

S2048, S2348 and S2554
SCOTTS YARD AND GARDEN TRACTORS

TECHNICAL MANUAL

TM1777 (24Feb00)
Replaces TM1777 (10Mar99)

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
- Component Location
- System Schematic
- Theory of Operation
- Troubleshooting Chart
- Diagnostics
- Tests & Adjustments
- Repair

Note: 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. If you find any errors, or want to comment on the layout of the manual, please mail your comments back to us.

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

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Safety



Specifications and Information



Engine – 20, 23 & 25 HP



Electrical System



Hydrostatic Power Train



Steering



Brakes



Attachments



Miscellaneous





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.

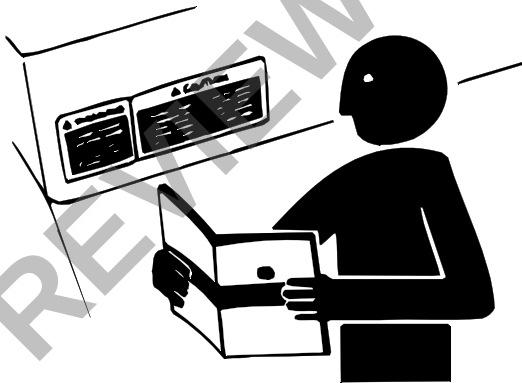
Follow recommended precautions and safe servicing practices.

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.

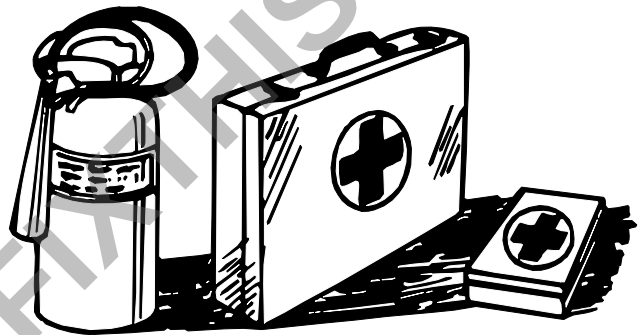
REPLACE SAFETY SIGNS



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

HANDLE FLUIDS SAFELY-AVOID FIRES

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.

SPECIFICATIONS

ENGINE (2048)

Engine	Kohler
Model Number	CV20S
Horsepower	14.9 kW (20 hp)
Displacement	624 cm ³ (38.1 cu.in.)
Oil Capacity	
w/o oil filter	1.65 L (1.7 qt.)
w/ oil filter	2.0 L (2.1 qt.)
Cylinders	2
Stroke/Cycle	4
Valves	Overhead Valves
Lubrication	Fully Pressurized
Oil Filter	Single Element, Full Flow, Spin-On Filter
Cooling System	Air Cooled
Air Cleaner	Dual Stage
Muffler	Horizontal Discharge Below Frame

ENGINE (2348)

Model Number	CV23S
Horsepower	17.15 kW (23 hp)
Displacement	674 cm ³ (41.1 cu.in.)
Bore	80 mm (3.15 in.)
Stroke	67 mm (2.64 in.)
Oil Capacity	
w/o oil filter	1.65 L (1.7 qt.)
w/ oil filter	2.0 L (2.1 qt.)
Cylinders	2
Stroke/Cycle	4
Valves	Overhead Valves
Lubrication	Fully Pressurized
Oil Filter	Single Element, Full Flow, Spin-On Filter
Cooling System	Air Cooled
Air Cleaner	Dual Stage
Muffler	Horizontal Discharge Below Frame

ENGINE (2554)

Engine	Kohler
Model Number	CV25S
Horsepower	18.6 kW (25 hp)
Displacement	725 cm ³ (44.0 cu.in.)
Oil Capacity	
w/o oil filter	1.65 L (1.7 qt.)
w/ oil filter	2.0 L (2.1 qt.)
Cylinders	2
Stroke/Cycle	4
Valves	Overhead Valves
Lubrication	Fully Pressurized
Oil Filter	Single Element, Full Flow, Spin-On Filter
Cooling System	Air Cooled
Air Cleaner	Dual Stage
Muffler	Horizontal Discharge Below Frame



INCH TORQUE VALUES

<div>  </div>	<div> <div>SAE Grade and Head Markings</div> <div> <div>1 or 2^b</div> <div>No Marks</div> <div></div> </div> </div>	<div> <div>5 5.1 5.2</div> <div></div> </div>	<div> <div>8 8.2</div> <div></div> </div>
	<div> <div>SAE Grade and Nut Markings</div> <div> <div>2</div> <div>No Marks</div> <div></div> </div> </div>	<div> <div>5</div> <div></div> <div></div> </div>	<div> <div>8</div> <div></div> <div></div> </div>

Size	Grade 1				Grade 2 ^b				Grade 5, 5.1 or 5.2				Grade 8 or 8.2			
	Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a		Lubricated ^a		Dry ^a	
	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft	Nm	lb-ft
1/4	3.8	2.8	4.7	3.5	6	4.4	7.5	5.5	9.5	7	12	9	13.5	10	17	12.5
5/16	7.7	5.7	9.8	7.2	12	9	15.5	11.5	19.5	14.5	25	18.5	28	20.5	35	26
3/8	13.5	10	17.5	13	22	16	27.5	20	35	26	44	32.5	49	36	63	46
7/16	22	16	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
1/2	34	25	42	31	53	39	67	49	85	63	110	80	120	88	155	115
9/16	48	35.5	60	45	76	56	95	70	125	92	155	115	175	130	220	165
5/8	67	49	85	63	105	77	135	100	170	125	215	160	240	175	305	225
3/4	120	88	150	110	190	140	240	175	300	220	380	280	425	315	540	400
7/8	190	140	240	175	190	140	240	175	490	360	615	455	690	510	870	640
1	285	210	360	265	285	210	360	265	730	540	920	680	1030	760	1300	960
1-1/8	400	300	510	375	400	300	510	375	910	670	1150	850	1450	1075	1850	1350
1-1/4	570	420	725	535	570	420	725	535	1280	945	1630	1200	2050	1500	2600	1920
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2140	1580	2700	2000	3400	2500
1-1/2	990	730	1250	930	990	730	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

DO NOT use these values if a different torque value or tightening procedure is given for a specific application. Torque values listed are for general use only. Check tightness of fasteners periodically.

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

Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.

Make sure fasteners threads are clean and that you properly start thread engagement. This will prevent them from failing when tightening.

Tighten plastic insert or crimped steel-type lock nuts to approximately 50 percent of the dry torque shown in the chart, applied to the nut, not to the bolt head.

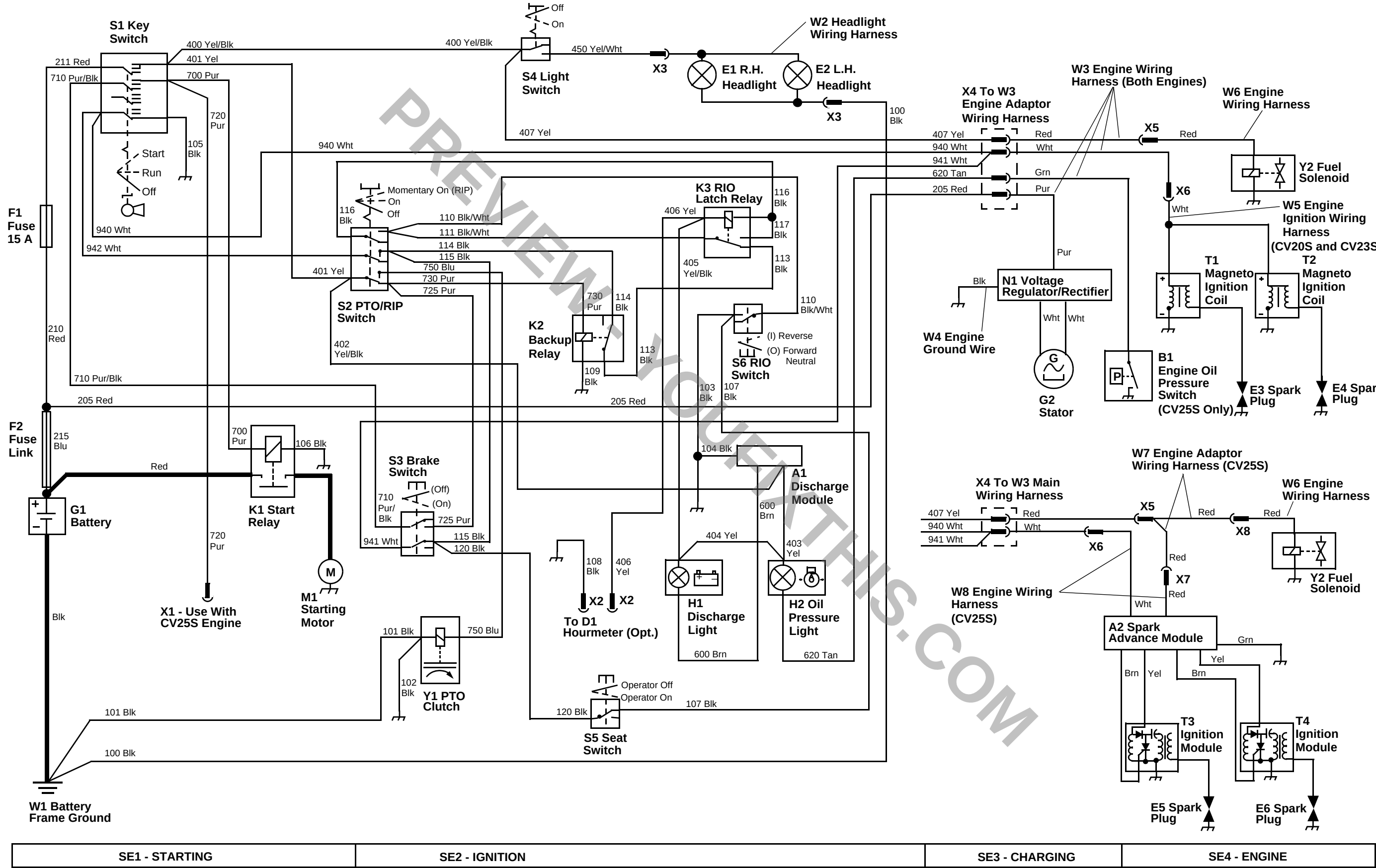
Tighten toothed or serrated-type lock nuts to the full torque value.

^a "Lubricated" means coated with a lubricant such as engine oil, or fasteners with phosphate and oil coatings.

"Dry" means plain or zinc plated without any lubrication.

^b Grade 2 applies for hex cap screws (not hex bolts) up to 152 mm (6 in.) long. Grade 1 applies for hex cap screws over 152 mm (6 in.) long, and for all other types of bolts and screws of any length.

ELECTRICAL SCHEMATIC



ENGINE TROUBLESHOOTING CHART



<div> <div>Problem or Symptom</div> <div>Check or Solution</div> </div>	Engine cranks but will not start	Engine won't stay running or runs rough	Engine stalls frequently	Engine backfires	Engine surges—has uneven rpm	Engine misses	Engine has low power under load	Engine has no spark	Exhaust smoke black, engine floods	Exhaust smoke blue or uses oil	Engine overheats	Excessive engine noise or vibration
Spark Plug Fouled, Or Gap Not Correct. Wrong Spark Plug	●	●	●	●		●	●				●	
Spark Advance Module Ground Wire Shorted To Ground	●	●	●	●	●	●	●	●				
Low Voltage Supply to Spark Advance Module	●	●	●			●	●	●				
Ignition Module Bad	●	●	●	●	●	●	●	●				
Tank Outlet Screen or Fuel Line Restricted. Fuel Stale, Contains Water, or Wrong Type	●	●	●	●	●	●	●				●	
Air filter element plugged, oil soaked, or restricted	●	●	●		●	●	●		●	●		●
Choke, or Governor Linkage Worn or out of adjustment	●	●	●		●	●	●		●		●	●
Carburetor Dirty or Shafts Worn	●	●	●	●	●		●		●		●	●
Carburetor, Intake Manifold, or Cylinder Head Gaskets Leaking	●	●	●	●	●	●	●				●	●
Low Compression from Worn Piston, Rings, Cylinder, Valves or Warped Head	●	●	●		●	●	●				●	●
Valve Clearance Incorrect. Burned or Warped Valves and Seats. Defective Springs	●	●	●	●	●	●	●		●		●	●
Engine Oil Type or Level Wrong	●						●			●	●	●
Engine Gaskets or Seals Leaking	●	●	●	●	●	●	●			●	●	
Crankcase Breather Restricted, Reed Valve Damaged, Clearance Incorrect, or Drain Hole Plugged					●	●	●			●		●
Valve Guides or Stems Worn				●		●				●	●	
Worn, Stuck, Broken Piston Rings. Cylinder Worn. Check Compression and Vacuum	●	●	●	●	●	●	●		●	●	●	●
Connecting Rod/Crankshaft Worn												●
Engine Mounting Hardware Loose, Broken, or Missing												●

TESTS AND ADJUSTMENTS

GOVERNOR ADJUSTMENT

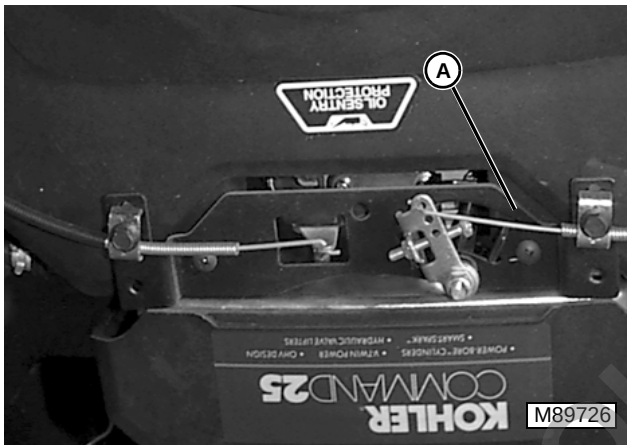
Reason:

To make sure the governor is operating correctly.

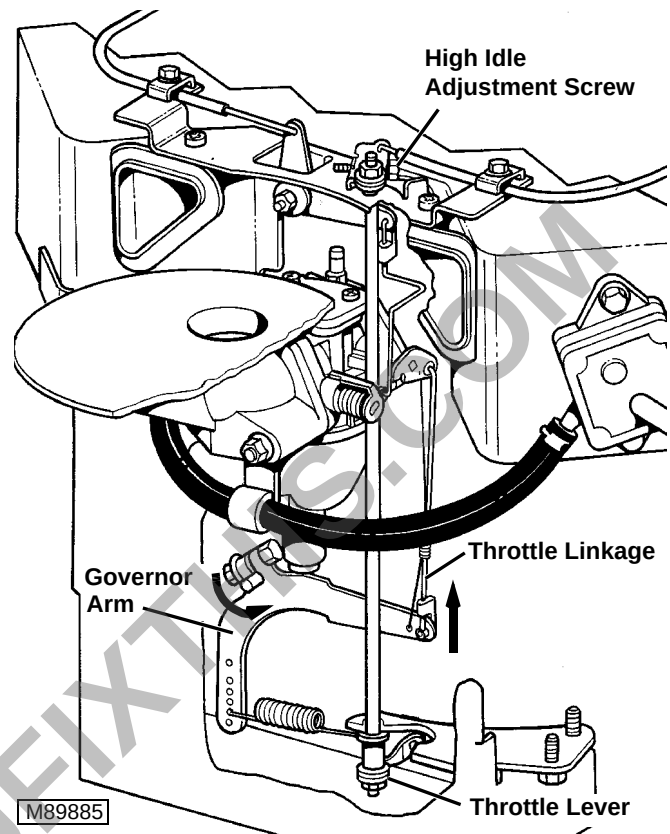
Initial Adjustment:



1. Park tractor and engage parking brake.
2. Disconnect headlight wiring harness and remove hood.



3. Loosen the throttle cable clamp (A) enough to allow the throttle cable to slide freely through the clamp.
4. Move throttle control lever, on the operators control panel, to FAST idle position. A solid "detent" should be felt to assure that the control lever is in the FAST idle position.
5. Rotate fast idle control arm until fast idle screw head contacts fast idle stop. Clamp throttle cable in this position.



6. Make sure the throttle linkage is connected to the governor arm and the throttle lever on the carburetor.
7. Loosen the nut holding the governor arm to the governor shaft. Move the governor arm towards the carburetor as far as it will move and hold.
8. Insert a pin or small punch into the hole on the governor shaft and rotate the shaft counterclockwise as far as it will turn, then tighten nut. Remove the pin or punch.
9. Replace air filter backing plate.

**CAUTION**

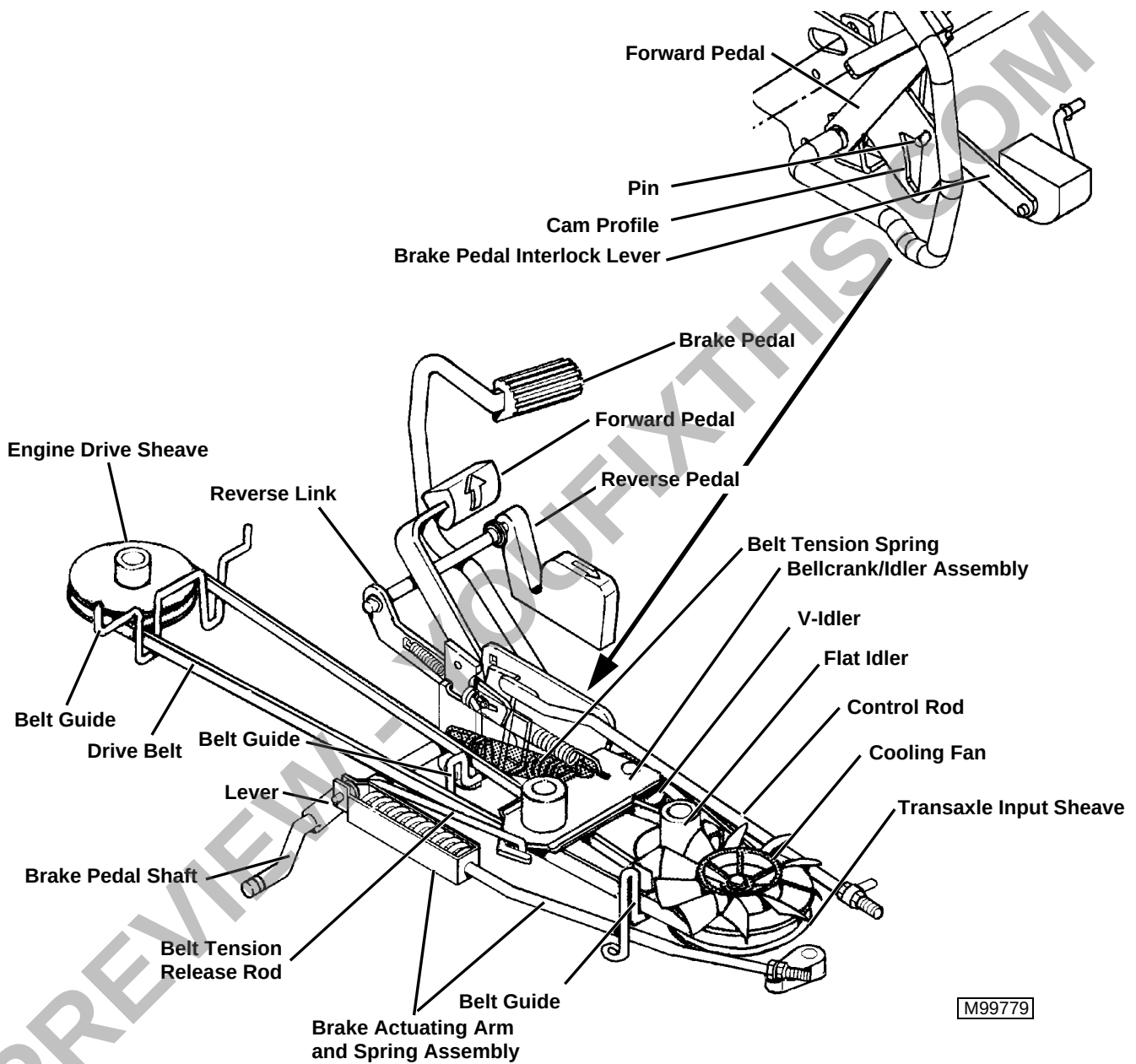
DO NOT run engine without replacing air filter backing plate, or using nuts to secure carburetor to manifold!

10. Start engine and use fast idle screw to adjust fast idle to specification.

Specification:

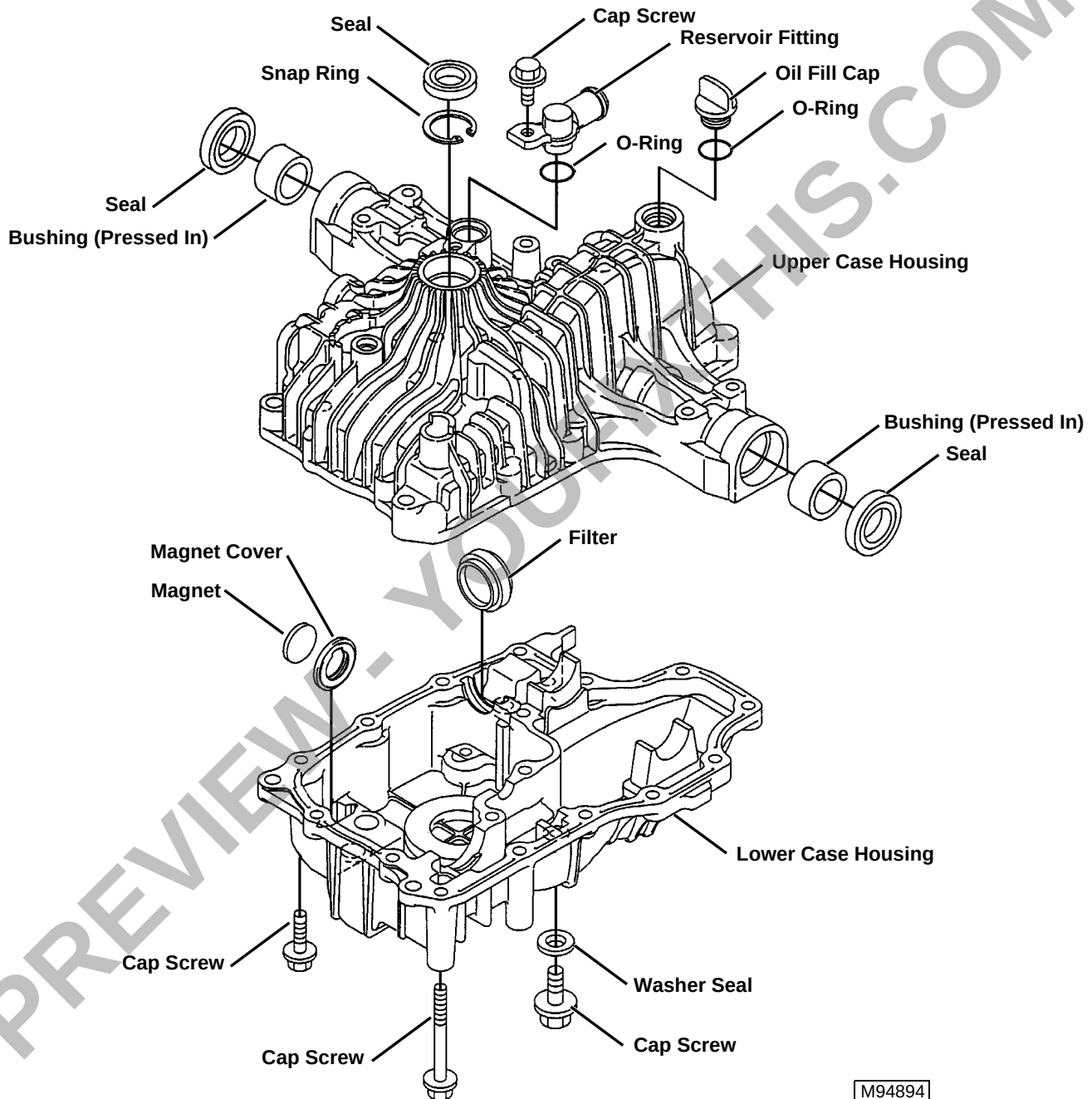
All Engines 3350 $\pm$ 75 rpm

11. Perform sensitivity adjustment.

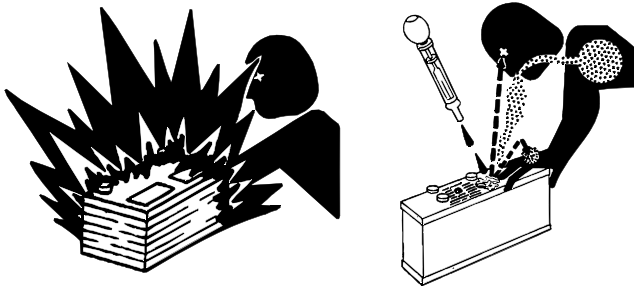


COMPONENT LOCATION

TRANSAXLE CASE HALVES (K62 & K66)



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).

Prevent Acid Burns

- Sulfuric acid in battery electrolyte is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed into eyes.
- **Avoid acid burns by:**
 1. Filling batteries in a well-ventilated area.
 2. Wearing eye protection and rubber gloves.
 3. Avoiding breathing fumes when electrolyte is added.
 4. Avoiding spilling or dripping electrolyte.
 5. Use proper jump start procedure.
- **If you spill acid on yourself:**
 1. Flush your skin with water.
 2. Apply baking soda or lime to help neutralize the acid.
 3. Flush your eyes with water for 10_15 minutes.
 4. Get medical attention immediately.
- **If acid is swallowed:**
 1. Drink large amounts of water or milk.
 2. Then drink milk of magnesia, beaten eggs, or vegetable oil.
 3. Get medical attention immediately.

USE SAFE SERVICE PROCEDURES

Wear Protective Clothing

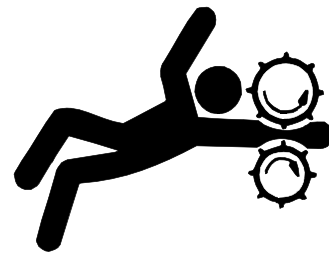


Wear close fitting clothing and safety equipment appropriate to the job.

Prolonged exposure to loud noise can cause impairment or loss of hearing. Wear a suitable hearing protective device such as earmuffs or earplugs to protect against objectionable or uncomfortable loud noises.

Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating machine.

Service Machines Safely



Tie long hair behind your head. Do not wear a necktie, scarf, loose clothing, or necklace when you work near machine tools or moving parts. If these items were to get caught, severe injury could result.

Remove rings and other jewelry to prevent electrical shorts and entanglement in moving parts.

Use Proper Tools

Use tools appropriate to the work. Makeshift tools and procedures can create safety hazards. Use power tools only to loosen threaded parts and fasteners. For loosening and tightening hardware, use the correct size tools. **DO NOT** use U.S. measurement tools on metric fasteners. Avoid bodily injury caused by slipping wrenches. Use only service parts meeting John Deere specifications.

STATOR OUTPUT TEST

Reason:

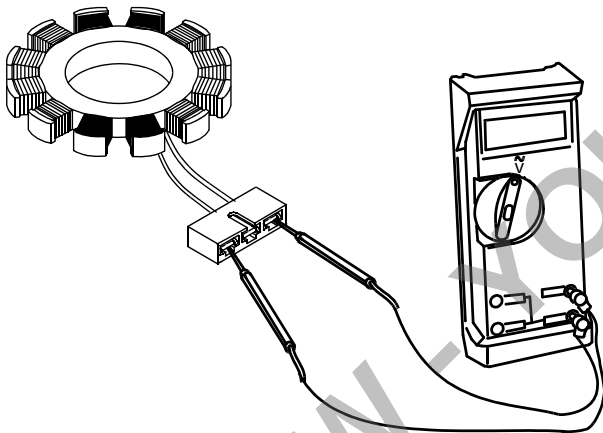
To measure AC voltage output of stator and verify correct resistance of stator.

Equipment:

- Fluke Multi-Meter (Set to AC volt scale)

Procedure:

1. Park machine on level surface.
2. Turn key switch to OFF position.
3. Move Forward/Reverse pedals to NEUTRAL position.
4. Engage park brake.
5. Raise hood.
6. Set meter to 50 VAC or Autorange scale.
7. Disconnect regulator/rectifier connector.



8. Start and run at **fast idle (3350 ± 75 RPM)**.
9. Measure stator voltage. Voltage should read a **minimum of 28 volts AC**.

Results:

- If voltage is less than specification, test stator with an ohmmeter.

10. Stop engine.
11. Change meter to ohms scale.
12. Measure resistance across stator leads. Resistance should read **0.1 to 0.2 ohms**.

Results:

- If resistance is infinite ohms, stator is open. Replace stator.

13. Measure resistance from each stator lead to ground. Resistance should read **infinite ohms**.

Results:

- If resistance (or continuity) is measured, stator leads are shorted to ground. Replace stator.

VOLTAGE REGULATOR/RECTIFIER TEST

Reason:

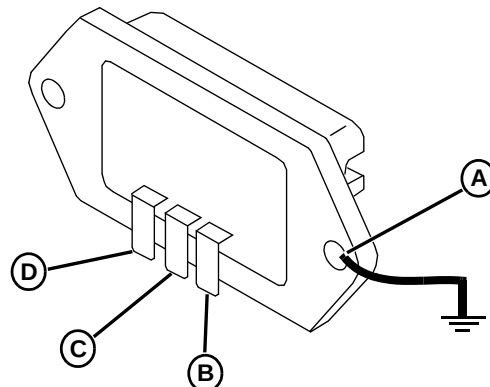
To verify proper operation capability of the voltage regulator/rectifier.

Equipment:

- Fluke Multi-Meter (Set to Ohms scale)

Procedure:

1. Park machine on level surface.
2. Turn key switch to OFF position.
3. Move Forward/Reverse pedals to NEUTRAL position.
4. Engage park brake.
5. Raise hood.



6. Disconnect stator connector from the voltage regulator/rectifier.
7. Set the multi-Meter to the Ohms scale.
8. Measure resistance between each point as shown in the chart. If resistance is not within specification, replace voltage regulator/rectifier.

	+	A	B	C	D
A			8 - 9 m	8 - 9 m	31.2 m
B		OL		0.2	OL
C		OL	0.2		OL
D		31.2 m	8 - 9 m	8 - 9 m	

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