Diagnostics

Engine Will Not Start

CAUTION: Avoid Injury! Be aware! The engine may start to rotate at any time. Keep hands away from all moving parts when testing.

NOTE: To test specific electrical components, see Electrical section and refer to either Diagnostics or Tests and Adjustments for further guidance.

Symptom: Engine Will Not Crank

(1) Is battery voltage 12.4 volts or higher?

Yes - Go to next step.

No - Charge battery and perform no-load test. Go to next step. Replace the battery if it will not take or hold a charge.

(2) Does starter solenoid click when ignition switch is turned to start position?

Yes - Check starter motor.

No - Check electrical system.

CAUTION: Avoid Injury! Do not rotate engine with starter if the spark plug is removed. Gasoline spray from the open cylinder may be ignited by ignition spark and cause an explosion or fire.

NOTE: Perform a visual inspection first to determine if battery cables are tight and not corroded. The battery must be sufficient size to turn the engine over at minimum cranking speed of 350 rpm.

Symptom: Engine Cranks But Will Not Start

(1) Is battery voltage 12.4 volts or higher?

Yes - Go to next step.

No - Charge battery and perform no-load test. Go to next step.

(2) Does fuel shutoff solenoid click when ignition switch is turned to start/run?

Yes - Go to next step.

No - Defective fuel shutoff solenoid, switch or wiring. See Electrical section.

(3) Does engine crank slow?

Symptom: Engine Cranks But Will Not Start

Yes - Remove spark plug and turn the engine over by hand. Go to next step.

No - Go to next step.

(4) Is the engine hard to turn over by hand?

Yes - Internal components binding.

No - Starter motor possibly defective. Repair or replace as needed.

(5) Is the choke operating properly?

Yes - Go to next step.

No - Adjust choke cable.

(6) Does spark plug have strong blue spark?

Yes - Go to next step.

No - Possible defective spark plug, magneto shorted to ground, flywheel magnet weak, or ignition coil air gap not adjusted. See Electrical section.

(7) Is valve clearance adjusted properly?

Yes - Go to next step.

No - Adjust valve clearance.

(8) Is engine getting fuel?

Yes - Check air cleaner, fuel mixture, possible contaminated fuel, or stuck float needle.

No - Check fuel shutoff valve, fuel lines, fuel pump, and engine vacuum.

Symptom: Engine Makes High Whining Sound

(1) Are the starter gears engaging and disengaging correctly?

Yes - Go to next step.

No - Check starting motor gears for correct engagement and disengagement. See “Starting Motor Removal and Installation” on page 50.

(2) Are the cam and crank gears engaging correctly?

No - Check cam shaft end play.

Tests and Adjustments

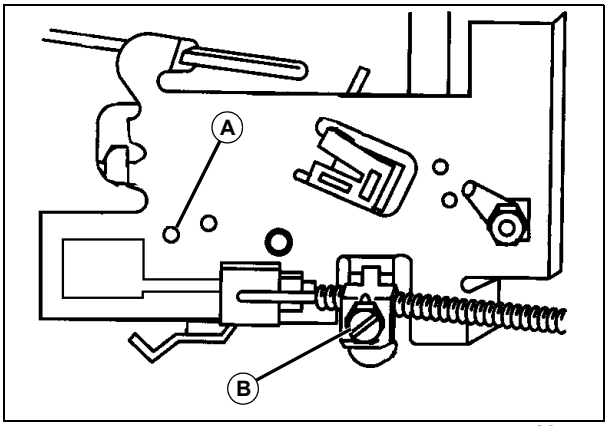
Throttle Cable Adjustment

Reason:

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

Procedure:

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



M95232

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:

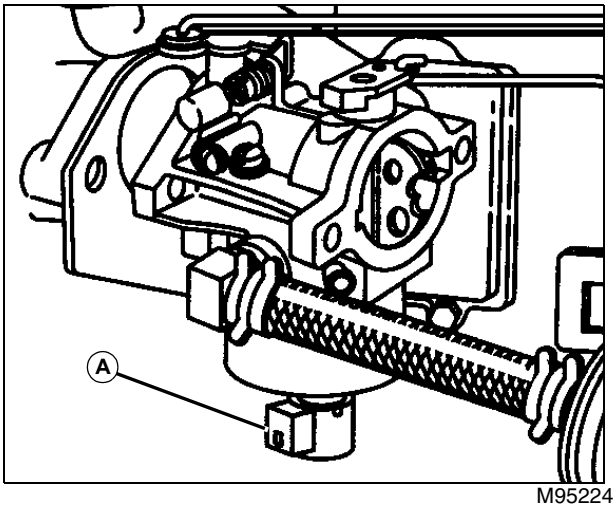
To test proper operation of fuel shutoff solenoid.

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 machine 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 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)

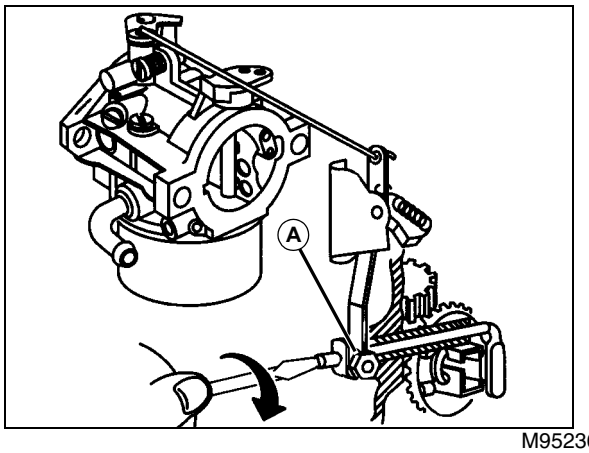
CAUTION: Avoid Injury! Before starting or running engine, static adjustment of the governor must be made. Failure to make static adjustments first, could result in engine overspeeding, and may result in engine or equipment damage, personal injury and/or property damage.

NOTE: All linkage must be installed to make adjustment.

Reason:

To set the initial engine speed limits.

Procedure:



M95236

1. Loosen governor lever bolt and nut (A).
2. Move throttle lever to FAST idle.

IMPORTANT: Avoid damage! Do not bend governor link or distort governor lever.

3. While holding throttle in FAST position, turn governor shaft clockwise until it stops.
4. Hold lever and shaft in position. Tighten governor lever bolt and nut to specification.

Specification:

Lock Nut . . . . . 4.5 N•m (40 lb-in.)

Governor Adjustment - Dynamic

(Full Throttle - No Load)

Reason:

To verify the engine speed settings are within limits.

Equipment:

- JT07270 Pulse Tachometer, or
- JT05719 Digital Tachometer

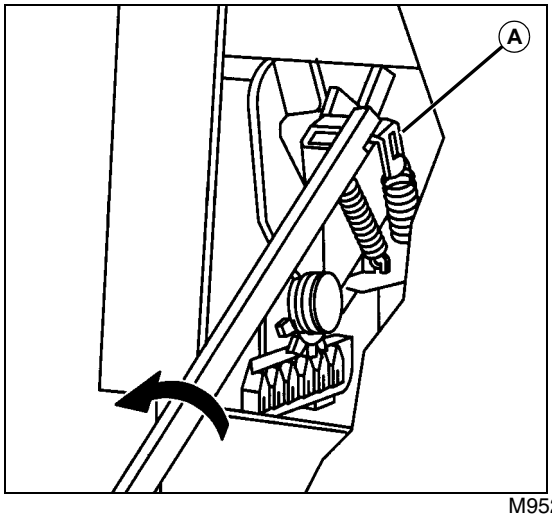
Procedure:

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.

IMPORTANT: Avoid damage! When servicing engine (with engine running), remove the hood to avoid damage from muffler exhaust heat.

1. Remove hood assembly. See “Hood Removal and Installation” on page 343 in the Miscellaneous section.
2. With engine running, set throttle lever to FAST.
3. Measure engine rpm.

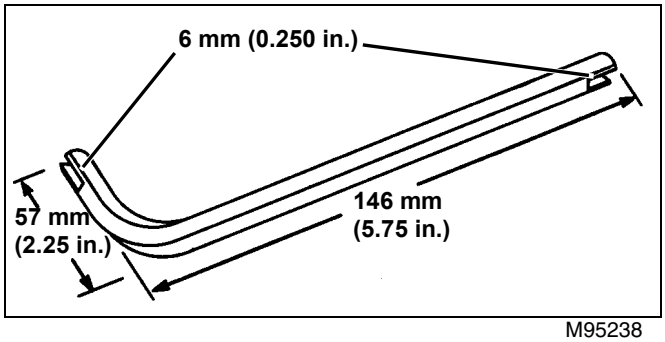


M95237

Picture Note: Arrow denotes direction to increase speed.

IMPORTANT: Avoid damage! Do not bend governor link or distort governor lever.

4. Bend the upper governor spring anchor (A) to adjust the top no load engine rpm to specification.
5. Bend the anchor UP to lengthen the spring and increase the rpm, or DOWN to shorten the spring and reduce the engine rpm.



M95238

Picture Note: A tool can be made from a 5/16 in. Allen wrench. Slots are cut into each end 6 mm (0.25 in.) across the with of the wrench.

Specification:

Top No Load rpm . . . . . 3350 ± 100 rpm

Governor Idle Adjustment

Reason:

To set the governed idle speed.

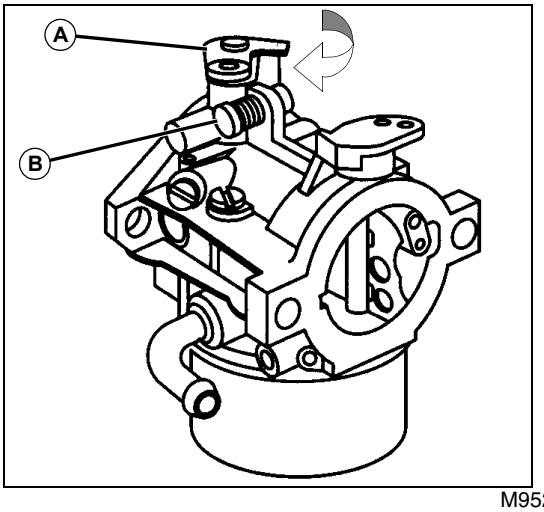
Equipment:

- JT07270 Pulse Tachometer, or
- JT05719 Digital Tachometer

Procedure:

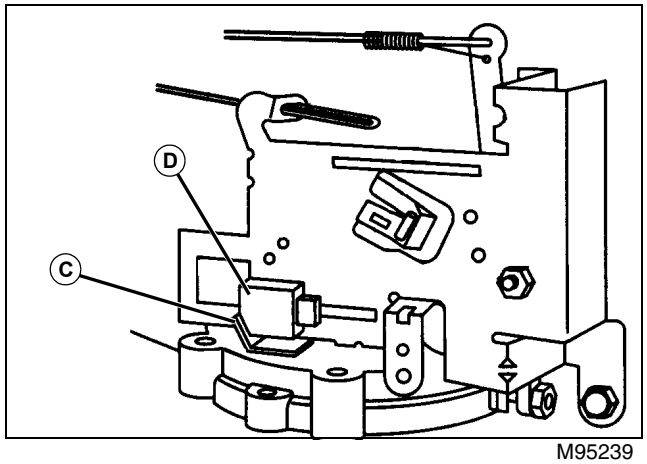
IMPORTANT: Avoid damage! When servicing engine (with engine running), remove hood to avoid damage from muffler exhaust heat.

1. Remove hood assembly. See “Hood Removal and Installation” on page 343 in the Miscellaneous section.
2. Start engine and run at 1/2 throttle for 5 minutes to bring engine to operating temperature.
3. Move throttle to SLOW.



M95222

4. Hold throttle shaft (A) closed with finger. Adjust idle speed screw (B) to **1200 rpm.**
5. Release throttle.
6. Set throttle to governed idle specification.



M95239

7. Bend tang (C) until it contacts remote control slide (D).

Specification:

Governed Idle rpm . . . . . 1750 rpm

Slow Idle Carburetor Adjustment

Reason:

To set the carburetor mixture screw for proper operation of the carburetor.

Equipment:

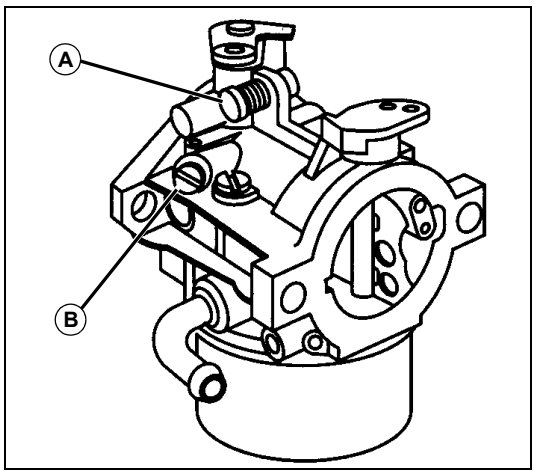
- JT07270 Pulse Tachometer, or
- JT05719 Digital Tachometer

IMPORTANT: Avoid damage! To obtain correct adjustment, the procedure must be performed in the sequence shown.

Procedure:

IMPORTANT: Avoid damage! When servicing engine (with engine running), remove hood to avoid damage from muffler exhaust heat.

1. Remove hood assembly. See “Hood Removal and Installation” on page 343 in the Miscellaneous section.
2. Start engine. Run at 1/2 throttle for 5 minutes to bring engine to operating temperature.
3. Move throttle to SLOW.



M95222

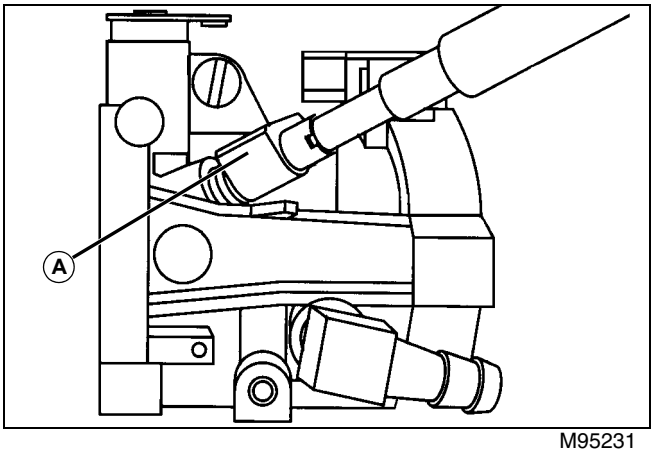
4. Turn idle speed screw (A) to obtain **1750 rpm** minimum.

5. Remove the limiter cap from the idle mixture screw (B).

6. Then turn idle mixture screw (B) slowly clockwise until engine just begins to slow. Note position of slot on screw.

7. Turn idle mixture screw (B) counterclockwise until engine just begins to slow. Note position of slot on screw.

8. Turn screw to midpoint between speed changes.



M95231

9. Install limiter cap (C) with flat facing up.

10.Move throttle control from idle to high speed position. Engine should accelerate smoothly. If it does not, open idle mixture needle screw 1/8 turn. There should be no afterfire.

Specification:

Carburetor Slow Idle Speed. . . . . .1750 rpm

Valve Clearance Adjustment

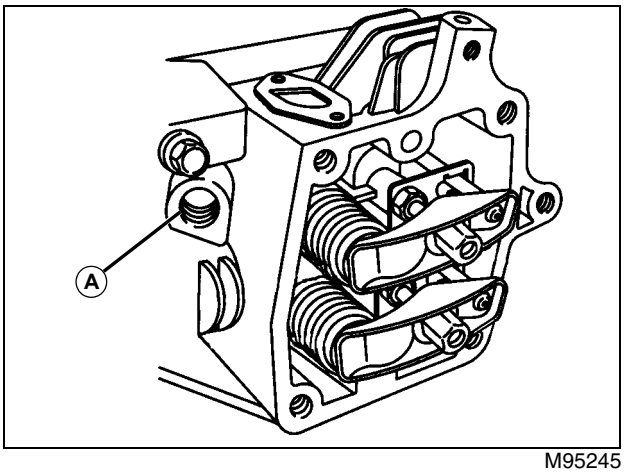
NOTE: Correct position of crankshaft is necessary to eliminate interference by the compression release mechanism when adjusting valve clearance.

Procedure:

1. Starting with a cold engine, remove valve cover.

2. Remove spark plug.

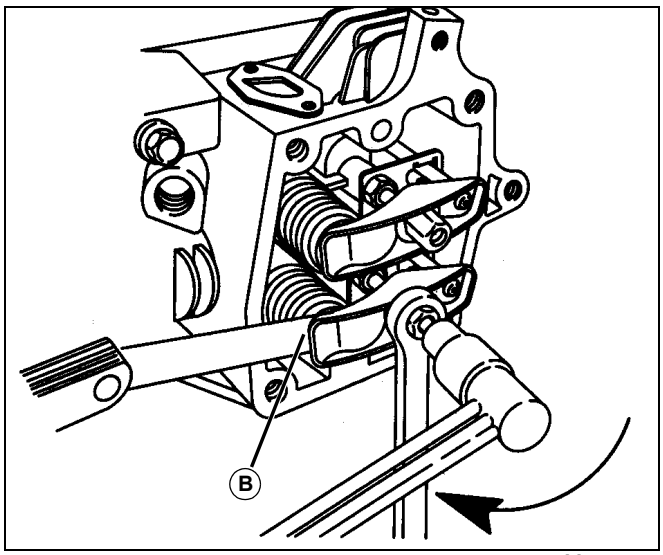
3. Turn crankshaft until piston is at Top Dead Center, (TDC) on the compression stroke (both valves closed).



M95245

4. Insert a screwdriver through the spark plug opening (A) until it touches the top of the piston.

5. Continue to turn the crankshaft clockwise until the piston has moved down **6.35 mm (0.25 in.)**.



M95246

6. Check valve clearance with a feeler gauge (B) between valve stem and rocker arm. Valve clearance should be **0.08 - 0.13 mm (0.003 - 0.005 in.)** for the intake valve, and **0.13 - 0.18 mm (0.005 - 0.007 in.)** for the exhaust valve.

Suggest:

If the above button click is invalid.

Please download this document

first, and then click the above link

to download the complete manual.

Thank you so much for reading

7. If not, adjust as necessary using a 13 mm open end wrench and a 5 mm hex wrench. Tighten lock nut to **7 N•m (60 lb-in.)**.

8. Recheck clearance and make adjustments if necessary.

9. Install spark plug. Torque to **20 N•m (180 lb-in.)**.

10. Install valve cover. Torque screws to **7 N•m (60 lb - in.)**.

Specifications:

Lock Nut . . . . . 7 N•m (60 lb-in.)

Valve Clearance

Intake . . . . . 0.08 - 0.13 mm (0.003 - 0.005 in.)

Exhaust . . . . . 0.13 - 0.18 mm (0.005 - 0.007 in.)

Valve Cover Cap Screws . . . . . 7 N•m (60 lb in.)

Spark Plug Torque . . . . . 20 N•m (180 lb-in.)

Armature Air Gap Adjustment

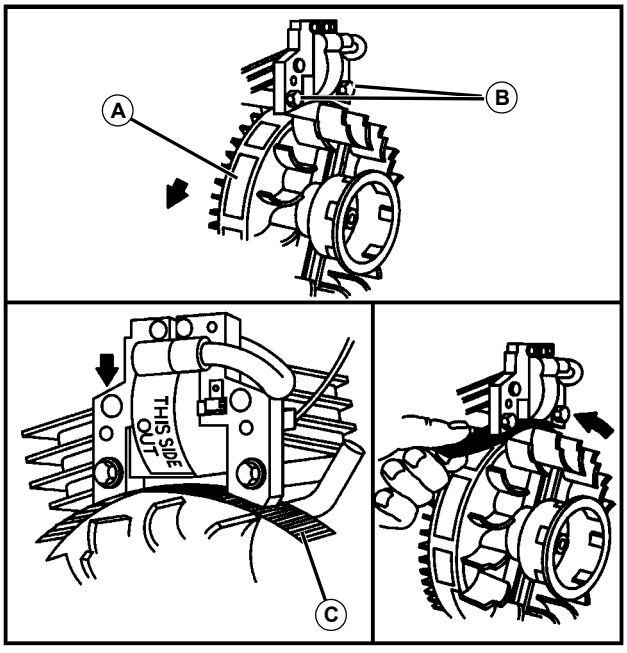
Reason:

To set the ignition air gap for proper operation.

Equipment:

- 0.30 mm (0.012 in.) Thickness Gauge

Procedure:



M95220

1. Rotate flywheel until magnet (A) is away from armature.

2. Loosen the armature mounting screws (B). Slide armature away from flywheel as far as possible.

3. Tighten one screw enough to hold the armature in place.

4. Rotate flywheel until magnet is directly under armature.

5. Place a **0.30 mm (0.012 in.)** thickness gauge (C) between armature and magnet.

6. Loosen the mounting screw so magnet will pull armature against thickness gauge.

7. Tighten both mounting screws (B) to specification.

8. Rotate flywheel while pulling thickness gauge out from between the armature and the magnet.

Specification:

Armature Air Gap . . . . 0.25 - 0.35 mm (0.010 - 0.014 in.)

Armature Mounting Screws . . . . . 2.8 N•m (25 lb-in.)

Crankcase Vacuum Test

Reason:

To determine operation of breather, condition of seals, gaskets, rings, piston, and cylinder wall.

Equipment:

- JTO3503 Vacuum Gauge
- JTO5703 Barb Fitting
- JTO5699 Line
- 8741-F66 Plug

Procedure:

1. Park machine safely

2. Raise hood and remove oil dipstick.

3. Place plug and brabed fitting in dipstick tube until tight.

4. Cover barbed fitting with a plug or finger and start engine.

5. Quickly remove plug or finger from barbed fitting and attach hose and gauge.

6. Run engine at fast idle and reacord reading on gauge.

7. Run engine at slow idle. Do not turn engine off.

8. Disconnect hose and quickly place plug or finger over barbed fitting.

9. Turn engine off.

10. Remove plug and install oil dipstick.

Results:

If crankcase vacuum is less than specification, check:

- breather reed valve clearance and condition.
- seals and gaskets for leakage.
- valve cover gasket for leakage.
- rings, piston and cylinder wall for wear or damage.