SABRE YARD & GARDEN TRACTORS
1948GV/HV, 2148HV, 2354HV, 2554HV

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TECHNICAL MANUAL

John Deere
Worldwide Commercial and
Consumer Equipment Division

TM1841 (03Mar00)

Litho in U.S.A

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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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Horicon, WI
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Safety

Specifications and Information

Engines

Electrical System

Gear Power Train

Hydrostatic Power Train

Steering

Brakes

Attachments

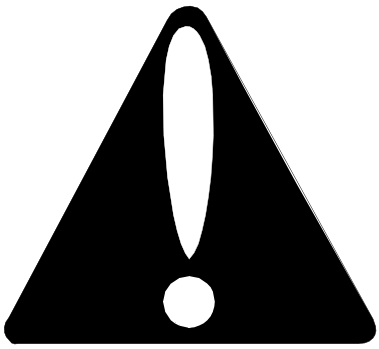
Miscellaneous M

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SAFETY

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.

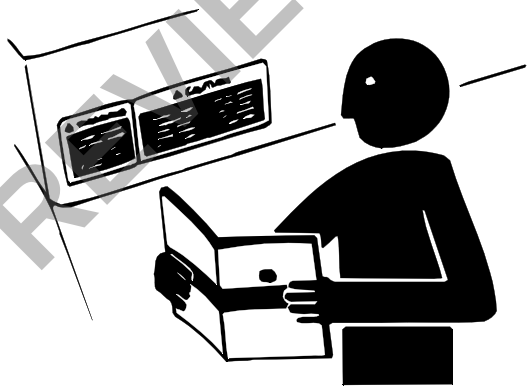
Follow recommended precautions and safe servicing practices.

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.

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SPECIFICATIONS

Engine (CV19 / CV21 / CV23)

Engine	Kohler
Model Number	CV19 / CV21 / CV23
Horsepower	
CV19	14.17 kW (19 hp)
CV21	15.66 kW (21 hp)
CV23	17.15 kW (23 hp)
Displacement	
CV19/CV21	624 cm^3 (38.1 cu.in.)
CV23	677 cm^3 (41.3 cu.in.)
Oil Capacity (w/ oil filter)	1.9 L (2.0 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 (CV25)

Engine	Kohler
Model Number	CV25
Horsepower	18.6 kW (25 hp)
Displacement	725 cm^3 (44.0 cu.in.)
Oil Capacity (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

Fuel System

Aspiration	Natural
Fuel Tank Location	Rear
Fuel Tank Capacity	11 L (3 U.S. gal)
Fuel (minimum octane)	Unleaded Gasoline, 87 Octane
Fuel Delivery	Float-Type Side Draft Carburetor
Fuel Filter	Replaceable In-Line

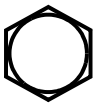
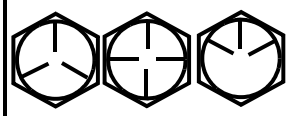
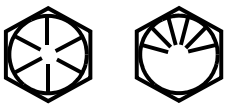
Electrical

Ignition	Electronic Capacitor Discharge Ignition (CDI)
Type of Starter	Solenoid Shift
Charging System	Flywheel Alternator
Battery Type	BCI Group, U1
Battery Voltage	12 V
Battery Reserve Capacity at 25 Amp	38 minutes
Battery Cold Cranking Amps at -18°C (0°F)	295 amps

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INCH TORQUE VALUES

SAE Grade and Head Markings	**No Marks** 		
SAE Grade and Nut Markings	**No Marks** 		

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.*

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ENGINE TROUBLESHOOTING CHART

Problem or Symptom / Check or Solution	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												●

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TESTS AND ADJUSTMENTS

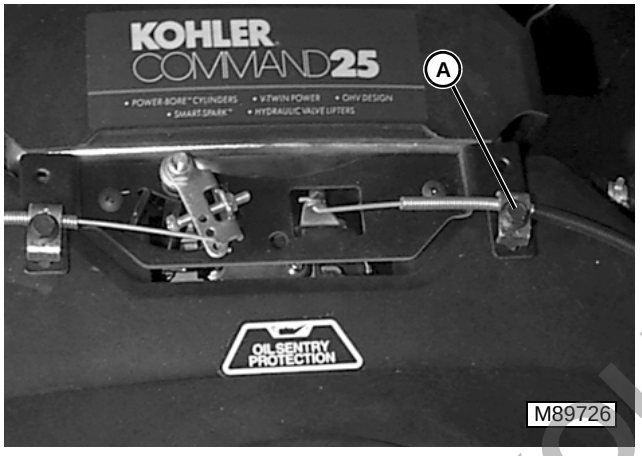
GOVERNOR ADJUSTMENT

Reason:

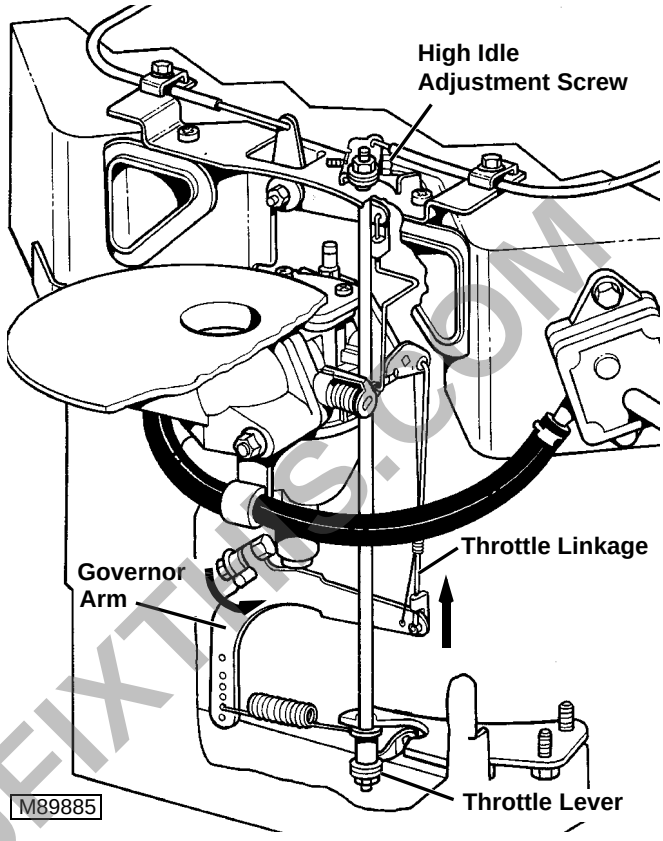
To make sure the governor is operating correctly.

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:

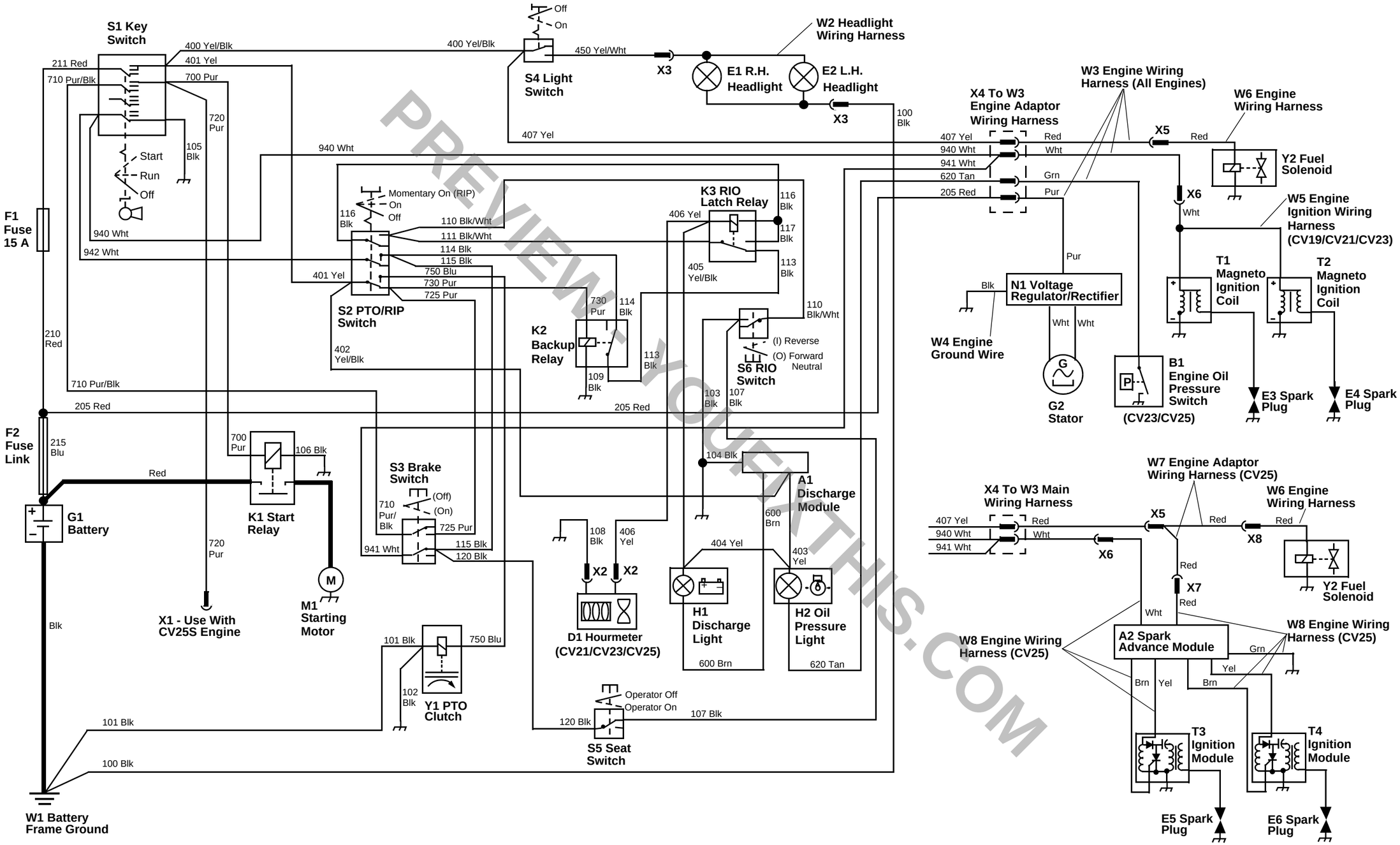
All Engines . . . . . 3350 ±75 rpm

11. Perform sensitivity adjustment.

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ELECTRICAL SCHEMATIC

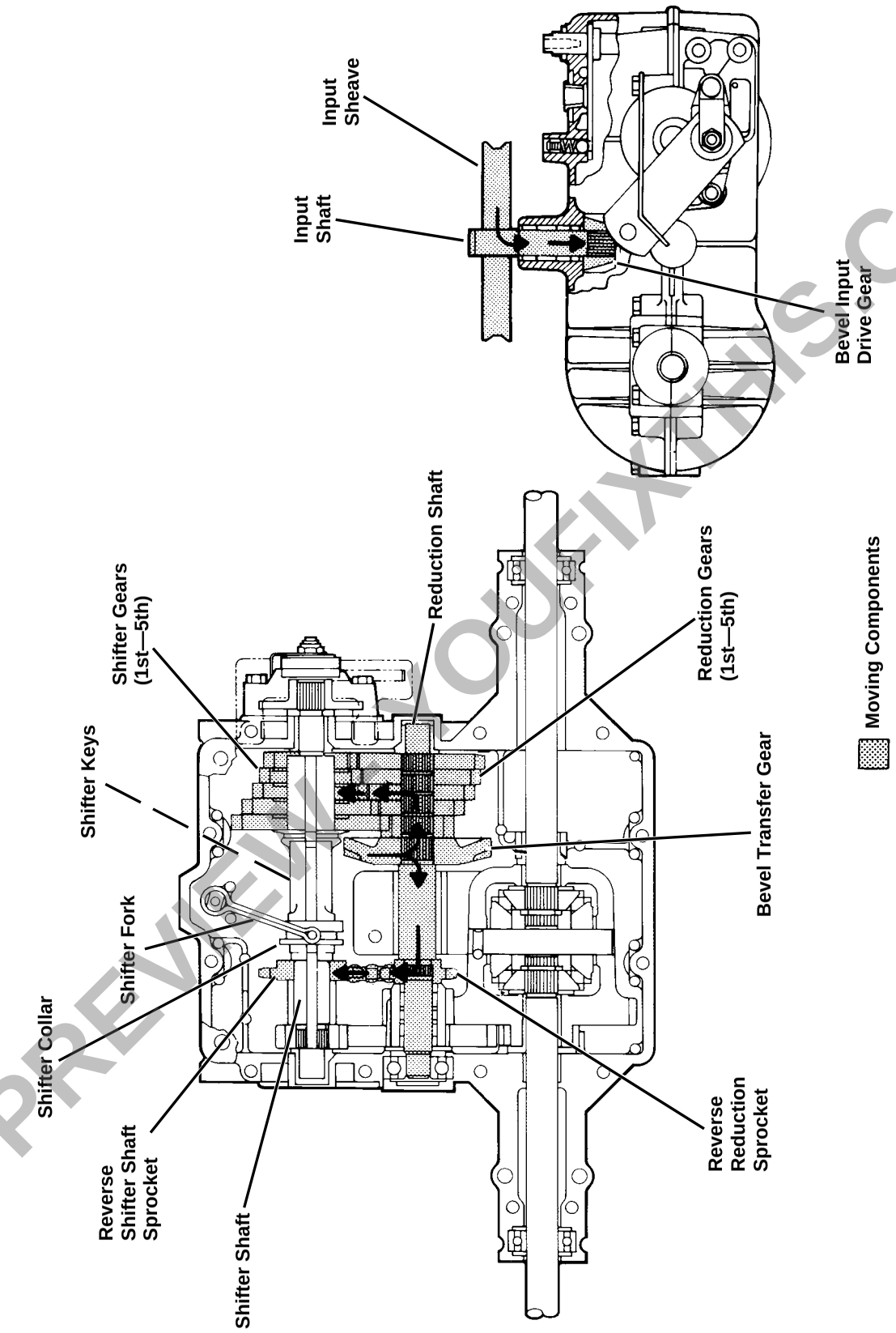


SE1 - STARTING	SE2 - IGNITION	SE3 - CHARGING	SE4 - ENGINE

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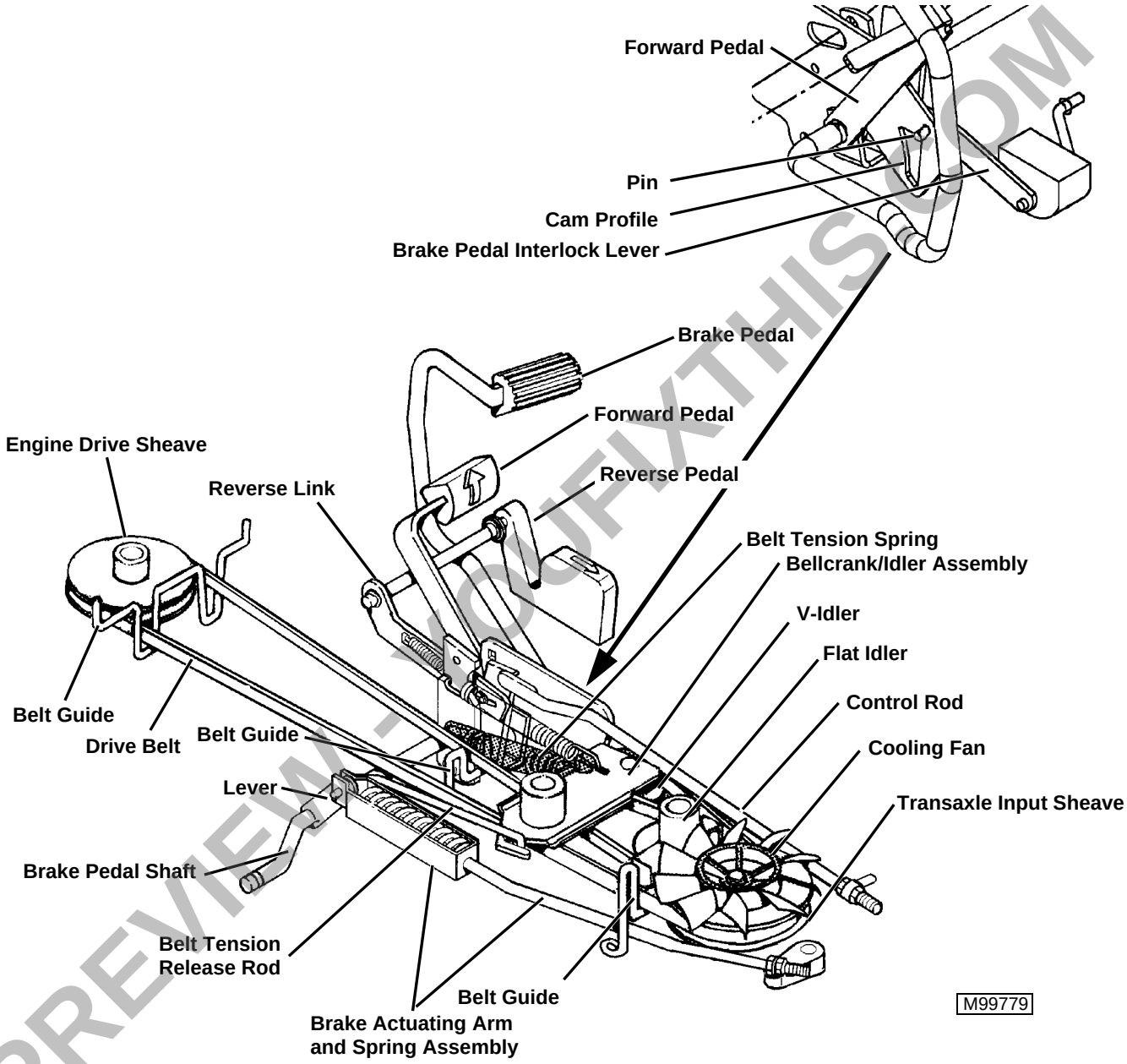
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A

Adjustments
- Attachments
  - Mower Gage Wheels Adjust 9-16
  - Mower Level Front-to-Rear 9-15
  - Mower Level Side-to-Side 9-14
- Brake Adjustment 8-11
- Gear Power Train
  - Gearshift Lever Neutral Adjustment 5-28
  - Traction Belt Tension Adjustment 5-28
- Hydrostatic Power Train
  - Pedal Height Adjustment 6-41
  - Traction Drive Belt Tension Adjustment . . 6-42
- Kohler Engine
  - Choke Adjustment 3-18
  - Crankcase Vacuum Test 3-22
  - Cylinder Compression Pressure Test . . . 3-20
  - Cylinder Leak Test 3-21
  - Engine Oil Pressure Test 3-24
  - Fast Idle Speed Adjustment 3-19
  - Fuel Pump Test 3-25
  - Fuel Shutoff Solenoid Test 3-22
  - Governor Adjustment 3-17
  - Magnets Test 3-27
  - Module Air Gap Adjustment 3-27
  - Slow Idle Speed Adjustment 3-20
  - Spark Plug Gap Adjustment 3-26
  - Spark Test 3-25
- Steering Drag Link Adjustment 7-7

Attachments
- 48/54-Inch Mower Deck Components 9-4
- Adjustment Specifications 9-3
- Adjustments 9-14
- Balancing Mower Blades 9-17
- Cross Section 48/54-Inch Deck 9-20
- Cuts Unevenly 9-13
- Diagnosis 9-9
- Draft Arms Component Location 9-5
- Gauge Wheels Component Location 9-6
- Idlers and Sheaves 48/54-Inch 9-7
- Mower Blades Removal/Installation 9-16
- Mower Deck
  - Deck Vibrates 9-12
  - Removal/Installation 9-18
  - Will Not Run 9-11
- Mower Deck Troubleshooting Chart 9-8
- Mower Drive Checks 9-9
- Mower Gage Wheels Adjust 9-16
- Mower Level Front-to-Rear 9-15
- Mower Level Side-to-Side 9-14
- Repair 9-16
- Repair Specifications 9-3
- Service Parts Kits 9-3
- Sharpen Mower Blades 9-17
- Special or Essential Tools 9-3
- Specifications 9-3
- Spindles 48/54-Inch
  - Disassembly/Inspection 9-19
  - Removal/Installation 9-19
- Troubleshooting 9-8

B

Battery
- Charge 4-51
- Load Test 4-52
- Specifications 4-6
- Test 4-51

Belt Drive System Operation
- Gear Power Train 5-4

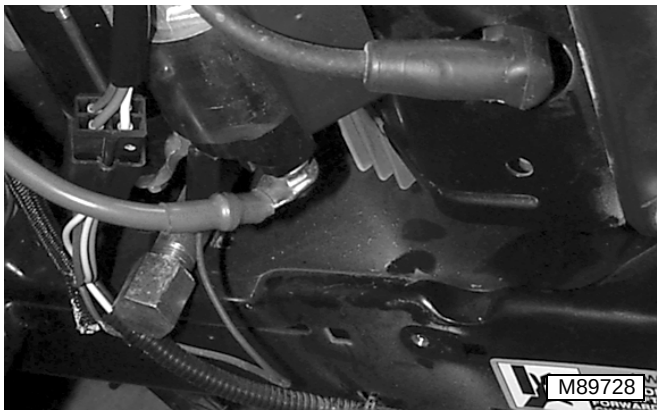
Brakes
- Adjustment Specifications 8-3
- Adjustments 8-11
- Brake Adjustment 8-11
- Brake Linkage 8-12
- Brake Pedal Assembly 8-12
- Brake System Operation 8-4
- Component Location and Operation 8-4
- Diagnosis 8-8
  - Brake Switch Does Not Engage 8-10
  - Brakes Do Not Engage 8-8
  - Machine is Slow in Reverse 8-10
  - Machine Will Not Move in Forward or Reverse or is Slow in Forward 8-9
  - Noisy Operation 8-9
  - Park Brake Does Not Hold On Slope 8-8
- Internal Brake Linkage Operation 8-6
- Other Materials 8-3
- Pedal and Linkage Adjustment 6-42
- Repair 8-12
- Repair Specifications 8-3
- Specifications 8-3
- Troubleshooting 8-7

C

Component Location
- Attachments

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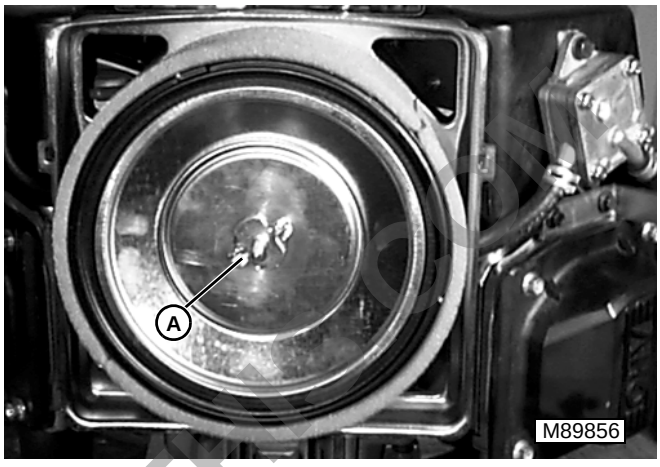
7. Connect engine electrical connector and starting motor wires.
8. Install front and side exhaust heat shields.



9. Connect throttle and choke controls.
10. Connect fuel line.
11. Connect battery negative (–) terminal.
12. Check engine oil and top off or fill if necessary.

AIR CLEANER REMOVAL AND INSTALLATION

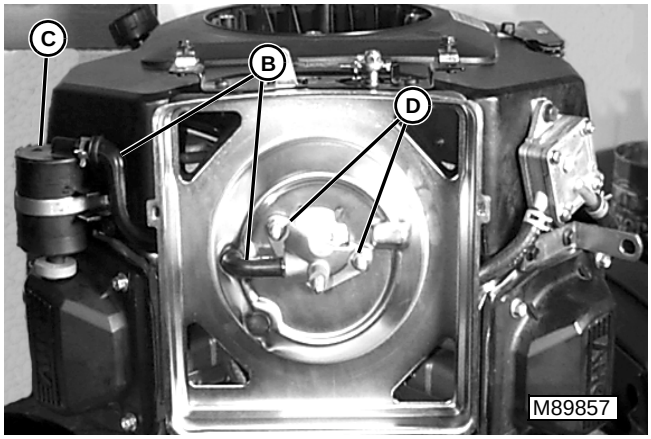
1. Remove the wing nut and the air cleaner cover.



2. Remove the wing nut (A) and the air cleaner element cover. Remove the air filter.
3. Remove the foam precleaner from the paper air filter element.

IMPORTANT: DO NOT use petroleum solvents, such as kerosene, to clean foam pre-cleaner. They may cause foam to deteriorate. DO NOT oil paper cartridge. DO NOT use pressurized air to clean or dry paper cartridge. If paper cartridge is excessively dirty replace with new cartridge.

4. Wash the precleaner in warm water with detergent. Rinse thoroughly, squeeze dry in a clean cloth.
5. Saturate the pre-cleaner with new engine oil. Squeeze in a clean absorbent cloth to remove excess oil.
6. Replace the paper element if it is dirty, damaged or bent.



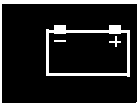
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Test Conditions:

- Key switch in RUN position
- Engine OFF

Test/Check Point	Normal	If Not Normal
10. PTO/RIP switch	Battery voltage	Check 401 Yel wire and connections.
11. Discharge module	Battery voltage	Check 402 Yel/Blk wire and connections.
12. Oil pressure light	Battery voltage	Check 403 Yel wire and connections.
13. Discharge light	Battery voltage	Check 404 Yel wire and connections.
14. Reverse Implement Option (RIO) Latch Relay	Battery voltage	Check 405 Yel/Blk wire and connections.
15. Hourmeter (If equipped)	Battery voltage	Check 406 Yel wire and connections.



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STATOR OUTPUT TEST

Reason:

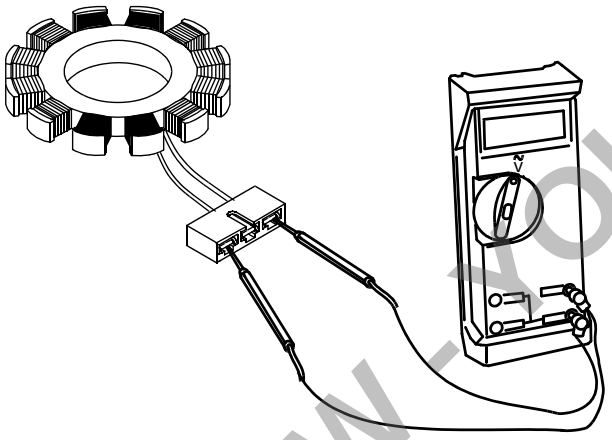
To measure AC voltage output of stator and verify correct resistance of stator.

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:

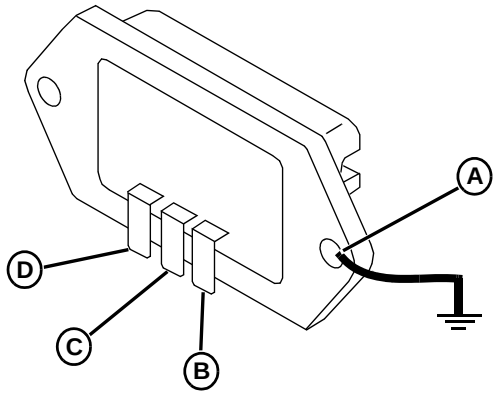
To verify proper operation capability of the voltage regulator/rectifier.

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.

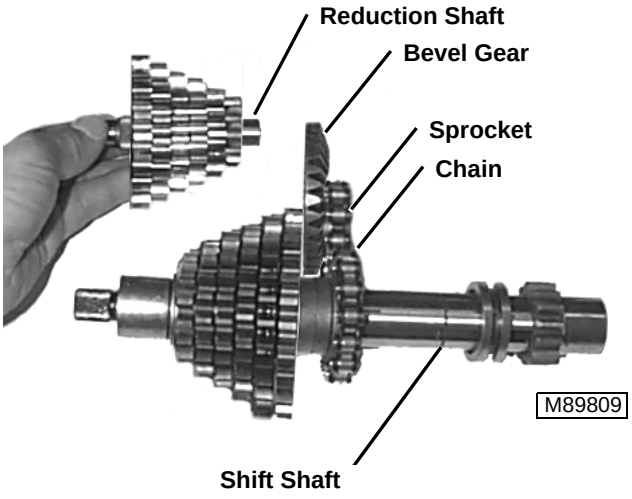


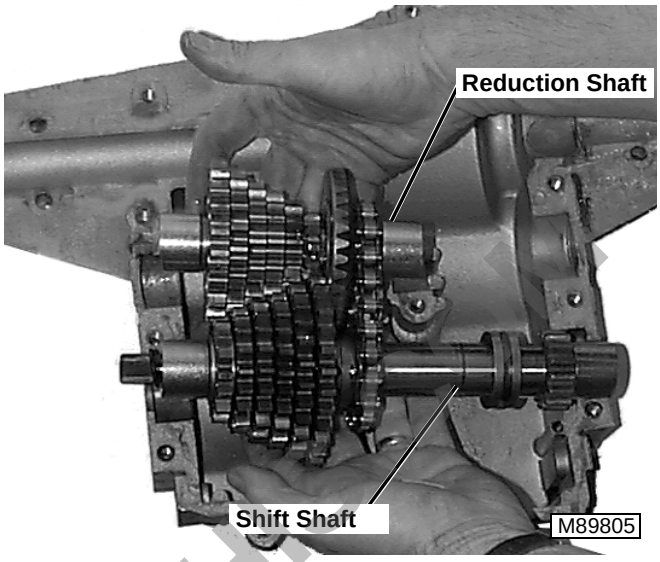
6. Disconnect stator connector from the voltage regulator/rectifier.
7. Set the multi-Meter to the Ohms scale.
8. Measure resistance between each point as shown in the chart. If resistance is not within specification, replace voltage regulator/rectifier.

— \ +	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	

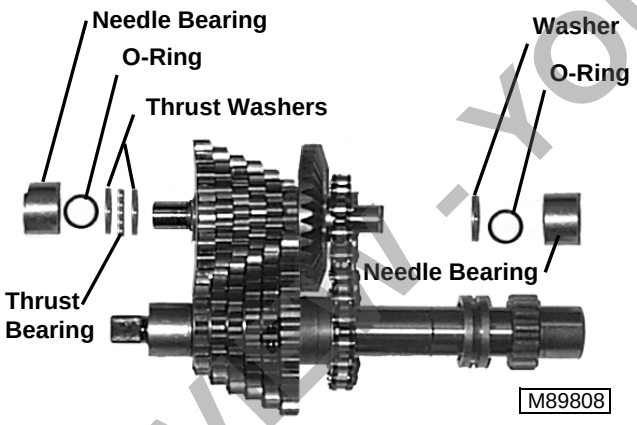
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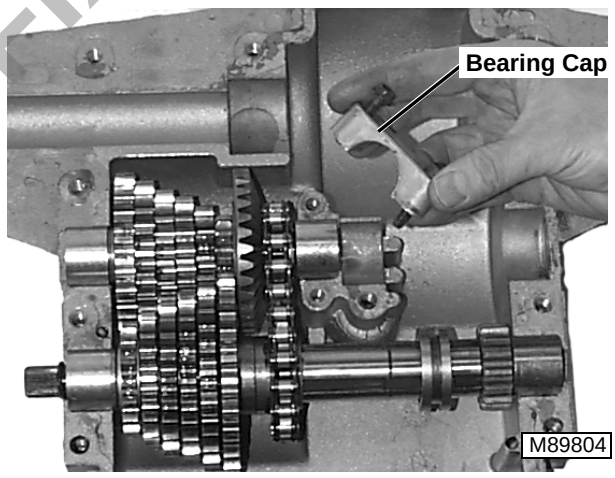


14. Install chain on sprocket on shift shaft.
15. Install reduction shaft sprocket in chain.
16. Align bevel gear with sprocket.
17. Withdraw reduction shaft through gear pack until end is flush with end gear. Mate reduction shaft gear pack with gears on shift shaft. Push transfer shaft through gear pack, bevel gear, and sprocket.



18. Install washer, O-ring, and needle bearing, on sprocket end of reduction shaft.
19. Install thrust washer, thrust bearing, second thrust washer, O-ring and needle bearing on small gear end of reduction shaft.

20. Install shift shaft and reduction shaft assemblies in case as a unit.
21. Make sure that needle bearing case seat firmly in respective saddles in transmission case.



22. Install bearing cap and secure with two cap screws. Torque to **10.2 – 11.2 N•m (90 – 100 lb-in.).**

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ADJUSTMENTS

HYDROSTATIC TRANSAXLE BLEEDING PROCEDURE

Reason:

This procedure is performed to eliminate air from the hydrostatic transaxle after repair or leakage of the transaxle.

Procedure:

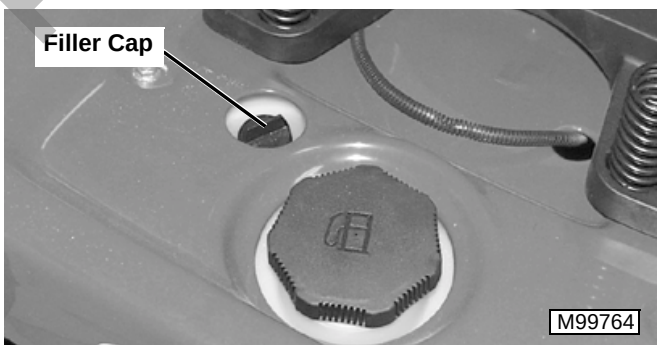
Check hydrostatic transaxle oil reservoir oil level. If necessary, fill to correct level with oil.

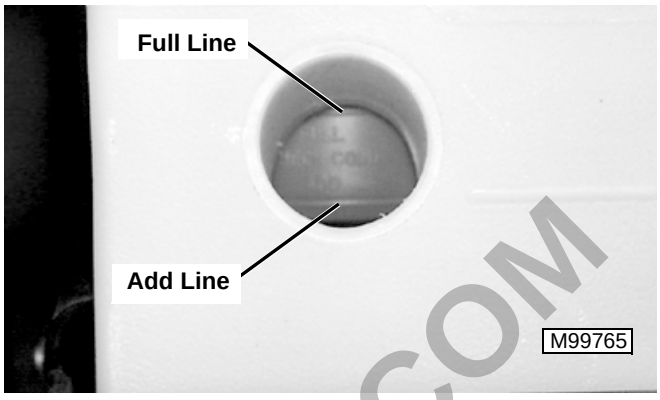
1. Raise rear wheels off the ground. Support rear axles with jack stands.
2. Place blocks in front of and behind front wheels.
3. Start and run engine at SLOW idle.

⚠ CAUTION

MOVING PARTS. Keep loose articles of clothing, hands and feet away from wheels during procedure to reduce the risk of personal injury.

4. While alternately depressing the forward and reverse pedals, engage and disengage the freewheel valve lever. Continue this procedure until the rear wheels start to rotate. This step may take 5 to 10 minutes to perform.
5. Turn off engine. Raise rear of tractor, remove stands, and lower the tractor to the ground. Remove blocks in front of and behind front wheels.
6. With engine off and control pedals in neutral, push the tractor forward and then rearward to turn the motor rotating group.
7. Start and run the engine at FAST idle.
8. Quickly depress and release the forward and reverse pedals until the tractor moves without hesitation.





9. Park tractor on a level surface. Stop engine and check oil level in reservoir bottle. Add oil if needed to bring level up to FULL line:
   - S2048 uses 5W30 or 10W30.
   - S2554 uses 5W50 Synthetic.

Results:

- Tractor moves without hesitation when forward or reverse pedals are depressed.

NEUTRAL CREEP ADJUSTMENT

Reason:

If the tractor creeps forward or backward with the forward/reverse pedals in the neutral position, parking brake released, and the engine running, the neutral eccentric must be adjusted.

Procedure:

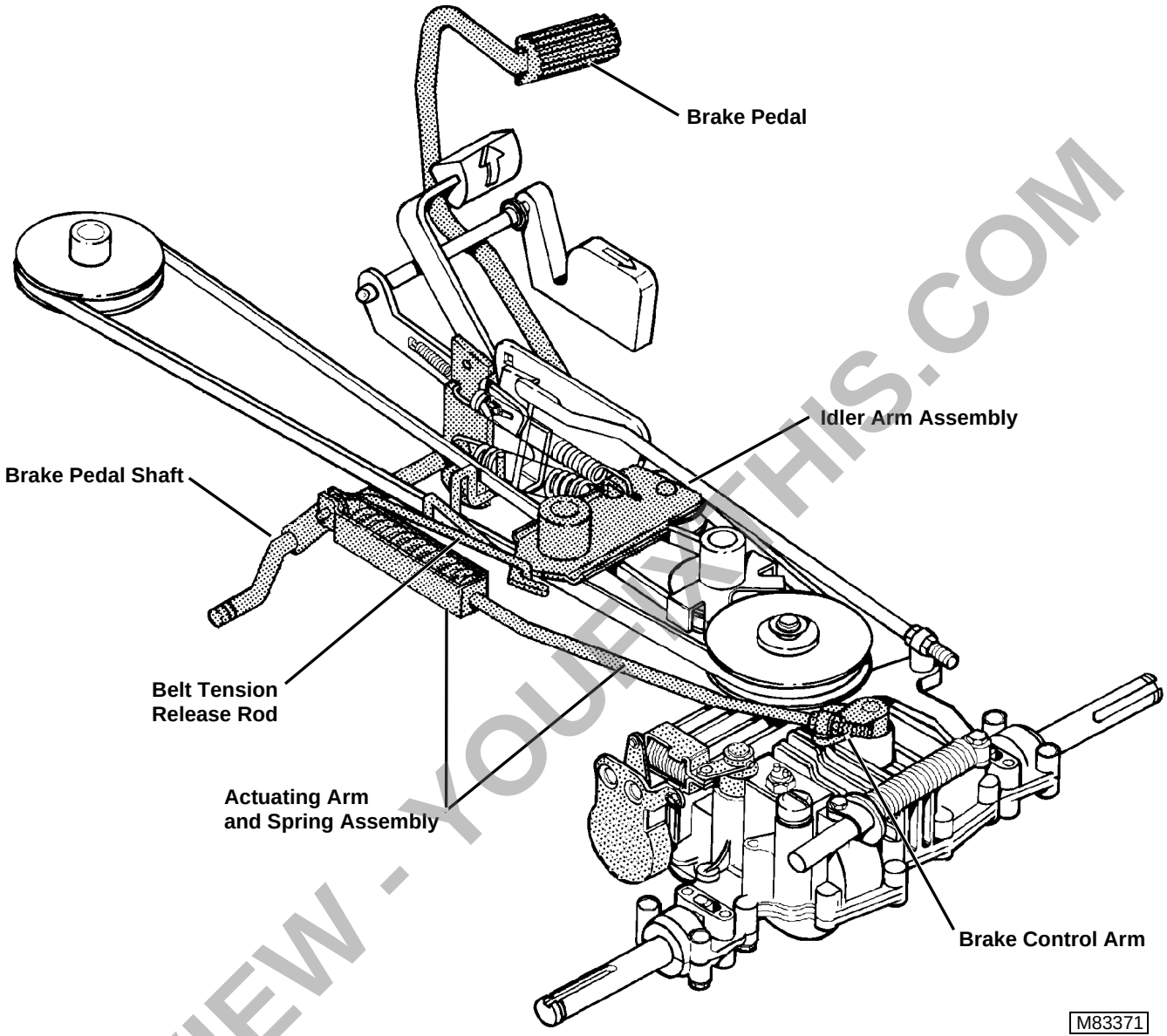
1. Park tractor on level surface.
2. Turn key switch to **STOP** position.
3. Move forward/reverse pedals to **NEUTRAL** position. Engage park brake.
4. Remove mower deck from tractor.
5. Lift rear of tractor until wheels are off the ground, and support tractor with jack stand.
6. Place blocks in front of and behind front wheels.

NOTE: The eccentric shaft is located on the right side of the transmission above and forward of the right hand axle.

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BRAKE SYSTEM OPERATION—HYDROSTATIC TRANSAXLE



Function:

To stop machine motion and disengage power from the engine to the transmission.

Theory of Operation:

When the brake pedal is depressed, it rotates the brake pedal shaft forward. Attached to the shaft is the belt tension release rod. Movement of the shaft is transferred to the rod which engages the end of the slot in the idler arm assembly. Continued movement pulls the left side of the idler arm forward and disengages drive belt tension.

Also attached to the brake pedal shaft is the brake actuating arm and spring assembly. Movement of the lever is transferred through the rod to the transmission brake actuator arm to provide braking action.

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