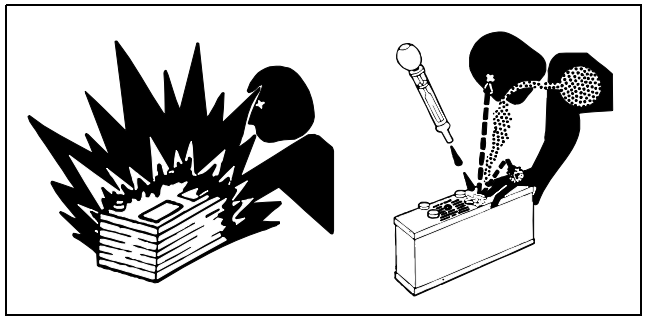
Be Prepared For Emergencies

- 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



Prevent Battery Explosions

- Keep sparks, lighted matches, and open flame away from the top of battery. Battery gas can explode.
- Never check battery charge by placing a metal object across the posts. Use a volt-meter or hydrometer.
- Do not charge a frozen battery; it may explode. Warm battery to 16°C (60°F).

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Specifications

Engine

14.542GS

Make	Briggs & Stratton
Model	Intek / 284H07
Horsepower	10.8 kW (14.5 hp)
Displacement	465 cm3 (28.42 cu in.)
Cylinders	1
Stroke/Cycle	4
Valves	Overhead
Lubrication	Pressurized
Oil Filter	None
Crankcase Capacity (Without Filter)	1.4 L (1.5 qt)
Cooling System	Air Cooled
Air Cleaner	Paper with outer foam element
Muffler	Horizontal discharge below frame
Spark Plug Gap	1 mm (0.040 in.)
Spark Plug Torque	26 N•m (240 lb-in.)

1642HS

Make	Briggs & Stratton
Model	Intek / 31F707
Horsepower	11.9 kW (16.0 hp)
Displacement	500 cm3 (30.52 cu in.)
Cylinders	1
Stroke/Cycle	4
Valves	Overhead
Lubrication	Pressurized
Oil Filter	None
Crankcase Capacity (Without Filter)	1.4 L (1.5 qt)
Cooling System	Air Cooled
Air Cleaner	Paper with outer foam element
Muffler	Horizontal discharge below frame
Spark Plug Gap	1 mm (0.040 in.)
Spark Plug Torque	26 N•m (240 lb-in.)

17.542HS

Make	Kohler
Model	Command / CV490S
Horsepower	13.1 kW (17.5 hp)
Displacement	490 cm3 (29.9 cu in.)
Cylinders	1

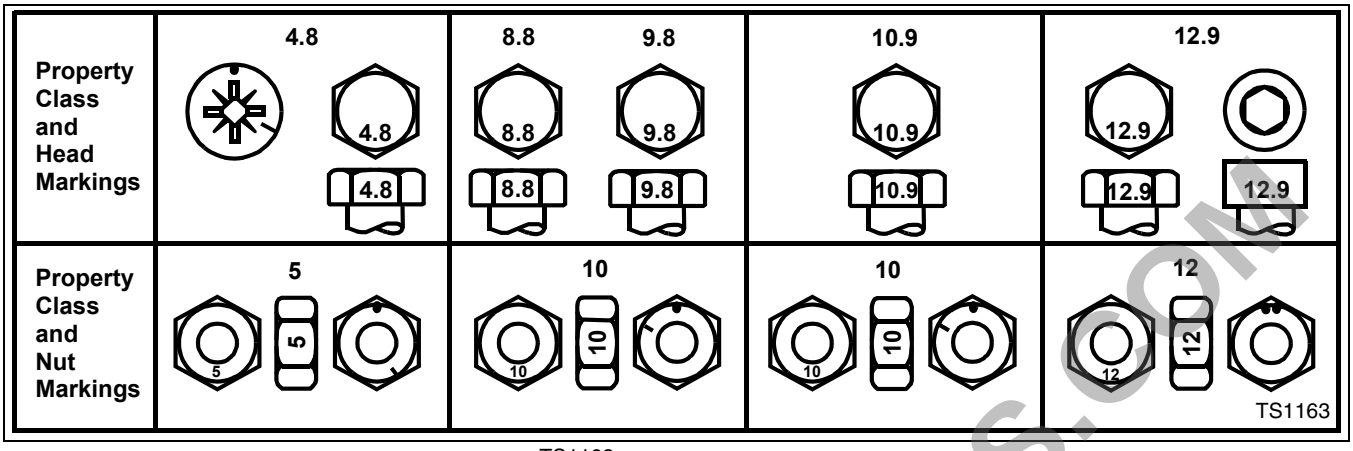
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Fastener Torques

Metric Fastener Torque Values



TS1163

	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 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*.

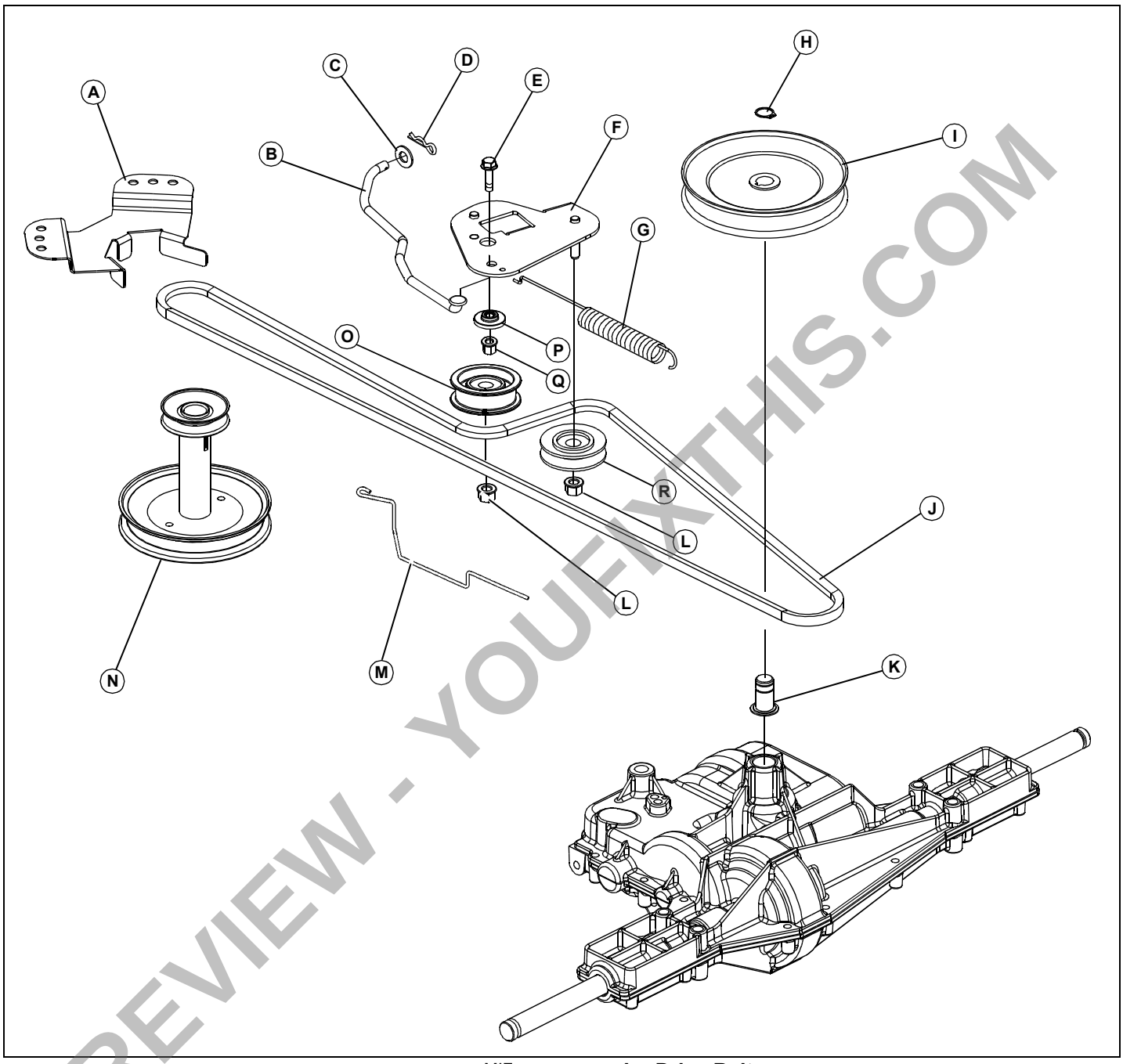
Reference: JDS—G200

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POWER TRAIN - GEAR / COMPONENT LOCATION

Component Location

Drive Components



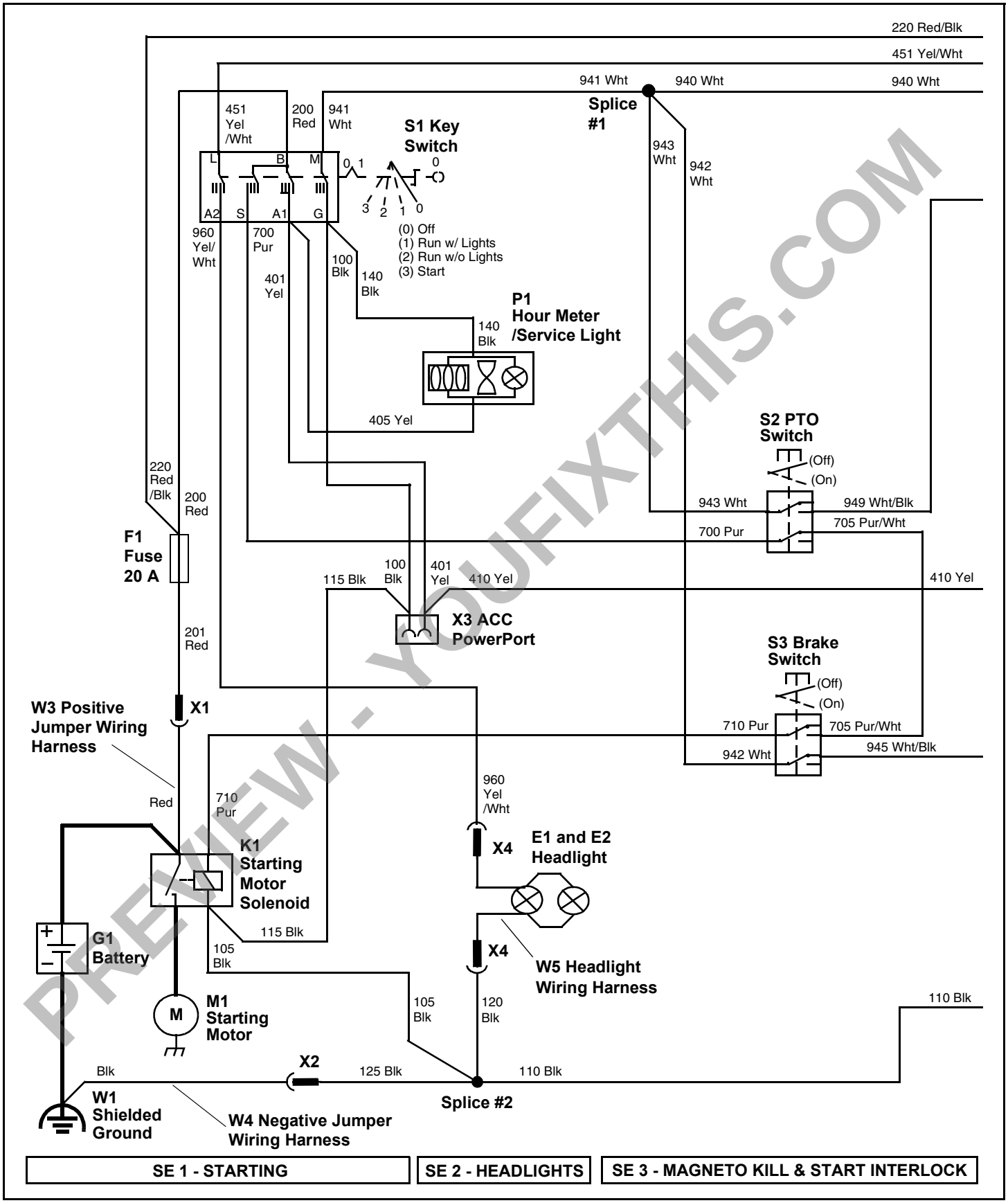
MIF

A - Belt Guide
B - Clutch Rod
C - Washer
D - Pin
E - Bolt
F - Idler Arm
G - Extension Spring
H - E-Ring
I - Transaxle Spindle
J - Drive Belt
K - Shaft
L - Lock Nut
M - Belt Guide
N - Jacksheave
O - Flat Idler
P - Bushing
Q - Lock Nut
R - V-Idler)

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Main Electrical Schematic



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Troubleshooting

Troubleshooting Table

Problem or Symptom	Possible Cause
Belt Jumping Off or Slapping	Belt sheaves, idlers, and guides loose, out of adjustment, worn, or damaged–tighten, replace, or adjust properly. Belt worn, frayed, glazed, or stretched–replace belt. Clutch/brake pedal linkage out of adjustment–adjust properly. Clutch/brake components worn, bent, or broken–replace and adjust properly. Internal components worn, stripped, or broken–replace transaxle. Transaxle case halves worn or broken–replace transaxle. Incorrect type or volume of lubricant used–replace with correct type and volume.
Lack of Drive in One or Both Directions	Belt sheaves, idlers, and guides loose, out of adjustment, worn, or damaged–tighten, replace, or adjust properly. Belt worn, frayed, glazed, or stretched–replace belt. Clutch/brake pedal linkage out of adjustment–adjust properly. Clutch/brake components worn, bent, or broken–replace and adjust properly. Input sheave or axle keys or keyways worn or damaged–replace keys; if keyways are worn, replace transaxle. Internal components worn, stripped, or broken–replace transaxle. Transaxle case halves worn or broken–replace transaxle. Incorrect type or volume of lubricant used–replace with correct type and volume. Intermediate shifter/brake shaft or axle seals worn or damaged–replace transaxle. Transaxle cap screws loose or case holes stripped–tighten cap screws or replace transaxle.

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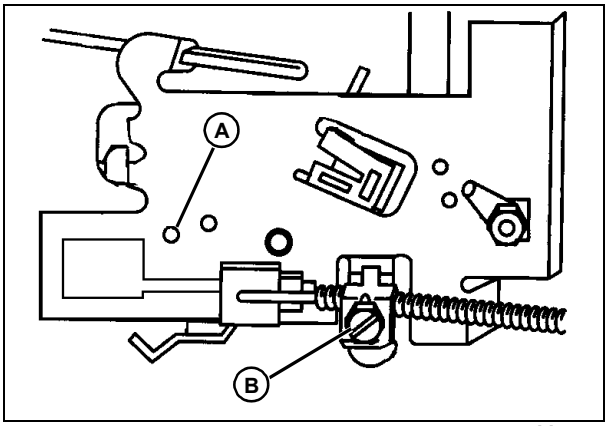
Tests and Adjustments

Throttle Cable Adjustment

Reason:

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

Procedure:



M95232

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

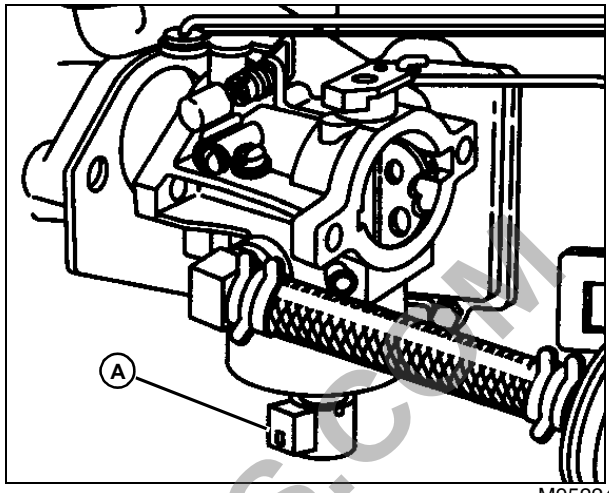
To test proper operation of fuel shutoff solenoid.

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 equipment 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 now 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 causing 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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Piston Pin OD:
New . . . . . **18.994 – 19.000 mm (0.7478 – 0.7480 in.)**
Minimum . . . . . **18.994 mm (0.7478 in.)**
Top Compression Ring-To-Groove Side Clearance: . . . . . **0.040 – 0.105 mm (0.0016 – 0.0041 in.)**
Middle Compression Ring-To-Groove Side Clearance: . . . . . **0.040 – 0.072 mm (0.0016 – 0.0028 in.)**
Oil Control Ring-To-Groove Side Clearance: . . . . . **0.551 – 0.675 mm (0.0217 – 0.0266 in.)**
Top and Center Compression Ring End Gap:
New Bore: . . . . . **0.3 – 0.5 mm (0.012 – 0.020 in.)**
Used Bore (Maximum): . . . . . **0.77 mm (0.030 in.)**
Piston Thrust Face OD:
New: . . . . . **86.942 – 86.959 mm (3.4229 – 3.4236 in.)**
Minimum: . . . . . **86.815 mm (3.4179 in.)**
Piston Thrust Face-To-Cylinder Bore Clearance:
New: . . . . . **0.055 – 0.063 mm (0.0020 – 0.0030 in.)**

Connecting Rod:

Crankshaft (Big End) Clearance:
New . . . . . **0.030 – 0.055 mm (0.0012 – 0.0022 in.)**
Maximum . . . . . **0.07 mm (0.0025 in.)**
Side . . . . . **0.18 – 0.41 mm (0.007 – 0.016 in.)**
Piston Pin Clearance . . . . . **0.015 – 0.028 mm (0.0006 – 0.0011 in.)**
Piston Pin End ID:
New . . . . . **19.015 – 19.023 mm (0.7486 – 0.7489 in.)**
Maximum . . . . . **19.036 mm (0.7495 in.)**

Governor:

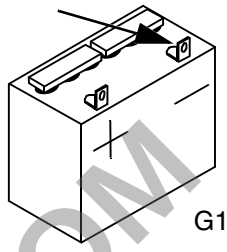
Crankcase Control Arm Bore ID:
New . . . . . **6.025 – 6.050 mm (0.2372 – 0.2382 in.)**
Maximum . . . . . **6.063 mm (0.2387 in.)**
Control Arm OD:
New . . . . . **5.974 – 6.000 mm (0.2352 – 0.2362 in.)**
Minimum . . . . . **5.962 mm (0.2347 in.)**
Crankcase Bore-To-Control Arm Clearance: . . . . . **0.025 – 0.075 mm (0.0010 – 0.0030 in.)**
Gear Shaft OD:
New . . . . . **5.990 – 6.000 mm (0.2358 – 0.2362 in.)**
Minimum . . . . . **5.977 mm (0.2353 in.)**
Gear Shaft-To- Gear Bore Clearance:
New . . . . . **0.015 – 0.140 mm (0.0006 – 0.0055 in.)**

Torque Specifications (Alphabetical)

Air Cleaner Base Nut . . . . . **10 N•m (89 lb-in.)**
Cylinder Head Cap Screw . . . . . **41 N•m (30 lb-ft)**
Connecting Rod Cap Screws:
8 mm Straight Shank Bolt . . . . . **22 N•m (200 lb-in.)**
Step Down Shank Bolt . . . . . **14 N•m (124 lb-in.)**
6 mm Straight Shank Bolt . . . . . **11 N•m (100 lb-in.)**

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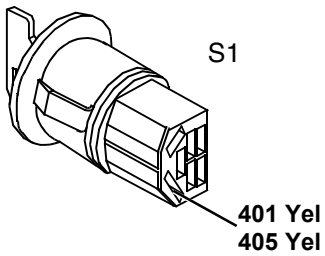
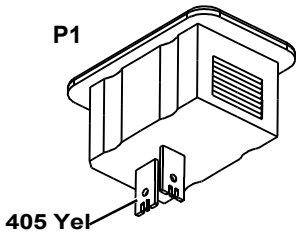
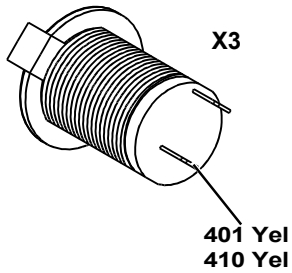
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Test Point/Procedure	Results	
Step (5) (G1) battery negative post to ground cable frame connection, test resistance.	**Less than 0.1 ohm resistance. Go To Step (1) of Test Procedure B.** • Check and clean negative battery terminal and retest. Less than 0.1 ohm resistance. **Go To Step (1)** of next Procedure. • More than 0.1 ohm resistance, check and clean harness wires and connections to frame and retest. Less than 0.1 ohm resistance. **Go To Step (1)** of next Procedure.	 MIF

Test Procedure B

Test Conditions:

- Key switch in RUN position.
- Engine OFF
- PTO in OFF position.
- Park brake engaged.

Test Point/Procedure	Results	
Step (1) (S1) Key switch at 401, 405 Yel wires, test voltage.	**Battery voltage. Go To Step (2)** • Less than battery voltage, replace key switch. **Go To Step (2)**	 MIF
Step (2) (P1) Hourmeter at 405 Yel wire, test voltage.	**Battery voltage. Go To Step (3)** • Less than battery voltage, check 405 Yel wire and connections and retest. Battery voltage. **Go To Step (3)**	 MIF
Step (3) (X3) ACC power port at 401 and 410 Yel wires, test voltage.	**Battery voltage. Go To Step (4)** • Less than battery voltage, check 401 Yel wire and connections and retest. Battery voltage. **Go To Step (4)**	 MIF

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Theory of Operation:

When the brake pedal is depressed, the compression spring in the brake assembly is compressed, and the idler arm assembly is rotated, removing tension from the traction drive belt. The brake assembly pulls on a lever on the transaxle. The transaxle brake lever actuates a wet disk brake inside the transaxle which is attached to the hydrostatic motor, which is linked to the axle shafts through a reduction gear and differential assembly.

Hydrostatic Transmission

Test Conditions:

- Tractor on level surface
- Engine OFF
- Front wheels blocked
- Rear wheels raised off surface with axle housings on jack stands

Diagnostics

Test/Check Point	Normal Condition	If Not Normal
Fan	Fan in good condition and tight	Replace snap ring and/or splined collar
Drive belt	Belt in good condition, not glazed, split, unraveled, or stretched	Replace drive belt
Idler Tensioning spring	Tensioning spring installed and not damaged	Install spring Repair or replace
Sheaves and idlers, belt traction drive system	Drive sheaves and idlers in good condition and adjusted properly Belt not slipping, squealing, or vibrating excessively	Adjust idler assembly Repair or replace Check belt condition, check adjustment and condition of idlers and guides. Adjust, repair or replace components as needed
Hydro housing exterior	No cracks, leaks, or loose hardware	Tighten hardware Replace transaxle Replace any damaged components
Axles	Axles straight	Replace transaxle as needed
Wheels and tires	Air pressure equal in driving tires Driving tires have same circumference Wheels not bent or out of round	Adjust air pressure Match tires for same circumference Repair or replace wheels as necessary
Axles, wheels, and tires	Axles, wheels, and tires in good shape and functioning properly	Check axles and wheel for straightness, check condition of keys and keyways, washers, and snap rings. Check tires for tread wear and proper inflation. Repair or replace components as needed
Engine performance	Engine running smoothly throughout throttle range	Adjust, tune, or repair engine

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