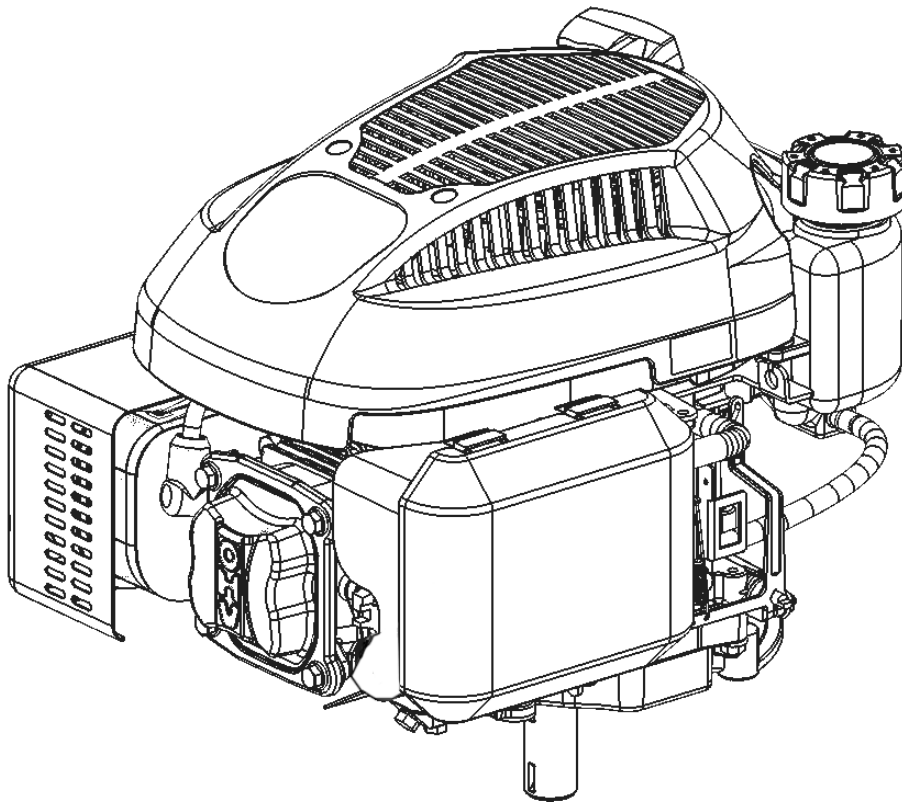




RESIDENTIAL PRODUCTS

WALK BEHIND MOWER ENGINE SERVICE MANUAL

2012 and Prior LC1P65FA (159cc)



About this Manual

This service manual was written expressly for Toro service technicians. The Toro Company has made every effort to make the information in this manual complete and correct. Basic shop safety knowledge and mechanical/electrical skills are assumed. The Table of Contents lists the systems and the related topics covered in this manual. An electronic version of this service manual is available on the Toro Dealer Portal. We are hopeful that you will find this manual a valuable addition to your service shop. If you have any questions or comments regarding this manual, please contact us at the following address:

The Toro Company
Residential and Landscape Contractor Service Training Department
8111 Lyndale Avenue South
Bloomington, MN 55420

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Chapter 1 – General Service Information

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Safety

Safety Information



This symbol means **WARNING or PERSONAL SAFETY INSTRUCTION** – read the instruction because it has to do with your safety. Failure to comply with the instruction may result in personal injury or even death.

This manual is intended as a service and repair manual only. The safety instructions provided herein are for troubleshooting, service, and repair of the Toro engine. The Toro mower and operator's manuals contain safety information and operating tips for safe operating practices.

Avoid Unexpected Engine Start - Turn off engine and disconnect the spark plug before servicing engine.

Avoid Lacerations and Amputations - Stay clear of all moving parts while the engine is running.

Avoid Burns - Do not touch the engine, muffler, or other components which may increase in temperature during operation, while the unit is running or shortly after it has been running.

Avoid Fires and Explosions - Avoid spilling fuel and never smoke while working with any type of fuel or lubricant. Wipe up any spilled fuel or oil immediately. Never remove the fuel cap or add fuel when the engine is running. Always use approved, labeled containers for storing or transporting fuel and lubricants.

Avoid Asphyxiation - Never operate an engine in a confined area without proper ventilation.

Avoid Injury From Batteries - Battery acid is poisonous and can cause burns. Avoid contact with skin, eyes, and clothing. Battery gases can explode. Keep cigarettes, sparks, and flames away from the battery.

Avoid Injury Due To Inferior Parts - Use only original equipment parts to ensure that important safety criteria are met.

Avoid Injury To Bystanders - Always clear the area of bystanders before starting or testing power equipment.

Avoid Injury Due To Projectiles - Always clear the area of sticks, rocks, or any other debris that could be picked up and thrown by the power equipment.

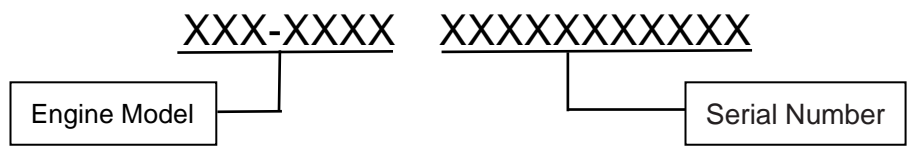
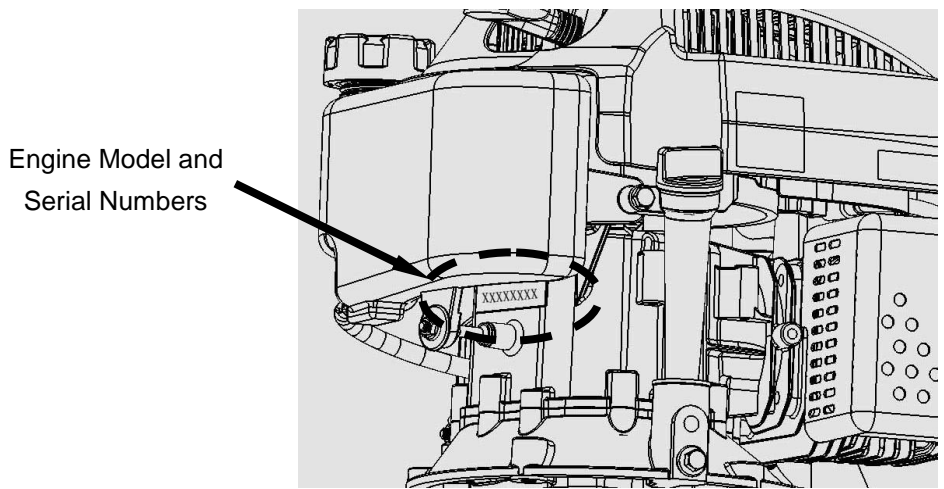
Avoid Modifications - Never alter or modify any part unless it is a factory approved procedure.

Service Rules

1. Only use genuine Toro parts and lubrication products.
2. Always install new gaskets, O-rings and seals when assembling engine.
3. Always torque fasteners to specification and in sequence.
4. Always lubricate friction components with clean engine oil or engine assembly lube when assembling engine.

Engine Model / Serial Number Location

The engine model and serial number are stamped into the crankcase, near the fuel tank.



Engine Fastener Torque Specifications

Item	Fastener Size	Torque Specification
Cylinder Head Bolts	M8	25 ft-lbs (34 Nm)
Connecting Rod Bolts	M7	9.5 ft-lbs (13 Nm)
Flywheel Nut	M14	62.5 ft-lbs (85 Nm)
Valve Adjust Lock Nut	M6	10 ft-lbs (14 Nm)
Pivot Arm Pivot Stud	M8	22 ft-lbs (30 Nm)
Crankcase Cover Bolt	M6	7.5 ft-lbs (10 Nm)
Muffler Nuts	M6	7.5 ft-lbs (10 Nm)
Air Cleaner Nuts	M6	6 ft-lbs (8 Nm)
Recoil (Fan Shroud) Nut	M6	6 ft-lbs (8 Nm)
Oil Drain Bolt	M10	15.5 ft-lbs (21 Nm)
Fuel Tank Bolts / Nuts	M6	7.5 ft-lbs (10 Nm)
Governor Arm Pinch Nut	M6	7.5 ft-lbs (10 Nm)
Spark Plug	-	22 ft-lbs (30 Nm)
Ignition and Charge Coil Bolts	M6	7.5 ft-lbs (10 Nm)
Electric Starter Motor Bolts	M6	7.5 ft-lbs (10 Nm)
Standard Torque Values	M5 Bolt / Nut	4.5 ft-lbs (6 Nm)
	M6 Bolt / Nut	7.5 ft-lbs (10 Nm)
	M8 Bolt / Nut	19 ft-lbs (26 Nm)
	M10 Bolt / Nut	28 ft-lbs (38 Nm)
	M12 Bolt / Nut	41 ft-lbs (55 Nm)

General Specifications

Model	1P65FA
Type	Single cylinder, 4-Stroke, Forced Air Cooling, OHV
Bore x Stroke (mm)	65x48
Displacement (cc)	159
Compression Ratio	8 :1
Lubrication	Splash
Starting	Recoil and Electric Start
Rotation	Counter-Clockwise (From P.T.O. Side)
Ignition System	Transistorized Magneto Ignition
Air Cleaner	Foam & Paper
Fuel Type	Unleaded Gasoline, 87 Octane
Oil Capacity	Max. Fill: 20 oz (0.59 l)
Dimensions (LxWxH)	371x338x356 (mm)
Dry Weight	26.4 lbs (12 kg)

Engine Specifications

1

Part	Item	Standard	Service Limit
Engine	Operating RPM	2900 – 3100 RPM	—
Cylinder Head	Warpage	—	0.00393" (0.10 mm)
Cylinder	Sleeve Taper / Out of Round (Inside Diameter)	2.559" (65.0 mm)	2.566" (65.165 mm)
Piston	Skirt Outside Diameter	2.558" (64.985 mm)	2.553" (64.845 mm)
	Cylinder Clearance	0.00059 - 0.00196" (0.015-0.05 mm)	0.00472" (0.12 mm)
	Piston Pin Bore Inside Diameter	0.5118" (13.002 mm)	0.5137" (13.048 mm)
	Piston Pin Clearance	0.00007- 0.0005" (0.002-0.014 mm)	.00314" (0.08 mm)
Piston Pin	Outside Diameter	0.5118" (13.0 mm)	0.51" (12.954 mm)
Piston Rings	Ring To Groove (Top and Middle)	0.00059 - 0.00177" (0.015-0.045 mm)	0.0059" (0.15 mm)
	End Gap (Top and Middle)	0.0078 - 0.0157" (0.2-0.4 mm)	0.0393" (1.0 mm)
	Width (Top and Middle)	0.059" (1.5 mm)	0.0539" (1.37 mm)
	Width (Oil Ring)	0.0984" (2.5 mm)	0.0933" (2.37 mm)
Connecting Rod	Small End Inside Diameter	0.5125" (13.02 mm)	0.5145" (13.07 mm)
	Big End Inside Diameter	1.0244" (26.02 mm)	1.0263" (26.07 mm)
	Big End Oil Clearance	0.00157 - 0.00248" (0.04-0.063 mm)	0.0047" (0.12 mm)
	Big End Side Clearance	0.00393 - 0.02755" (0.1-0.7 mm)	0.0433" (1.1 mm)
Crankshaft	Crackpin Outside Diameter	1.0228" (25.98 mm)	1.0204" (25.92 mm)
Valve	Clearance (cold) (Intake)	0.0039" (0.10 mm)	—
	Clearance (cold) (Exhaust)	0.0059" (0.15 mm)	—
	Stem Diameter (Intake)	0.2157" (5.48 mm)	0.2093" (5.318 mm)
	Stem Diameter (Exhaust)	0.2141" (5.44 mm)	0.2076" (5.275 mm)
Valve Guides	Inside Diameter (Intake, Exhaust)	0.2165" (5.50 mm)	0.2193" (5.572 mm)
	Stem to Guide Clearance (Intake)	.00039" - 0.0013" (0.01-0.034 mm)	.00393" (0.10 mm)
	Stem to Guide Clearance (Exhaust)	0.0019 - 0.0027" (0.05-0.070 mm)	0.0047" (0.12 mm)
Valve Seat	Seat Width	0.0314" (0.8 mm)	0.0787" (2.0 mm)
Valve Spring	Free Length	1.2007" (30.5 mm)	1.1417" (29.0 mm)
Camshaft	Height (Intake)	1.0905" (27.7 mm)	1.0807" (27.45 mm)
	Height (Exhaust)	1.0925" (27.75 mm)	1.0826" (27.50 mm)
	Journal (Bearing)	0.5505" (13.984 mm)	0.5478" (13.916 mm)
Crankcase Cover	Camshaft Hole Diameter	0.5511" (14.0 mm)	0.553" (14.048 mm)
	Crankshaft Hole Diameter	1.0" (25.4 mm)	1.00472" (25.52 mm)
Spark Plug	Gap	0.0275 - 0.0314" (0.7-0.8 mm)	—
Ignition Coil	Resistance (Primary)	1.1-1.6 Ω	—
	Resistance (Secondary)	10.5 KΩ +/- 15%	—
	Gap to Flywheel	.01" (0.254 mm)	—

NOTE: The only internal parts available for this engine are gaskets and seals.

Troubleshooting

Hard Starting / Poor Running

- Incorrect Fuel (Level, Age, Octane, Ethanol Content)
- Fuel System Contamination and / or Carburetor Debris
- Incorrect Oil Level
- Spark Plug (Incorrect Gap, Fouled, Loose or Faulty)
- Air Filter Restriction
- Air Intake System Leaks
- Ignition Coil to Flywheel Gap Incorrect
- Weak / No Spark
- Auto Choke System (Improper Function)
- Choke / Air Vane Linkage
- Operating RPM Incorrect
- Governor Adjustment Incorrect
- Engine Valve Clearance out of Specification
- Low Compression or Excessive Leakdown

Overheating

- Incorrect Oil Level
- Cylinder Head Gasket Leak
- Debris Build-Up Restricting Air Flow

Chapter 2 - Engine Service / Maintenance

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Engine Oil Change Procedure

1. Run engine to warm engine oil.
2. Remove spark plug cap from the spark plug.

NOTE: Ensure fuel system contains no fuel to prevent leakage when the mower is tipped onto its side.

3. Remove the dipstick.
4. Tip the mower onto side with the dipstick on the downward side. Drain the used oil through the oil fill tube into a suitable container.
5. Return the mower to the operating position.
6. Add oil through the dipstick tube. Wipe the dipstick clean and insert it into the dipstick tube to check the oil level.

NOTE: DO NOT screw the dipstick into the dipstick tube to check the oil level

NOTE: DO NOT overfill the engine oil

7. Fully Install the dipstick and hand tighten it securely.
8. Properly dispose of the used engine oil.

Engine Oil Capacity:

Max. Fill: 20 oz (0.59 l)

Engine Oil Type:

SAE 30 or 10W-30 detergent oil. API classification of SF,SG, SH, SJ, SL, or higher.

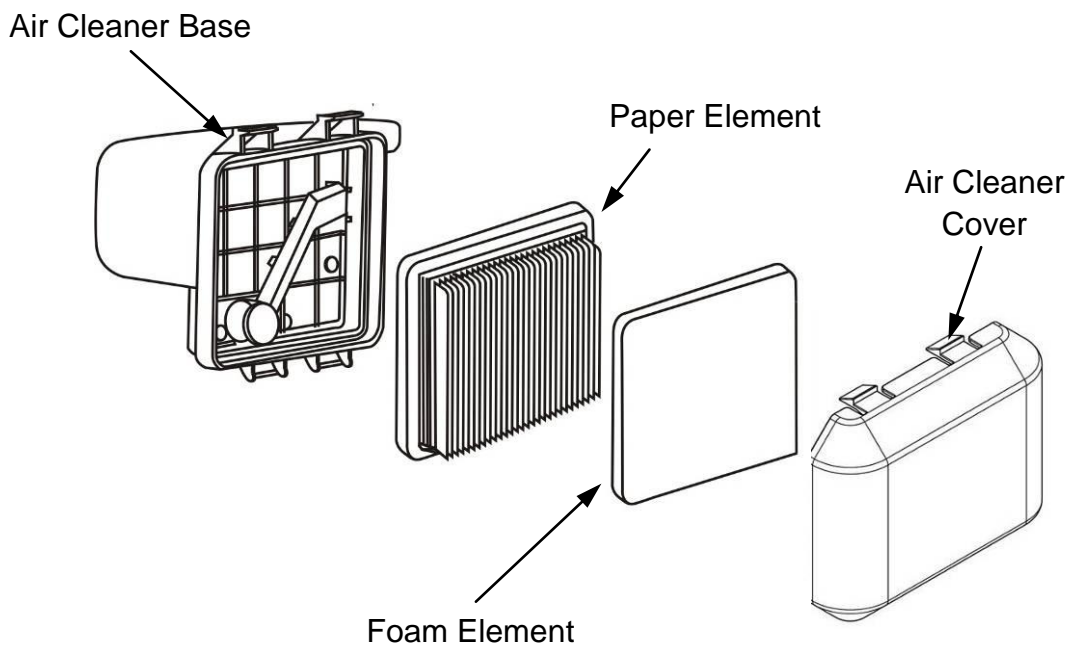
Air Cleaner Service

2

1. Press the upper latch tabs and rotate the top of the cover outward to open and remove the cover.
2. Remove the paper air filter and the foam pre-filter.
3. Inspect the foam pre-filter, and replace it if damaged or excessively dirty.
4. Inspect the paper air filter.

NOTE: If the paper air filter is excessively dirty, damaged or is wet with oil or fuel, replace it.

5. Remove dirt from the air cleaner body and cover using a moist rag. **Do not wipe dirt into the air duct.**
6. If the foam pre-filter is reusable, clean it with warm soapy water. Thoroughly rinse and dry foam element.
7. Insert the foam pre-filter and the paper air filter into the air cleaner
8. Properly Install the cover and verify cover latch tabs are fully engaged.



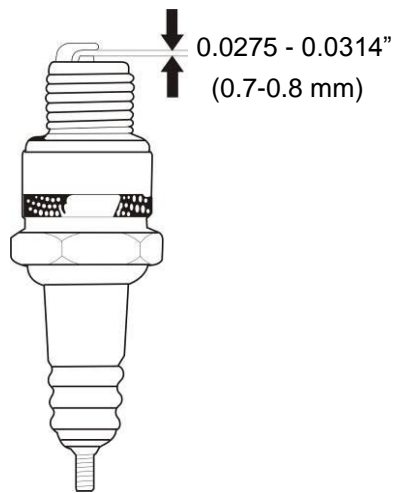
Spark Plug Service

NOTE: Spark plugs of the wrong size or incorrect heat range can cause severe engine damage.



High Voltage Ignition Systems can be Dangerous - Use Caution when Servicing Ignition Systems

1. Disconnect the spark plug cap and thoroughly clean the spark plug area.
2. Remove the spark plug from the engine.
3. Inspect the spark plug for excessively worn electrodes, chips or cracks in the insulator, or excessive deposits.
4. Measure the electrode gap and adjust if necessary. **Spark Plug Gap: 0.0275 - 0.0314" (0.7-0.8 mm)**
5. Install spark plug and torque to specification - **22 ft-lbs (30 Nm)**.
6. Fully install the spark plug cap on the plug.



Valve Clearance Inspection and Adjustment

2

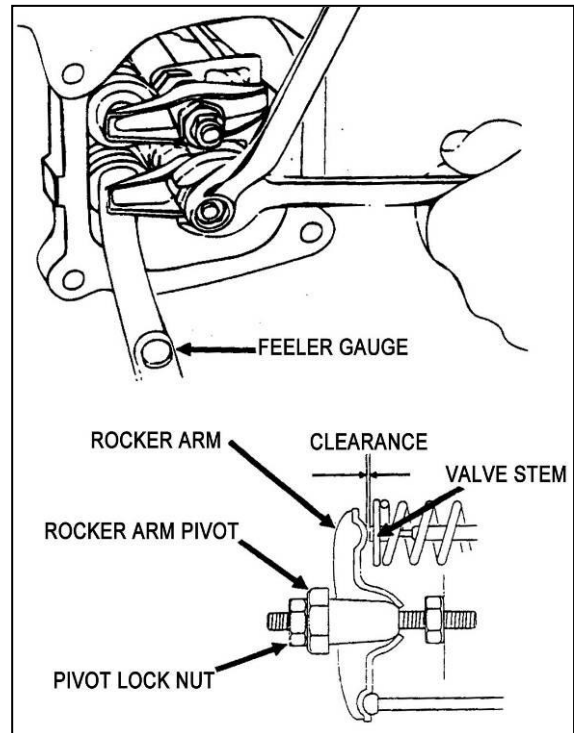
NOTE: Valve clearance inspection and adjustment must be done with the engine cold.

1. Rotate engine to TDC (top-dead-center) of the compression stroke.
2. Remove the valve cover. Be sure both valves are completely closed and the decompression arm is not holding the valve open.
3. Measure the clearance between the rocker arm and the valve stem with a feeler gauge.

Intake: 0.0039" (0.10 mm)

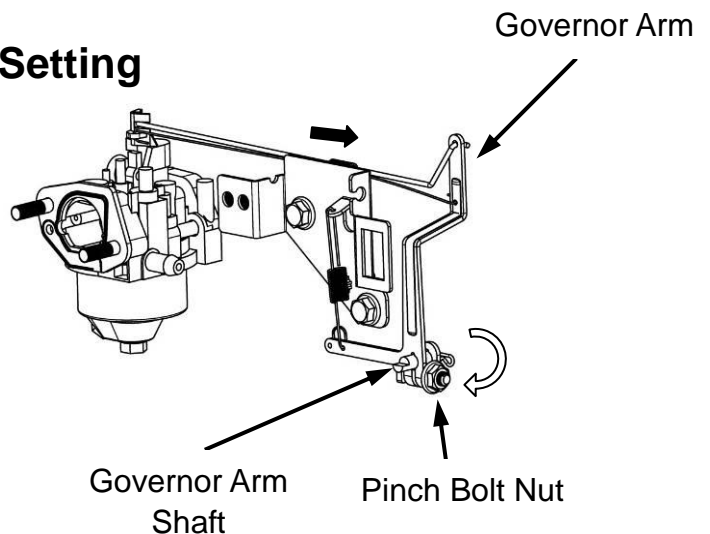
Exhaust: 0.0059" (0.15 mm)

4. To adjust valve clearance:
 - Hold the rocker arm pivot and loosen the pivot lock nut.
 - Turn the rocker arm pivot to obtain the specified clearance.
 - Hold the rocker arm pivot and tighten the pivot lock nut to specification - **11 ft-lbs (15 Nm)**.
5. Recheck the clearance and readjust if necessary.
6. Inspect the valve cover gasket and replace if necessary. Install the valve cover and torque fasteners to specification - **7.5 ft-lbs (10 Nm)**.



Engine Governor – Zero Point Setting

1. Loosen but do not remove the governor arm pinch bolt and nut.
2. Move the governor arm to fully open the throttle valve. Firmly hold the governor arm in this position.
3. Rotate the governor arm shaft fully clockwise and secure it in this position with a pair of pliers.
4. Tighten the governor arm pinch bolt and nut to Specification - **7.5 ft-lbs (10 Nm)**.
5. Verify that the governor arm and throttle valve move freely. Verify engine RPM is within specification.



Fuel Filter and Hose Replacement

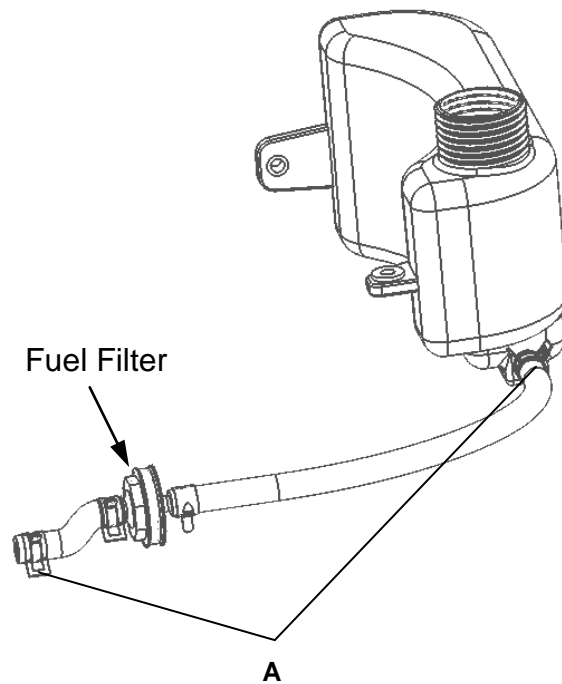


- **Fuel is Extremely Flammable** - Use Extreme Caution When Servicing the Fuel System

1. Drain the fuel tank into an approved container.

NOTE: Ensure fuel system contains no fuel to prevent leak when the fuel filter is replaced.

2. If necessary, remove air filter cover and base as outlined in this manual.
3. Release the fuel filter / fuel hose clamps (A) and slide them away from fittings.
4. Remove the fuel filter / fuel hose asm. from the engine.
5. Install new fuel filter / hose asm. and hose clamps (A).
6. Re-fill tank with fresh fuel.
7. Verify hose routing and check for leaks.
8. Properly dispose of any unused fuel.
9. Reinstall air filter cover and base as outlined in this manual.



Auto Choke System / Function

2

A. Governor Rod - Connected to the governor system which controls the angle of the throttle plate and sets engine operating RPM.

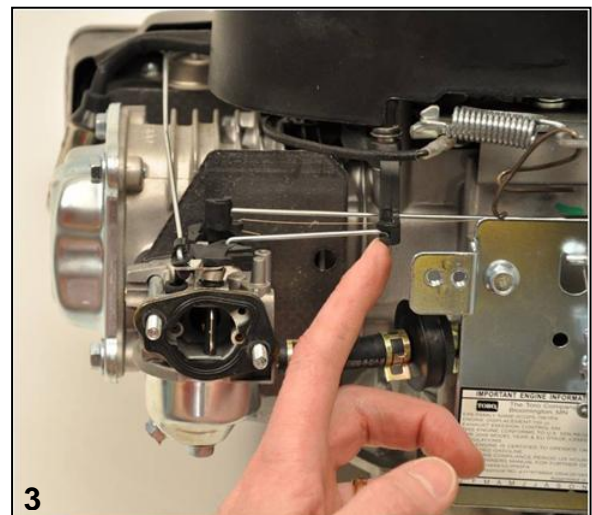
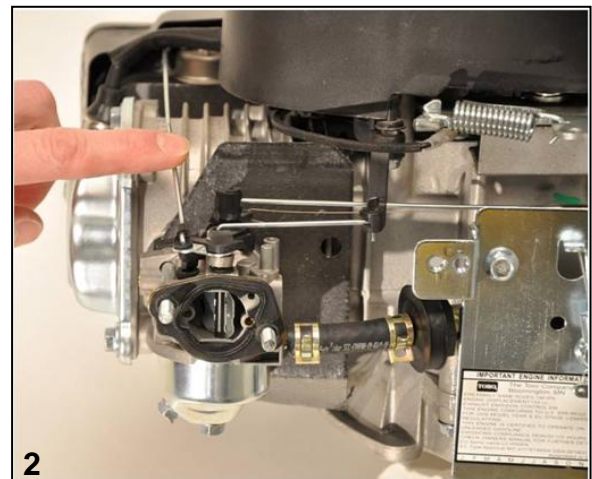
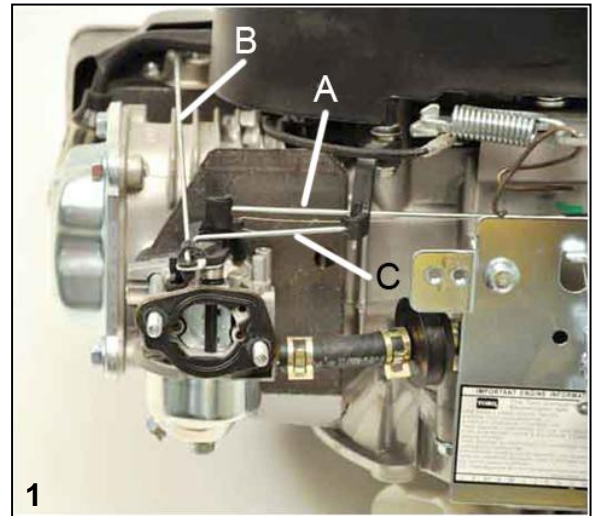
B. Thermal Spring Rod - Connected to the thermal spring, which mounts on the muffler. The thermal spring adjusts the choke plate angle as the engine temperature changes.

C. Air Vane Rod - Connected to the air vane in the blower housing which will fully open the choke plate at full operating RPM at any engine temperature.

COLD START - **Picture 1** illustrates the choke plate position while starting a cold engine. The thermal spring is cold, keeping the choke closed. The air vane is inactive because the engine is not running.

HOT START - **Picture 2** illustrates the maximum amount the thermal spring can open the choke plate while the engine is hot and **not** running.

FULL RPM - **Picture 3** illustrates the maximum amount the air vane can open the choke plate. When engine RPM decreases, the choke will close, however if the engine is hot, the thermal spring will prevent the choke from fully closing.



Auto Choke System View

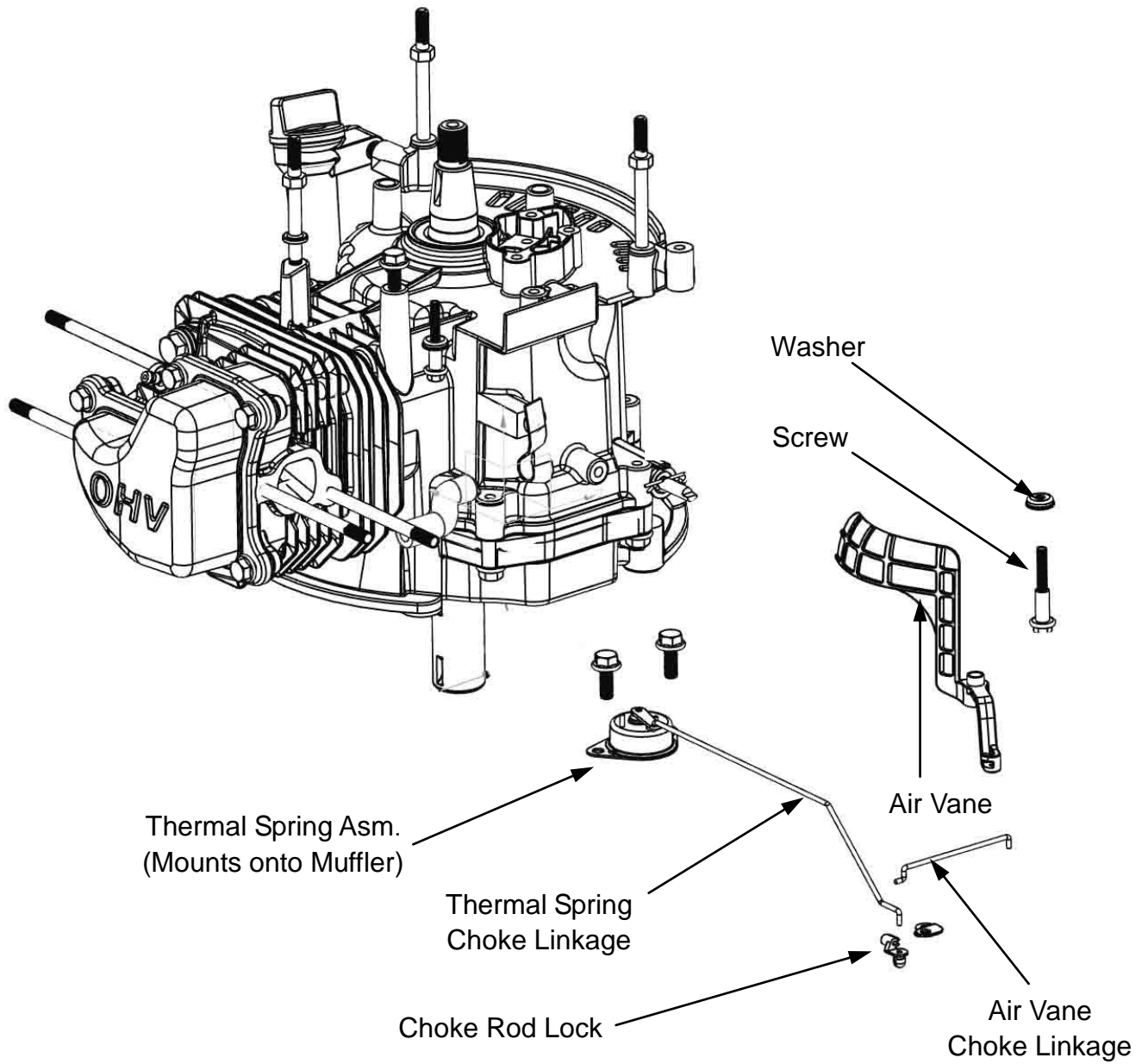


Image for Reference Only

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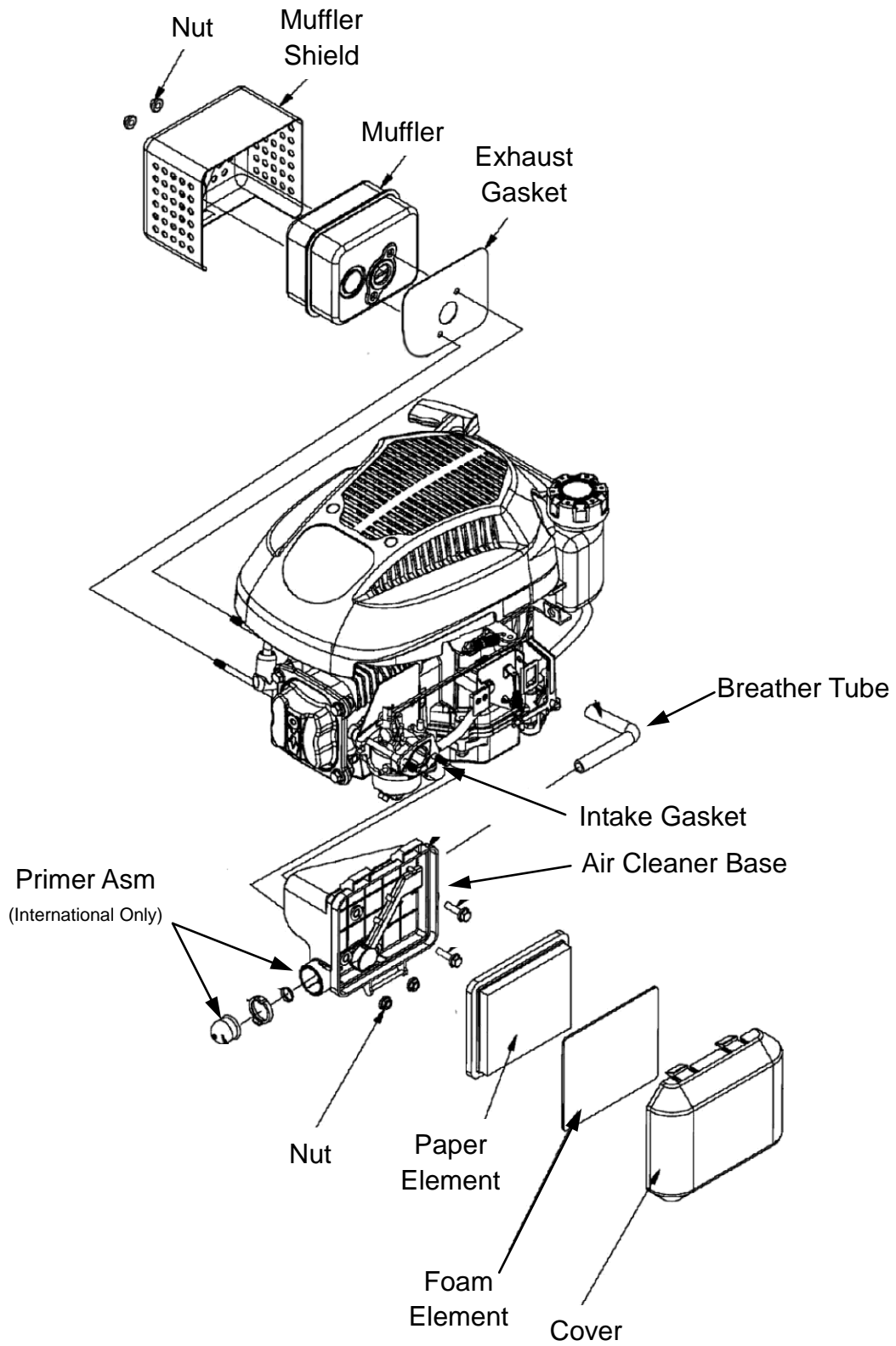
Engine Service – Lower End **27-36**

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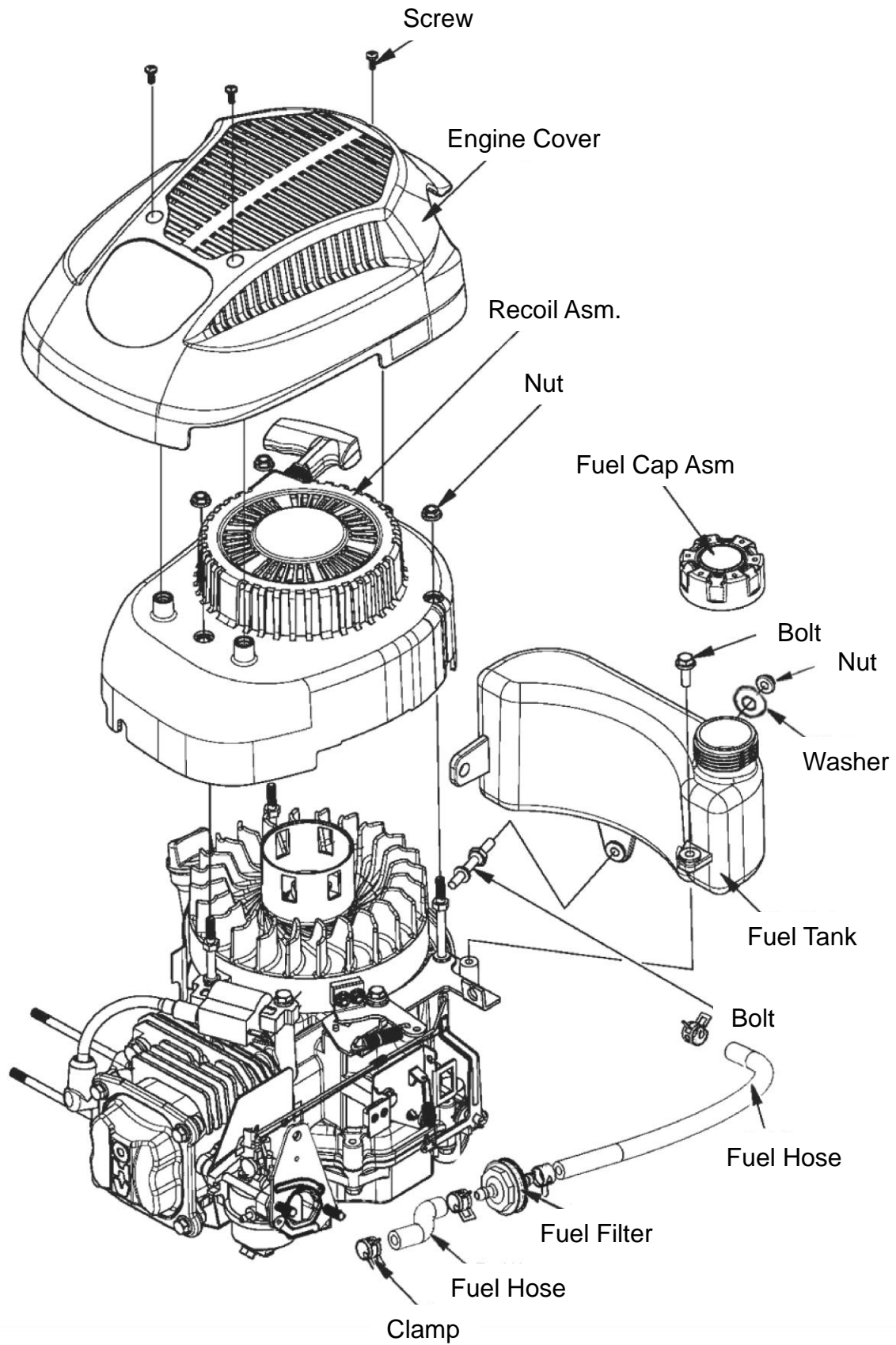
NOTE: The only internal parts available for this engine are gaskets and seals.

Engine Service – Upper End

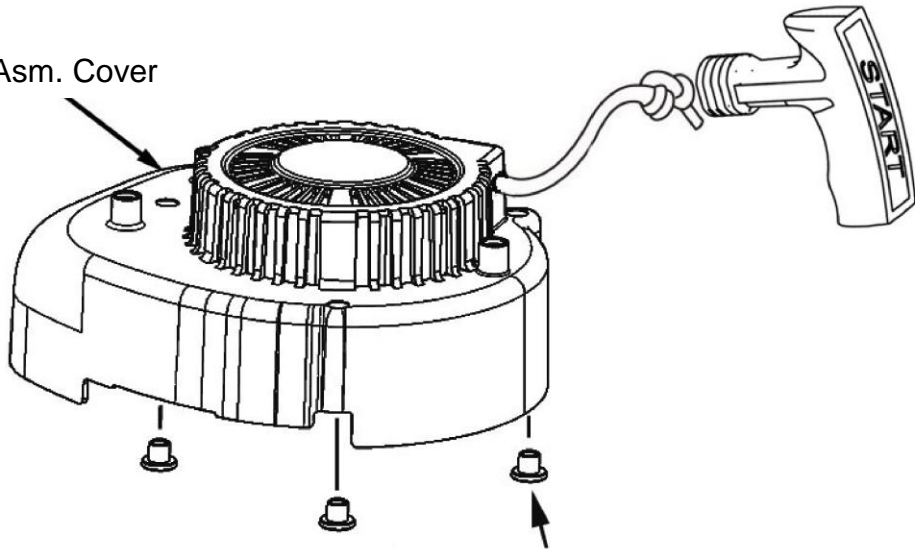
Air Cleaner and Muffler Exploded View



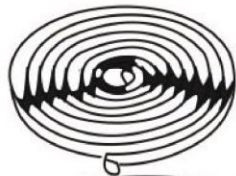
Recoil Starter and Engine Cover Exploded View



Recoil Asm. Cover



Bushing



Spring



Reel



Spring



Ratchet



Spring

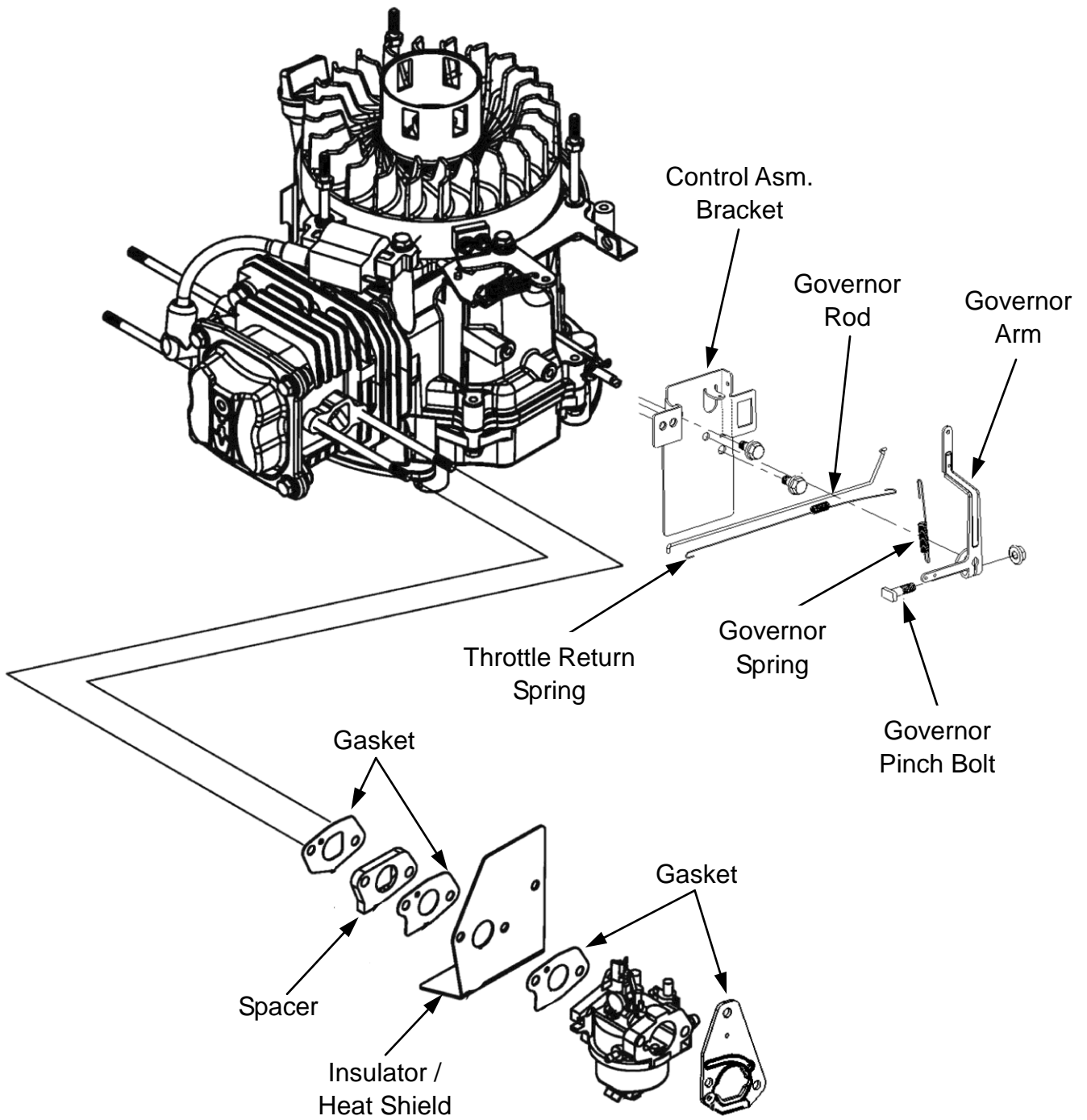


Ratchet Guide

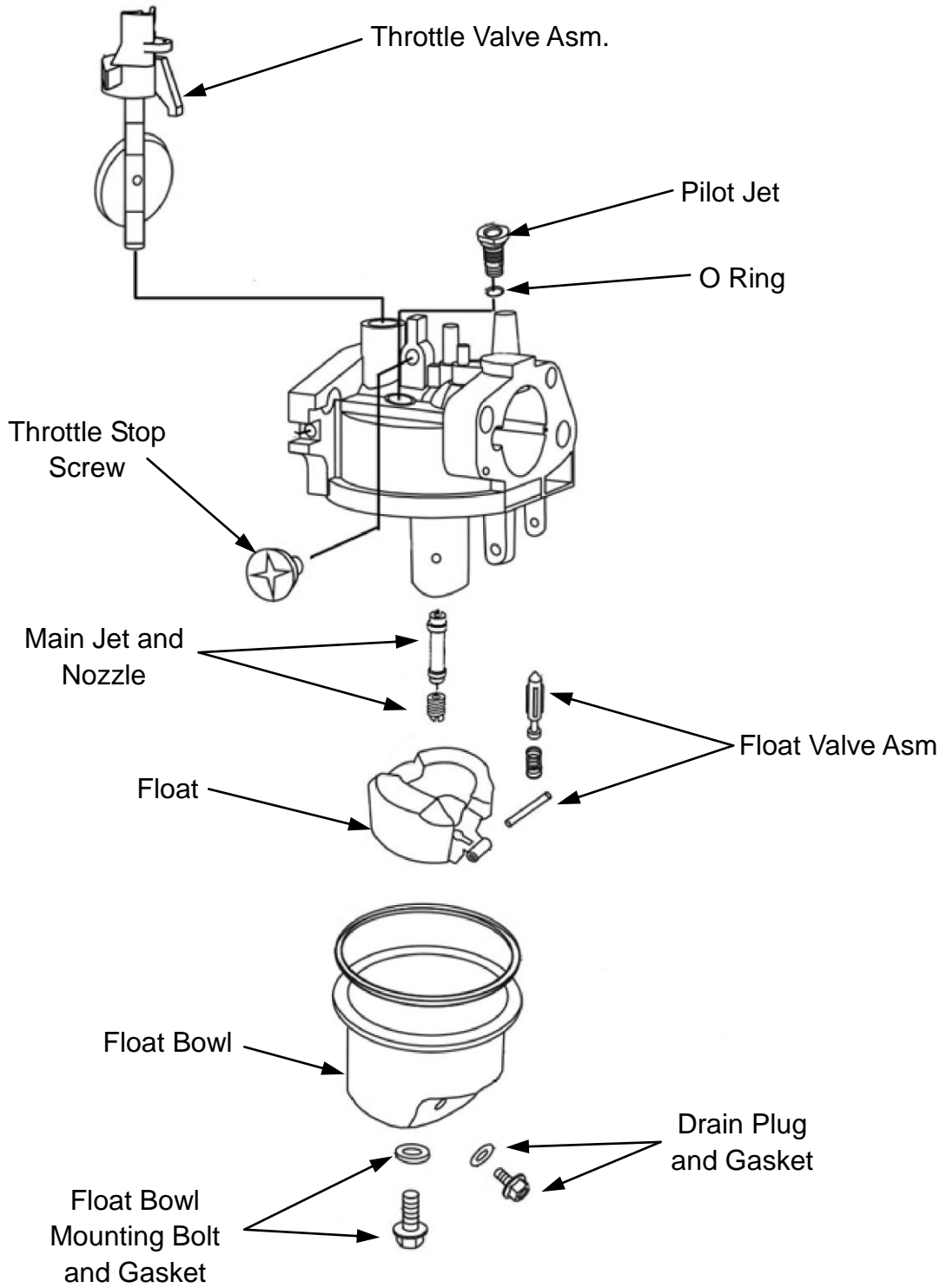


Set Screw

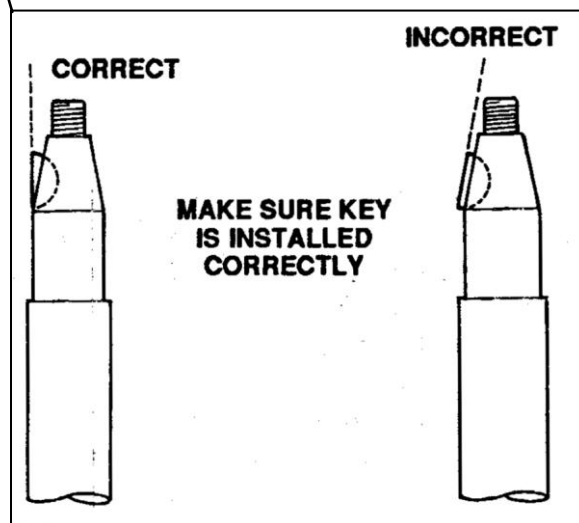
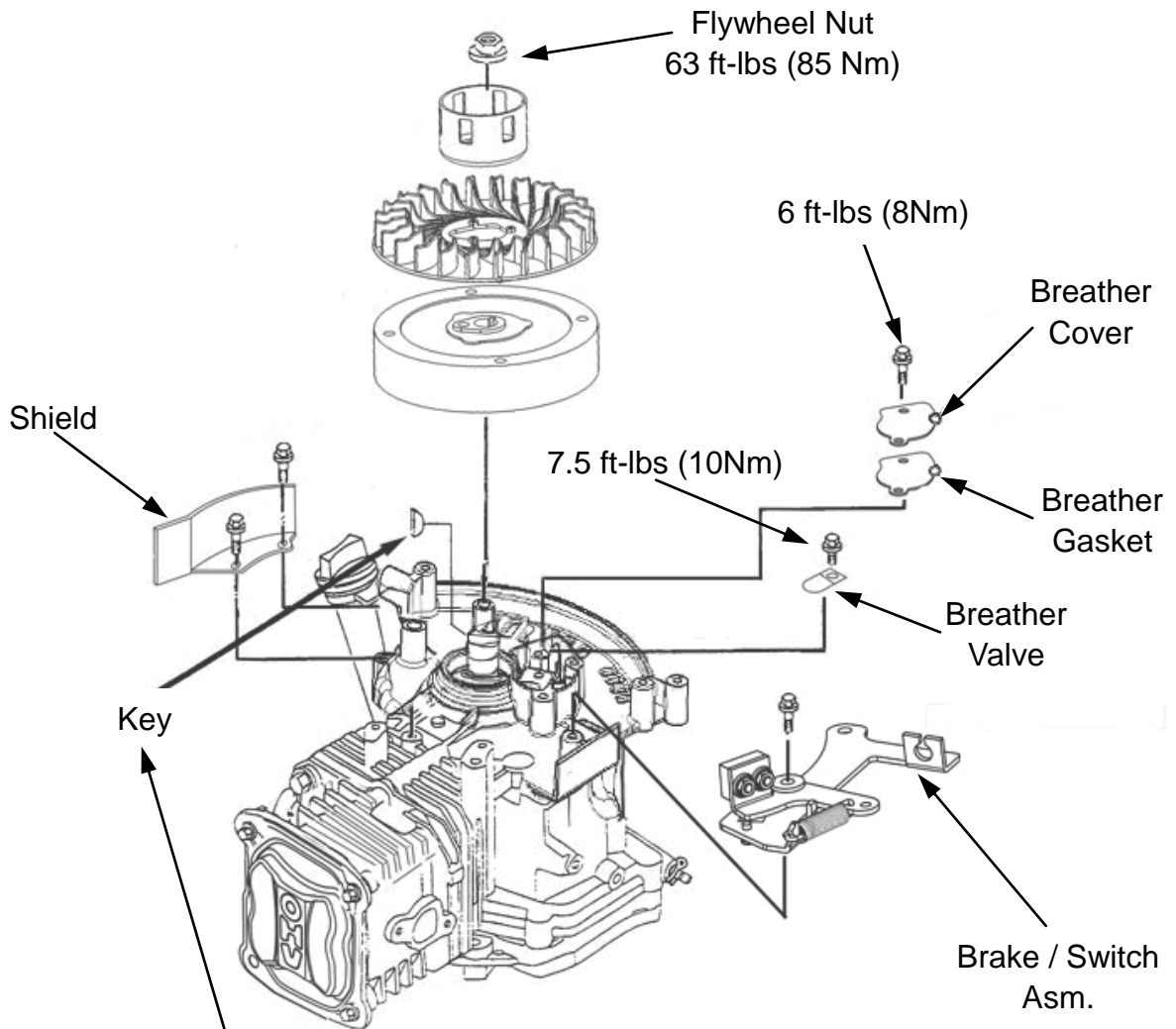
Carburetor and Linkage Exploded View



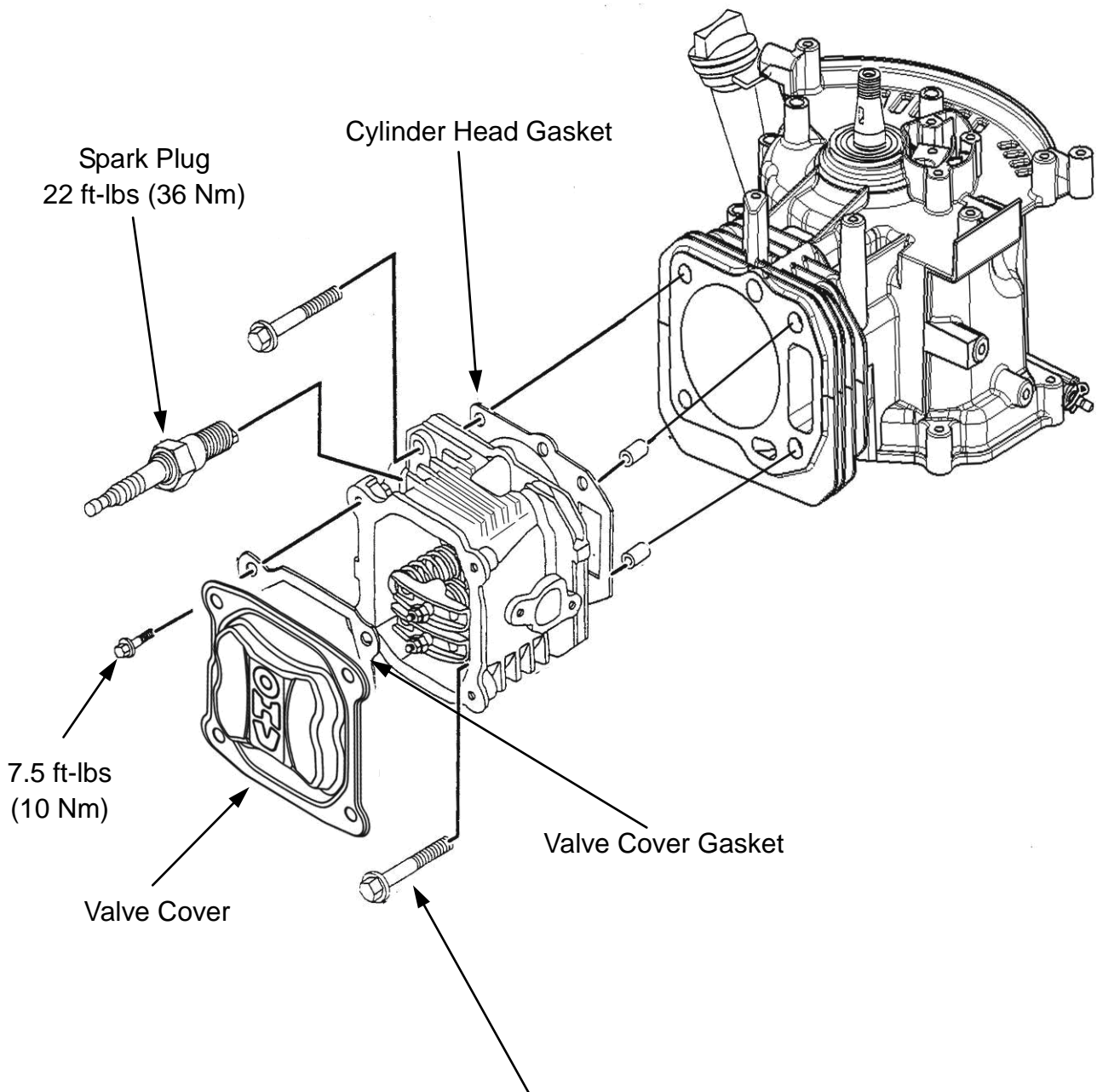
Carburetor Exploded View



Flywheel and Breather Exploded View and Service Info



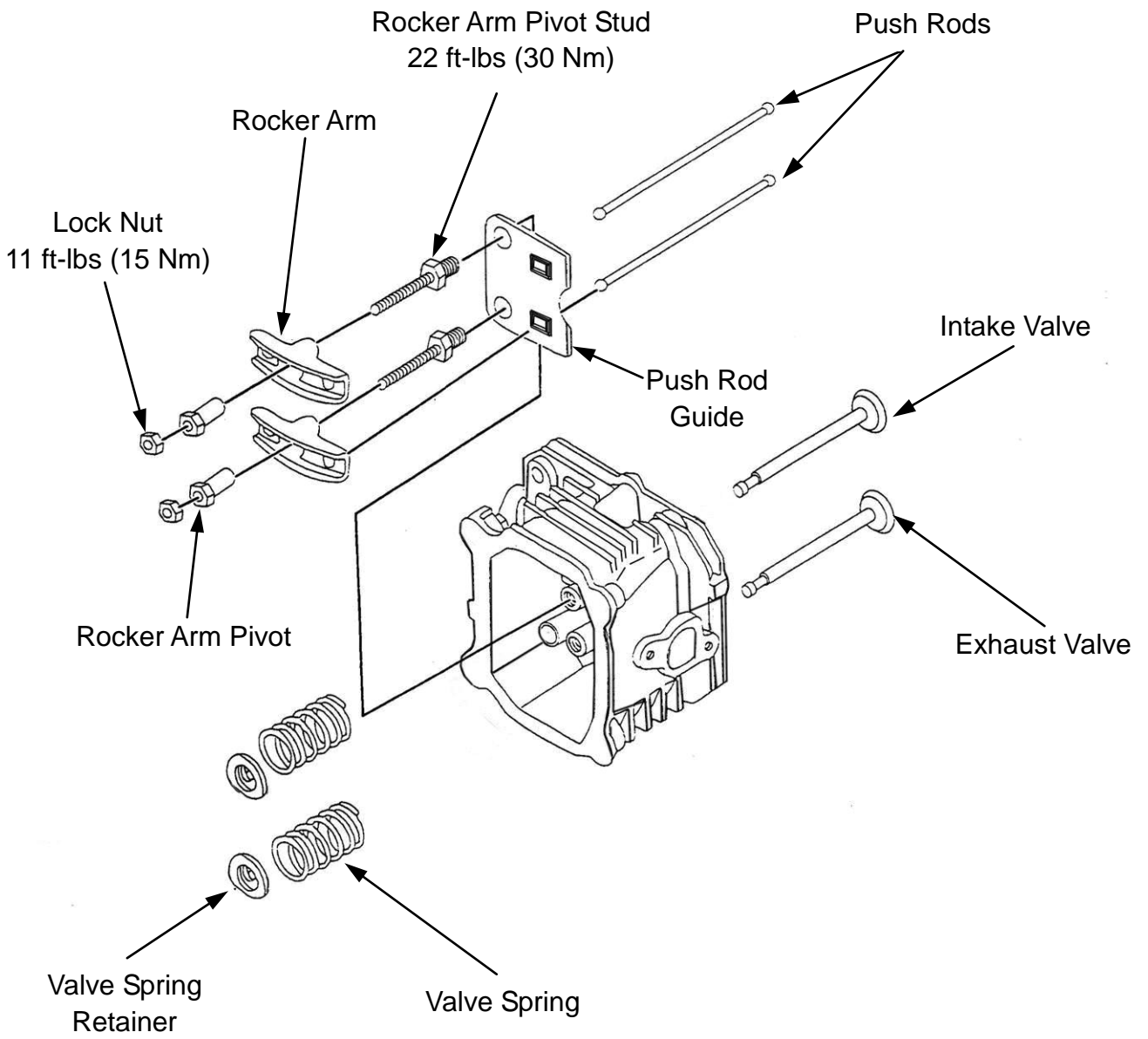
Cylinder Head Exploded View and Service Information



Cylinder Head Bolt Torque Sequence:

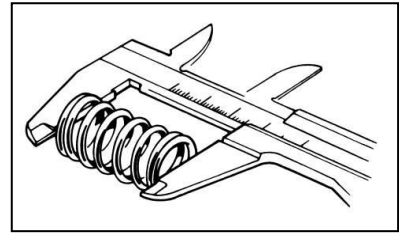
1. Initially Torque the (4) Cylinder Head Bolts in a Crisscross Pattern to **10 ft-lbs (14 Nm)**.
2. Evenly Torque the (4) Cylinder Head Bolts in a Crisscross Pattern to **25 ft-lbs (34 Nm)**.

Intake and Exhaust Valve Exploded View and Service Information



Valve Spring Free Length Specification

Standard	Service Limit
1.2007" (30.5 mm)	1.1417" (29.0 mm)



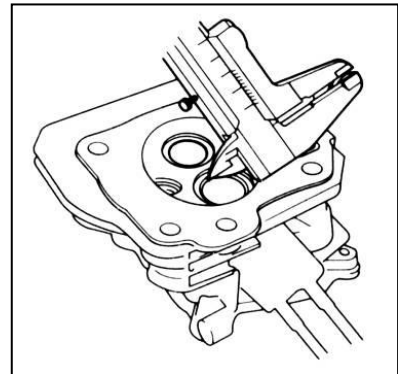
NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

Valve Seat Width Inspection

Remove carbon deposits from the combustion chamber. Inspect the valve seats for pitting or other damage.

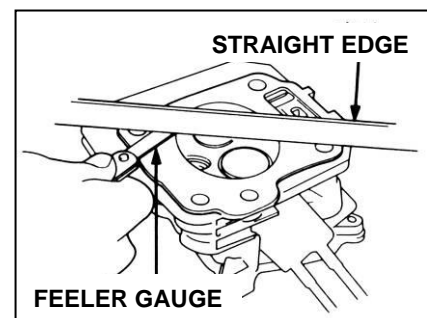
Valve Seat Width Specification:

Standard	Service limit
0.0314" (0.8 mm)	0.0787" (2.0 mm)



Cylinder Head Warp Inspection

- Remove carbon deposits from the combustion chamber.
- Clean off any gasket material from the cylinder head surface.
- Check the spark plug hole and valve areas for cracks.
- Check the cylinder head for warpage with a straight edge and a feeler gauge as shown.



Service Limit	0.00393" (0.10 mm)
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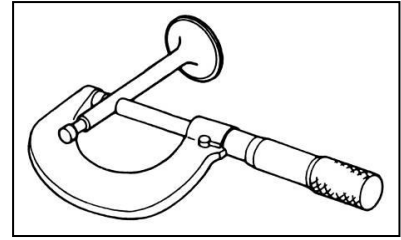
NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

Valve Stem Inspection

Inspect each valve for face irregularities, bending or abnormal wear.

Valve Stem Diameter Specification

	Standard	Service Limit
Intake	0.2157" (5.48 mm)	0.2093" (5.318 mm)
Exhaust	0.2141" (5.44 mm)	0.0047" (0.12 mm)



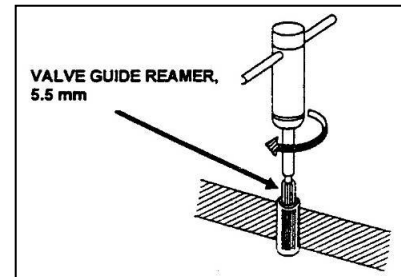
NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

Valve Guide Inspection

Ream the exhaust valve guide to remove any carbon deposits before measuring.

Valve Guide ID Specification:

Standard	Service limit
0.2165" (5.50 mm)	0.2193" (5.572 mm)



NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

Valve Stem to Guide Clearance

Subtract each valve stem OD from the corresponding guide ID to obtain the guide-to-stem clearance.

	Standard	Service limit
Intake	.00039" - 0.0013" (0.01-0.034 mm)	.00393" (0.10 mm)
Exhaust	0.0019 - 0.0027" (0.05-0.070 mm)	0.0047" (0.12 mm)

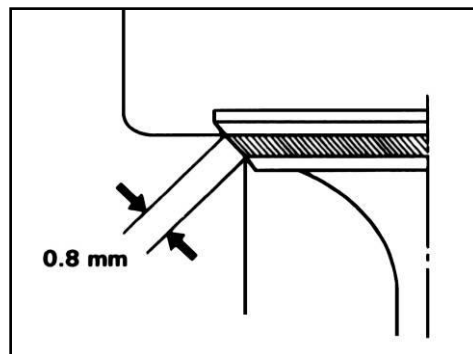
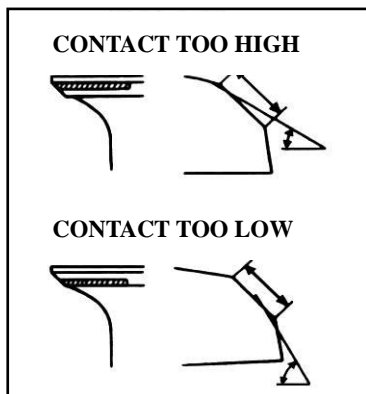
NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

Valve Seat Reconditioning

1. Thoroughly clean the combustion chamber and valve seats to remove carbon deposits.
2. Apply a light coat of Prussian Blue or erasable felt-tipped marker ink to the valve faces.
3. Properly install valves, springs and keepers. Manually open the valves, then and snap them closed against their seats several times. Be sure the valves do not rotate on the seat. Remove the valve assemblies. The transferred marking compound will show any area of the seat that is not concentric.
4. Use a 45°cutter to remove enough material to produce a smooth and concentric seat. Follow the valve seat cutter manufacture's instructions. Turn the cutter clockwise, never counterclockwise. Continue to turn the cutter as you lift it from the valve seat.
5. Use a 30°~32° and 60° cutter to narrow and adjust the valve seat so that it contacts the middle of the valve face. The 30°~32° cutter removes material from the top edge. The 60° cutter removes material from the bottom edge. Be sure that the width of the finished valve seat is within specification.
6. Lap valves in accordance with valve lapping kit instructions.
7. Clean valve and seat of all lapping compound.

Valve Seat Width

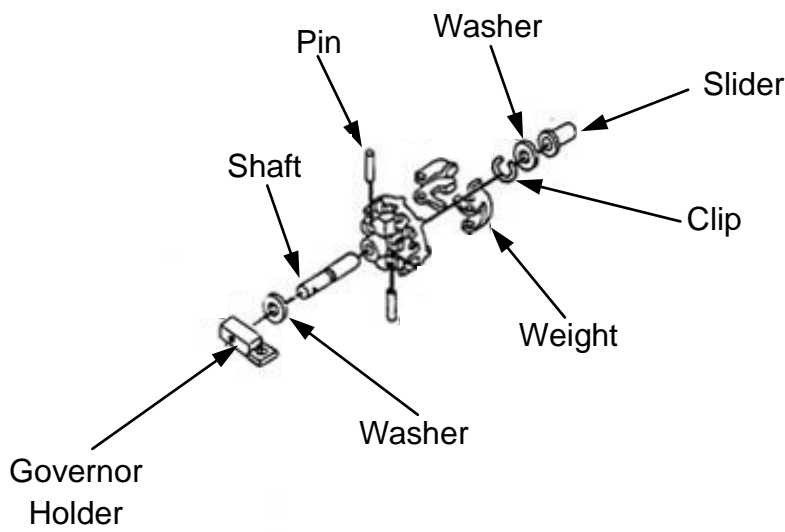
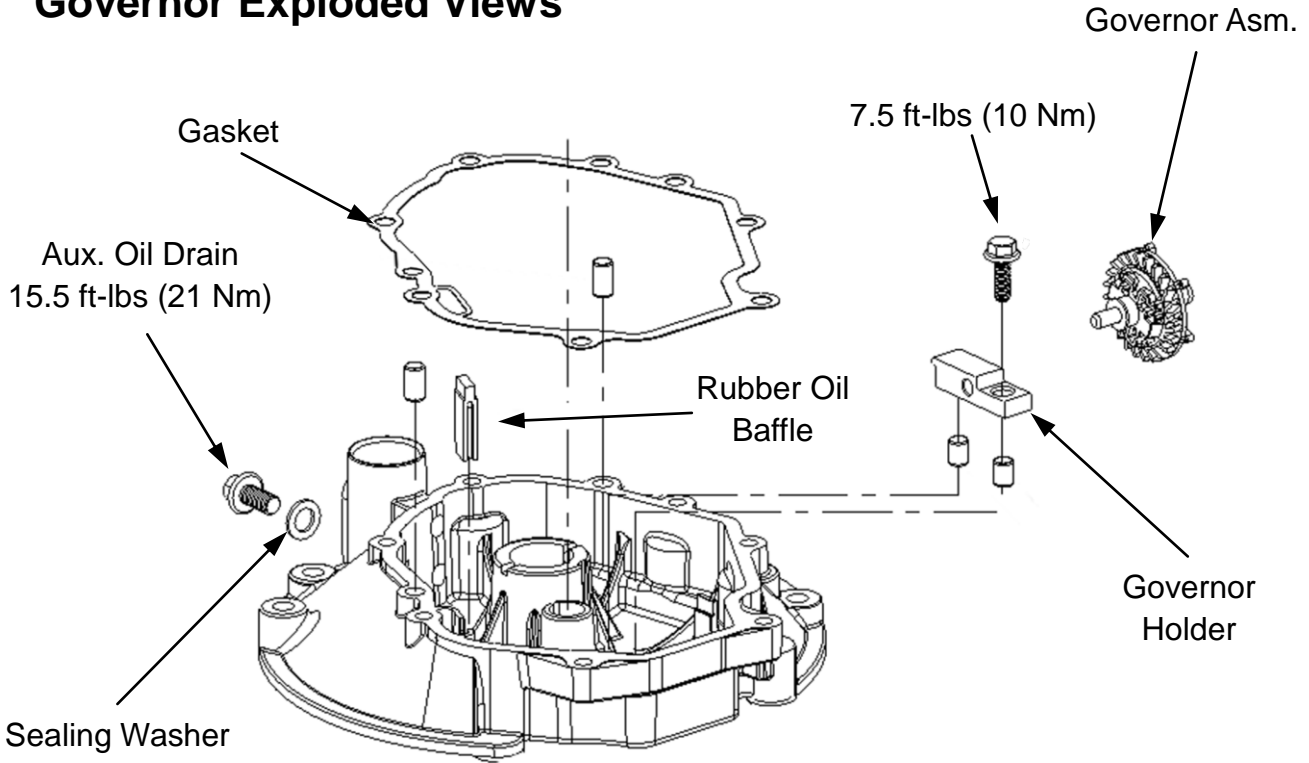
Standard	Service Limit
0.0314" (0.8 mm)	0.0787" (2.0 mm)



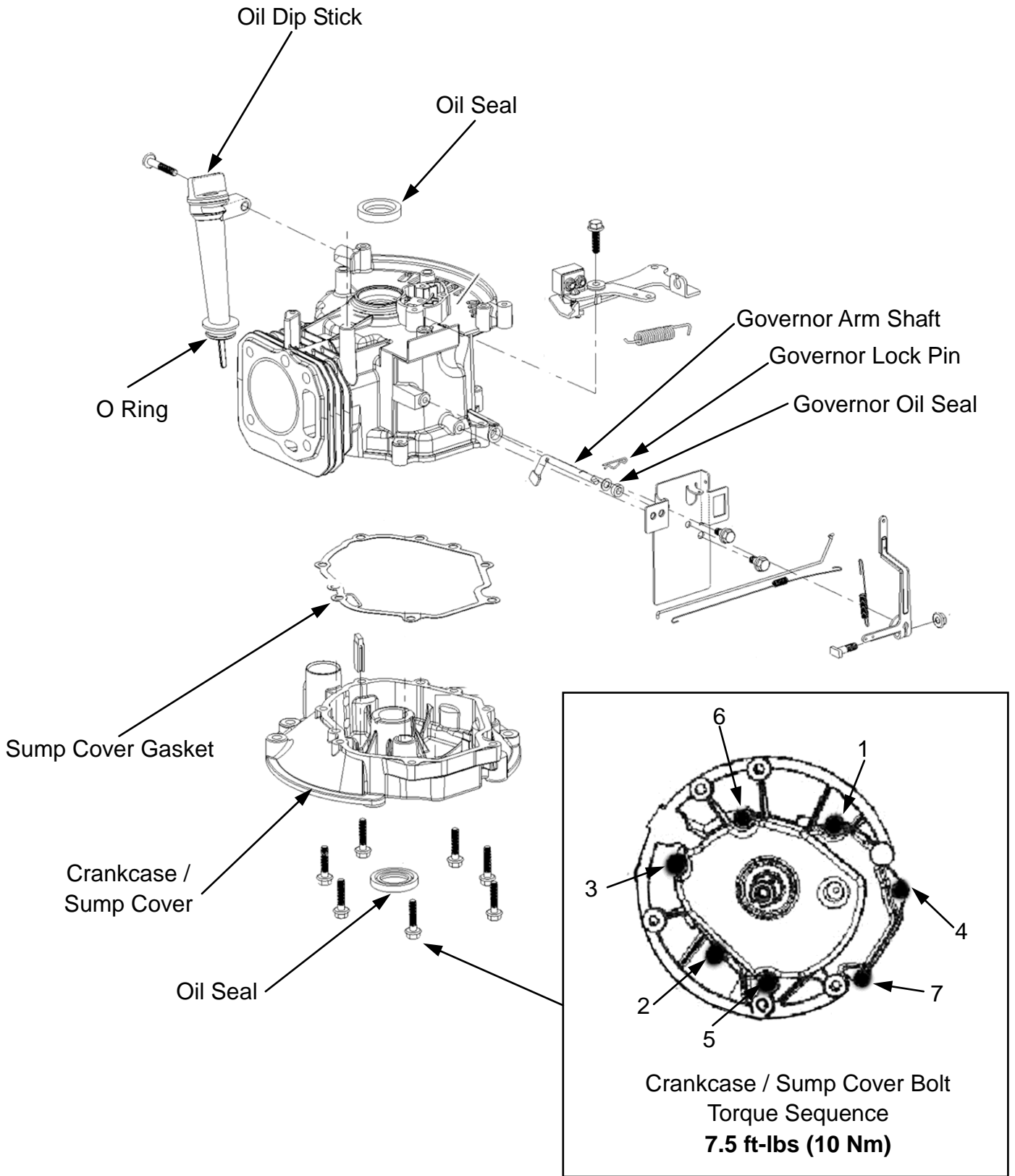
Engine Service – Lower End

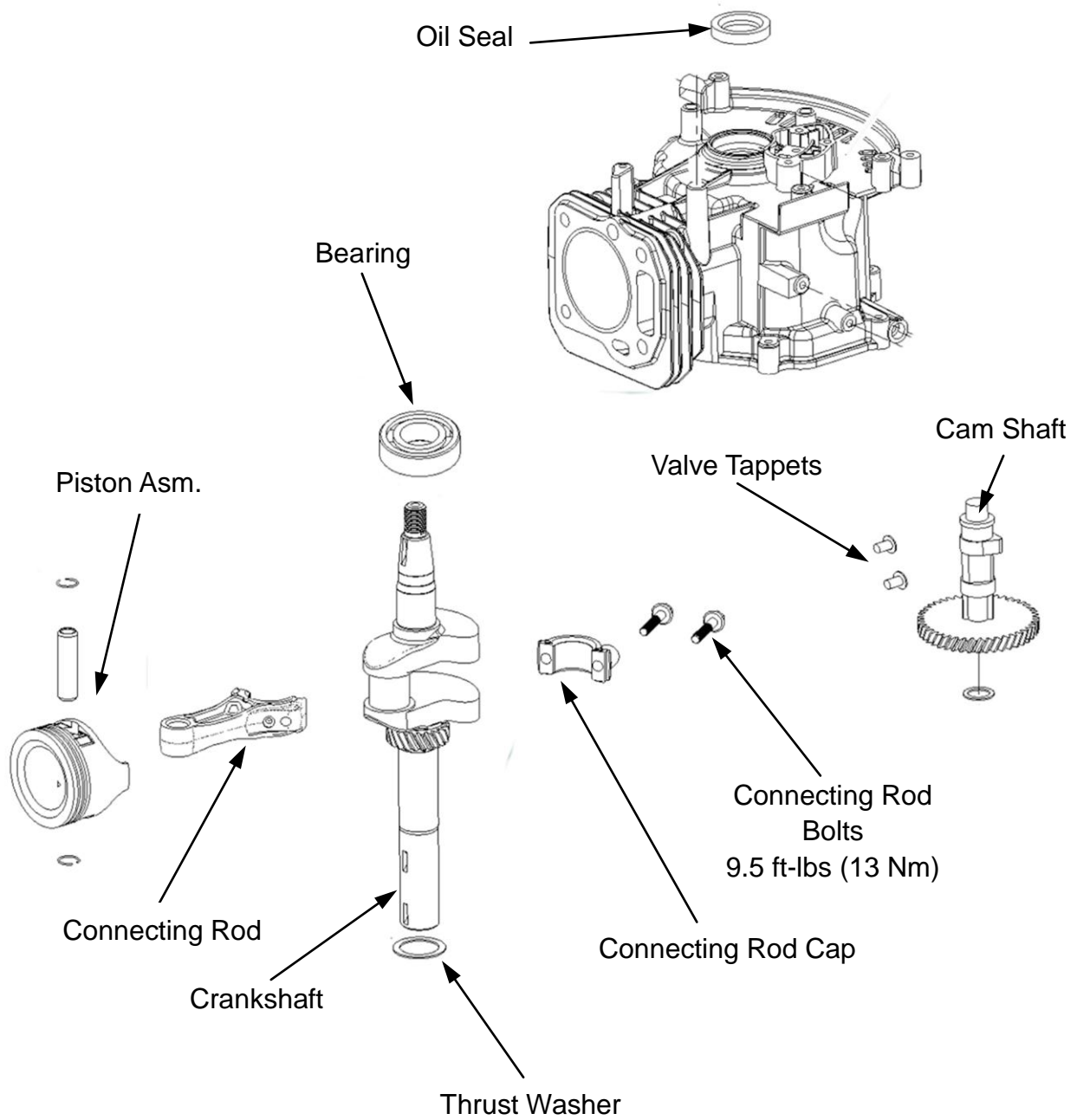
Crankcase / Governor Exploded View and Service Information

Governor Exploded Views

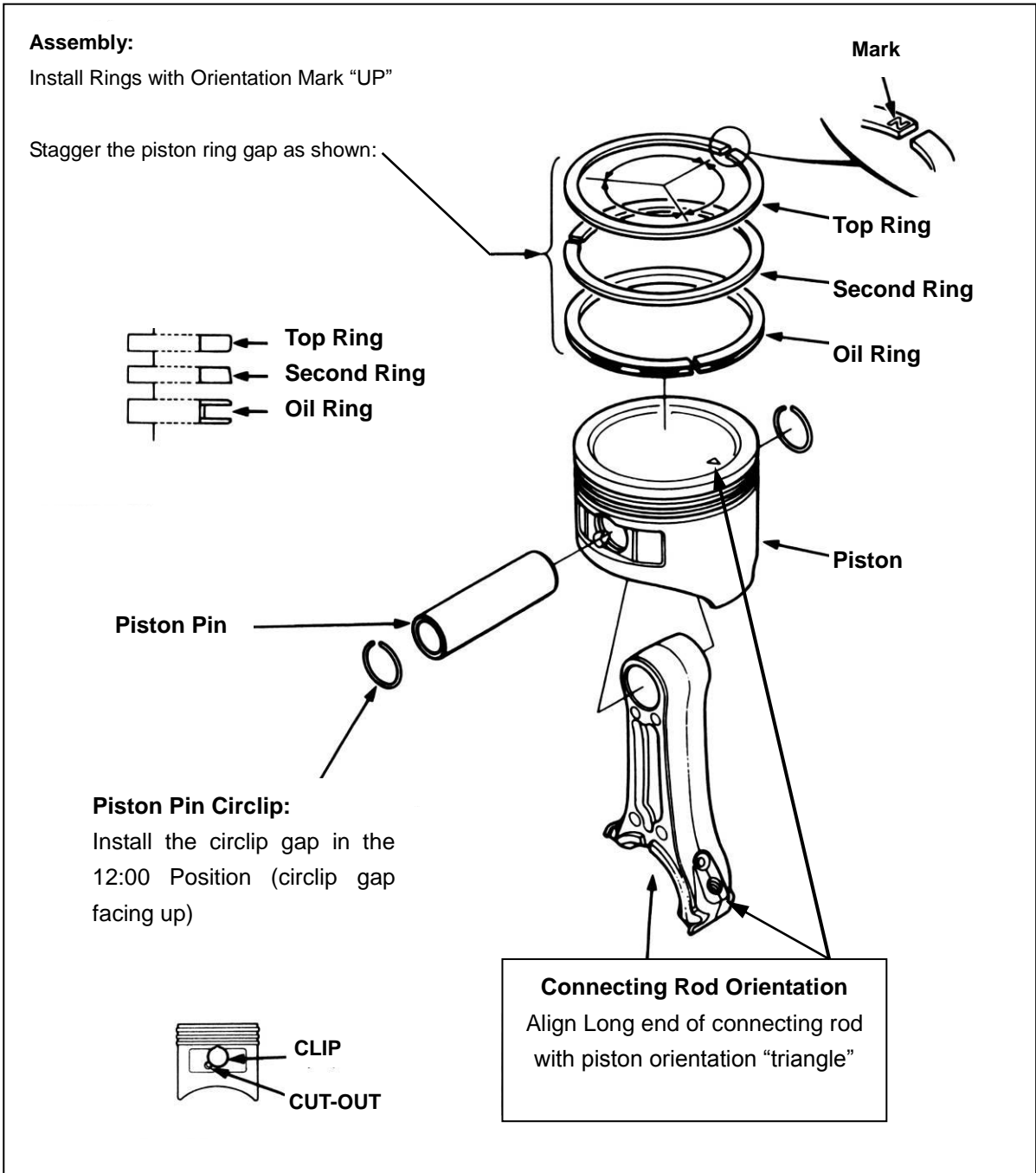


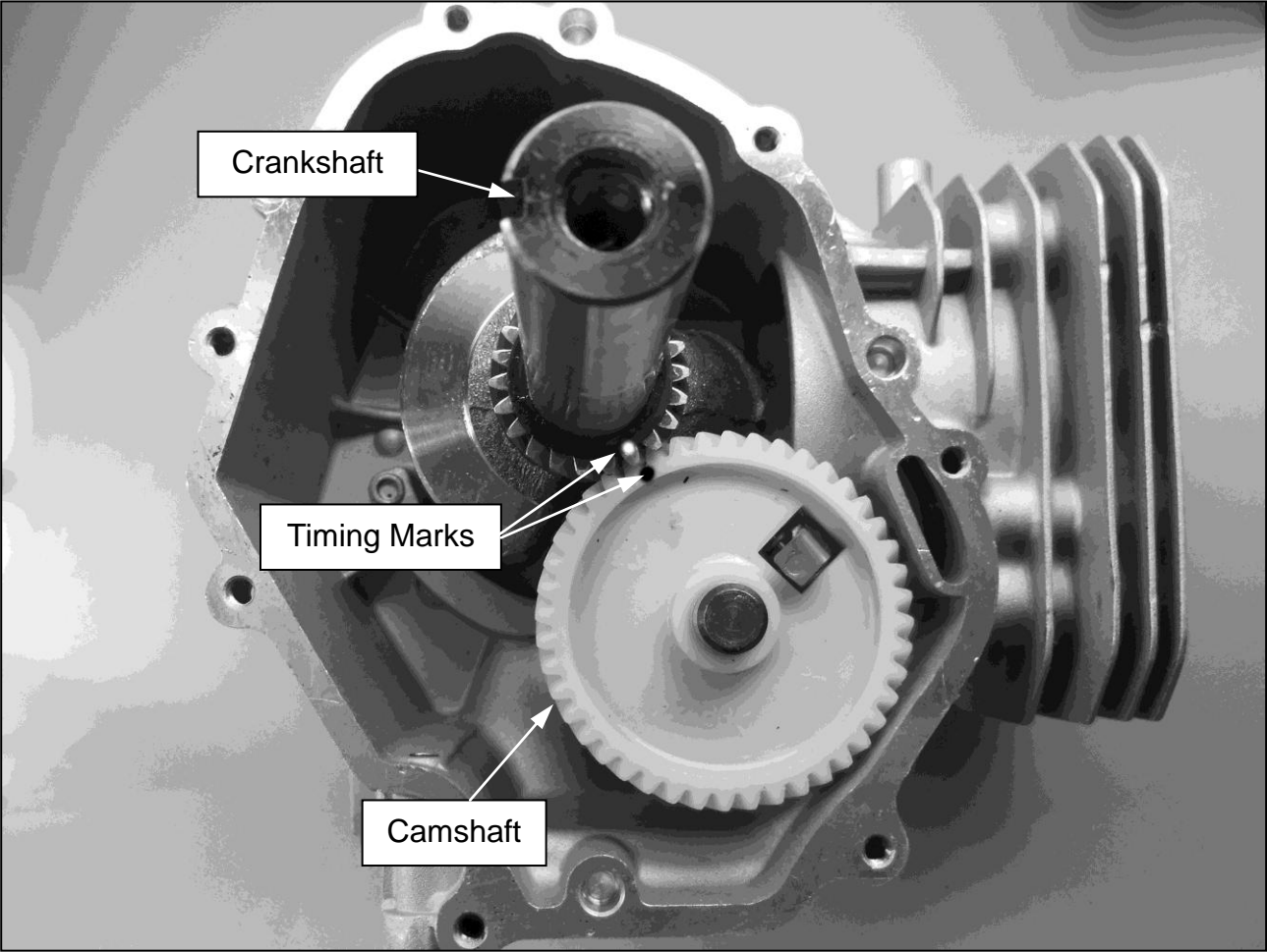
Crankcase Exploded View





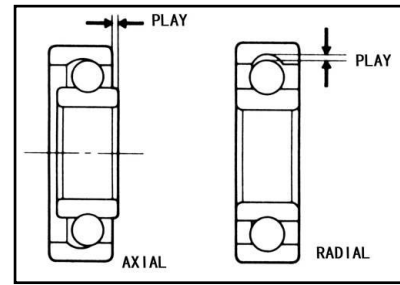
Piston Connecting Rod Exploded View and Service Information





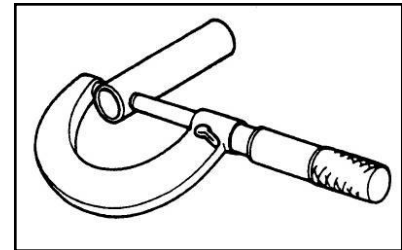
Crankshaft Bearing Free Play

1. Clean the bearing in solvent and dry it.
2. Spin the bearing by hand and check for play.



Piston Pin Outside Diameter

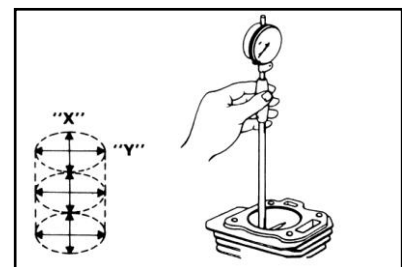
Standard	Service Limit
0.5118" (13.0 mm)	0.51" (12.954 mm)



NOTE: If this measurement is out of specification, complete engine replacement is required.
The only internal parts available for this engine are gaskets and seals.

Cylinder Taper and Out of Round

Inspect cylinder for taper and out of round with a bore gauge.
Measure in two different directions, front to back and side to side, on three different levels ($\frac{1}{2}$ " down from the top, middle and $\frac{1}{2}$ " up from the bottom).



Cylinder Taper and Out of Round Specifications

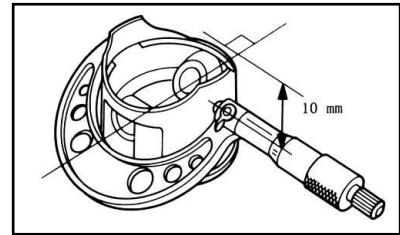
Standard	Service Limit
2.559" (65.0 mm)	2.566" (65.165 mm)

NOTE: If this measurement is out of specification, complete engine replacement is required.
The only internal parts available for this engine are gaskets and seals.

Piston Skirt Outside Diameter

Measure the piston skirt outside diameter 10mm from the skirt base and 90° to piston pin hole.

Standard	Service Limit
2.558" (64.985 mm)	2.553" (64.845 mm)



NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

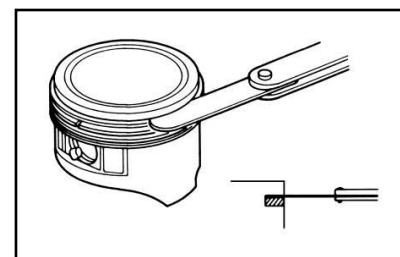
Piston to Cylinder Clearance Specification

Standard	Service Limit
0.00059 - 0.00196" (0.015-0.05 mm)	0.00472" (0.12 mm)

NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

Piston Ring to Groove Clearance

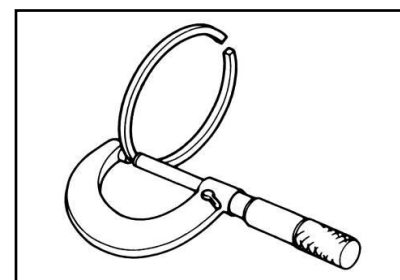
	Standard	Service Limit
Top/ Middle	0.00059 - 0.00177" (0.015-0.045 mm)	0.0059" (0.15 mm)



NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

Piston Ring Width

	Standard	Service Limit
Top/ Middle	0.059" (1.5 mm)	0.0539" (1.37 mm)

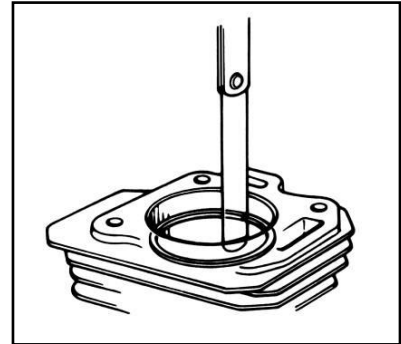


NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

Piston Ring End Gap

Standard	Service Limit
0.0078 - 0.0157" (0.2-0.4 mm)	0.0393" (1.0 mm)

Use the piston to position the rings squarely 1" down from the top of the cylinder.

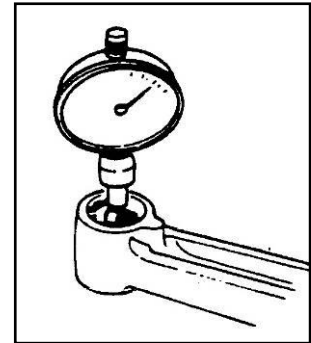


NOTE: If this measurement is out of specification, complete engine replacement is required.
The only internal parts available for this engine are gaskets and seals.

Connecting Rod Small End ID

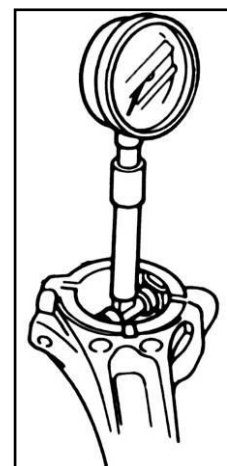
Standard	Service Limit
0.5125" (13.02 mm)	0.5145" (13.07 mm)

NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.



Connecting Rod Big End ID

Standard	Service Limit
1.0244" (26.02 mm)	1.0263" (26.07 mm)

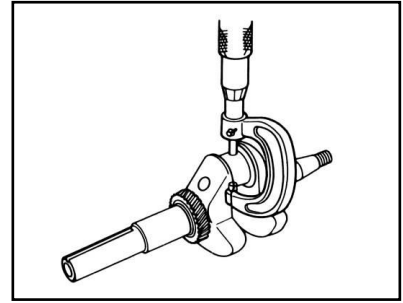


NOTE: If this measurement is out of specification, complete engine replacement is required.
The only internal parts available for this engine are gaskets and seals.

Crankshaft pin OD

Standard	Service Limit
1.0228" (25.98 mm)	1.0204" (25.92 mm)

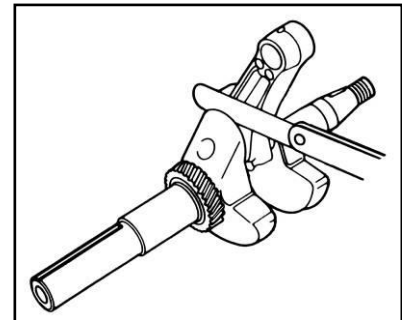
NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.



Connecting Rod Big End Side Clearance

Standard	Service Limit
0.00393 - 0.02755" (0.1-0.7 mm)	0.0433" (1.1 mm)

NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

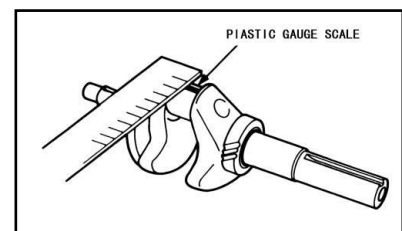


Connecting Rod Big End Oil Clearance

1. Clean oil from the crankshaft and connecting rod.
2. Use plastic gauge style measuring tool in accordance to the manufactures instructions to measure the oil clearance.

Connecting Rod Bolt Torque: **9.5 ft-lbs (13 Nm)**

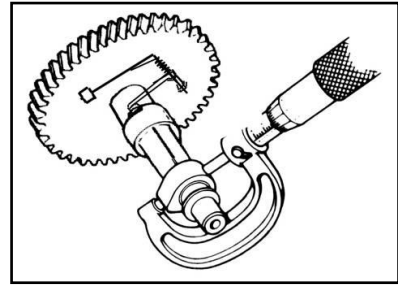
Standard	Service Limit
0.0015 – 0.0024" (0.040-0.063 mm)	0.0047" (0.120 mm)



NOTE: If this measurement is out of specification, complete engine replacement is required. The only internal parts available for this engine are gaskets and seals.

Camshaft Lobe Specifications

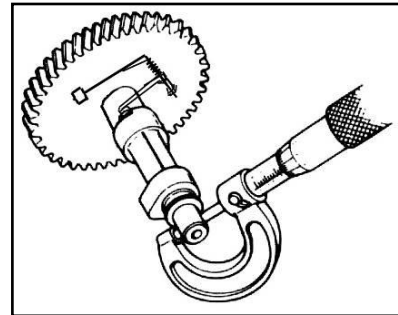
	Standard	Service Limit
Intake	1.0905" (27.7 mm)	1.0807" (27.45 mm)
Exhaust	1.0925" (27.75 mm)	1.0826" (27.50 mm)



NOTE: If this measurement is out of specification, complete engine replacement is required.
The only internal parts available for this engine are gaskets and seals.

Camshaft Journal OD

Standard	Service Limit
0.5505" (13.984 mm)	0.5478" (13.916 mm)



Check the camshaft bearing journal for scoring, wear or damage.

NOTE: Verify that the decompression mechanism moves freely.

NOTE: If this measurement is out of specification, complete engine replacement is required.
The only internal parts available for this engine are gaskets and seals.

Chapter 4 – Electrical System Information

4

Ignition / Charge Coil Gap Adjustment	38
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Ignition / Charge Coil Gap Adjustment



High Voltage Ignition Systems can be Dangerous - Use Caution when Servicing Ignition Systems

1. Install the coil and lightly tighten the mounting bolts.
2. Rotate engine so the coil is aligned with the magnet portion of the flywheel.
3. Insert the feeler gauge between the flywheel and coil.
4. Adjust the coil gap at both side of the coil.
5. Torque the coil mounting bolts to specification – **7.5 ft-lbs (10 Nm)**.

Ignition / Charge Coil Gap	.01" (0.254 mm)
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Ignition Coil Resistance Inspection

Primary Coil

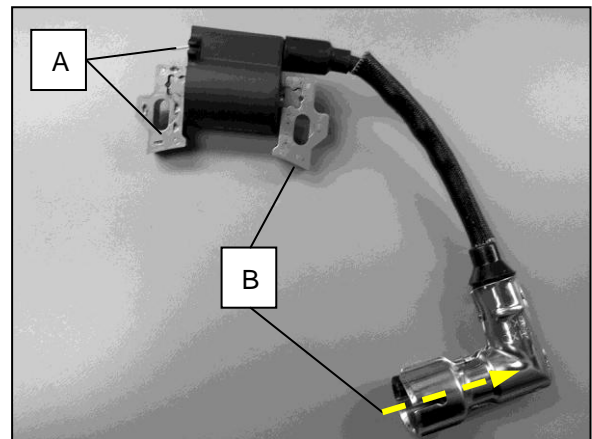
Place Ohm meter leads between the harness connection lead and the exposed metal coil leg.

A - Primary Coil Resistance	1.1-1.6 Ω
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Secondary Coil

Place Ohm meter leads between exposed metal coil leg and the spark plug terminal connection.

B - Secondary Coil Resistance	10.5 K Ω +/- 15%
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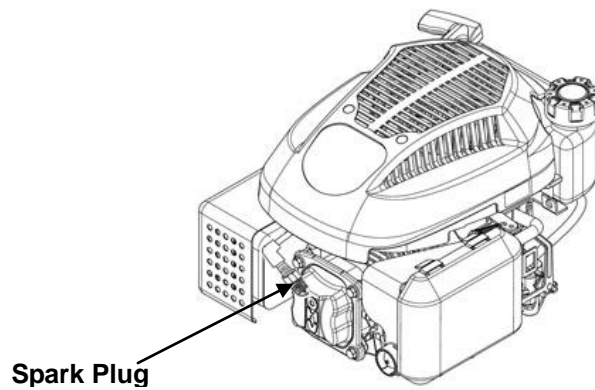
Spark Testing

4



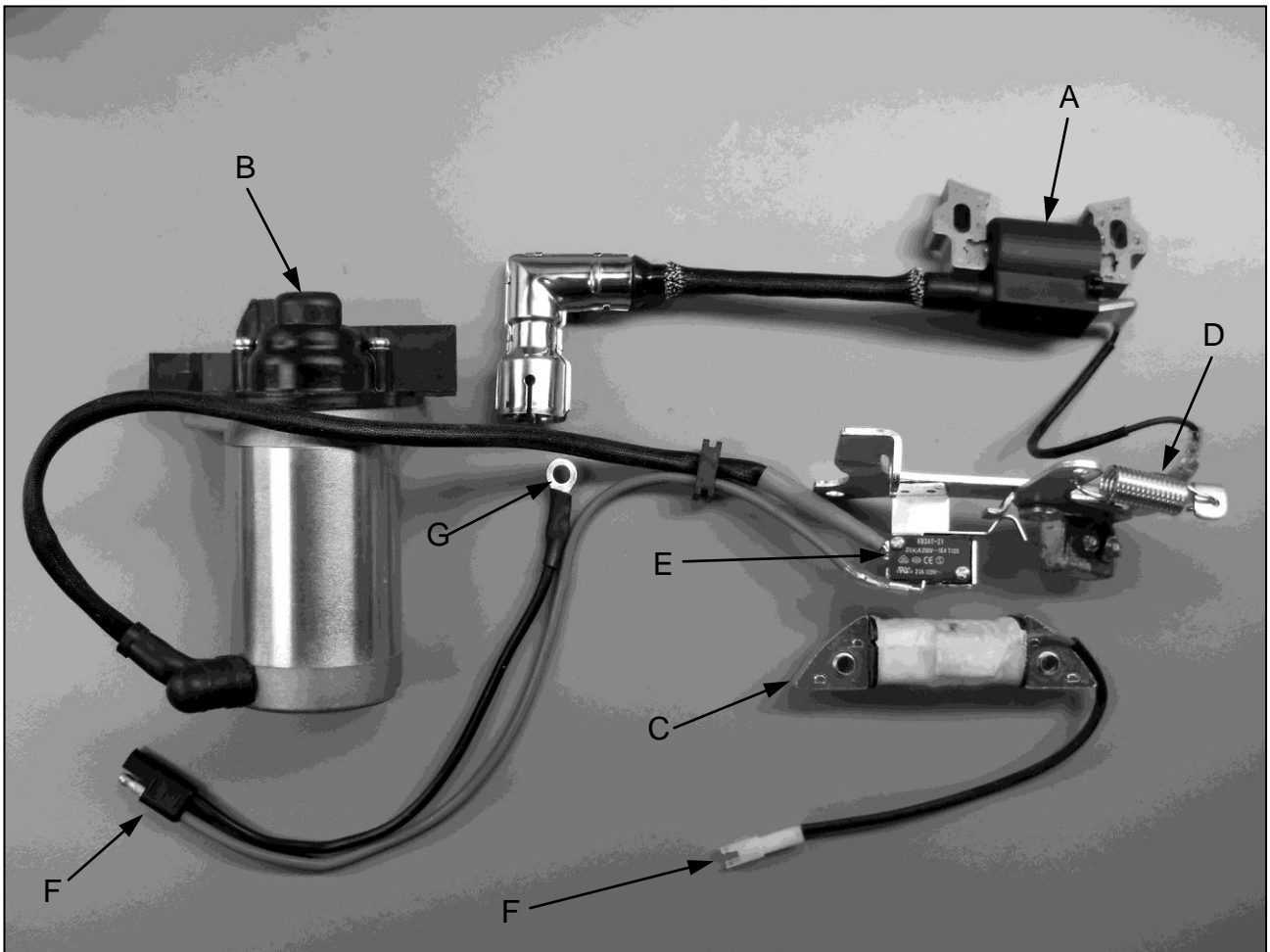
- **Fuel is Extremely Flammable** - Use Extreme Caution When Servicing the Fuel System
- **High Voltage Ignition Systems can be Dangerous** - Use Caution when Servicing Ignition Systems

1. Safely drain the fuel system and store fuel in an approved container.
2. Remove spark plug boot from the spark plug.
3. Remove the spark plug from the engine.
4. Connect the negative (-) electrode of the spark plug (threaded area) to ground (cylinder head cover).
5. Crank the engine and view the electrode gap. Spark should be present when engine is turning over.
6. Reinstall the spark plug and torque to specification - **22 ft-lbs (30 Nm)**.
7. Properly install the spark plug boot.



Electrical System Wiring (Electric Start Shown)

- A Ignition Coil
- B Starter Motor
- C Alternator
- D Brake / Kill Switch
- E Starter Interlock Switch
- F To Chassis Harness
- G To Ground



NOTES:



RESIDENTIAL PRODUCTS

Form Number: 492-9231