AC-1 ENGINE SERVICE MANUAL

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TORO®

AC-1 Engine

SERVICE MANUAL



ABOUT THIS MANUAL

This Service Manual was written expressly for the Toro AC-1 Four Stroke Engine. The Toro Company has made every effort to make the information in this manual complete and correct. We are hopeful you find this manual a valuable addition to your service shop. If you have any questions or comments regarding the information inside, please contact us at the following address:

The Toro Company

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ENGINE SPECIFICATIONS

Item	
Engine Type	Air-cooled, 4-Cycle
Displacement	26.2 cc
Stroke	1.28 in (32.51 mm)
Average Compression	115-125 lbs (52-57 kg)
Piston Rings Side Clearance	0.004 in max (0.101 mm)
Top Piston Ring Width	0.040 in (1.01 mm)
Top Piston Ring End Gap	0.024 in (0.60 mm)
Middle Piston Ring Width	0.040 in (1.01 mm)
Middle Piston Ring End Gap	0.024 in (0.60 mm)
Oil Piston Ring Width	0.099 in (2.48 mm)
Oil Piston Ring End Gap	0.024 in (0.60 mm)
Rocker Arm to Valve Clearance	0.003-.006 in (0.076-0.152 mm)

FUEL AND LUBRICATION

Item	
Approx Fuel Tank Capacity	18 oz (530 ml)

IGNITION

Item	
Ignition Type	Electronic/with Governor
Ignition Module Air Gap	0.008-0.012 in. (0.201-0.305 mm)
Spark Plug Type	Champion® RDZ19H
Spark Plug Gap	0.025 in (0.635 mm)

TORQUE SPECIFICATIONS

Item	
Carburetor/Air Filter Base Plate Mounting Screws	30-35 in•lb (3.3-3.9 N•m)
Carburetor Mount Insulator Screws	30-35 in•lb (3.3-3.9 N•m)
Clutch Housing/Drum Assembly Screws	35-45 in•lb (3.9-5.0 N•m)
Clutch Rotor	140-150 in•lb (15.8-16.9 N•m)
Cylinder Head Hex Nuts	35-40 in•lb (3.9-4.4 N•m))
Cylinder Screws	35-40 in•lb (3.9-4.4 N•m)
Spark Plug	100-110 in•lb (11.2-13.5 N•m)
Rear Engine Cover Screw	30-35 in•lb (3.3-3.9 N•m)
Front Engine Cover Screws	15-20 in•lb (1.7-2.2 N•m)

TORQUE SPECIFICATIONS (cont)

Item	
Top Engine Cover Screw	20-25 in•lb (2.5-3.0 N•m)
Fuel Tank Bracket Screws	25-35 in•lb (2.8-3.3 N•m)
Ignition Module Mounting Screws	30-40 in•lb (3.3-4.4 N•m
Spark Arrester Screen Screw	15-20 in•lb (1.7-2.2 N•m)
Muffler Mounting Bolts	40-45 in•lb (4.5-5.0 N•m)
Starter Pulley Retainer Screws	15-20 in•lb (1.7-2.2 N•m)
Oil Pan Screws	35-45 in•lb (3.9-4.9 N•m)
Rocker Arm Cover Screw	20-30 in•lb (2.2-3.3 N•m)
Fan Housing Screws	40-45 in•lb (4.5-5.0 N•m)
Lower Handle Retainer Screw	15-20 in•lb (1.7-2.2 N•m)
Upper Handle Screws	15-20 in•lb (1.7-2.2 N•m)

SAFETY WARNINGS AND NOTES

The purpose of safety symbols is to attract your attention to possible dangers. The safety symbols and the explanations with them, deserve your careful attention and understanding. The safety warnings do not by themselves eliminate any danger. The instructions or warnings they give are not substitutes for proper accident prevention measures. Some general warnings follow.

WARNING: Spring Under Tension!

The rope starter on these engines contains a flat wire spring that is under tension.Wear eye and hand protection when replacing worn or broken spring, in case it should uncoil as it is handled. Allow spring tension to be completely relieved and make sure pulley disengages from spring before removing the pulley retainers, pulley, and starter spring from housing.

WARNING: Electrical Shock!

Never touch electrical wires or components while the engine is running. They can be sources of electrical shock.

WARNING: Hot Surfaces!

The muffler, cylinder, crankcase, trimmer cutting head, and other engine surfaces get extremely hot from operation. These surfaces remain hot for a short period of time after the engine is stopped. To prevent severe burns, allow the engine to cool completely before servicing.

WARNING: Explosive Fuel!

Gasoline may be present in the fuel tank, carburetor, fuel lines, or crankcase. Gasoline is extremely flammable and its vapors can explode if ignited. Keep sparks, flames, and other sources of ignition away from the engine. Do not smoke while servicing the engine. Never use gasoline as a cleaning agent.

Store gasoline only in approved containers,in well-ventilated, unoccupied buildings, away from sparks, flames, or other sources of ignition. Do not fill the fuel tank while the engine is hot or running, since spilled fuel could ignite if it comes in contact with hot parts or sparks from ignition. Do not start the engine near spilled fuel. Do not smoke while handling gasoline or filling the fuel tank.

WARNING: Cracked Or Broken Flywheel Fins Can Become Projectiles!

Be careful not to crack or break any flywheel cooling fins. They could fly off during operation. If cooling fins are cracked or broken, replace the flywheel.

PRODUCT IDENTIFICATION NUMBERS

When ordering parts, or in any communication involving an engine or product, always give the:

- Model Number, and
- Serial Number

These numbers are located on a decal (or decals) affixed to the unit (Figure 1-1). The identification decal(s) will be located on the metal boom. The actual location will vary depending on the type of product.



Figure 1-1. Product Identification Decal 1.0762.005

OIL AND FUEL RECOMMENDATIONS

WARNING: Explosive Fuel!

Gasoline is extremely flammable and its vapors can explode if ignited. Store gasoline only in approved containers, in well-ventilated, unoccupied buildings, away from sparks or flames. Do not fill the fuel tank while the engine is hot or running, since spilled fuel could ignite if it comes in contact with hot parts or sparks from ignition. Do not start the engine near spilled fuel. Do not smoke while handling gasoline. Never use gasoline as a cleaning agent.

NOTE: READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO START OR OPERATE THIS UNIT. Using old oil or fuel can cause engine damage. This type of damage will void the engine warranty

Recommended Oil Type

Toro 4-cycle oil is recommended for use in this engine (Figure 1-2). If another brand 4-cycle oil is used, use a ***high quality SAE 30 weight oil of API (American Petroleum Institute) service class SG, SF, SH.***

Using the proper type and weight of oil in the oil pan is extremely important. Check the oil before each use and change the oil regularly. Failure to use the correct oil, or using dirty oil, can cause premature engine wear and failure.

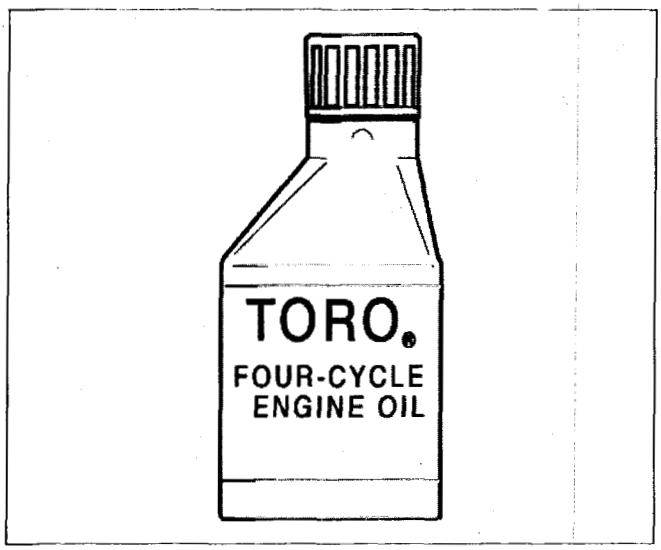


Figure 1-2. Recommended Oil Type. 3.6051.002

Checking the Oil

The importance of checking and maintaining the proper oil level in the oil pan cannot be overemphasized. Check the oil **BEFORE EACH USE** as follows:

1. Make sure the engine is stopped, level and is cool so the oil has had time to drain into the oil pan (Figure 1-3 for straight shaft units or Figure 1-4 for curved shaft units).

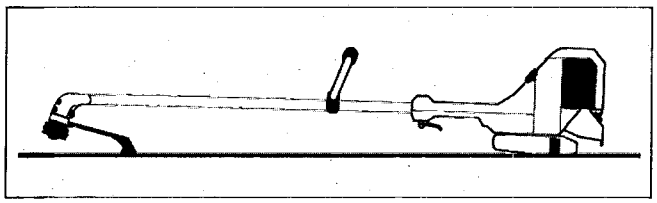


Figure 1-3. Level Engine - Straight Shaft Unit. 3.6051.020

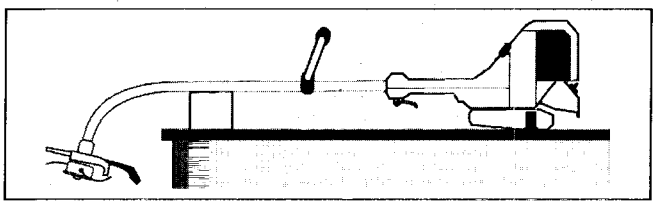


Figure 1-4. Level Engine - Curved Shaft Unit. 3.6051.004

2. To keep dirt, grass clippings, etc. out of the engine, clean the area around the oil fill plug before removing it.

3. Remove the oil fill plug; wipe the oil off. Reinsert it into the crankcase. Thread the oil fill plug into the oil pan.

4. Remove the oil fill plug and check the oil level (Figure 1-5).

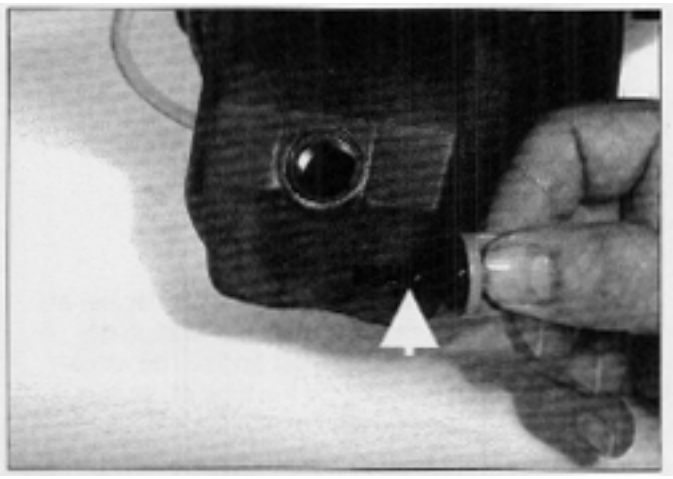


Figure 1-5. Removing Oil Fill Plug. 2.6051.005

The oil level should be up to the top of the dipstick (Figure 1-5).

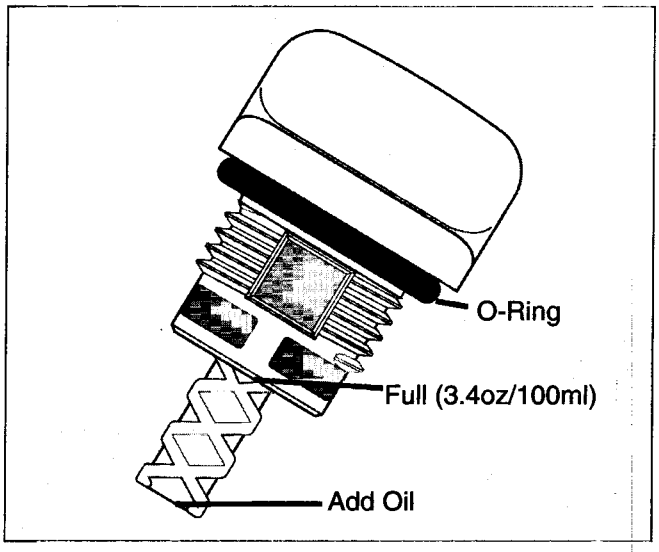


Figure 1-6. Oil Level 3.6051.006

5. If the oil level is low, add the oil to the top of the dipstick (see Figure 1-6). Always check the level with the dipstick before adding more oil.

Changing the Oil

For a new engine, change the oil after the **first 10 hours** of operation. Thereafter, change the oil after **every 25 hours** or before storing the unit for an extended period of time.

Change the oil while the engine is still warm. The oil will flow freely and carry away more impurities.

Change the oil as follows:

1. Remove the oil fill plug.

2. Pour the oil into a container by tipping the trimmer in a vertical position (Figure 1-7). Be sure to allow ample time for complete drainage. Dispose of oil properly.

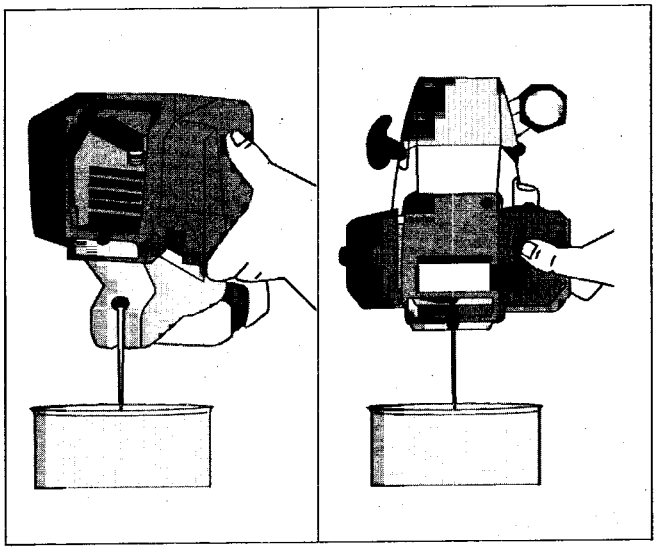


Figure 1-7. Pouring Oil. 3.6051.007

3. Fill the oil pan, with 3.4 oz (100 ml) of new oil of the proper type, to the top of the dipstick.

4. Reinstall the oil fill plug and tighten securely.

NOTE: Make sure the O-ring is in place on the oil fill plug when checking and changing the oil.

NOTE: To prevent extensive engine wear or damage, always maintain the proper oil level in the crankcase. Never operate the engine with the oil level below the bottom of the dipstick

Recommended Fuel Type

Use clean, fresh, regular grade unleaded gasoline less than 60 days old.

NOTE: Alcohol blended fuel absorbs moisture (water). As little as 1% moisture in the fuel can cause fuel to separate and form acids when stored.

If these types of fuel must be used, use fresh fuel (less than 60 days old).

Definition of Blended Fuels

Today's fuels are often a blend of gasoline and one or more oxygenates such as ethanol, methanol or MTBE (ether).

Use of Blended Fuels

If you choose to use a blended fuel or its use is unavoidable, the following precautions are recommended.

1. Always use fresh fuel.

2. Use the special additive Toro Gas Conditioner/ Stabilizer, STA-BIL® or an equivalent.

3. Drain the fuel tank and run the engine dry before storing the unit.

Use of Fuel Additives

The use of fuel additives, such as Toro Gas Conditioner/Stabilizer, STA-BIL Gas Stabilizer or an equivalent, will inhibit corrosion and minimize the formation of gum deposit. Add 0.8 oz (23 ml) per gallon of fuel per instructions on the container. NEVER add fuel additives directly to the unit's fuel tank.Using a fuel additive can keep fuel fresh for up to 60 days.

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STARTING/STOPPING INSTRUCTIONS

To Start the Engine

1. Set the unit on the ground, check the oil level in the oil pan,and put the ignition switch in the "RUN" (I) position (Figure 1-8).

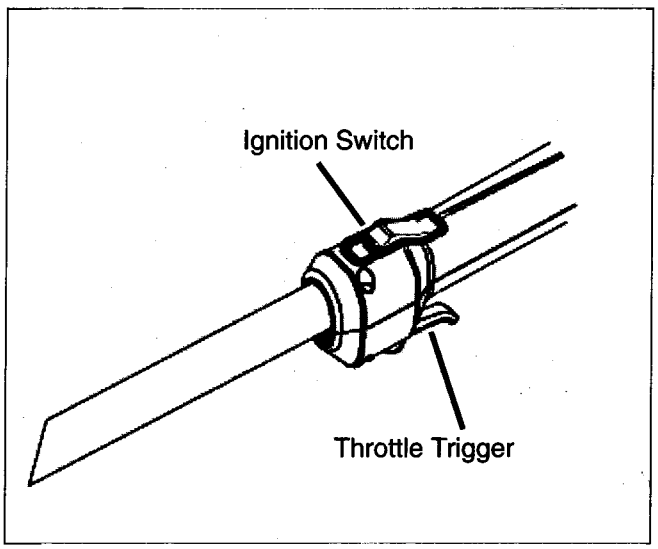


Figure 1-8. Ignition Switch and Throttle Trigger. 3.6051.008

2. FULLY PRESS AND RELEASE the primer bulb 5 to 7 times (Figure 1-9).

NOTE: For a warm engine, go directly to step 5 (place the choke lever directly in the "PARTIAL" choke position).

3. Place the choke lever in the FULL "CHOKE" position (Figure 1-9).

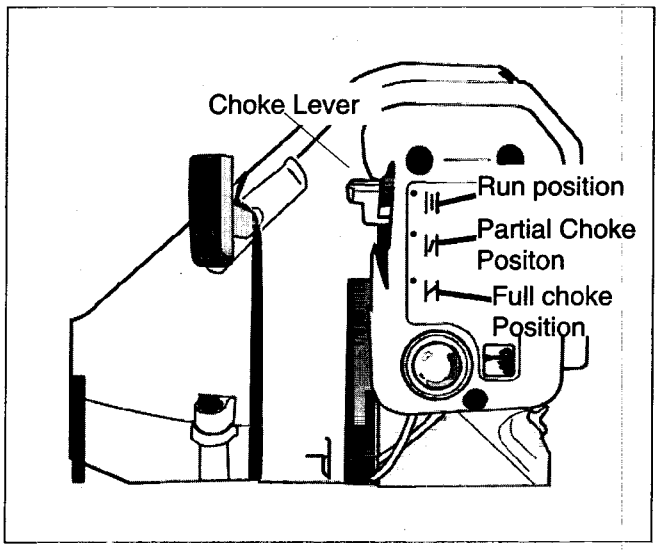


Figure 1-9. Primer Bulb, Choke Lever and Choke Positions. 3.6051.009

4. With the unit on the ground, pull the starter rope quickly until the engine sounds like it wants to run (no more than 5 pulls) (Fig. 1-10).

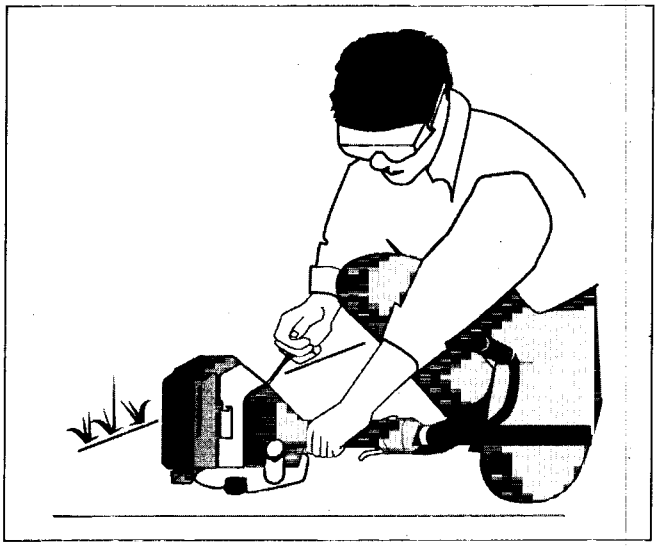


Figure 1-10. Pulling the Starter Rope. 3.6051.010

5. Place the choke lever in the "PARTIAL" choke position (see Figure 1-9 on page 1.4). Pull the starter rope quickly until the engine starts (no more than 5 pulls).

6. If the engine does not start, repeat steps 2 to 8.

7. Run the engine for 30 seconds, with the throttle lever fully squeezed (see Figure 1-6), to warm up. Place the choke lever in the "RUN" position (Figure 1-9).

NOTE: In colder weather, run the engine for 2 to 3 minutes to warm up.

To Stop the Engine

Place the ignition switch in the "STOP" position (see Figure 1-8).

SERVICE / MAINTENANCE INSTRUCTIONS

Air Filter

NOTE: CLEAN AND RE-OIL THE AIR FILTER EVERY 10 HOURS OF OPERATION. The air filter is one of the most important areas to maintain. If it is not maintained as follows, poor engine performance and severe engine damage can result.

1. Remove the three (3) screws on the carburetor/air filter cover assembly. Remove the air filter cover and air filter. Refer to *Part 3 - Engine Disassembly.*

2. Wash the air filter in detergent and water (Figure 1-11). Rinse the air filter thoroughly in clean water and allow it to dry.

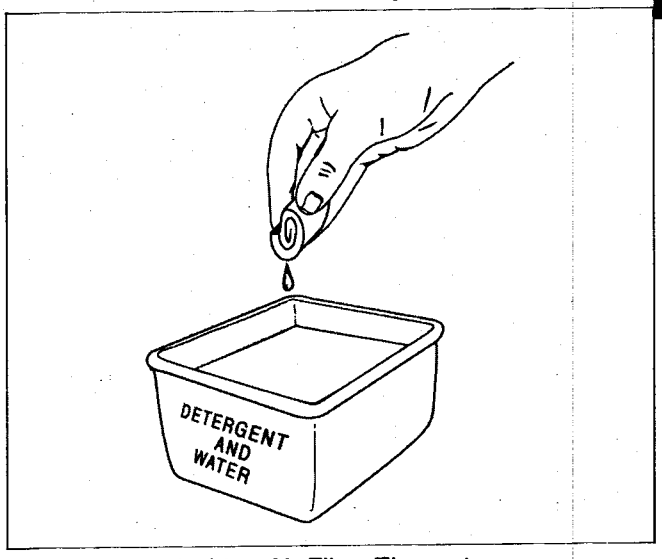


Figure 1-11. Washing Air Filter Element. 3.6051.011

3. Apply clean SAE 30 oil to the air filter (Figure 1-12).

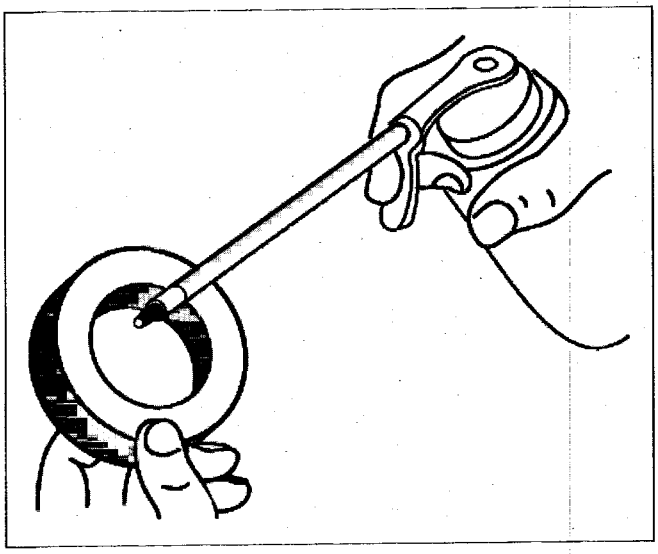


Figure 1-12. Oiling Air Filter Element. 3.6051.012

4. Squeeze the air filter to ensure that the oil is spread throughout the entire filter (Figure 1-13).

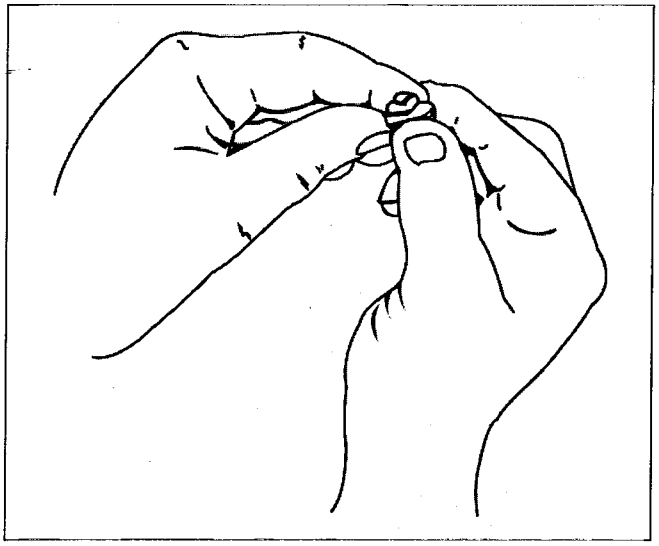


Figure 1-13. Squeezing Excess Oil from Air Filter Element. 3.6051.013

5. Reinstall the air filter in the carburetor/air filter base. Refer to *Part 5 - Engine Reassembly.*

Spark Plug

Use a Champion RDZ19H spark plug. Every **50 hours** of operation, remove the spark plug, check its condition, and reset the gap or replace with a new plug as necessary. Allow the engine to cool before removing the spark plug.

WARNING: Electrical Shock!

Never touch electrical wires or components while the engine is running. They can be sources of electrical shock.

1. Before removing the spark plug, clean the area around the base of the spark plug to keep dirt and debris out of the engine.

2. Disconnect the spark plug wire and remove the spark plug from engine.

3. Inspect the spark plug for carbon buildup and clean if necessary. Replace the plug if it is badly burnt or if reuse is questionable.

NOTE: Do not clean the spark plug in a machine which uses abrasive grit. Some grit could remain on the spark plug and enter the engine causing extensive damage.

4. Check the spark plug gap using a wire feeler gauge. Set the gap to **0.025 in (0.635 mm)**(Figure 1-14).

5. Reinstall the spark plug and torque to **100-110 in•lb (11.3-12.3 N•m)**.

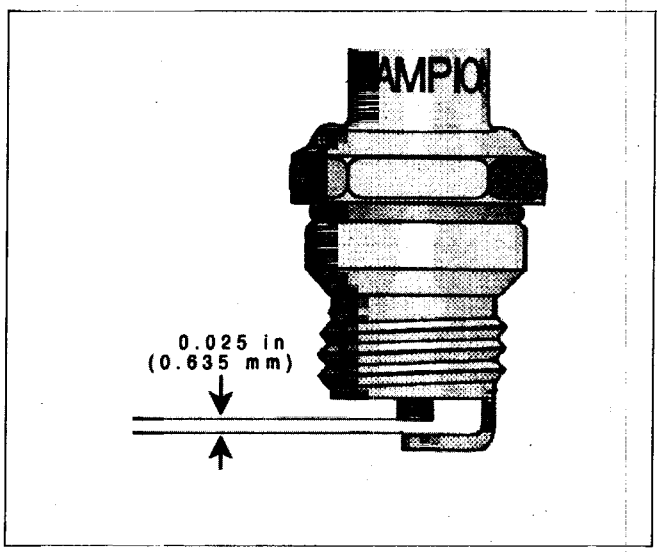


Figure 1-14. Spark Plug Gap. 3.6051.014

Carburetor Adjustment

These engines are equipped with a diaphragm-type carburetor. The carburetor has been carefully calibrated at the factory. In most cases, no further adjustment will be required.

The condition of the air filter is very important to the operation of the trimmer. A dirty air filter will restrict the air flow to the carburetor. This in turn upsets the fuel-air mixture in the carburetor. The resulting symptoms are often mistaken for an out-of-adjustment carburetor. Therefore, check the condition of the air filter before adjusting the carburetor. Refer to "Air Filter" Service/Maintenance Instructions.

If the following conditions are experienced, it may be necessary to adjust the carburetor.

- The engine will not idle
- The engine hesitates or stalls on acceleration.
- The loss of engine power, which is not corrected by cleaning the air filter, muffler, spark arrester screen or adjusting the rocker arm to valve clearance
- The engine operates in an erratic or fuel-rich condition

NOTE: Follow these carburetor adjustment procedures carefully. An incorrectly adjusted carburetor can cause severe engine damage.

Make sure the unit is fully assembled before making carburetor adjustments.

For trimmers and brushcutters, make sure the boom, cutting head, and line guard are installed and the cutting line is extended to its full cutting length.

The carburetor has three basic adjustments: the idle speed adjustment, the idle speed mixture adjustment, and the high speed mixture adjustment (Figure 1-15).

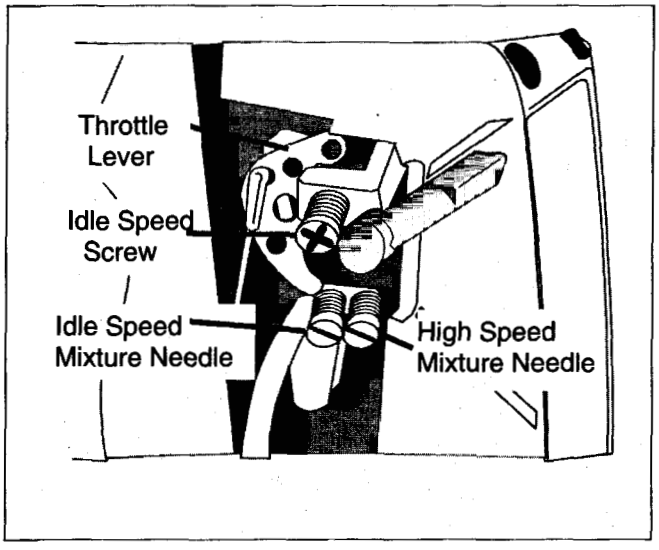


Figure 1-15. Carburetor Adjustments. 3.6051.015

For Units with Engine Serial Numbers Prior to 407000001—Use the following carburetor adjustment instructions:

1. **Initial Idle Speed Setting:** Turn the idle speed screw *until it stops.*

2. **Initial High Speed Mixture and Idle Speed Mixture Settings:** Turn both the high speed mixture and idle mixture needles **in (clockwise)** until they are *lightly seated.*

3. Turn the needles **out (counterclockwise)** the following number of turns:
   - High Speed Mixture Needle: 1 turn
   - Idle Speed Mixture Needle: 1 turn

NOTE: Turn the high speed mixture and idle mixture needles *finger-tight.* Do not force the needles with a screwdriver as this can damage the tips of the needles and the seats in the carburetor body.

4. Start the engine and let it run for 3 to 5 minutes with the throttle lever fully squeezed.

5. Release the throttle trigger and let the engine idle. Turn the idle speed screw **out (counterclockwise)** until the speed decreases and the bump head stops rotating.

6. **Final Idle Speed and Mixture Adjustments:** Adjust the idle speed screw and idle speed mixture needle for the smoothest engine idle using the following procedure. Do not squeeze throttle trigger when adjusting the idle speed screw and idle speed mixture needle.

   a. Set the idle speed mixture needle at the optimum setting (Figure 1-16). See "Definition of Optimum Setting" on page 1-15.

b. Squeeze the throttle trigger. If the engine falters or hesitates as it accelerates, turn the idle speed mixture needle **out (counterclockwise) 1/16 turn at a time** until the engine accelerates rapidly.

c. If the idle speed has changed significantly because of steps a. and b. above, readjust the idle speed screw.

7. **Final High Speed Mixture Setting:** Adjust the high speed mixture needle as follows:

a. Squeeze the throttle trigger and run the unit at high speed for 3 to 5 minutes.

b. While squeezing the throttle trigger fully, set the high speed mixture needle at the optimum setting. See "Definition of Optimum Setting" on page 1-15.

NOTE: The high speed mixture needle adjustment must be the last adjustment made on the carburetor. If the idle speed mixture needle is adjusted, the high speed mixture needle must be readjusted.

8. Make sure the air filter cover is reinstalled securely before placing the unit back into service.

For Units with Engine Serial Number 407000001 and Greater—Use the following carburetor adjustment instructions:

1. **Initial Idle Speed Setting:** Back the idle speed screw (Figure 1-15) **out (counterclockwise)** until it *does not contact* the carburetor throttle lever. Then turn the screw **in (clockwise)** until it *just begins* to move the throttle lever; then continue turning **2 full turns**.

2. **Initial High Speed Mixture and Idle Speed Mixture Settings:** Turn both the high speed mixture and idle speed mixture needles **in (clockwise)** until they are *lightly seated*.

3. Turn the needles **out (counterclockwise)** the following number of turns:

High Speed Mixture Needle:1 1/8 turns

Idle Speed Mixture Needle1 1/8 turns

NOTE: Seat the high speed mixture and idle speed mixture needles using finger pressure. Forcing the mixture needles will damage the tips of the needles and the seats in the carburetor body.

4. Start the engine and let it run for 3 to 5 minutes with the throttle lever fully squeezed.

5. Release the throttle trigger and let the engine idle. If the engine stops, turn the idle speed screw **in (clockwise) 1/8 turn** at a time (as required) until the engine idles.

6. **Final High Speed Mixture Needle Adjustment:**

a. While squeezing the throttle trigger fully, set the high speed mixture needle at the optimum setting. See "Definition of Optimum Setting".

NOTE: After the final high speed mixture needle adjustment is made, no more high speed mixture needle adjustments to the carburetor are necessary.

7. **Final Idle Speed and Idle Speed Mixture Adjustments:** Adjust the idle speed screw and idle speed mixture needle for the smoothest engine idle using the following procedure. Do not squeeze the throttle trigger when adjusting the idle speed screw and idle speed mixture needle.

a. Set the idle speed mixture needle at the optimum setting (Figure 1-16). See "Definition of Optimum Setting".

b. Turn the idle speed mixture needle **out (counterclockwise) 1/8 turn** to the rich side of optimum.The engine should idle and accelerate smoothly.

8. **Final Idle Speed Adjustment:** Adjust the idle speed by turning the idle speed screw **in (clockwise)** or **out (counterclockwise)** until the cutting head does not rotate. Do not squeeze the throttle trigger when adjusting the idle speed screw.

9. Make sure the air filter cover is reinstalled securely before placing the unit back into service.

Definition of Optimum Setting for Idle Speed Mixture and High Speed Mixture Adjustments

Always set the idle speed mixture needle and high speed mixture needle at the optimum setting. To find the optimum setting, use the following procedure.

1. Turn the adjusting needle **out (counterclockwise)** from the preliminary setting until the engine speed decreases (rich). Note the position of the needle.

2. Turn the adjusting needle **in (clockwise)**. The engine speed may increase as the needle is turned in (lean). Note the position of the needle.

3. Set the adjusting needle **midway** between the rich and the lean settings (Figure 1-16).

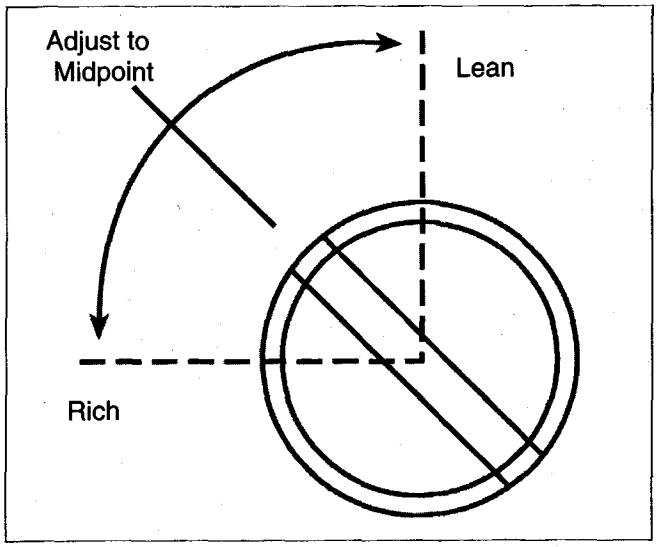


Figure 1-16. Optimum Setting. 3.6051.016

Rocker Arm to Valve Clearance Adjustment

Every 50 hours of operation, remove the rocker arm cover and check the rocker arm to valve clearance.

1. Remove the four (4) screws from the engine cover. Remove the engine cover. Remove the rocker arm cover. Refer to *Part 3 - Engine Disassembly.*

2. Position the crankshaft so that the piston is at the top of the compression stroke (both rocker arms are free and loose).

3. Measure the clearance between the valve stems and rocker arms, using a *flat* feeler gauge (Figure 1-17).

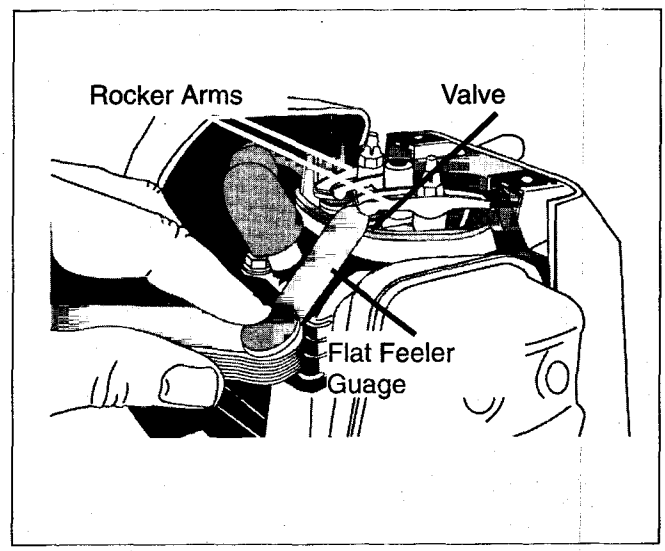


Figure 1-17. Measuring the Rocker Arm to Valve Clearance. 3.6051.017

The recommended rocker arm to valve clearance for both the intake and exhaust is **.003-.006 in (.076 mm-.152 mm).**

4. If the clearance is not within specification, adjust as follows:

   a. Turn the adjusting nut (Figure 1-18), using a 5/16 in (8 mm) wrench or nut driver.

To increase the rocker arm to valve clearance, turn the adjusting nut counterclockwise.

To decrease the rocker arm to valve clearance, turn the adjusting nut **clockwise**.

   b. Recheck the clearance with a *flat* feeler gauge and readjust as necessary (see Figure 1-17).

5. Reinstall the rocker arm cover, using a new gasket. Torque the rocker arm cover screw to **20-30 in•lb (2.2-3.4 N•m).**

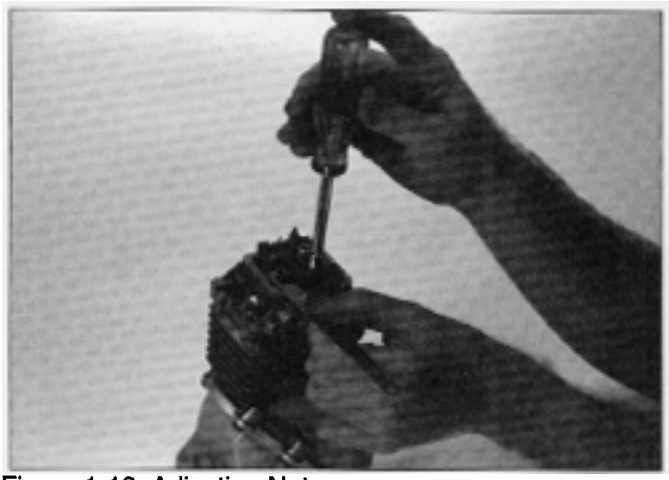


Figure 1-18. Adjusting Nuts. 2.6051.018

6. Install the breather hose to the air filter base.

7. Reinstall the engine cover and screws. Refer to *Part 5 - Engine Reassembly.*

Torque the top screws to **15-20 in•lb (1.7-2.2 N•m)**.
Torque the front screw to **20-25 in•lb (2.2-2.8 N•m)**.
Torque the rear screw with washer to **30-35 in•lb (3.5-4.0 N•m).**

Spark Arrester Screen

This unit is equipped with a spark arrester screen. Every **50 hours** of operation, check the spark arrester screen for debris and/or deposits.

WARNING: Hot Surfaces!

Make sure the muffler is cool before checking the spark arrester screen to prevent injury.

1. Remove the spark arrester cover screw and cover (Figure 1-19).

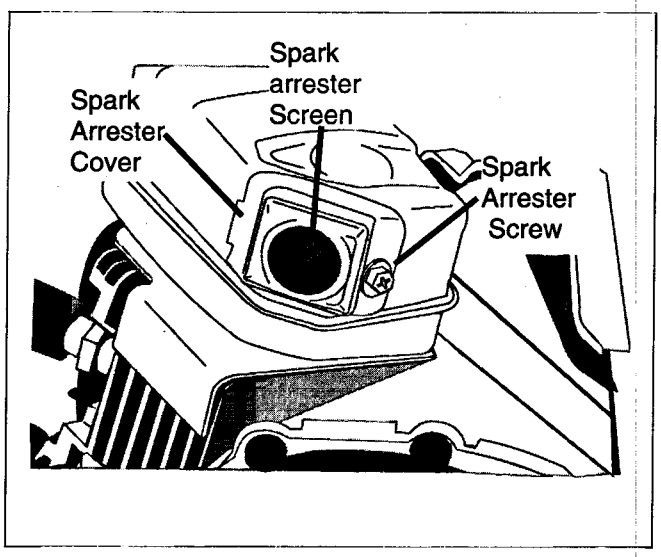


Figure 1-19. Spark Arrester Screen. 3.6051.019

2. Push the spark arrester screen out of the cover.

3. Inspect the spark arrester screen.

   If the screen is clean, reinstall the screen, cover and screw. If the screen is plugged, replace it.

4. Torque the screw to **15-20 in•lb (1.7-2.2 N•m).**

STORAGE INSTRUCTIONS

WARNING: Explosive Fuel!

Gasoline is extremely flammable and its vapors can explode if ignited. Store gasoline only in approved containers, in well-ventilated, unoccupied buildings, away from sparks or flames. Do not fill the fuel tank while the engine is hot or running, since spilled fuel could ignite if it comes in contact with hot parts or sparks from ignition. Do not start the engine near spilled fuel. Do not smoke while handling gasoline. Never use gasoline as a cleaning agent.

1. Drain all fuel from the fuel tank. **Do not use fuel that has been stored for more than 60 days.**

2. Start the engine and run it until it stalls. This ensures that all fuel has been drained from the carburetor.

3. Drain the oil from the crankcase and add fresh oil (3.4 oz /100 ml). Pull the starter rope a few times to lubricate the engine.

4. Allow the engine to cool. Remove the spark plug and put several drops of any **high quality SAE 30 weight oil of API (American Petroleum Institute) service class SG, SF, SH** into the cylinder. Pull the starter rope slowly to distribute the oil. Reinstall the spark plug.

5. Clean the unit and inspect for any loose or damaged parts. Repair or replace damaged parts and tighten loose screws, nuts, or bolts.

6. Store the unit in a dry, well ventilated area. Place the **unit** flat on the floor or on a table (Figure 1-20 for straight shaft units or Figure 1-21 for curved shaft units).

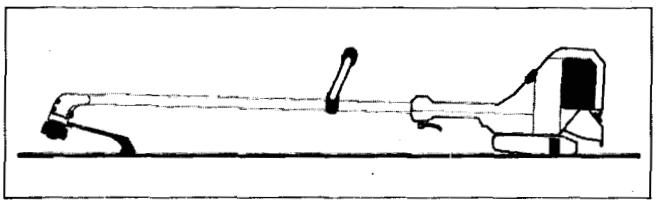


Figure 1-20. Storing a Straight Shaft Unit. 3.6051.020

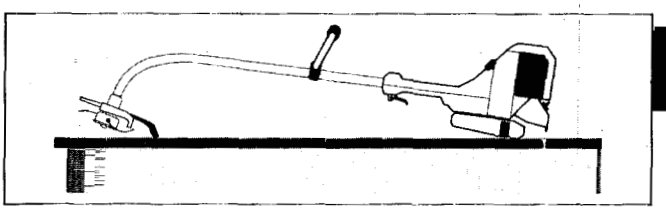


Figure 1-21. Storing a Curved Shaft Unit. 3.6051.021

To Reactivate Unit for Service

1. Remove the spark plug and drain the oil from the cylinder by slowly pulling the starter rope.

2. Reinstall the spark plug.

3. Refuel the unit with fresh gasoline. Start engine in accordance with the *Starting Instructions.*

Special Tools

In addition to typical hand tools, the following special tools are required to properly service this engine:

- Clutch Rotor Tool, P/N 180918 (Figure 1-22).
- Flywheel Holding Tool, P/N 180919 (Figure 1-23).
- 0-250 in•lb (0-28.1 N•m) Torque Wrench (Commercially available).
- Torx® Screwdriver or Bit Set (Commercially available).
- Two-stroke, Magnetic Pick-up Tachometer (Commercially available).

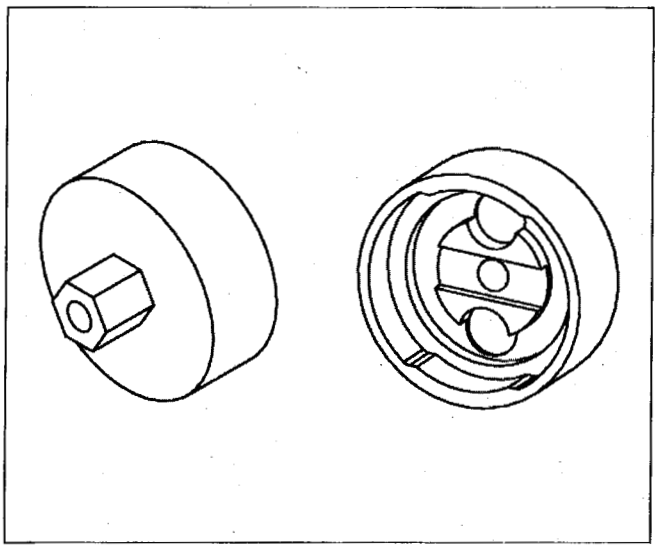


Figure 1-22. Clutch Rotor Tool, P/N 180918. 3.6051.022

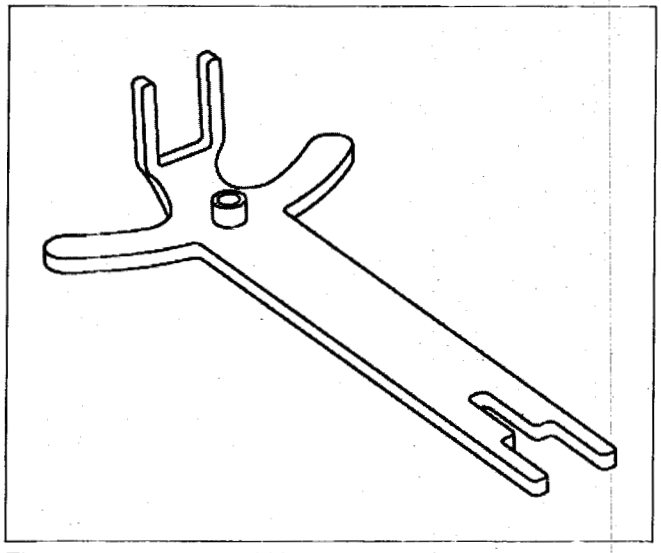


Figure 1-23. Flywheel Holding Tool, P/N 180919. 3.6051.023

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When difficulties occur, be sure to check for simple causes which, at first , may seem too obvious to be considered. A starting problem, for example, could be caused by an empty fuel tank.

The following table lists some common causes of operating troubles and the possible causes and remedies.

Engine Fails To Start

Possible Cause	Remedy
Ignition switch in STOP (O) position	Place switch in RUN (I) position
Out of fuel or water in fuel	Drain tank and blow out fuel lines to remove water Refuel tank with fresh fuel
Dirty or plugged air filter	Clean or replace air filter
Loose spark plug lead wire	Reconnect lead wire
Fouled, improperly gapped or broken spark plug	Clean or replace spark plug; set gap to 0.025 inch (0.635 mm)
Plugged fuel tank cap vent	Clean fuel tank cap vent
Plugged or waterlogged fuel filter	Replace fuel filter
Improperly adjusted carburetor	Adjust carburetor
Plugged muffler	Clean or replace muffler
Faulty primer or primer/fuel lines improperly installed	Correctly install primer/fuel lines or replace primer
Plugged fuel line	Blow out fuel line
Faulty carburetor diaphragm	Replace diaphragm
Plugged spark arrester screen	Clean or replace spark arrester screen
Faulty fuel pump diaphragm	Replace pump diaphragm
Plugged carburetor/fuel pump passages	Clean out passages
Incorrect air gap between flywheel & ignition module	Set ignition module air gap to 0.008-0.012 in (0.201-0.305 mm)
Faulty ignition module	Replace ignition module
Low compression	Replace piston rings or cylinder
Rocker arm to valve clearance is out of adjustment	Adjust rocker arm to valve clearance

Engine Starves On Acceleration

Possible Cause	Remedy
Plugged fuel filter	Replace fuel filter
Improperly adjusted carburetor	Adjust carburetor about 1/8 turn

Engine Is Hard To Start

Possible Cause	Remedy
Fouled, improperly gapped or broken spark plug	Clean or replace spark plug; set gap to 0.025 inch (0.635 mm).
Plugged or waterlogged fuel filter	Replace fuel filter
Improperly adjusted carburetor	Adjust carburetor
Clogged muffler	Clean or replace muffler
Faulty primer or primer/fuel lines improperly installed	Correctly install primer/fuel lines or replace primer
Incorrect air gap between flywheel and ignition module	Set ignition module air gap to 0.008-0.012 in (0.201-0.305 mm)
Faulty ignition module	Replace ignition module
Plugged spark arrester screen	Clean or replace spark arrester screen
Rocker arm to valve clearance is out of adjustment	Adjust rocker arm to valve clearance
Worn or improperly adjusted carburetor jet needle	Adjust or replace needle
Faulty carburetor diaphragm	Replace carburetor diaphragm
Faulty fuel pump diaphragm	Replace fuel pump diaphragm
Low compression	Replace piston rings or cylinder

Engine Stalls

Possible Cause	Remedy
Dirty or plugged air filter	Clean or replace air filter
Fouled, improperly gapped or broken spark plug	Clean or replace spark plug; set gap to 0.025 inch (0.635 mm)
Plugged fuel tank cap vent	Clean fuel tank cap vent
Improperly adjusted carburetor	Adjust carburetor
Plugged muffler	Clean or replace muffler
Plugged spark arrester screen	Clean or replace spark arrester screen
Plugged fuel line	Blow out fuel line
Faulty ignition module	Replace ignition module

Engine Fires Intermittently

Possible Cause	Remedy
Fouled, improperly gapped or broken spark plug	Clean or replace spark plug; set gap to 0.025 inch (0.635 mm).
Incorrect air gap between flywheel and ignition module	Set ignition module air gap to 0.008-0.012 in (0.201-0.305 mm))
Improperly adjusted carburetor	Adjust carburetor
Faulty ignition module	Replace ignition module

Engine Does Not Produce Maximum Power

Possible Cause	Remedy
Plugged air filter	Clean or replace air filter
Plugged muffler	Clean or replace muffler
Plugged spark arrester screen	Clean or replace spark arrester screen
Plugged or waterlogged fuel filter	Replace fuel filter
Improperly adjusted carburetor	Adjust carburetor
Air leak at carburetor base gasket	Tighten carburetor fasteners or replace carburetor base gasket
Intermittent spark	Replace ignition module
Low compression	Replace piston ring or cylinder
Scored piston and/or cylinder	Replace piston and cylinder assembly
Worn piston rings or low compression	Overhaul engine
Cam gear improperly timed	Disassemble cam bracket assembly and realign cam gear
Valves leaking	Replace valves

Carburetor Floods

Possible Cause	Remedy
Faulty primer or improperly installed primer/fuel lines	Correctly install primer/fuel lines or replace primer
Improperly adjusted carburetor	Adjust carburetor
Damaged carburetor	Replace carburetor
Leaking fuel inlet needle	Replace fuel inlet needle

Engine Stops After Running Briefly

Possible Cause	Remedy
Partially plugged fuel tank cap vent	Clean fuel tank cap vent
Dirty or plugged air filter	Clean or replace air filter
Water in fuel	Drain tank and blow out lines
Air leak at carburetor base gasket	Tighten carburetor mounting fasteners or replace carburetor base gaskets
Dirty carburetor fuel inlet needle or passage	Replace fuel inlet needle or clean out carburetor
Faulty carburetor diaphragm	Replace diaphragm
Losing compression	Replace piston rings or gaskets or overhaul engine

Engine Will Not Idle

Possible Cause	Remedy
Improperly adjusted carburetor	Adjust carburetor
Dirty or plugged air filter	Clean or replace air filter
Faulty carburetor diaphragm	Replace carburetor diaphragm
Faulty carburetor inlet seat gasket	Replace carburetor inlet seat gasket
Leaking crankshaft seal	Replace crankshaft seal
Scored cylinder or low compression	Overhaul engine

Engine Backfires Or Misfires

Possible Cause	Remedy
Fouled, improperly gapped or broken spark plug	Clean or replace spark plug; set gap to 0.025 inch (0.635mm)
Shorted ignition module leads	Check for loose or bare wires or loose assembly and corrector replace ignition module
Rocker arm to valve clearance is out of adjustment	Adjust rocker arm to valve clearance
Weak valve spring	Replace valve spring

Engine Will Not Accelerate

Possible Cause	Remedy
Carburetor improperly adjusted	Adjust carburetor
Air filter clogged	Clean or replace air filter
Spark plug fouled	Clean or replace spark plug; set gap to 0.025 inch(0.635 mm)
Plugged muffler	Clean or replace muffler
Plugged spark arrester screen	Clean or replace spark arrester screen
Carburetor diaphragm gasket leaking	Replace gasket

Engine Lacks Power Or Stops During Operation

Possible Cause	Remedy
Faulty primer bulb causing flooding	Replace primer bulb
Dirty or plugged air filter	Clean or replace air filter
Plugged muffler	Clean or replace muffler
Plugged spark arrester screen	Clean or replace spark arrester screen
Rocker arm to valve clearance is out of adjustment	Adjust rocker arm to valve clearance
Scored cylinder or low compression (below 90 psi)	Overhaul engine

Engine Vibrates Excessively

Possible Cause	Remedy
Engine not securely mounted	Tighten fan housing screws
Bent crankshaft	Replace crankcase

Engine Uses Excessive Amount Of Oil

Possible Cause	Remedy
Oil level too high	Check the oil level; drain excess oil
Oil fill plug loose or O-ring is leaking oil	Replace O-ring and tighten oil fill plug
Breather housing plugged or damaged,	Replace breather housing assembly
Gaskets damaged or gasket surfaces nicked	Clean and smooth gasket surfaces; always use new gaskets
Valve guides worn excessively	Replace cylinder head assembly
Cylinder wall worn or glazed	Replaced cylinder
Piston rings and grooves worn excessively	Replace piston rings and/or piston
Piston fit undersized	Measure and replace piston if necessary

Starter Rope Is Difficult To Pull Or Engine Locks

Possible Cause	Remedy
Oil accumulated in combustion chamber	1. Remove the spark plug 2. Drain the oil from the spark plug opening 3. Pull the starter rope several times to remove any excess oil from the cylinder 4. Clean the spark plug and wipe off excess oil with a dry cloth 5. Reinstall the spark plug

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Typical Disassembly Sequence

This section covers the disassembly of major internal engine components. *Part 4 - Inspection and Repair* covers the disassembly, reassembly, inspection and repair of the subassemblies of the engine components.

Clean all parts thoroughly as the component parts are disassembled. Only clean parts can accurately be inspected and gauged for wear or damage. There are many commercially available cleaners that will quickly remove oil and grime from engine parts. When such a cleaner is used, follow the manufacturer's instructions and safety precautions carefully. Particular attention should be given to commercial cleaners compatibility with plastic parts.

Make sure that the cleaner is wiped off of engine parts and not allowed to air dry as some cleaners leave a residue on parts which can affect engine lubrication.

The following sequence is suggested for complete engine disassembly. This procedure can be varied to accommodate individual requirements for disassembly.

Refer to the appropriate parts manual to ensure the correct replacement parts are ordered.

1. Drain Fuel from Tank and Oil from Oil Pan
2. Remove Spark Plug Wire and Spark Plug
3. Remove Engine from Equipment
4. Remove Lower Handle
5. Remove Air Filter
6. Remove Air Filter Base, Primer Bulb and Carburetor
7. Remove Engine Cover
8. Remove Carburetor Mount Insulator
9. Remove Intake Baffle
10. Remove Muffler
11. Remove Clutch
12. Remove Starter Module Assembly
13. Remove Fuel Tank Bracket and Fuel Tank
14. Fuel Tank Lines Disassembly and Reassembly
15. Remove Fan Housing
16. Remove Muffler Baffle
17. Remove Ignition Module
18. Remove Flywheel
19. Remove Rocker Arm Assembly
20. Remove Cylinder Head, Valve Assembly and Cylinder
21. Remove Piston/Connecting Rod
22. Remove Cam Bracket Assembly
23. Remove Oil Pan
24. Remove Seal

NOTE: Only disassemble the engine to the extent necessary to make the desired repairs.

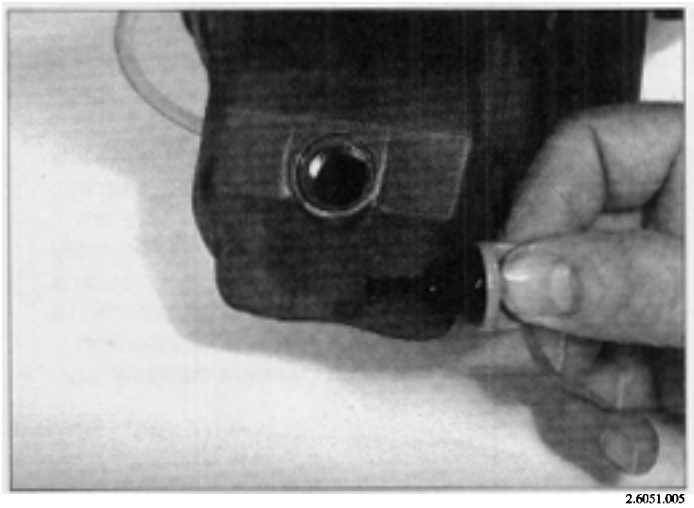
REMOVE MAJOR COMPONENTS

Remove Engine

1. Drain all fuel from the fuel tank.

2. Start the engine and allow it to run until it stalls. Allow the engine to cool.

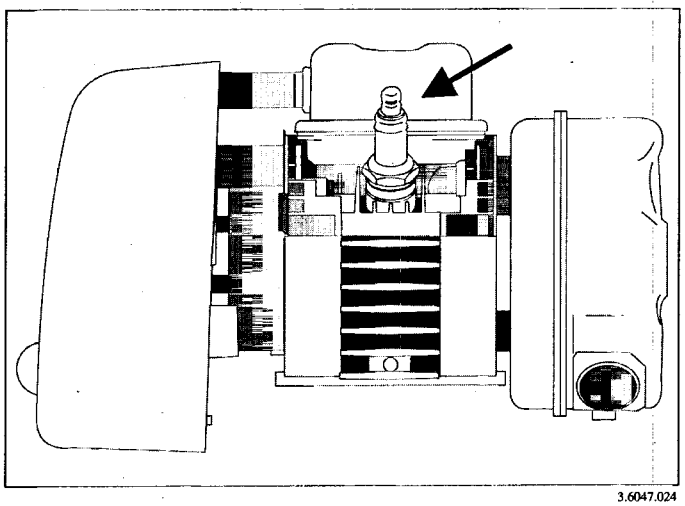
3. Drain the oil from the oil pan.



2.6051.005

Remove The Spark Plug Wire And Spark Plug

1. Disconnect the spark plug wire from the spark plug. Remove the spark plug .

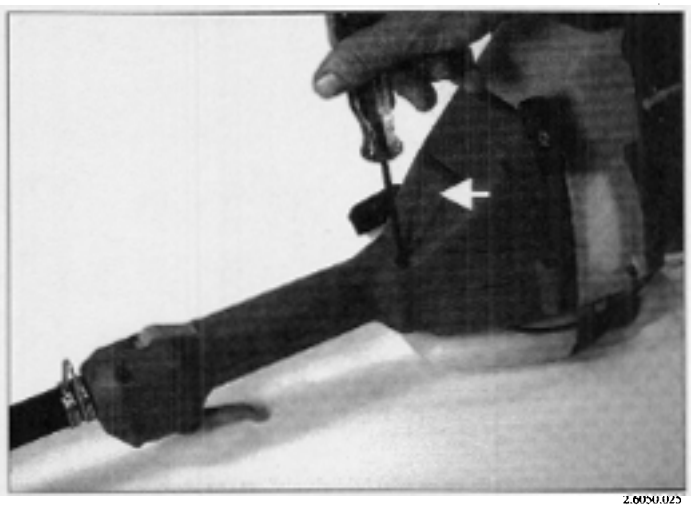


3.6047.024

Remove Upper Handle

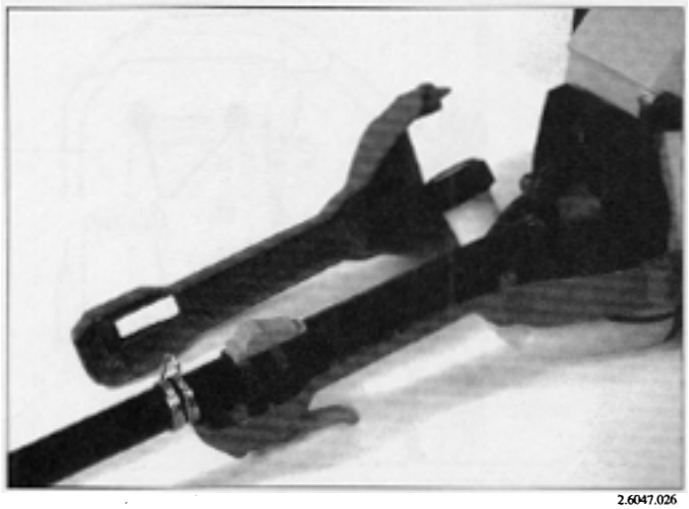
NOTE: All screws are T-25 Torx® screws and can be removed with a T-25 Torx® screwdriver.

1. Remove the six (6) screws from the upper handle.



2.6050.025

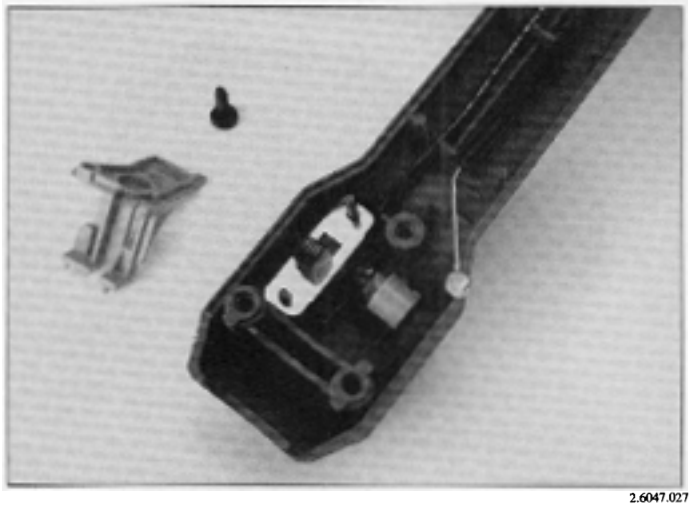
REMOVE MAJOR COMPONENTS (cont.)



2.6047.026

2. Separate the two halves of the handle by prying the two halves apart with a screwdriver at the rear of the handle, next to the screw boss .

NOTE: The anti-vibration isolator is wedged into the handle, making removal of the halves difficult.

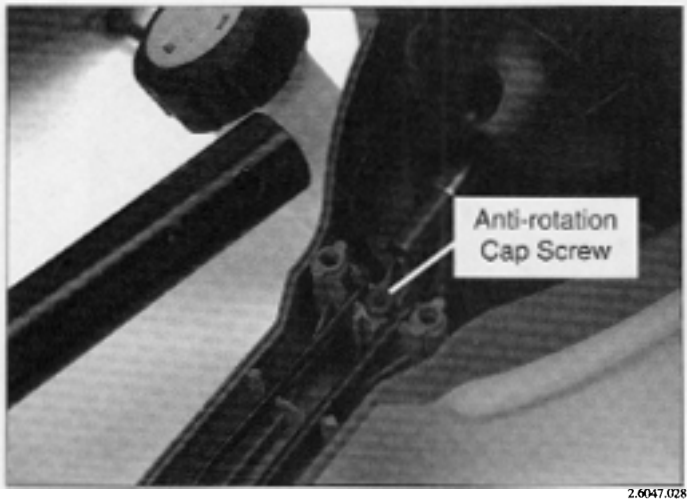


2.6047.027

Remove Lower Handle

1. Remove the retainer screw, which holds the switch and throttle trigger assembly in the handle. The trigger can now be removed from the cable and the switch lifted off the two pins located in the lower handle.

2. Remove the throttle cable and lead wires from the lower handle.



2.6047.028

3. Press down on the lower handle at the rear, near the isolator. This will dislodge the isolator from the lower handle, allowing the handle to be removed.

NOTE: If you have difficulty removing the lower handle slightly loosen the screws on the fuel tank bracket and pull the fuel tank and bracket away from the lower handle.

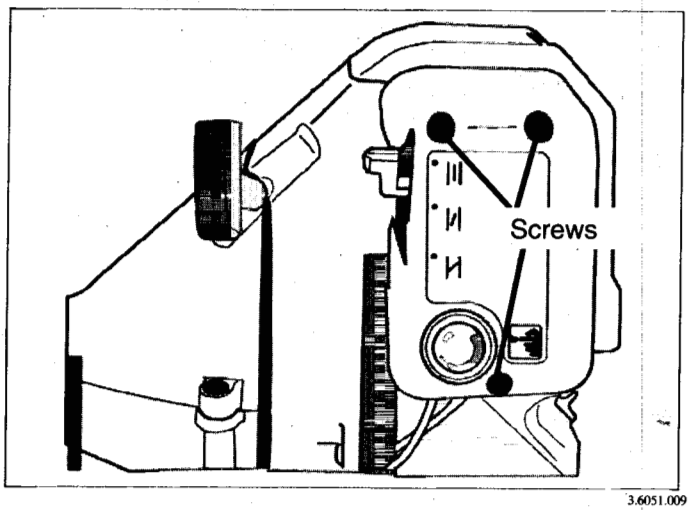
NOTE: When removing the lower handle note the location of the anti-rotation cap screw, lead wires and throttle cable location.

REMOVE MAJOR COMPONENTS (cont.)

Remove Air Filter

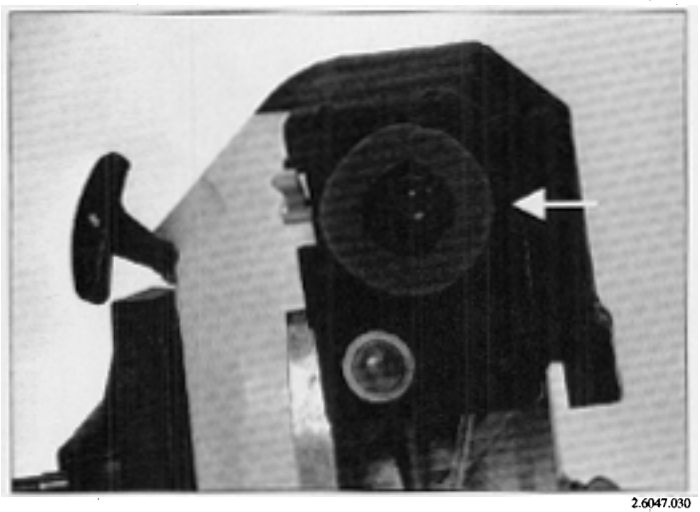
1. Remove the three (3) screws securing the air filter cover. Remove the air filter cover).

NOTE: The choke lever should be in the "PARTIAL" position to remove and install the air filter cover.



3.6051.009

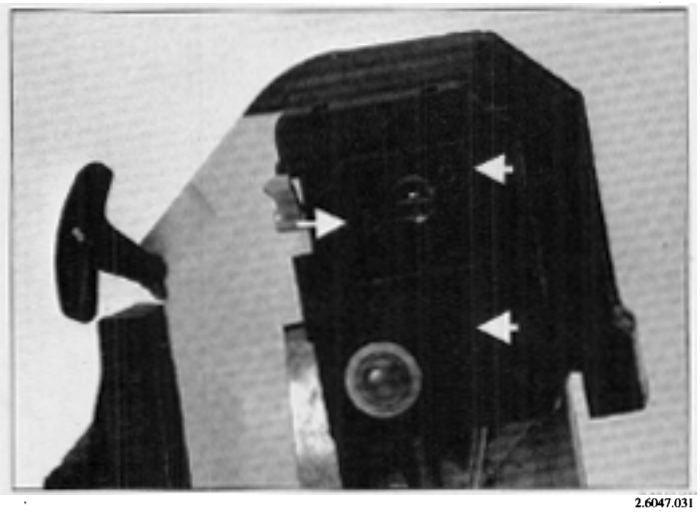
2. Remove the air filter element from the air filter base . The element is held in place by eight (8) pins.



2.6047.030

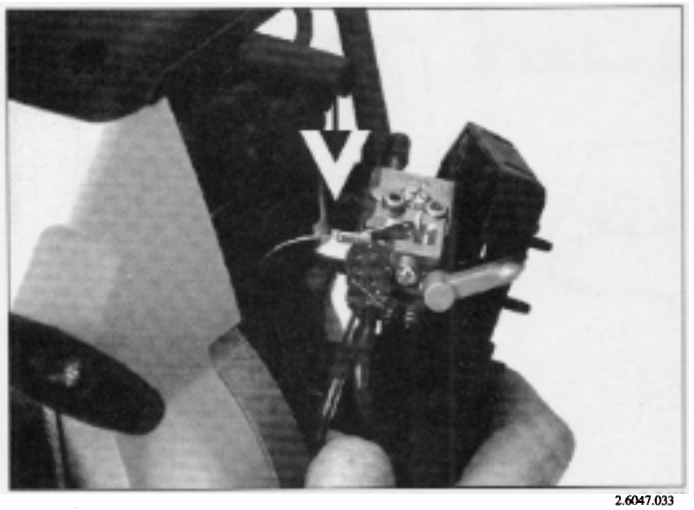
Remove Air Filter Base, Primer Bulb And Carburetor

1. Remove the three (3) screws securing the air filter base, primer bulb and carburetor to the carburetor mount insulator).



2.6047.031

REMOVE MAJOR COMPONENTS (cont.)

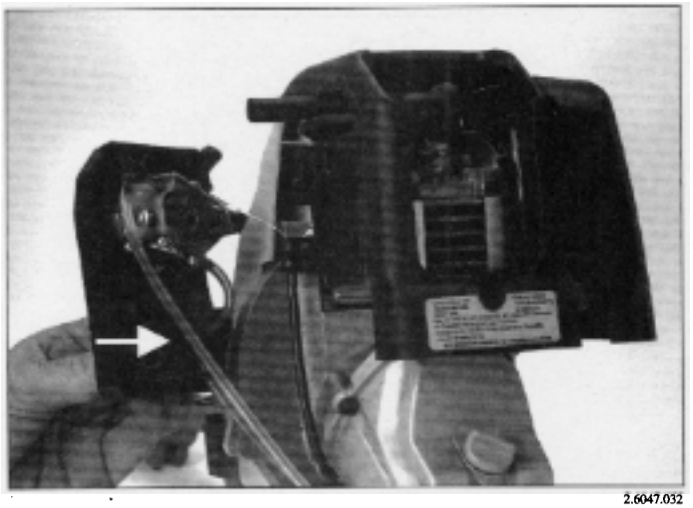


2.6047.033

2. Remove the Z-bend of the throttle cable from the hole in the carburetor throttle lever .

NOTE: The Z-bend is located in the third hole from the top of the throttle lever.

3. Remove the carburetor and the two (2) gaskets. Dicard the gaskets.

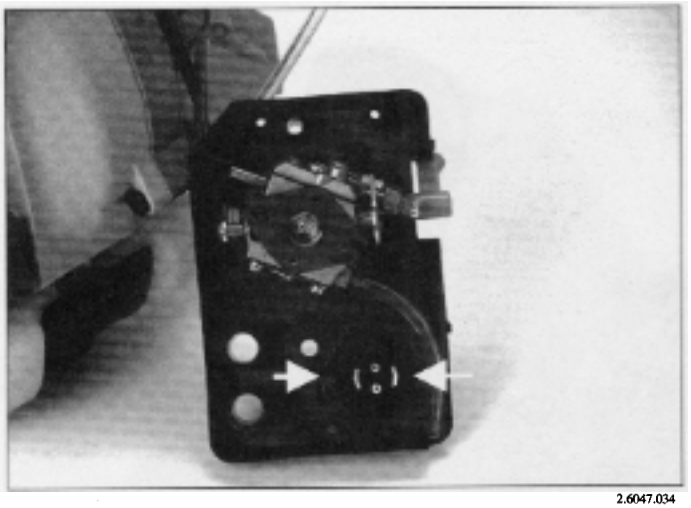


2.6047.032

4. Remove the fuel line from the carburetor fuel inlet fitting.

5. Remove the fuel line from the fuel outlet fitting on carburetor (to primer bulb).

6. Remove the throttle cable from the carburetor mount insulator.



2.6047.034

Remove Primer Bulb

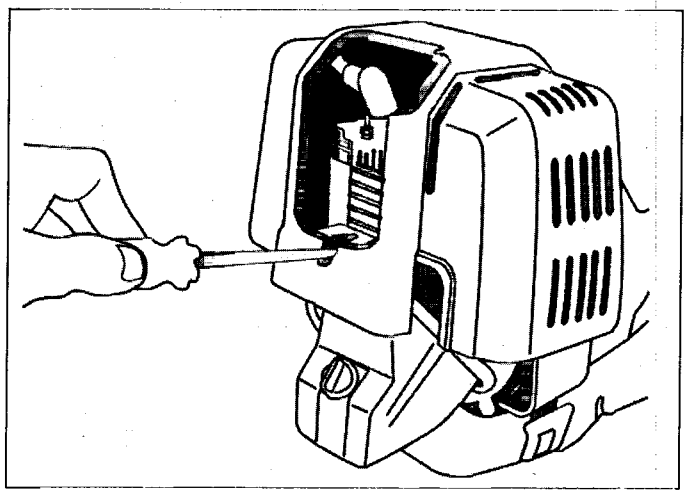
1. Remove the fuel lines from the fittings on the primer bulb.
2. Squeeze the mounting tabs on the back of the bulb and pull the bulb out from the front of the air filter base.
3. Inspect the check valves in the primer bulb for fuel leakage. To do this inspection, place your finger over the long fitting on the back of the primer bulb and press the front of the bulb. If the bulb collapses and air comes out through the short fitting, replace the primer bulb.

   Inspect the primer bulb for flexibility and cuts or tears. Replace the primer bulb if necessary.

REMOVE MAJOR COMPONENTS (cont.)

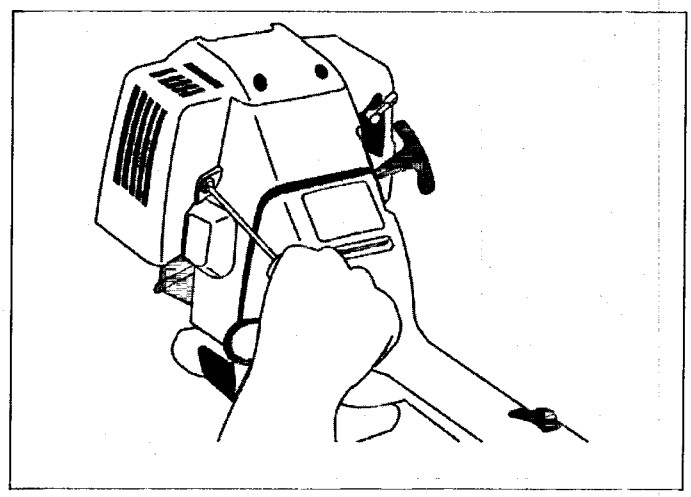
Remove Engine Cover

1. Remove the rear engine cover screw



3.6047.035

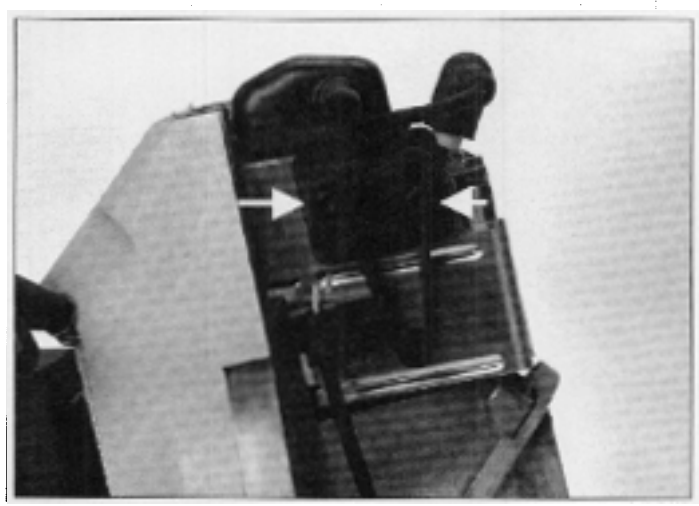
2. Remove the two (2) screws from the top of the cover and the screw from the front of the cover. Lift the cover up and off of the engine.



3.6047.037

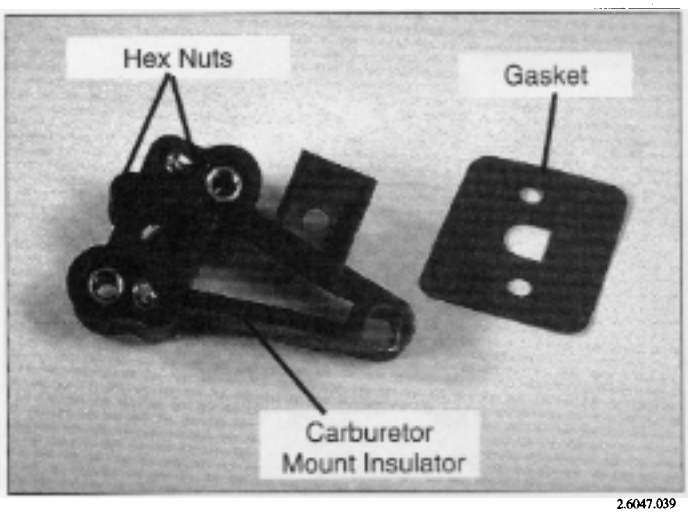
Remove Carburetor Mount Insulator

1. Remove the two (2) screws securing the carburetor mount insulator to the crankcase.



2.6047.037

REMOVE MAJOR COMPONENTS (cont.)

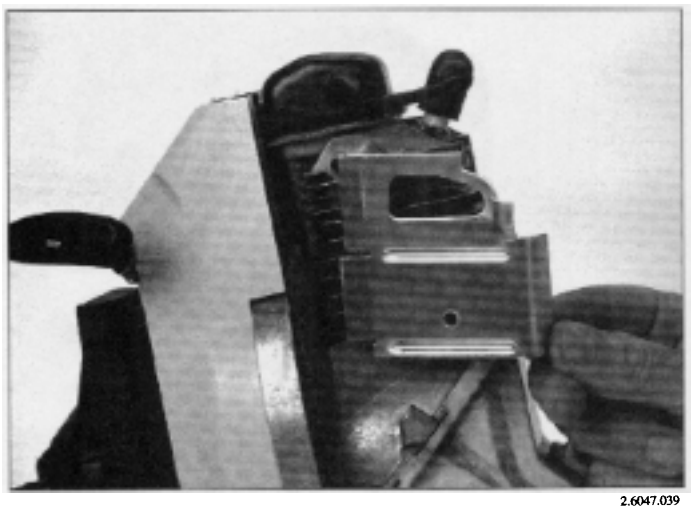


2.6047.039

2. Remove the carburetor mount insulator and carburetor mount insulator gasket.

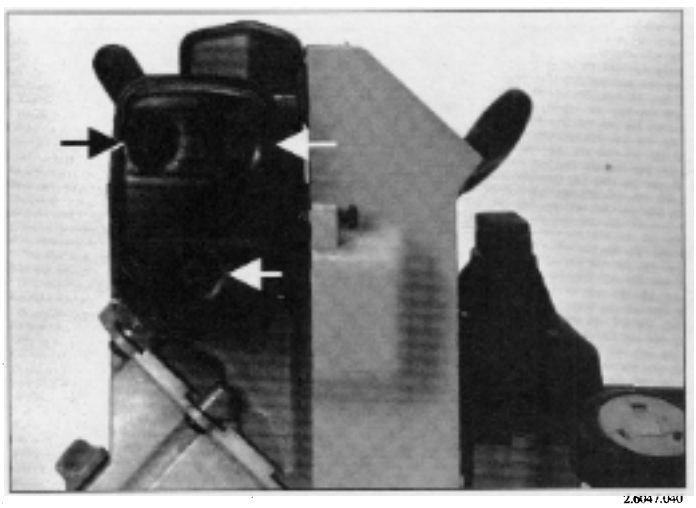
3. Remove the two (2) hex nuts on the back of the carburetor mount insulator.

NOTE: For Units Prior to Engine Serial Number 4050000001—The hex nuts were not retained. Be careful not to lose them.


2.6047.039

Remove Intake Baffle

1. Remove the intake baffle from the cylinder


2.6047.040

Remove muffler

1. Remove the three (3) muffler mounting bolts

REMOVE MAJOR COMPONENTS (cont.)

2. Remove the muffler and muffler gasket. Discard the old gasket.



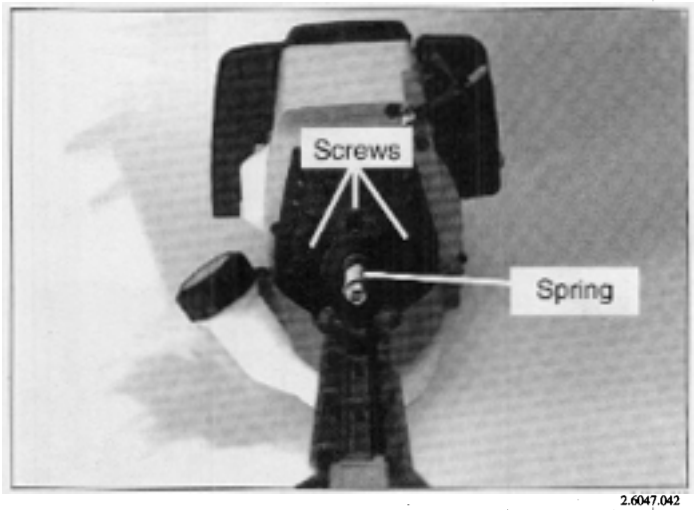
2.6047.041

NOTE: The muffler baffle cannot be removed at this time.

NOTE: Do not scrape the gasket surfaces with metal scrapers. Always use wood or plastic scrapers.

Remove Clutch

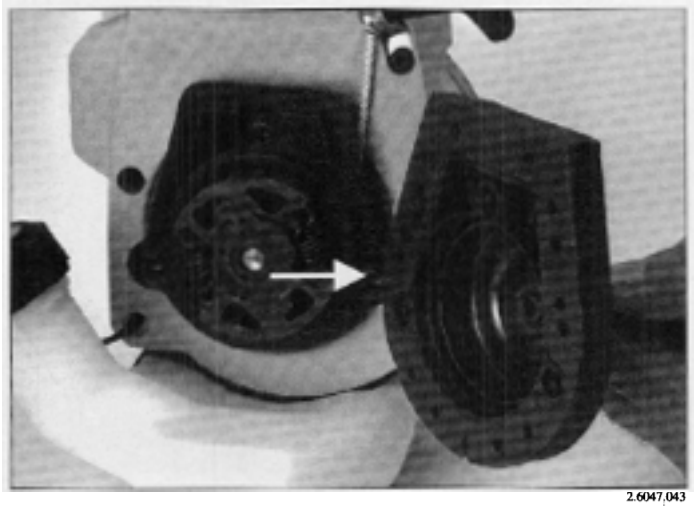
1. Remove the three (3) screws securing the clutch housing/drum assembly to the fan housing. Remove the clutch housing/drum assembly



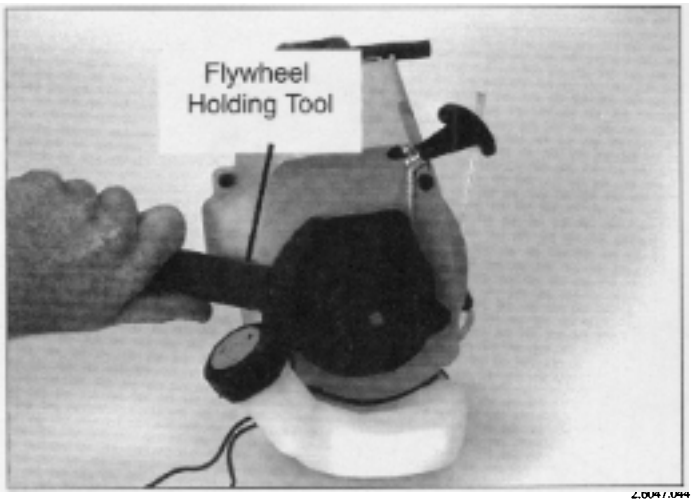
2.6047.042

For units that take attachments, remove the spring.

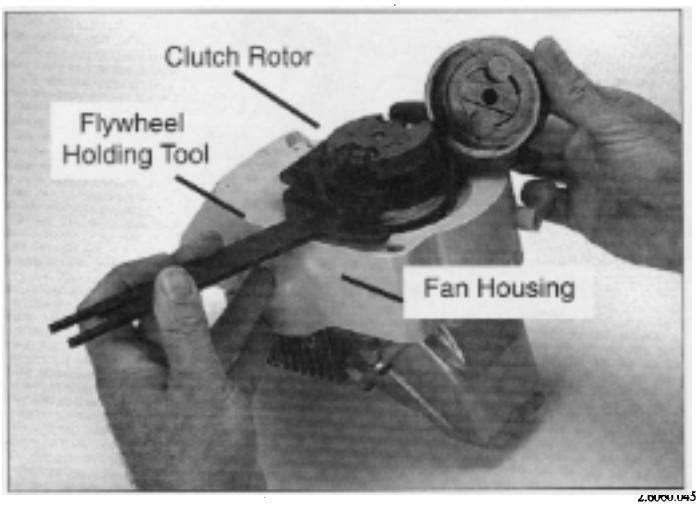
2. Remove the isolator, which is located between the clutch cover and the starter module assembly.


2.6047.043

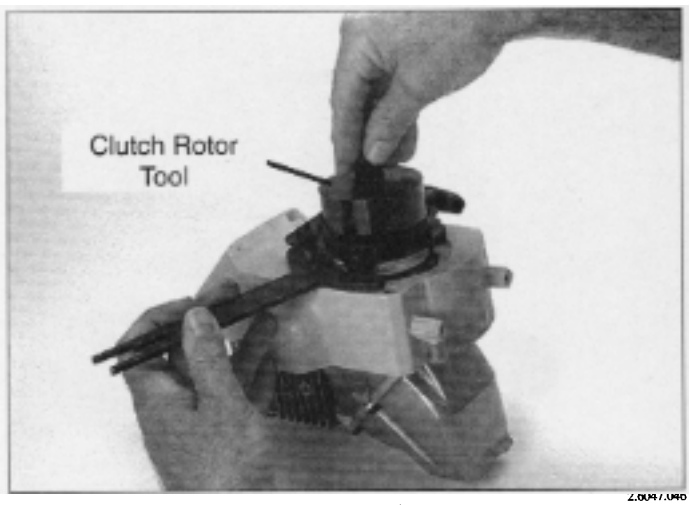
REMOVE MAJOR COMPONENTS (cont.)



3. With the starter pawls on the flywheel positioned at the top (12 o'clock) and bottom (6 o'clock), install flywheel holding tool, P/N 180919.



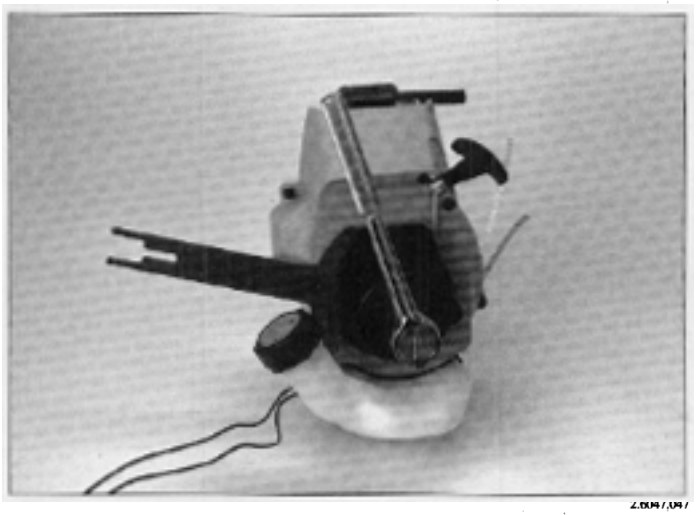
4. Lift the starter assembly until it contacts the clutch rotor. At 9 o'clock on the fan housing, roll the flywheel holding tool into the flywheel until the head of the cap screw on the bottom of the tool fits into the screw hole of the fan housing.



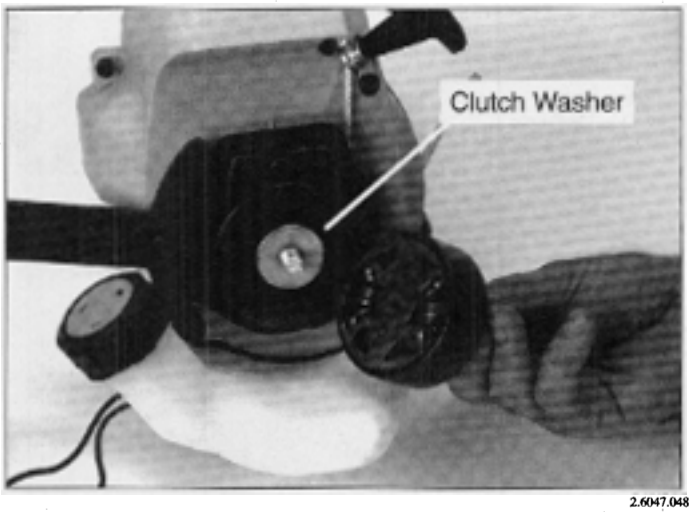
5. Holding the flywheel holding tool in place, postion the clutch rotor tool (P/N 180918) over the rotor.

REMOVE MAJOR COMPONENTS (cont.)

6. Using a 3/4 inch socket wrench, turn the clutch rotor tool counterclockwise to remove the clutch rotor.



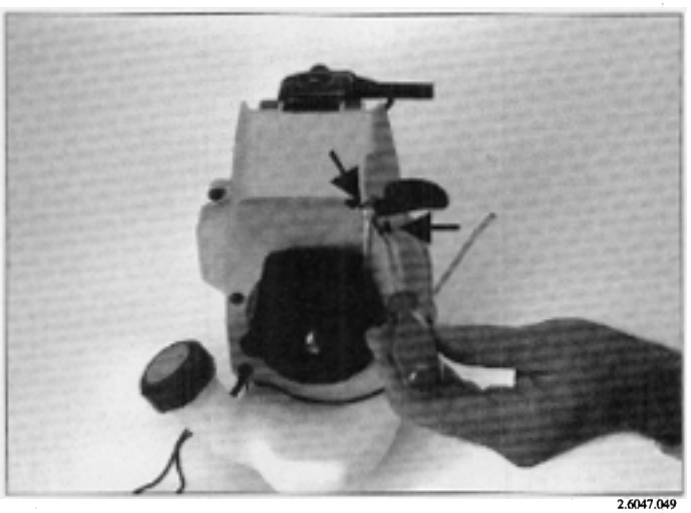
7. Remove the clutch rotor and washer.



2.6047.048

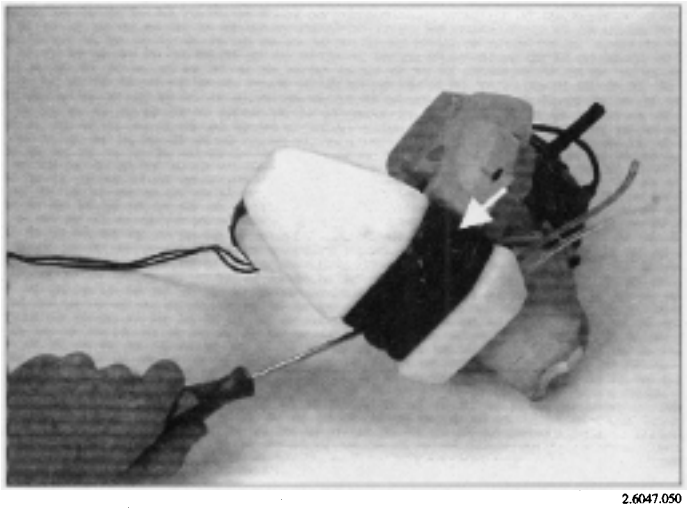
Remove Starter Module Assembly

1. Remove the two (2) screws securing the starter rope eyelet bracket. Remove the starter module assembly.



2.6047.049

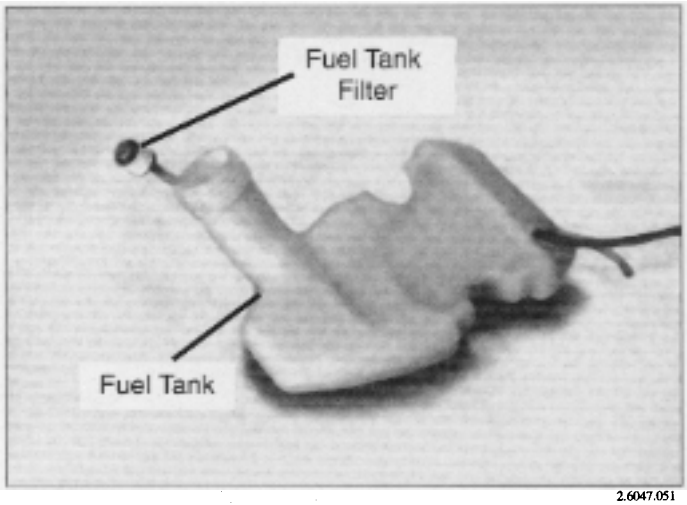
REMOVE MAJOR COMPONENTS (cont.)



2.6047.050

Remove Fuel Tank Bracket And Fuel Tank

1. Remove the two (2) screws from the fuel tank bracket.
2. Remove the fuel tank bracket and fuel tank.
3. Remove the rubber fuel tank pad.



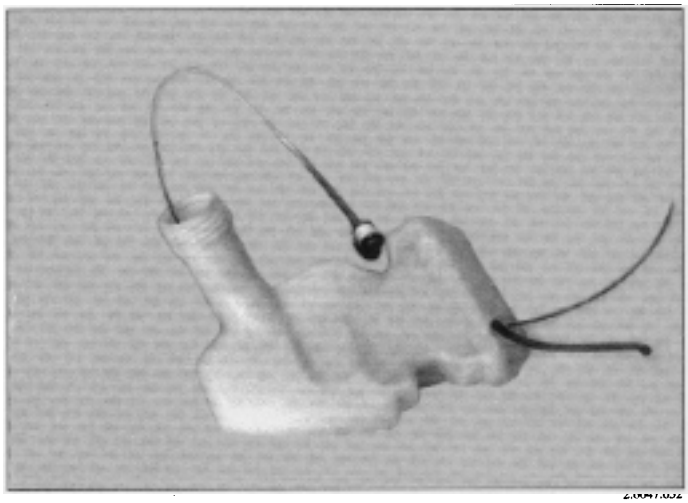
2.6047.051

Fuel Tank And Lines Disassembly And Reassembly

Fuel Line and Filter Removal

This unit has two fuel lines to the fuel tank. The clear line provides normal fuel flow. The blue line provides a return line for excess fuel flow during the primer operation.

1. Push the fuel line into the fuel tank until you can pull the filter out of the tank neck.
2. If the fuel filter is dirty or clogged, replace it with a new fuel line assembly.



Fuel Line and Filter Installation

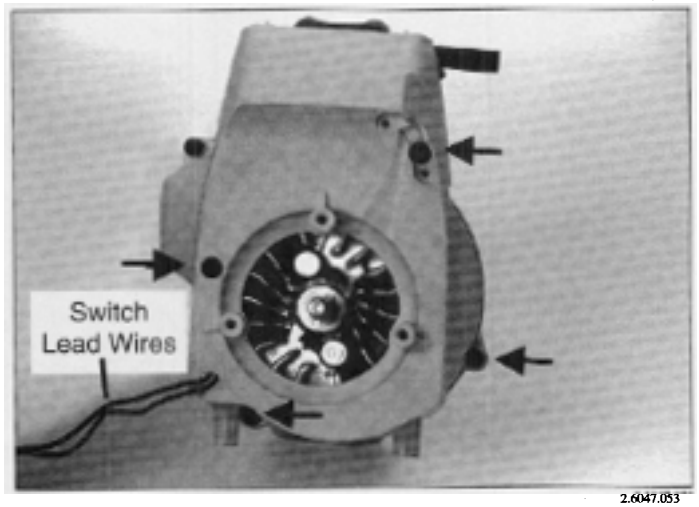
1. Insert a piece of trimmer line through the hole in the rear side of the fuel tank to the filler opening. Slide the fuel line over the trimmer line.
2. Guide the fuel line through the hole in the tank with the trimmer line.
3. Working through the filler neck, insert the fuel line with the fuel filter attached through the hole in the rear of the tank.
4. Work the fuel line from outside of tank, pulling until the filter lays on the bottom of the tank or 6 inches (152 mm) of line are exposed.

DISASSEMBLE ENGINE

Remove Fan Housing

1. Remove the four (4) screws securing the fan housing to the crankcase. Remove the fan housing.

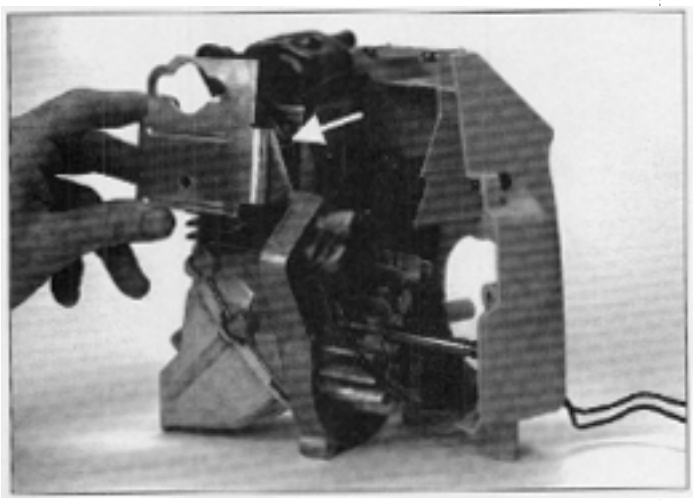
2. Disconnect the switch lead wires.



2.6047.053

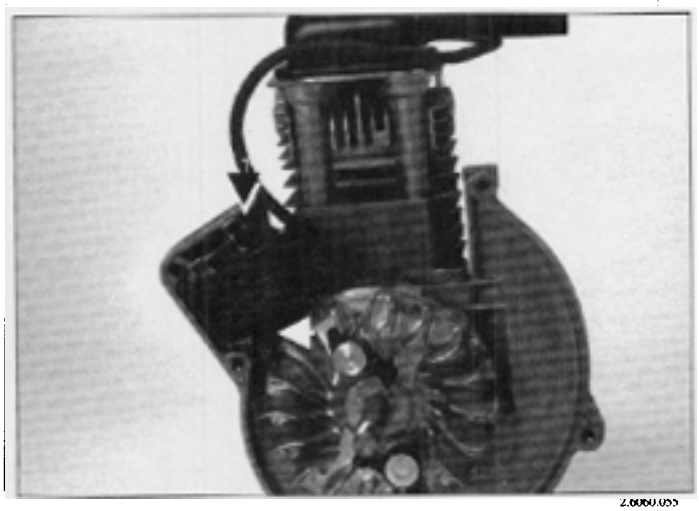
Remove Muffler Baffle

1. Remove the muffler baffle.

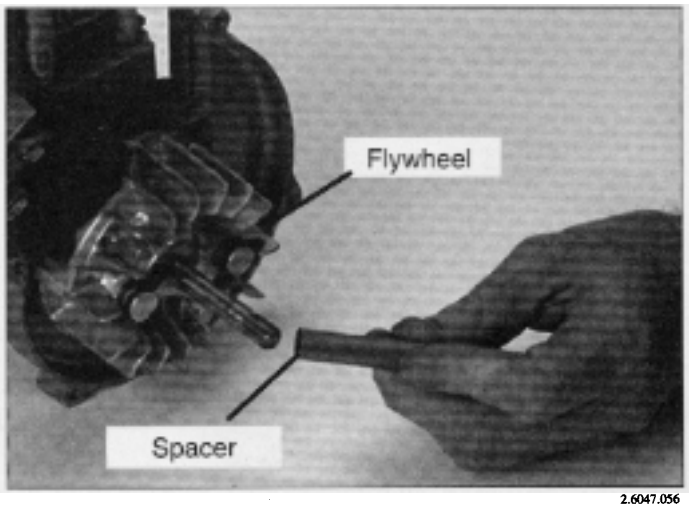

2.6047.054

Remove Ignition Module

1. Remove the two (2) screws securing the ignition module to the crankcase. Remove the ignition module.


2.6060.055

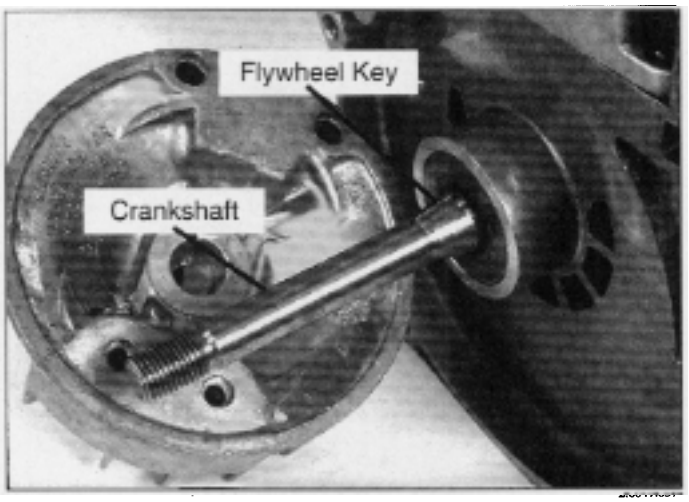
DISASSEMBLE ENGINE (cont.)



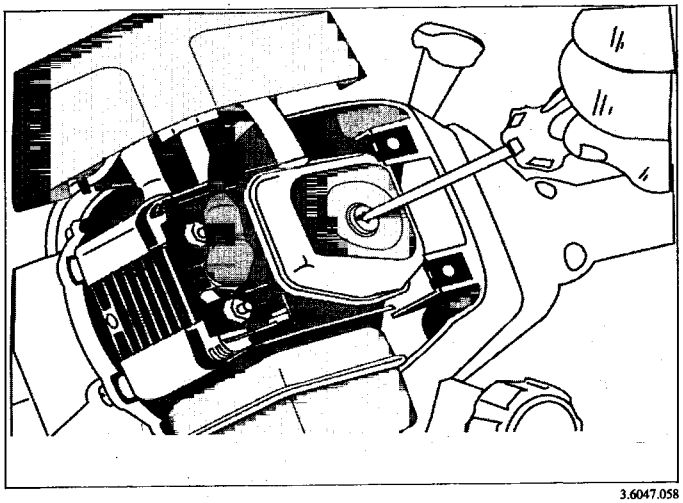
2.6047.056

WARNING: CRACKED OR BROKEN COOLING FINS ARE A HAZARD! Be careful not to crack or break any cooling fins. They could fly off during operation. If cooling fins are cracked or broken, replace the flywheel.

1. Remove the spacer from the crankshaft.
2. Using a plastic-faced mallet, tap and pull the flywheel until it breaks free from the crankshaft.



3. Remove the flywheel from the crankshaft.
4. Remove the flywheel key from the crankshaft.

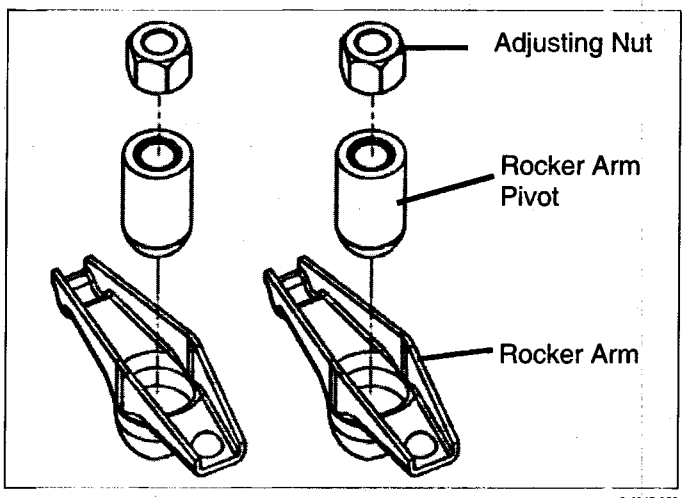

3.6047.058

Remove Rocker Arm Assembly

1. Remove the rocker arm cover screw. Remove rocker arm cover and gasket.

DISASSEMBLE ENGINE (cont.)

2. Remove the rocker adjusting nuts, rocker arm pivots and rocker arms.

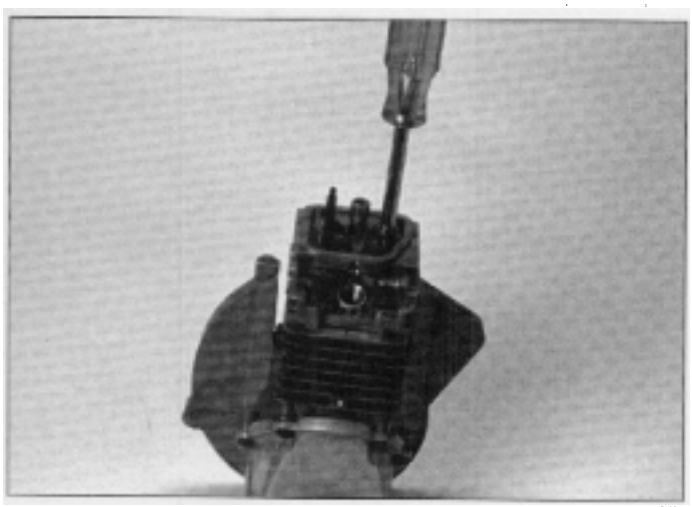


3.6047.059

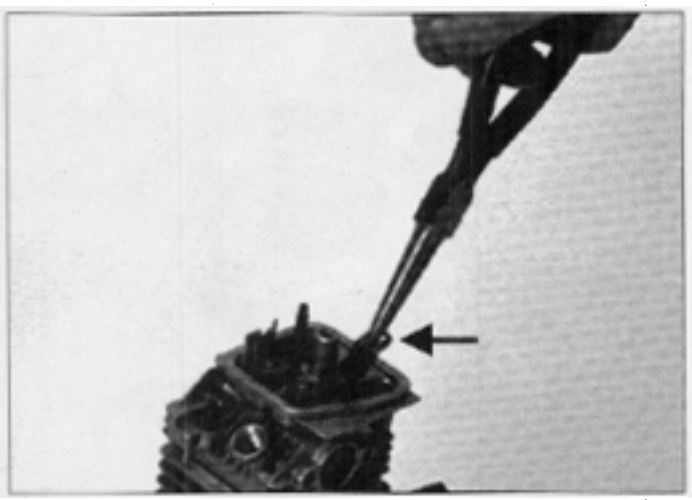
NOTE: Always match intake and exhaust parts when disassembling the rocker arm assembly.

3. Remove the two (2) push rods from the push rod guides.

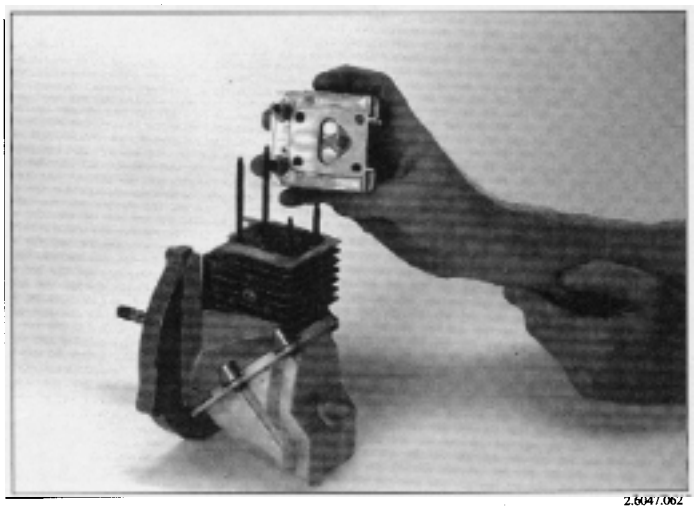
4. Remove the four (4) cylinder hex nuts and washers.


2.6060.060

5. Remove the push rod guides from the cylinder studs.

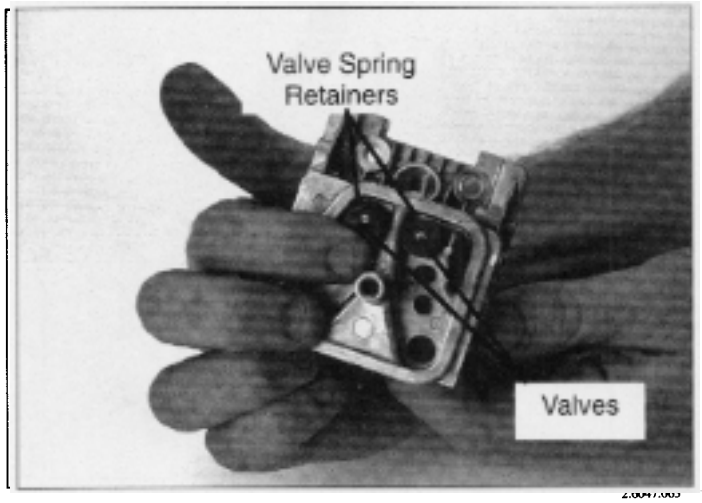

2.6047.061

DISASSEMBLE ENGINE (cont.)



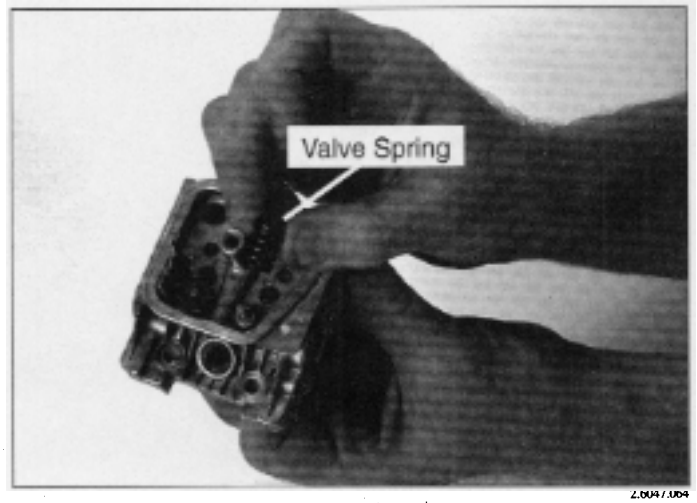
Remove Cylinder Head, Valve assembly And Cylinder

1. Lift the cylinder head off of the cylinder. Remove the cylinder head gasket.



2. Remove the two (2) valves and valve retainers from the cylinder head.

NOTE: To make removal of the valves easier, push down on the valve retainers with your fingers and rock them to the side.



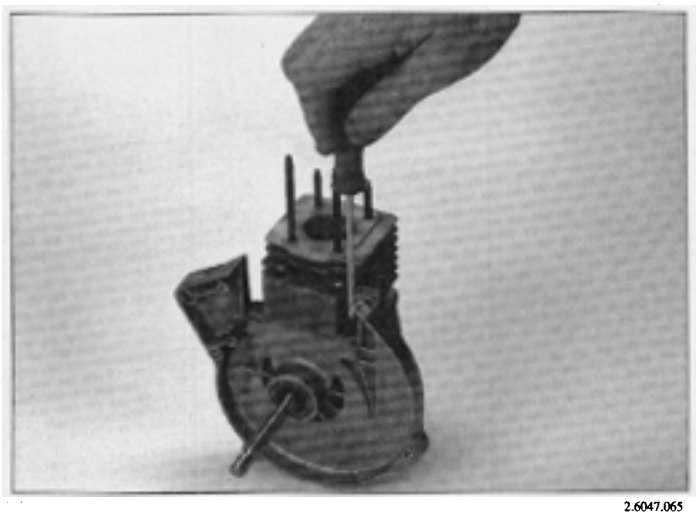
3. Remove the two (2) valve springs.

NOTE: The valves cannot be ground. Replace, if necessary.

NOTE: The rocker box is factory assembled and should not be removed from the cylinder head.

DISASSEMBLE ENGINE (cont.)

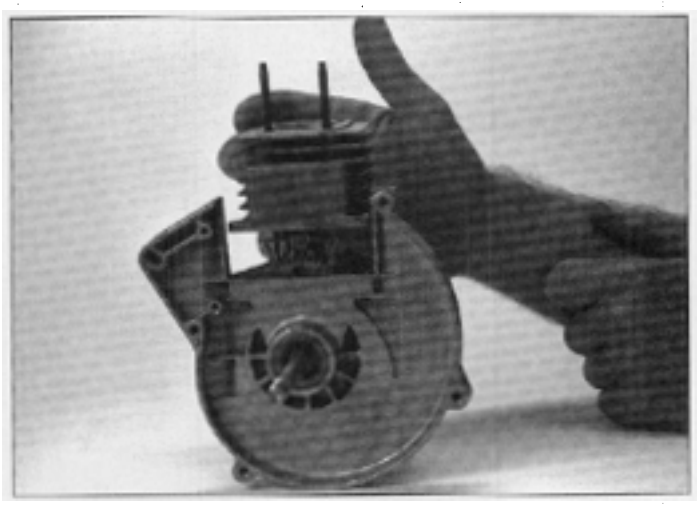
4. Remove the two (2) cylinder screws from the cylinder.



2.6047.065

5. Remove the cylinder and cylinder gasket from the crankcase.

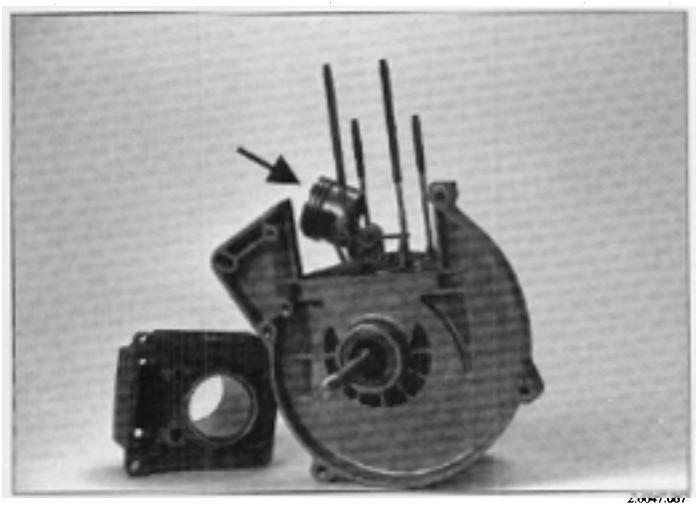
NOTE: Do not scrape the gasket from the cylinder. To remove the gasket, soak the cylinder with solvent.



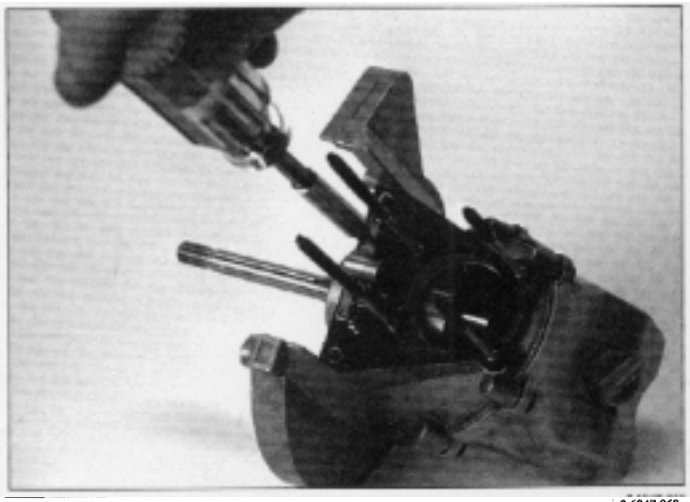
2.6047.066

Remove Piston/Connecting rod

1. Remove the piston/connecting rod from the crankcase. Grasp the piston/connecting rod, slide it to the rear and twist slightly. No tool is required.



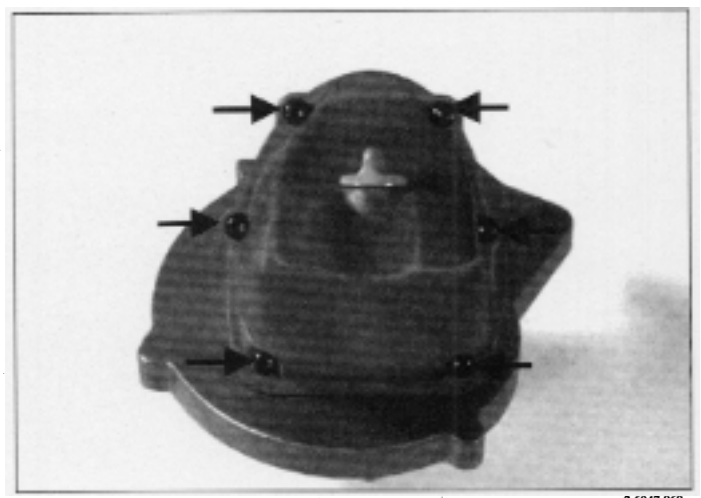
DISASSEMBLE ENGINE (cont.)



2.6047.068

Remove Cam Bracket Assembly

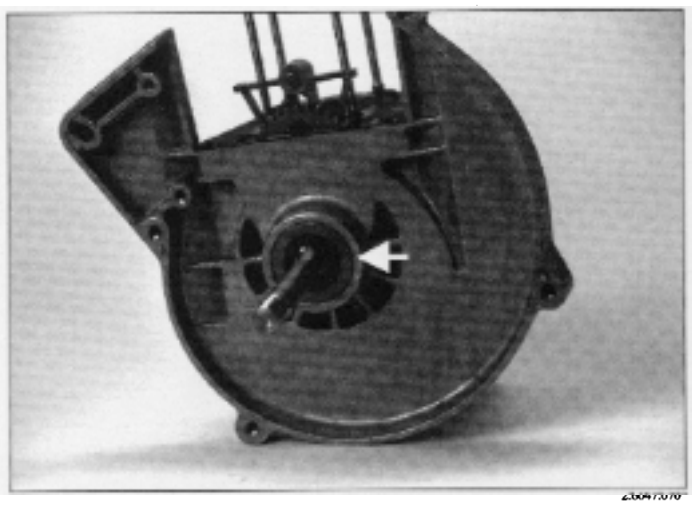
1. Remove the two (2) screws from the cam bracket assembly. Remove the cam bracket assembly.



2.6047.069

Remove Oil Pan

1. Remove the six (6) screws from the oil pan. Remove the oil pan.



Remove Seal

NOTE: Remove the seal only if oil is leaking from he crankcase.

1. Remove the seal from the flywheel side of the crankcase, using a seal puller or flathead screwdriver.

NOTE: Do not remove the crankshaft from the crankcase.

General Information . . . . . .

Troubleshooting . . . . . .

Disassembly . . . . . .

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Reassembly . . . . . .

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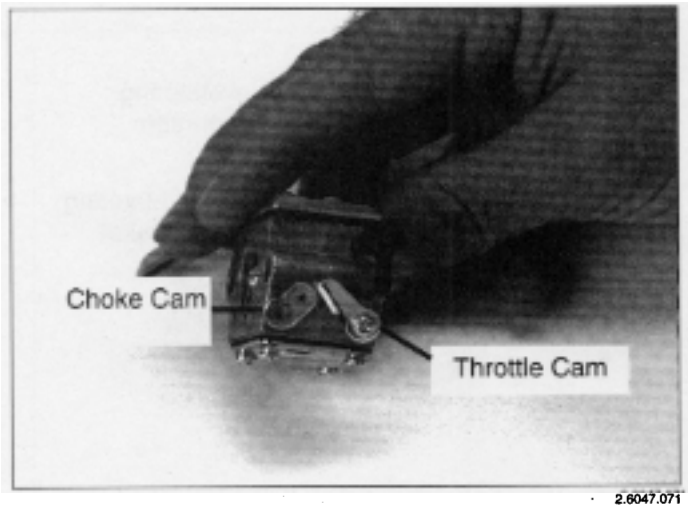
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This section covers the disassembly, reassembly, inspection and repair of the subassemblies of the major internal engine components.

Clean all parts thoroughly as the component parts are disassembled. Only clean parts can accurately be inspected and gauged for wear or damage. There are many commercially available cleaners that will quickly remove oil and grime from engine parts. When such a cleaner is used, follow the manufacturer's instructions and safety precautions carefully. Particular attention should be given to commercial cleaners compatibility with plastic parts.

Make sure that the cleaner is wiped off of the engine parts and not allowed to air dry as some cleaners leave a residue on parts which can affect engine lubrication.

CARBURETOR DISASSEMBLY AND REASSEMBLY

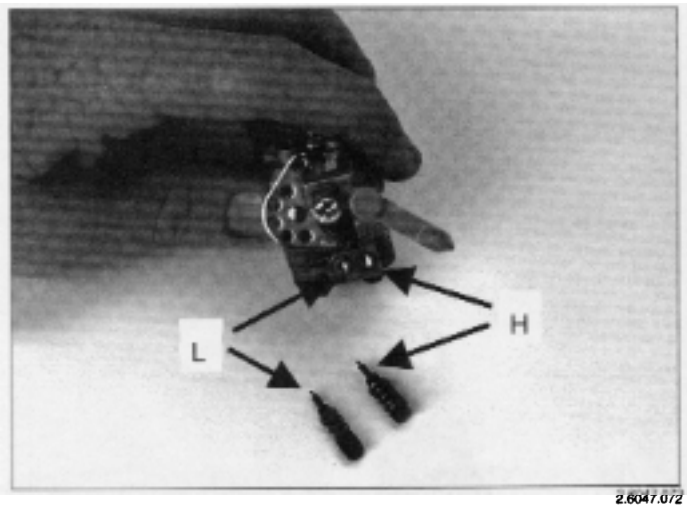


2.6047.071

Carburetor Disassembly

The fast idle starting system consists of a throttle cam, which is activated by a choke cam. When the cams are in the choke position, it is not necessary to squeeze the throttle fully when starting, which reduces the likelihood of flooding.

1. Inspect throttle and choke cams for wear or damage. Replace, if necessary.



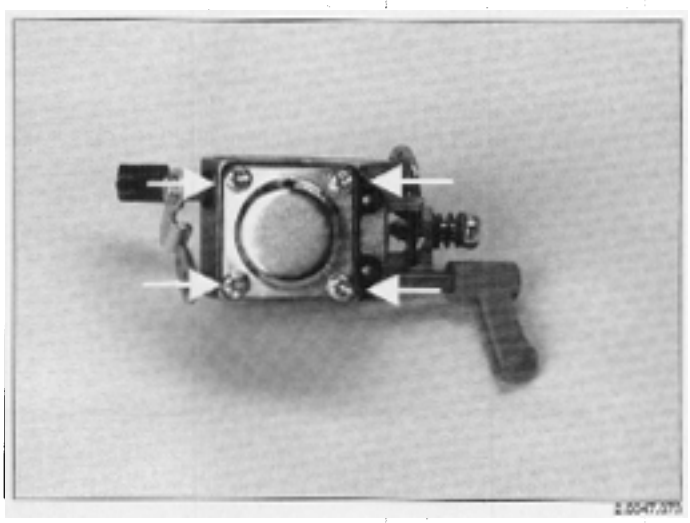
2.6047.072

2. Remove the high speed mixture (H) and idle mixture (L) adjusting needles and springs.

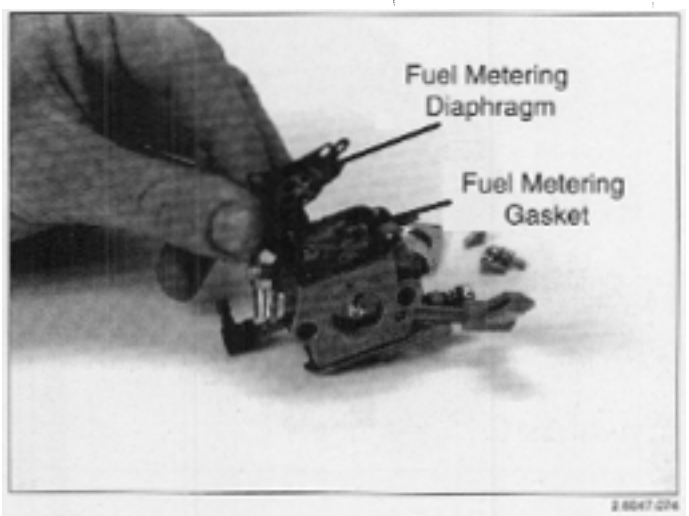
CARBURETOR DISASSEMBLY AND REASSEMBLY (cont.)

Fuel Metering Side

1. Remove the fuel metering cover screws and cover.

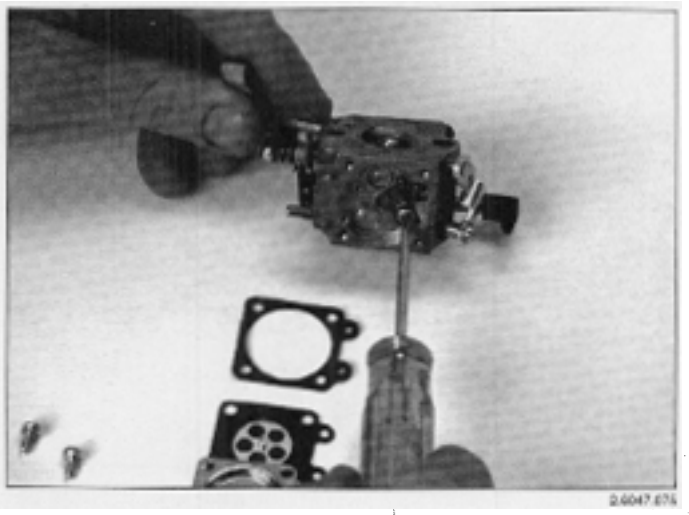


2. Remove the fuel metering diaphragm and gasket.



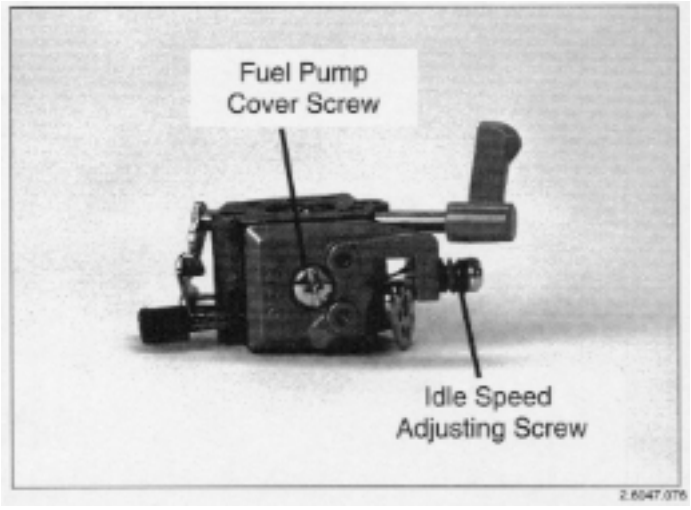
3. Remove the screw securing the metering lever hinge pin in the carburetor body.

   Remove the metering lever, hinge pin, metering lever spring and fuel inlet needle.



NOTE: These components are under spring tension. Remove them carefully to prevent loss. Make sure the spring is not stretched.

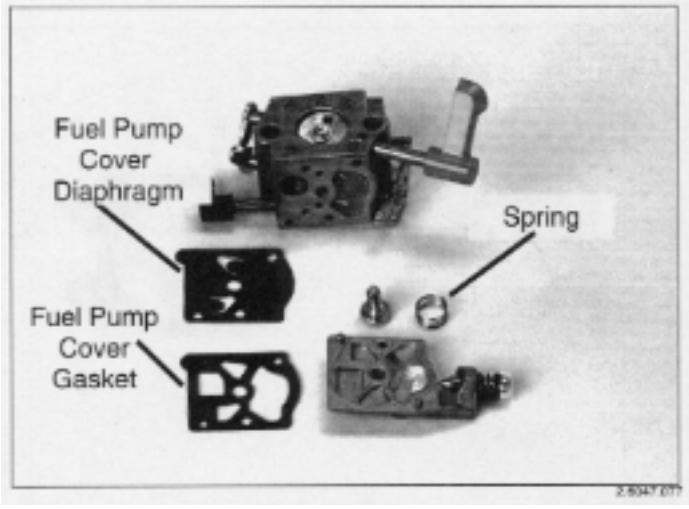
CARBURETOR DISASSEMBLY AND REASSEMBLY (cont.)



Fuel Pump Side

1. Remove the idle speed adjusting screw and spring from the fuel pump cover.

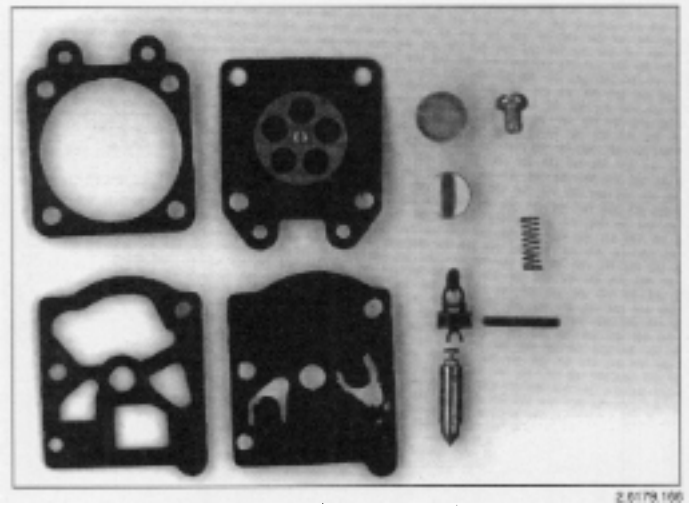
2. Remove the fuel pump cover screw and cover.



3. Remove the spring, fuel pump cover gasket and pump diaphragm from the fuel pump cover.

NOTE: Further disassembly to remove the throttle plate, throttle lever, choke lever, welch plugs, fuel inlet screen, etc. is not recommended.

NOTE: To prevent damage to the carburetor body, do not use drill bits or wire to clean fuel ports and passages.



Carburetor Inspection and Cleaning

Two carburetor service kits are available: a gasket/diaphragm kit and a carburetor repair kit.

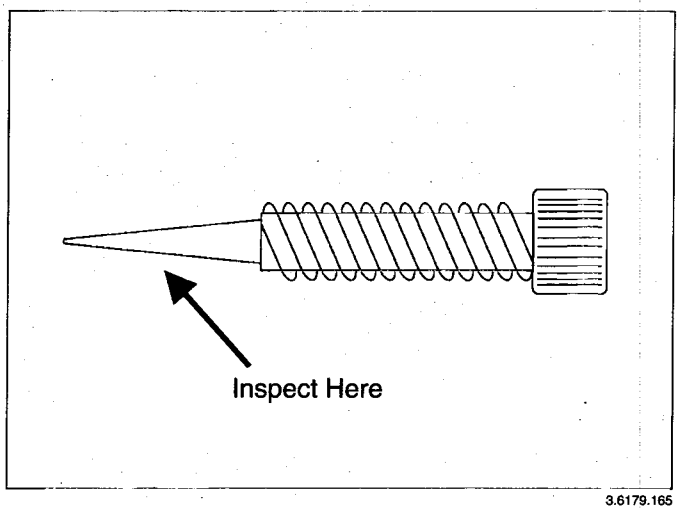
The gasket/diaphragm kit contains the fuel metering cover gasket, fuel metering diaphragm, fuel pump cover gasket, and fuel pump diaphragm.

The carburetor repair kit contains the gaskets and diaphragms included in the gasket/diaphragm kit plus fuel inlet needle and spring, fuel metering lever, metering lever hinge pin, the fuel inlet screen and welch plugs.

CARBURETOR DISASSEMBLY AND REASSEMBLY (cont.)

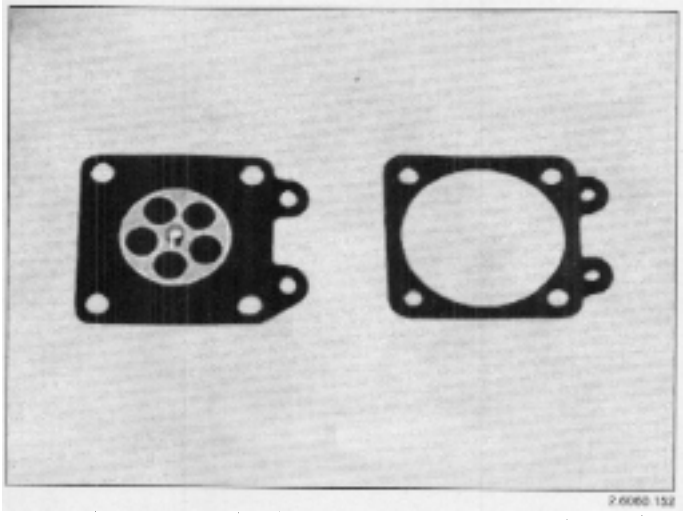
Refer to the appropriate parts manual for service kit part numbers.

1. Inspect the tips of the high speed mixture needle, idle speed mixture needle, and fuel inlet needle for wear or damage. Replace the needles if necessary.



3.6179.165

2. Gaskets and diaphragms eventually deteriorate and become stiff with age and use. It is good practice to replace gaskets and diaphragms for each repair. However, if the diaphragm is soft and flexible, you do not need to replace it, unless a complete carburetor rebuild is being performed.

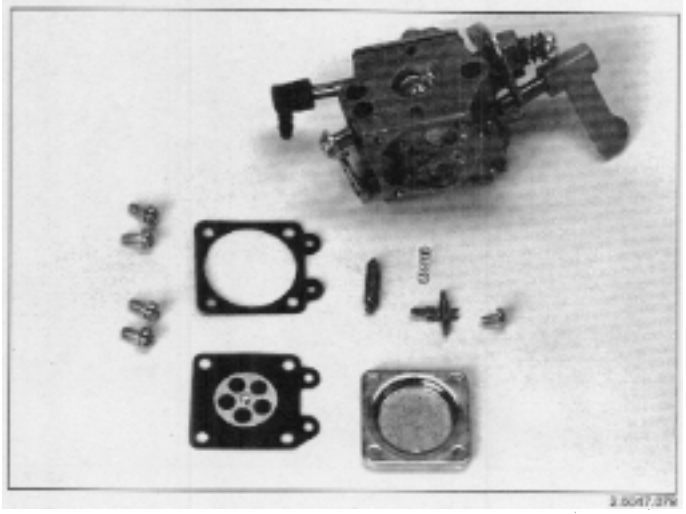


3. Clean the metering cover, pump cover, carburetor body and filter screen with carburetor cleaner. Blow out all passages with compressed air.

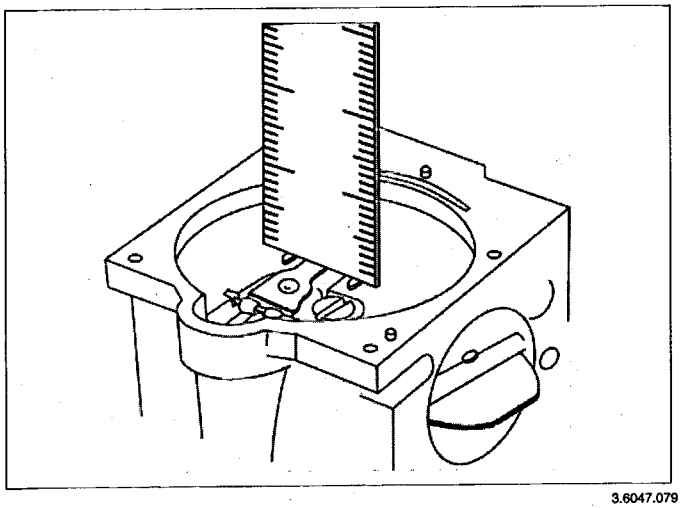
Carburetor Reassembly

Fuel Metering Side

1. Install the fuel inlet needle, fuel metering lever spring, metering lever and metering lever hinge pin. Secure the hinge pin in carburetor body with the hinge pin screw.



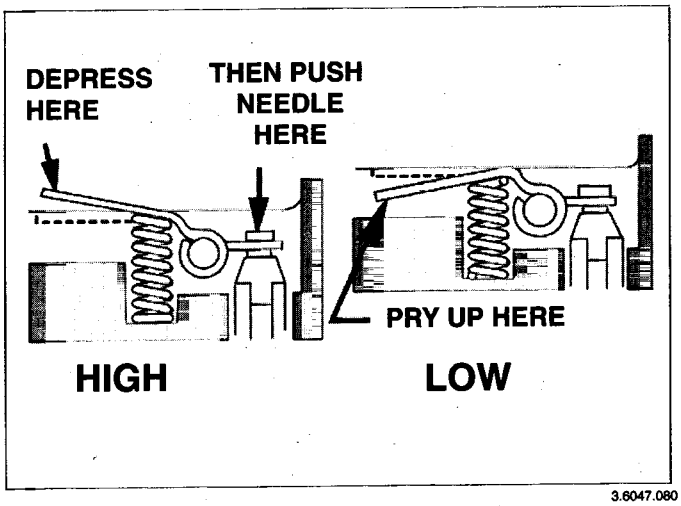
CARBURETOR DISASSEMBLY AND REASSEMBLY(cont.)



3.6047.079

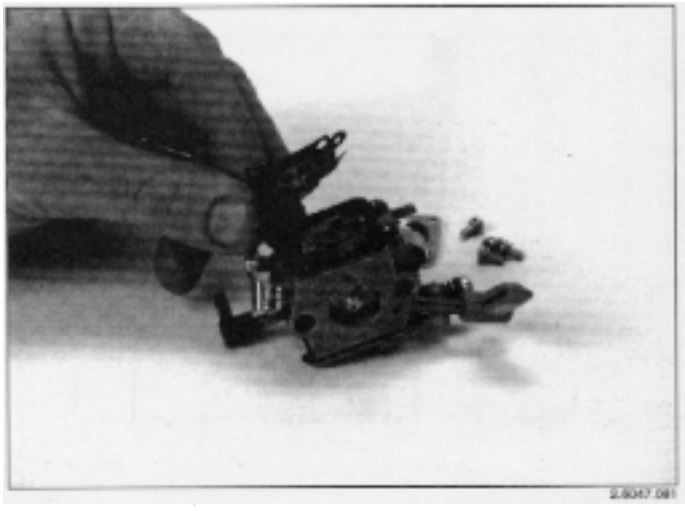
2. Place a straight edge across the carburetor body. Use a *wire* feeler gauge to measure the distance between the straight edge and the top of the fuel metering lever.

   The fuel metering lever should be **0.060-0.070 in. (1.52-1.78 mm)** below the straight edge.



3.6047.080

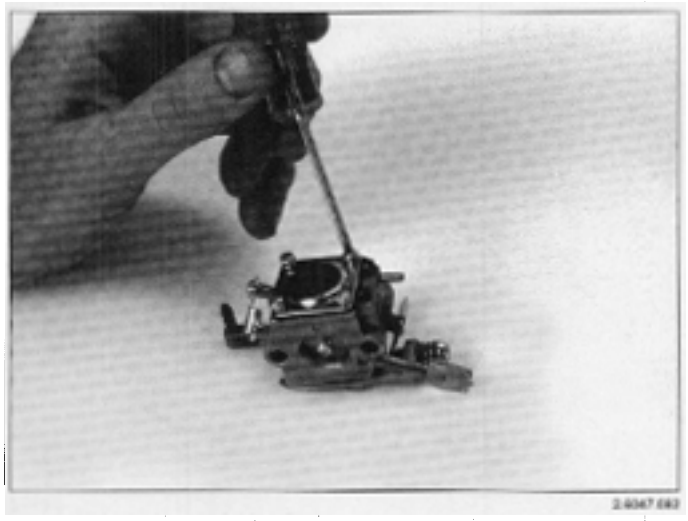
If the lever is adjusted too high, the engine will run rich. If the lever is adjusted too low, the engine will run lean. Poor acceleration and erratic operation may also be noted.



3. Install the metering cover gasket (next to carburetor body) and metering diaphragm. Make sure the larger circular plate of diaphragm is towards the metering lever.

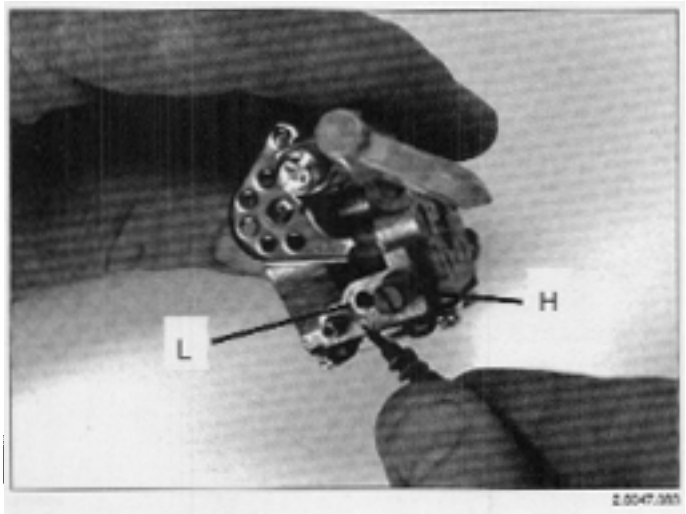
CARBURETOR DISASSEMBLY AND REASSEMBLY(cont.)

4. Make sure there are no wrinkles in the metering diaphragm. Install the metering cover and screws. Tighten the screws securely.



5. Install the high speed mixture (H) and idle mixture (L) adjusting needles and springs.

   Turn both needles **in (clockwise)** until they are *lightly seated*. Then turn the needles **out (counterclockwise)** the following number of turns:



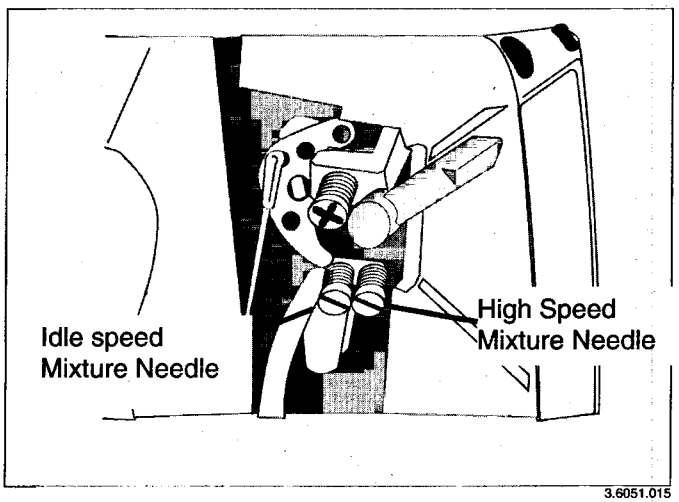
For Units with Engine Serial Number Prior to 407000001

High Speed Mixture Needle: **1 turn**
Idle Speed Mixture Needle: **1 turn**

For Units with Engine Serial Number 407000001 and Greater—

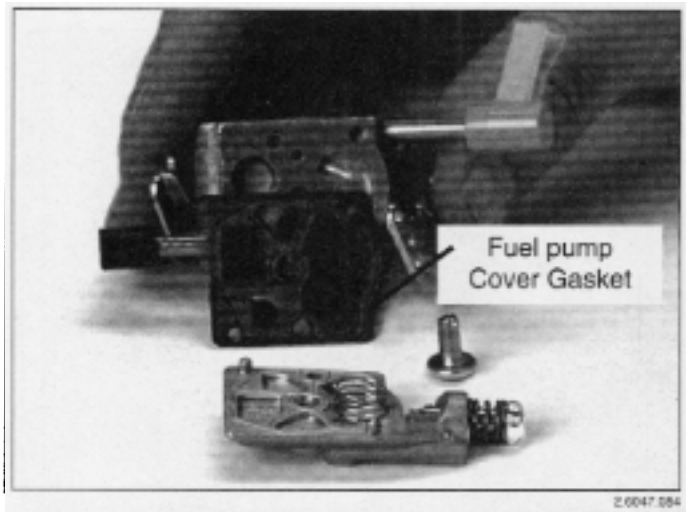
High Speed Mixture Needle: **1 1/8 turns**
Idle Speed Mixture Needle: **1 1/8 turns**

NOTE: Turn the high speed mixture and idle mixture needles *finger-tight*. Do not force the needles with a screwdriver because this can damage the tips of the needles and the seats in the carburetor body.



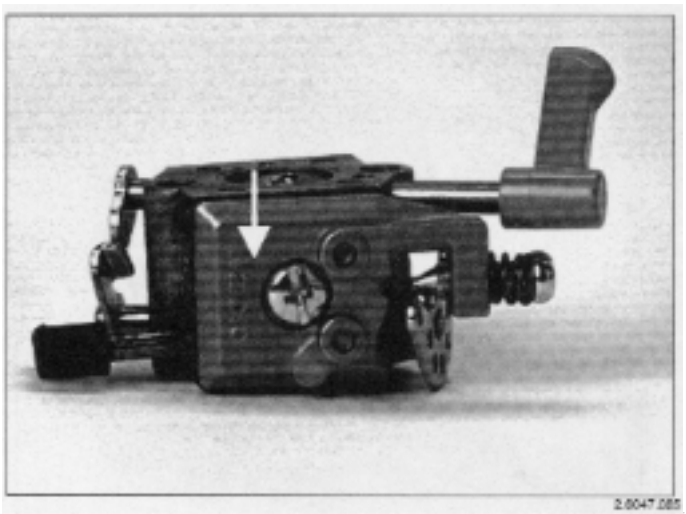
3.6051.015

CARBURETOR DISASSEMBLY AND REASSEMBLY (cont.)

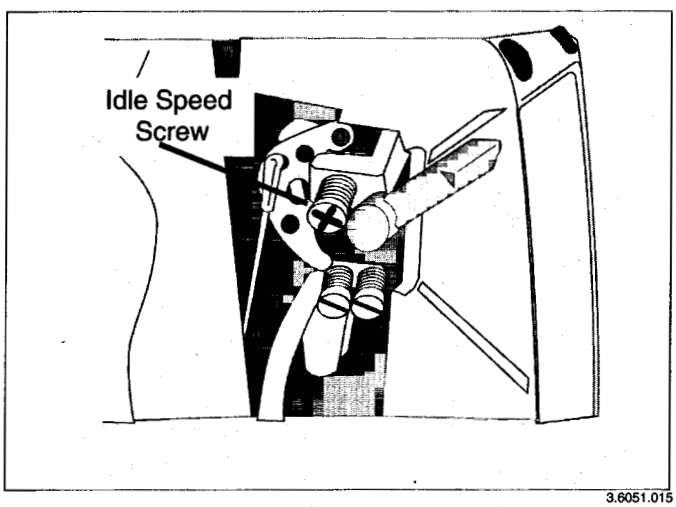


Fuel Pump Side

1. Install the fuel pump diaphragm (next to carburetor body) and gasket.



2. Install the spring, fuel pump cover, and cover screw. Tighten the screw securely.



3.6051.015

3. If necessary, install the idle speed adjusting screw and spring.

For Units with Engine Serial Number 407000001 and Greater— Turn the adjusting screw **in (clockwise)** until it *just touches* the throttle lever; then continue turning **2 full turns**.

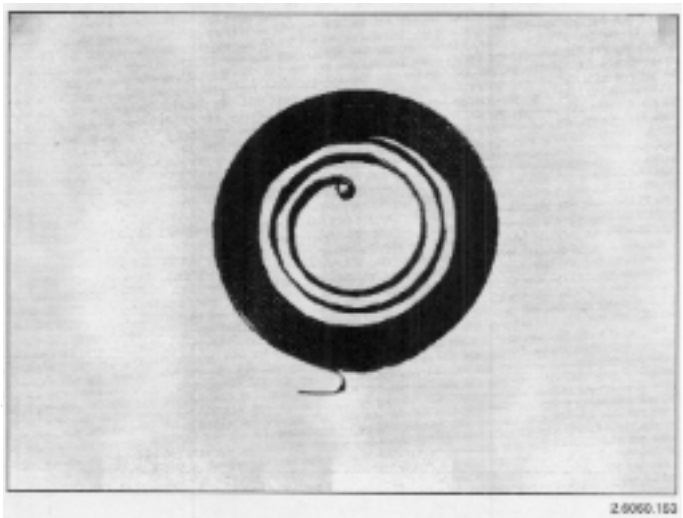
Final Carburetor Adjustment

Make final adjustments to the carburetor when the unit is fully reassembled. Refer to "Carburetor Adjustment" in *Part 1 - General Information.*

STARTER DISASSEMBLY AND REASSEMBLY

WARNING: Spring under tension!

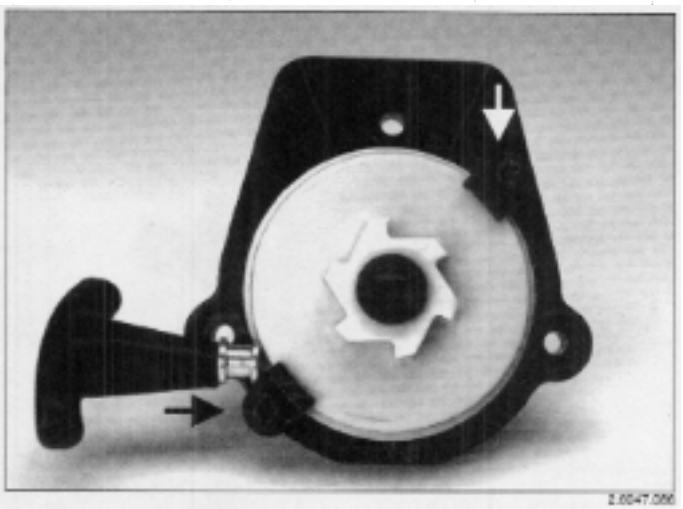
The rope starter on these engines contains a flat wire spring that is under tension.Wear eye and hand protection when replacing a worn or broken spring, in case it should uncoil as it is handled. Allow spring tension to be completely relieved and make sure the pulley disengages from spring before removing the pulley retainers, pulley, and starter spring from housing.



Adding Starter Spring Tension

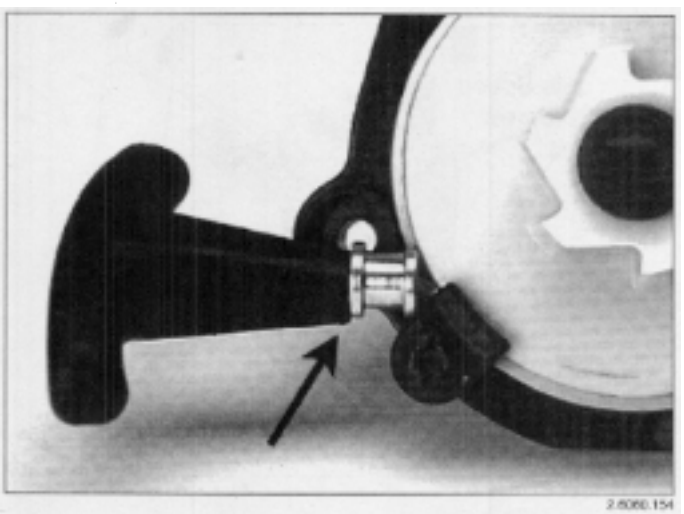
1. Holding the pulley in place, remove the two (2) screws and retainers from the starter housing.
2. Wind one or more extra turns of rope onto the pulley.
3. Replace the retainers and screws.

NOTE: Torque the retainer screw to **20-30 in•lb (2.3-3.4 N•m)** after additional rope is wound onto the pulley.

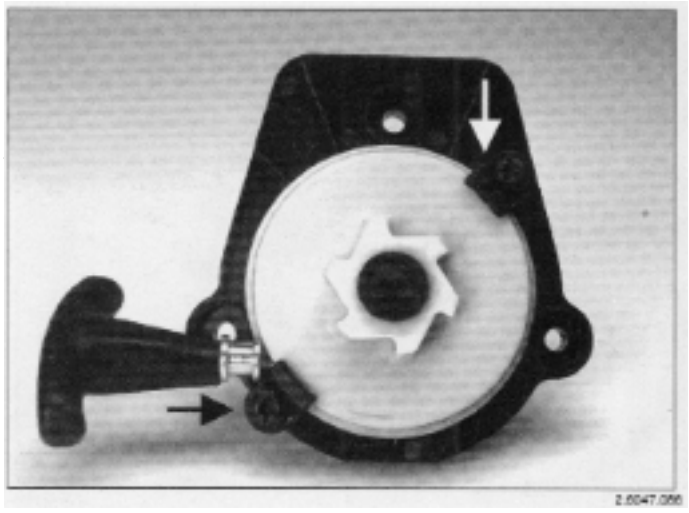


4. Pull the rope out to its full length and let it return until the pull handle rests against the starter housing.

NOTE: Do not add any more tension than is necessary to make the pull handle return against the starter housing. Adding excessive spring tension can cause the spring to break. If spring pressure is weak and adjustment will not enable the pull handle to return against the starter housing, replace the spring.



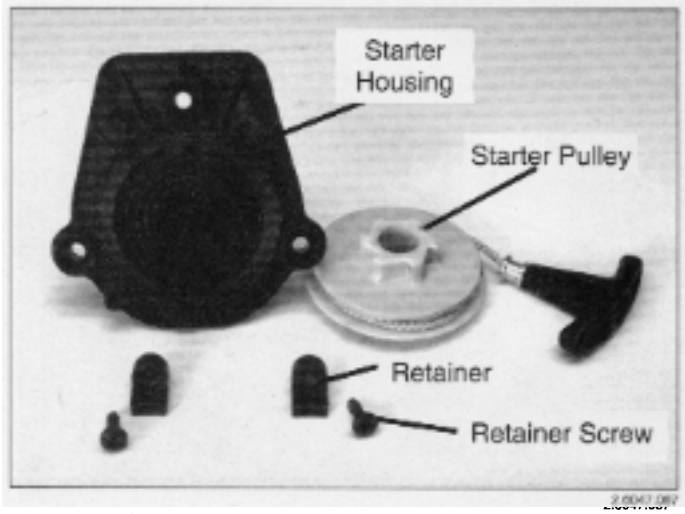
STARTER DISASSEMBLY AND REASSEMBLY (cont.)



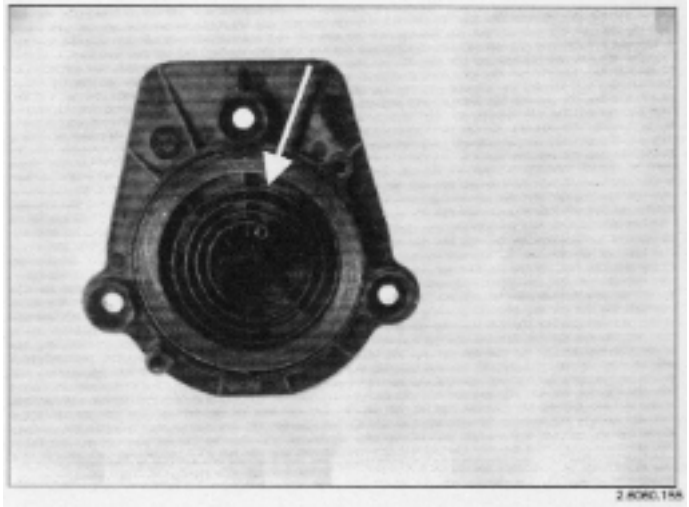
Starter Disassembly

1. Relieve the spring tension by removing the pull handle and allowing the pulley to *slowly* unwind inside the starter pulley. Make sure the spring tension is *fully relieved* before proceeding.

2. Remove the two (2) screws and retainers.



3. Remove the starter pulley from the starter housing.



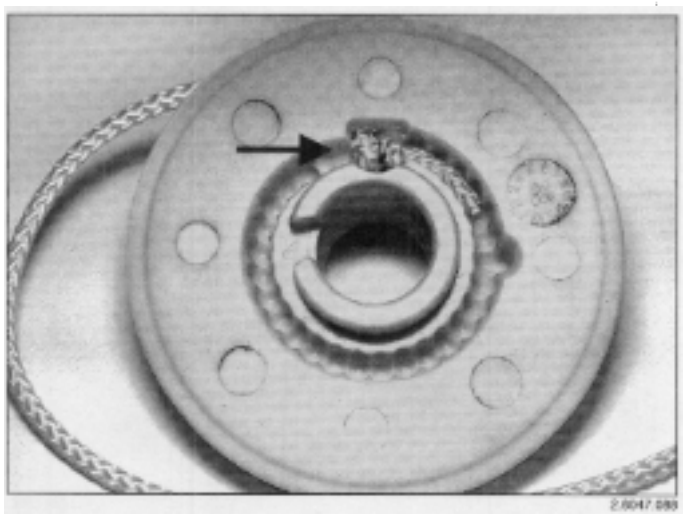
4. If necessary, remove the starter spring from the starter housing.

NOTE: To prevent injury when removing the starter spring, drop the spring into a trash container, which will release the spring from the housing.

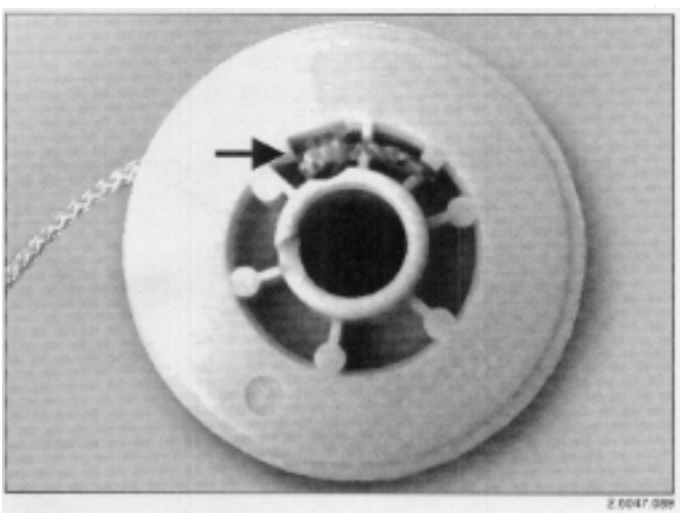
NOTE: Once the starter spring is removed from the starter housing, a service replacement spring (prewound and contained in a spring retainer) should be used to reassemble the starter. Reinstallation of the old starter spring is not recommended.

STARTER DISASSEMBLY AND REASSEMBLY (cont.)

5. Remove the starter rope from the pulley.



NOTE: Two types of starter pulleys were used in the production of the AC-1 engine. Your unit is equipped with one of the starter pulleys shown.

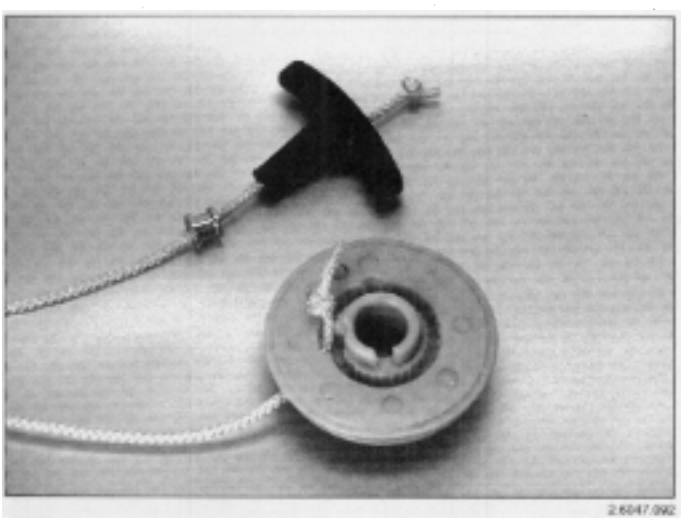


Starter Inspection and Service

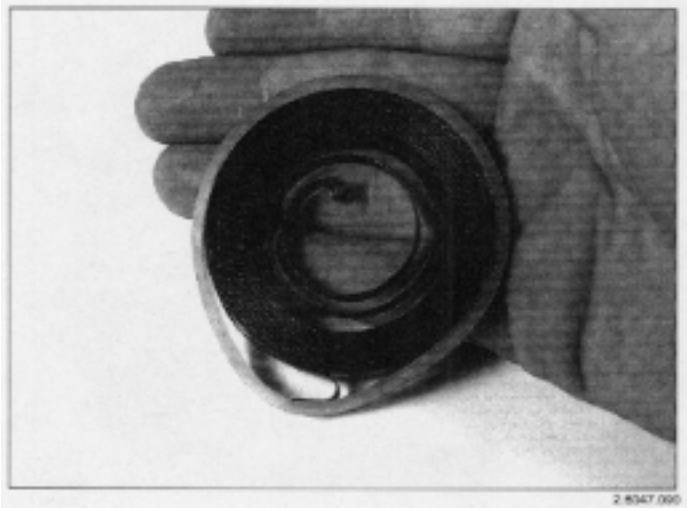
1. Inspect the starter rope for wear or frays. Replace the rope if necessary.

2. Inspect the starter pulley for worn pawl engagement teeth. Also check for wear on the surface of pulley that is in contact with the starter spring.

3. Make sure old grease and dirt are cleaned from all starter components before reassembling.



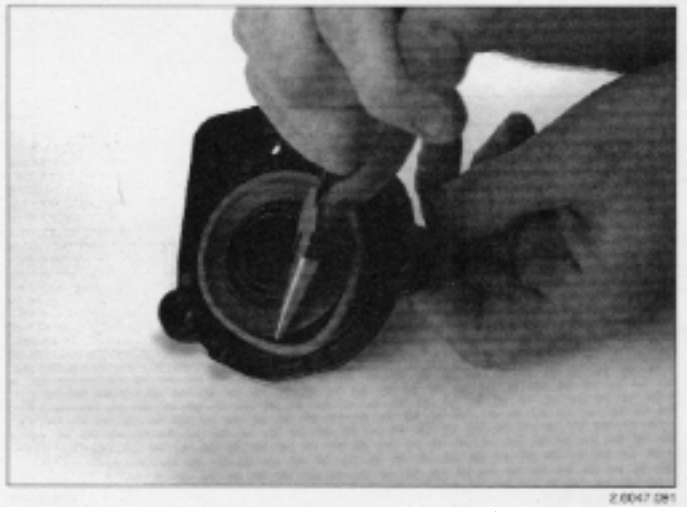
STARTER DISASSEMBLY AND REASSEMBLY (cont.)



Starter Reassembly

1. Install the starter spring into the starter housing as follows:

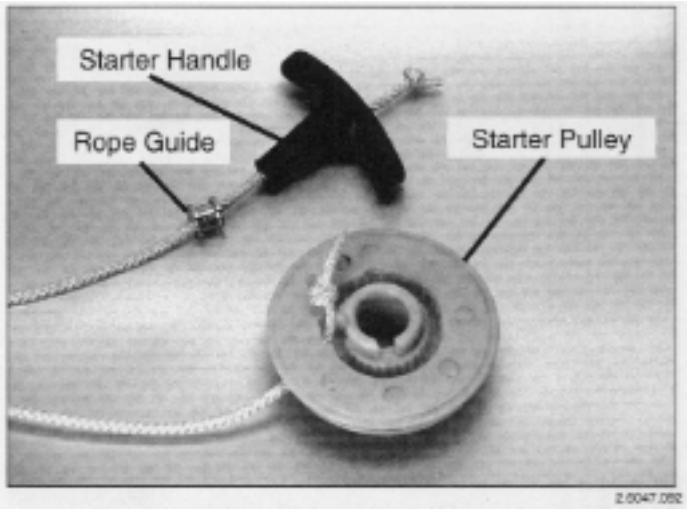
a. Orient the replacement starter spring so the spring windings are **clockwise** (the open end of spring hook is to the left).



b. Grasp the spring near the spring hook with a needle-nose pliers and *carefully* remove the spring retainer.

c. Place the spring into the starter housing. Make sure the spring hook is installed into the groove of the starter housing.

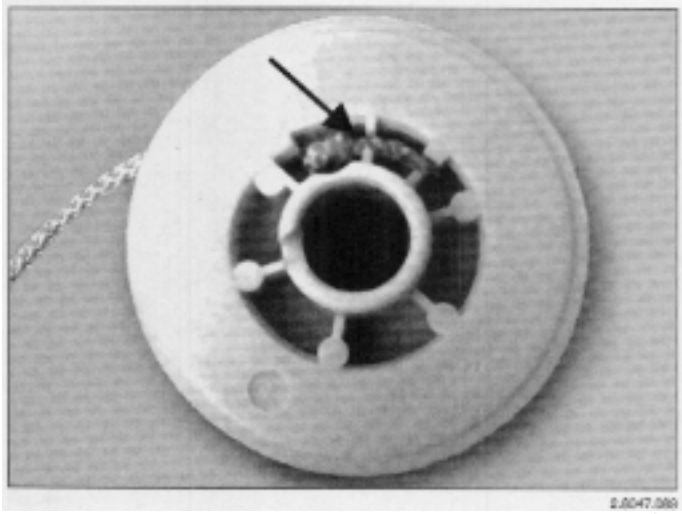
d. Make sure the spring windings are laying flat against the starter housing around the entire circumference of the spring. Hold the spring in this position and *carefully* release the needle-nose pliers holding the spring.



2. Insert the rope through the hole in the starter pulley. Tie a single knot in the rope approximately **0.5 in. (12.7 mm)** from the end.

STARTER DISASSEMBLY AND REASSEMBLY (cont.)

3. Pull the rope tight and the knot into the pocket in the pulley. Using a screwdriver or similar tool, push the end of the rope into the slot in the pulley.



4. Hold the pulley with the pawl engagement teeth towards you. Wrap the rope around the pulley in the **clockwise** direction. Make sure *all* of the rope is wound onto the pulley.

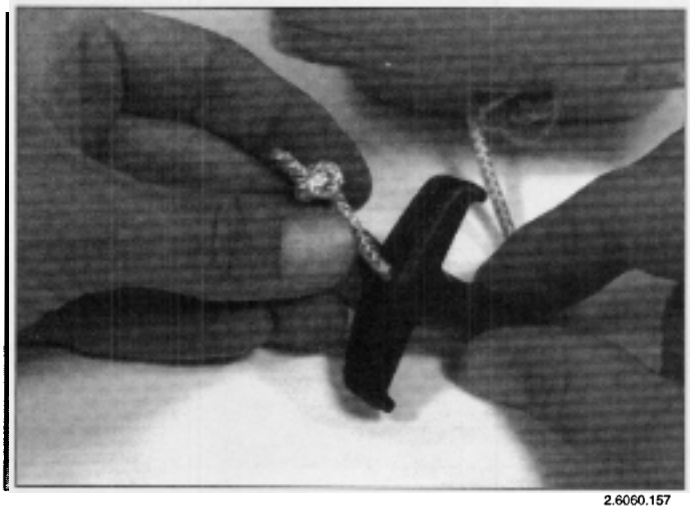


2.6060.156

5. Apply a small amount of grease (Mobilgrease® HP or equivalent) to the post in the starter housing, spring, and the backside of the pulley.

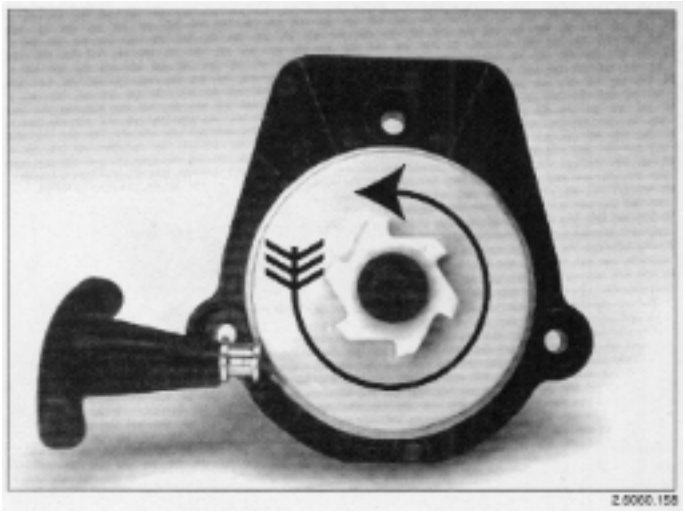
6. Install the rope guide eyelet onto the starter rope.

7. Place the rope through the eyelet. Install the pull handle on the rope and secure it with a single knot.



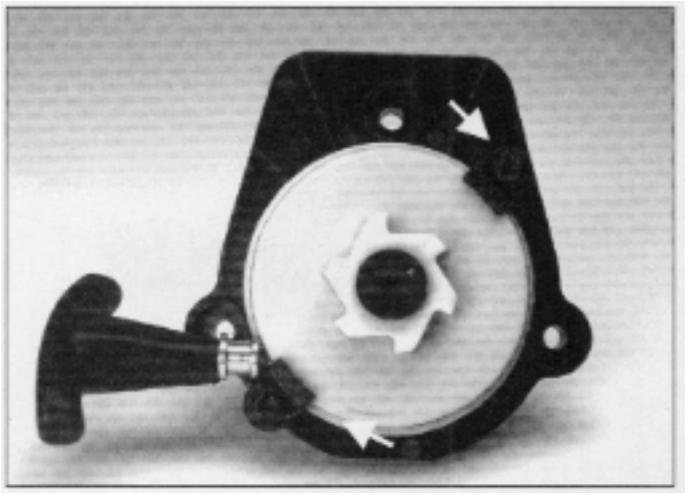
2.6060.157

STARTER DISASSEMBLY AND REASSEMBLY (cont.)



8. Install the pulley/rope assembly into the starter housing. Rotate the pulley slightly until the spring hooks onto the pulley and the pulley drops into place.

9. Holding the pulley down, put **1 full turn** of spring tension on the pulley.

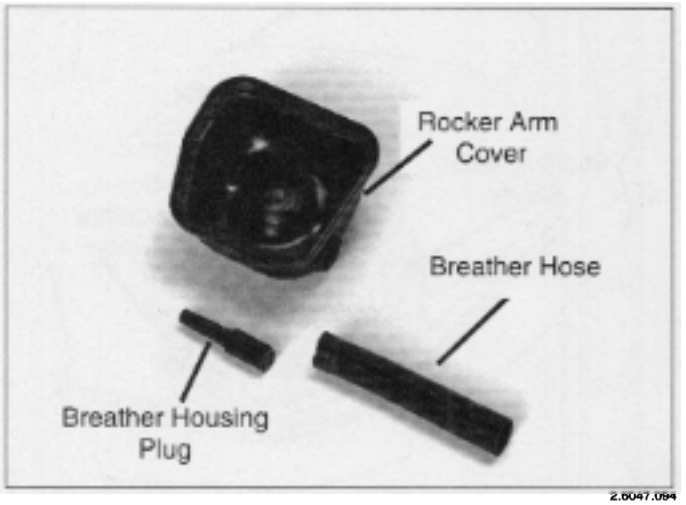


2.6047.086

10. Install the two (2) pulley retainers and screws. Torque the screws to **20-30 in•lb (2.3-3.4 N•m)**.

11. Pull the rope out to its full length and let it return. Check the spring tension and adjust as necessary. Refer to "Adding Starter Spring Tension" on page 4-10 for the location of the starter rope.

BREATHER DISASSEMBLY AND REASSEMBLY

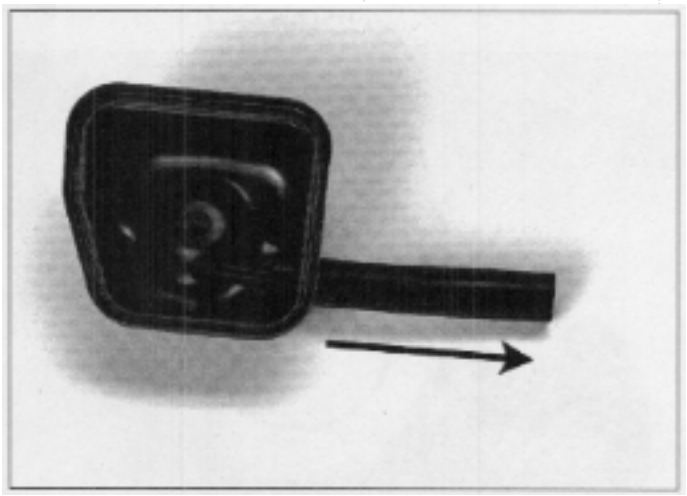


2.6047.094

1. Remove the breather hose assembly from the rocker arm cover.

2 Remove the breather hose from the breather housing/plug.

BREATHER DISASSEMBLY AND REASSEMBLY (cont.)

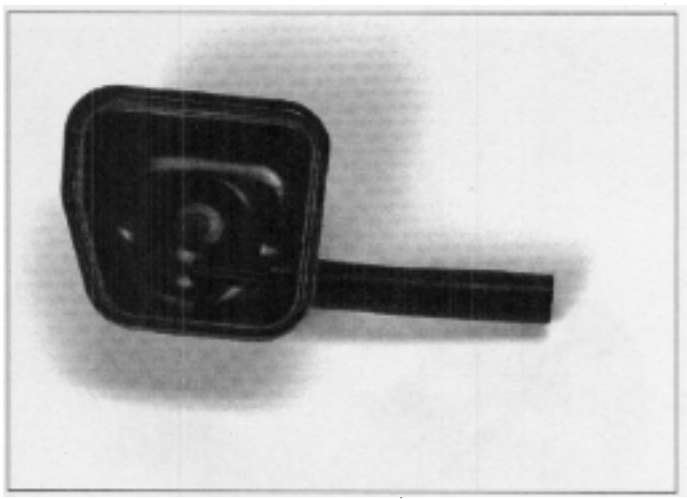


2.6060.159

Breather Hose Function Test

1. Test the hose by attempting to blow air through it in both directions. air should flow only in the direction shown (out of the crankcase).

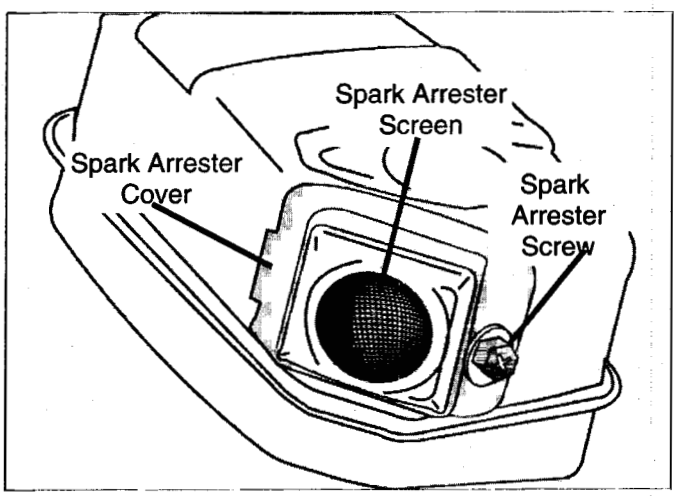
Reassembly



2.6047.095

1. Install the breather housing/plug into the hose.
2. Slide the breather hose assembly, from the inside out, into the rocker arm cover until the breather hose seats into the cover.

SPARK ARRESTER SCREEN

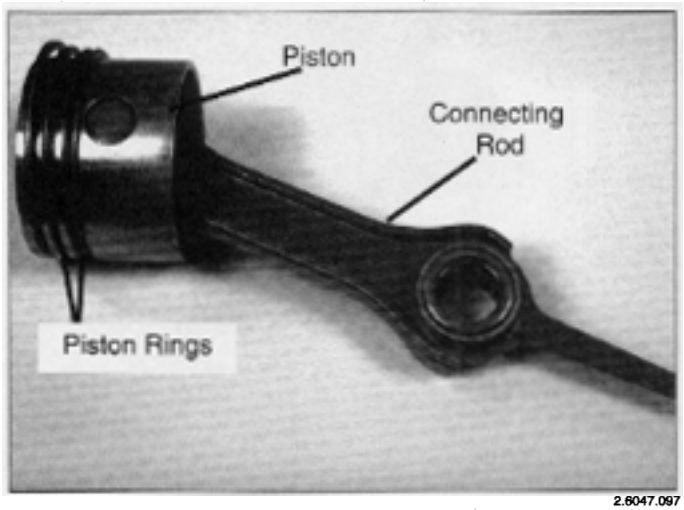


3.6047.096

1. Remove the spark arrester screw and cover.
2. Push the spark arrester screen out of the cover.
3. Inspect the spark arrester screen.

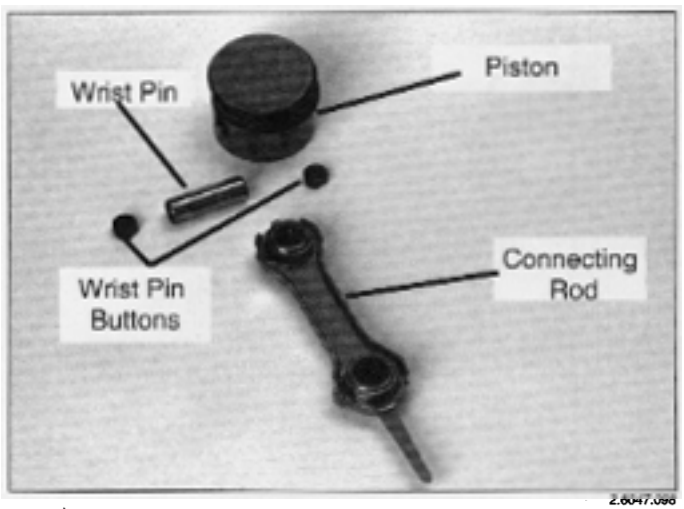
   If the screen is clean, reinstall the screen, cover and screw. If the screen is plugged, clean or replace.

PISTON/CONNECTING ROD DISASSEMBLY & ASSEMBLY

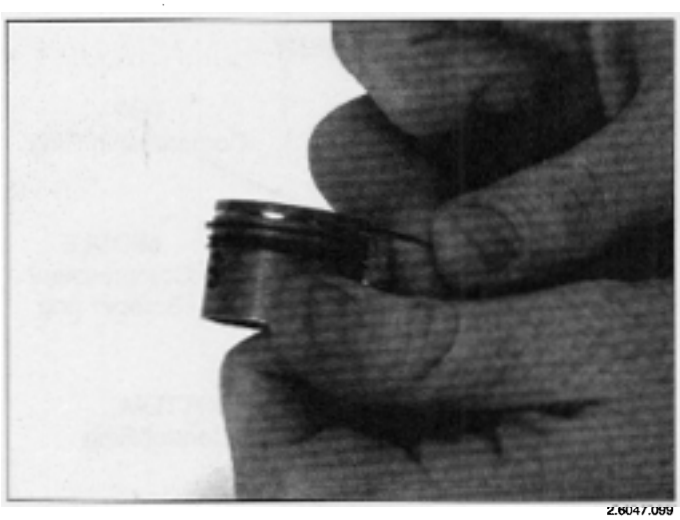


2.6047.097

1. Remove the three (3) piston rings from the piston/connecting rod.



2. Remove the wrist pin buttons, wrist pin and connecting rod from the piston.


2.6047.099

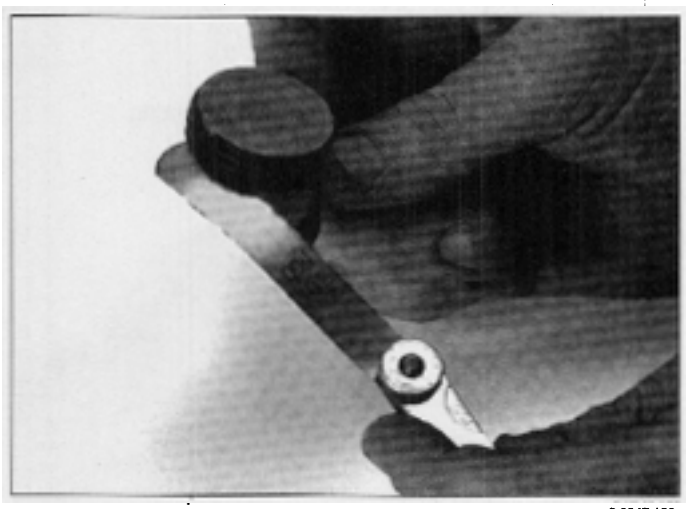
Piston Inspection and Repair

1. Inspect the piston and piston rings for wear and damage. Refer to the specifications and tolerances in *Part 1 – General Information.* Replace the piston and piston rings if necessary.

2. Inspect the ring grooves on the piston for carbon deposits. Clean the ring grooves thoroughly with an old broken ring.

PISTON/CONNECTING ROD DISASSEMBLY & ASSEMBLY (cont.)

3. Check the side clearance of the piston rings. The maximum side clearance is **.005 inch (0.127 mm)**.

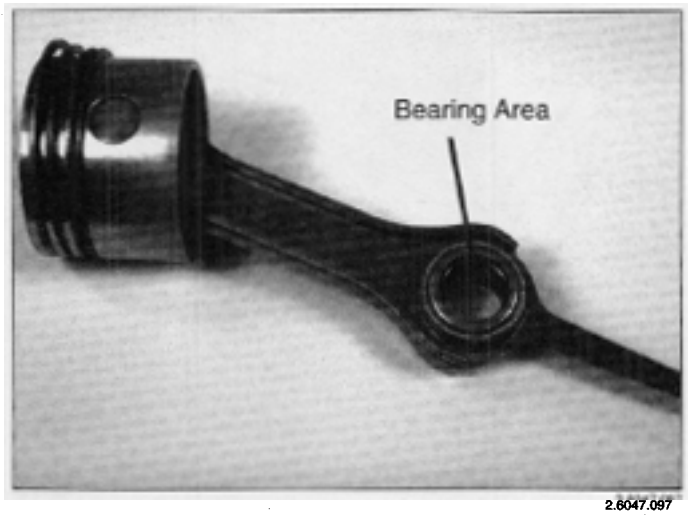


2.6047.100

4

Connecting Rod Inspection and Repair

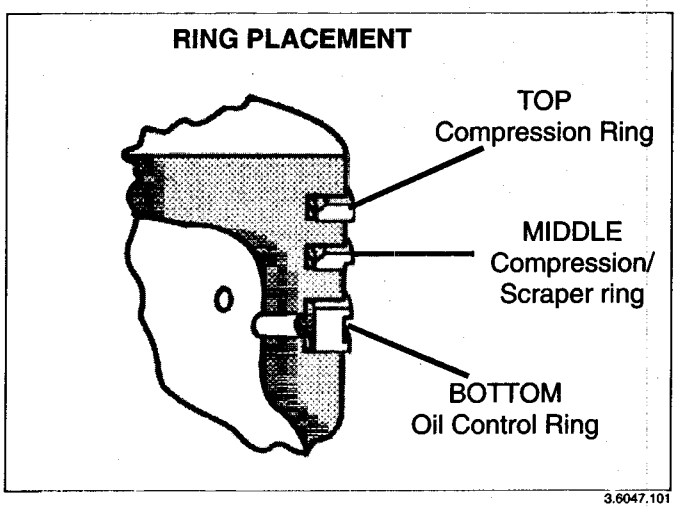
1. Check the bearing area (lower end) for excessive wear, score marks, running and side clearances. Refer to the specifications and tolerances in *Part 1 – General Information*. Replace the connecting rod if necessary.



2.6047.097

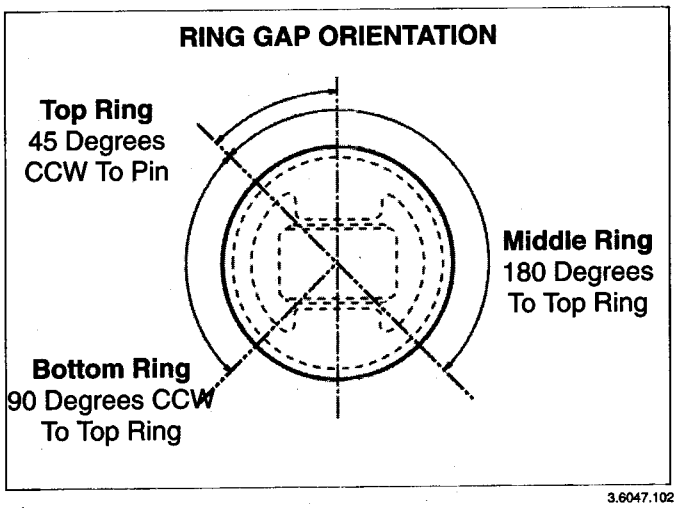
Reassembly

1. Install the piston rings into the ring grooves in the piston.



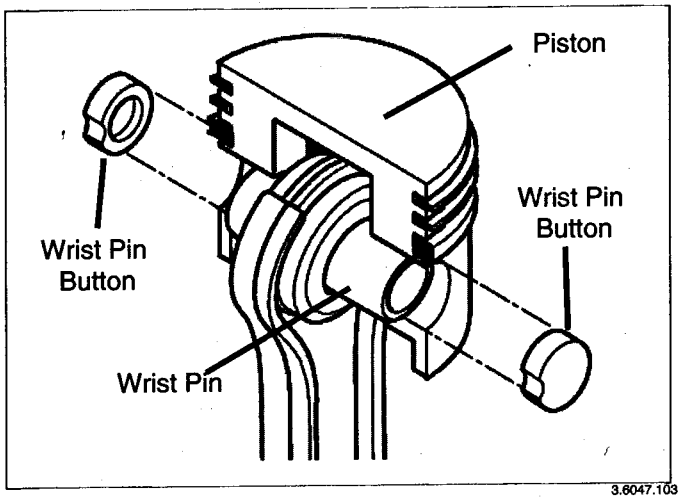
3.6047.101

PISTON/CONNECTING ROD DISASSEMBLY & ASSEMBLY



3.6047.102

Orient the piston ring gaps as shown

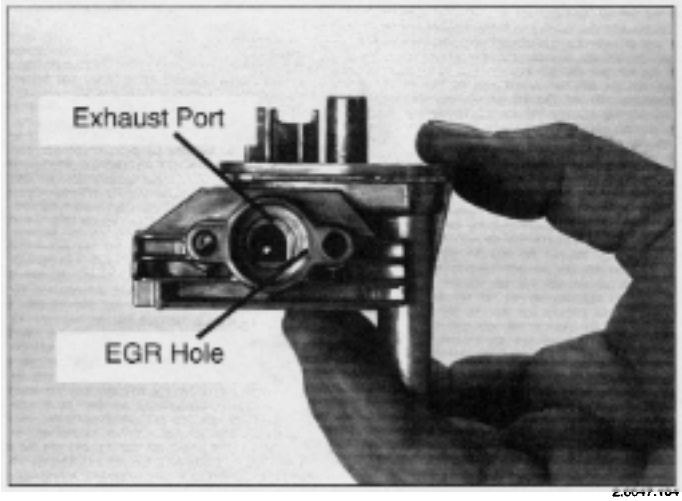


3.6047.103

2. Install the connecting rod, wrist pin buttons and wrist pin into the piston.

NOTE: Make sure the buttons are installed with the recess of the button facing the piston.

CYLINDER HEAD INSPECTION & REPAIR



Cylinder Inspection and Repair

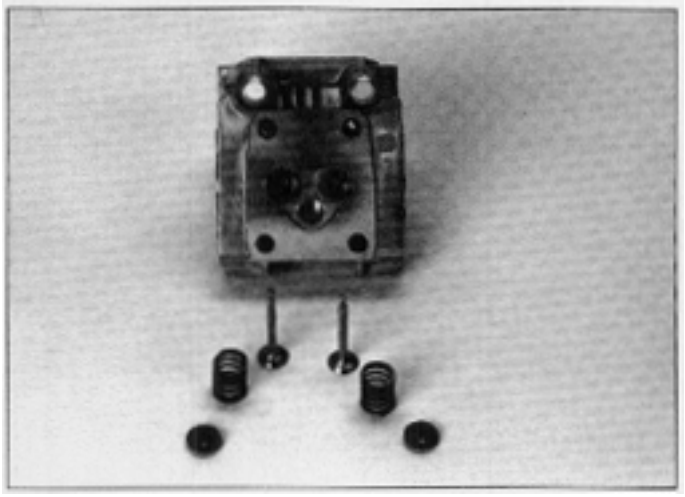
1. Check all gasket surfaces to make sure they are free of debris. Gasket surfaces must also be free of deep scratches or nicks.
2. Inspect the cylinder and cylinder head for wear and damage.
3. Inspect the intake port of the cylinder head for blockage. Clean if necessary.
4. Inspect and clean the "EGR" (Exhaust Gas Recirculation) hole, which is located between the exhaust and intake ports.

CYLINDER HEAD INSPECTION & REPAIR (cont.)

Valve Assembly Inspection and Repair

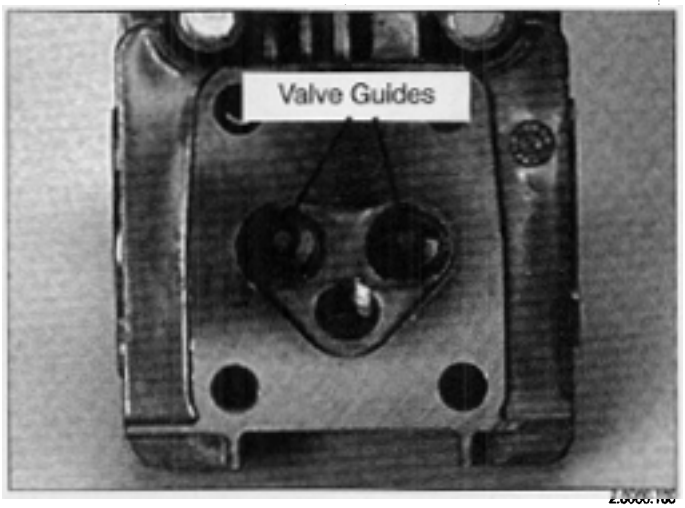
1. Inspect the valve springs and related hardware for excessive wear or distortion.
2. Check the valves and valve seat area for evidence of deep pitting, cracks, or distortion. Check the clearance of the valve stems in the guides.

NOTE: Difficult starting or loss of power accompanied by high fuel consumption may be symptoms of faulty valves. Although these symptoms could also be attributed to worn rings, remove and check the valves first.



2.6047.118

3. Check the valve guides for excessive wear. If a valve guide is worn beyond specifications, it will not guide the valve in a straight line. This may result in burnt valve faces or seats, loss of compression and excessive oil consumption. Replace cylinder head, if necessary.

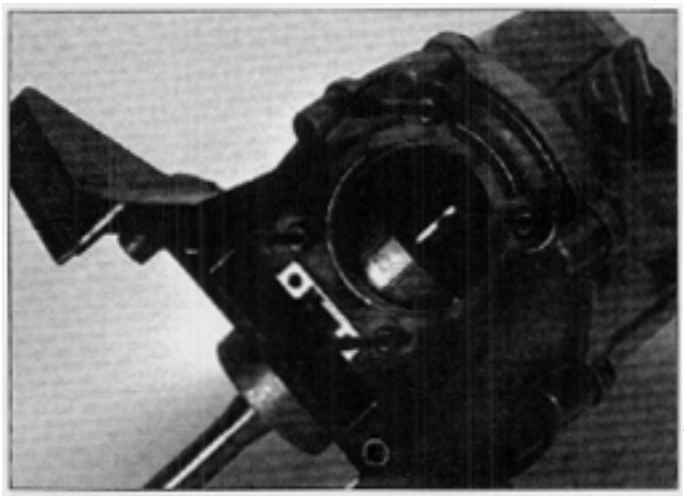


CRANKCASE INSPECTION & REPAIR

Crankcase Inspection

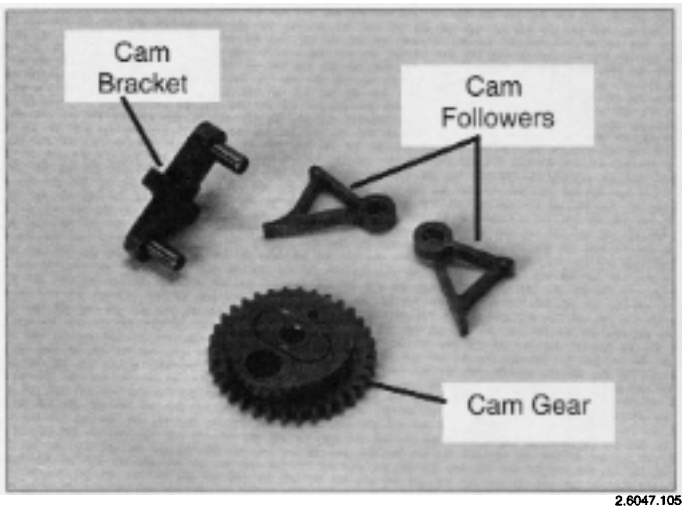
1. Inspect the crankcase for nicks, cracks, and deformation. Replace, if necessary.

2. Inspect the crankshaft for nicks, cracks, roundness and deformation. Replace, if necessary.



2.6047.109

CRANKCASE INSPECTION & REPAIR (cont.)



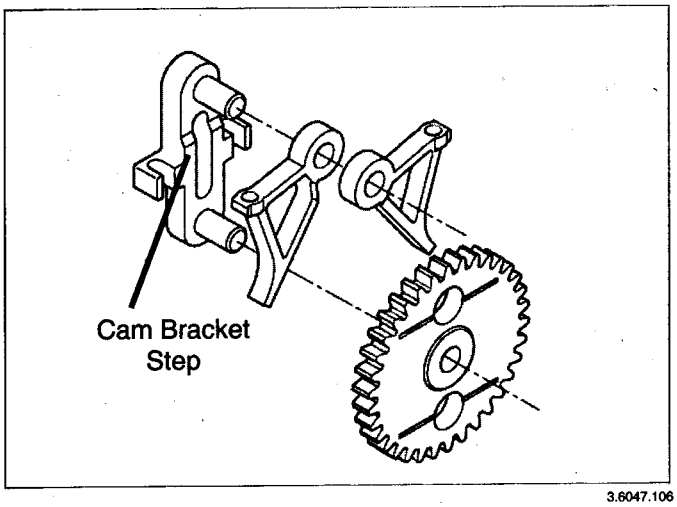
2.6047.105

Cam Bracket Disassembly and Inspection

1. Disassemble the cam gear, two (2) followers and bracket .

2. Inspect the cam gear, bracket, and followers for wear or damage. Replace any or all of the parts if necessary.

3. Inspect the teeth on the cam gear. If the teeth are badly worn, chipped or missing, replace the cam gear.



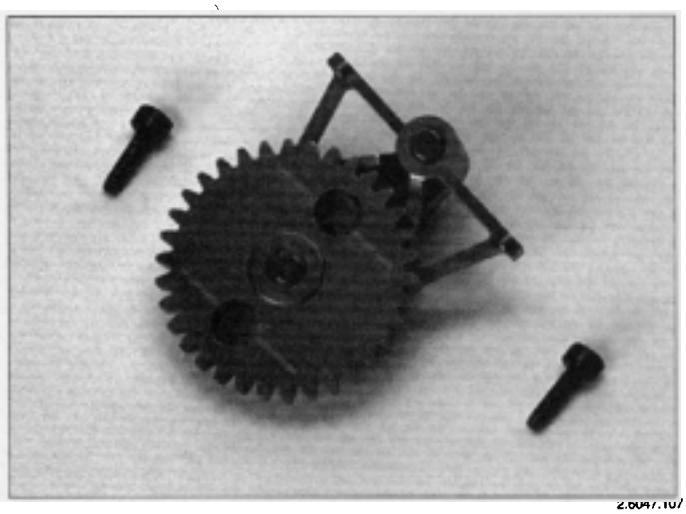
3.6047.106

Cam Bracket Reassembly

1. Make sure you have all of the necessary parts to reassemble the cam bracket assembly.

2. Install the cam followers to the cam bracket.

NOTE: Make sure the cam followers are installed to the end of the bracket with the step on it.



2.6047.107

3. Install the cam gear to the cam followers and bracket .

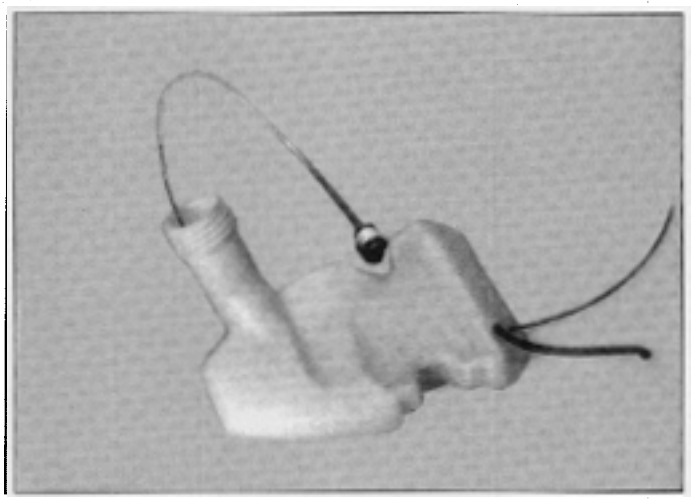
MAJOR COMPONENTS INSPECTION & REPAIR

Fuel Tank and Cap Inspection

1. Inspect the fuel tank for cracks, rubbing, or chaffed spots. Replace the tank if necessary.

2. Inspect the rubber fuel tank mounting pad for condition. Replace the pad if necessary.

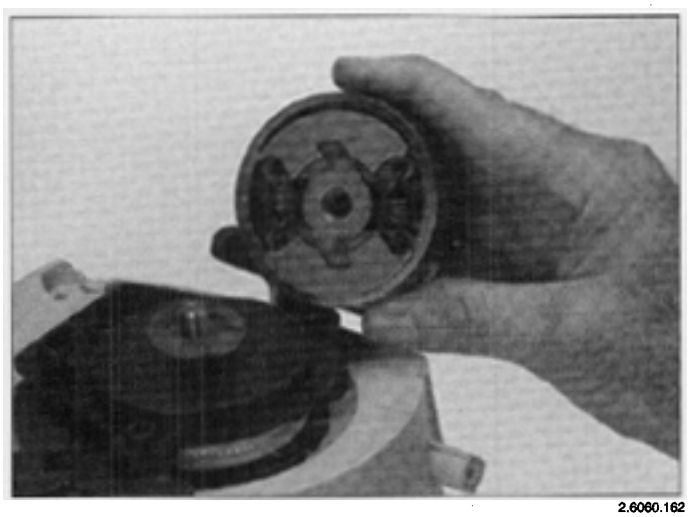
3. Inspect the fuel tank cap for cracks, damaged vent valve, or other visible signs of damage. Replace the cap if necessary.



2.6047.052

Clutch Inspection

1. Check the clutch rotor for wear or damage. Replace, if necessary.



2.6060.162

Muffler Inspection and Cleaning

The muffler should be removed periodically to inspect for excessive carbon build-up. Excessive deposits around the exhaust port will cause poor engine performance.

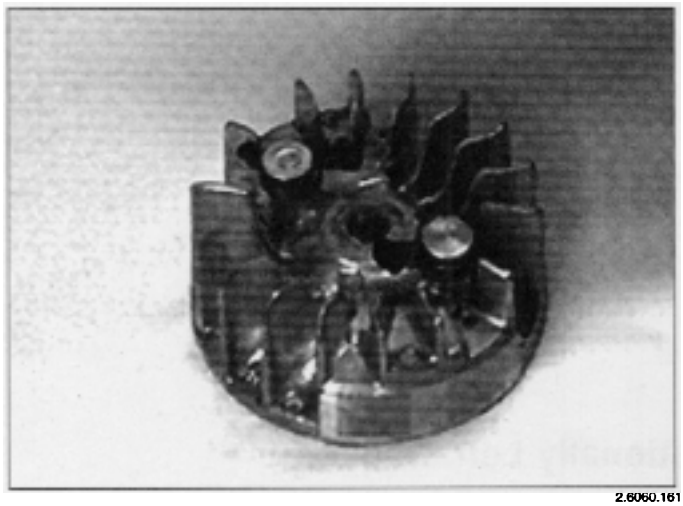
If carbon build-up cannot be cleaned, replace the muffler.

Inspect the muffler mounting holes for elongation. Replace the muffler if the holes are elongated.



2.6047.125

MAJOR COMPONENTS INSPECTION & REPAIR (cont.)

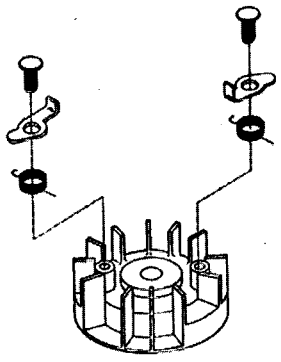


2.6060.161

Flywheel Inspection and Repair

Inspect the flywheel for the following conditions:

- Miissing, broken or cracked fins.
- Oval shaped pawl pin holes.
- Broken, damaged or missing springs, pawls or pawl pins. Freedom of movement of pawls.
- Evidence that the Starter Pawl Repair Kit has been installed (holes in bottom of the flywheel below pawl pins).Engine
- Other signs of fatigue, wear or damage to the flywheel.



CONTENTS OF KIT #180142

2 Starter Pawl Pins (oversized)

2 Starter Pawl Springs

2 Starter Pawls

Starter Pawl Repair Kit, P/N 180142, is available to repair the flywheel. This kit contains 2 pawl pins (oversized*), two (2) pawl springs, and two (2) pawls. To install the kit, an arbor press, 0.228 inch (5.79 mm) drill and drill press are required. Installation instructions are provided in the kit.

NOTE: The pawl pins in this kit are oversized. Once this kit is installed, the flywheel cannot be repaired a second time.

General Information . . . . . .

Troubleshooting . . . . . .

Disassembly . . . . . .

Inspection and Repair . . . . . .

Reassembly . . . . . .

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- Install Ignition Module 5-14
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- Install Air Filter Base, Air Filter and Air Filter Cover 5-18

Assemble Handle 5-20
- Install Lower Handle 5-20
- Install Upper Handle 5-21

Assemble Covers 5-23
- Install Engine Cover 5-23

The following sequence is suggested for complete engine reassembly. This procedure assumes that all components are new or have been reconditioned, and all component subassembly work has been completed. This procedure can be varied to accommodate individual requirements for assembly.

NOTE: Make sure the engine is assembled using all specified torque values and clearances. Failure to observe specifications can cause severe engine wear or damage.

No contaminants or debris should be on the parts when reassembling.

Always use new gaskets.

Typical assembly sequence

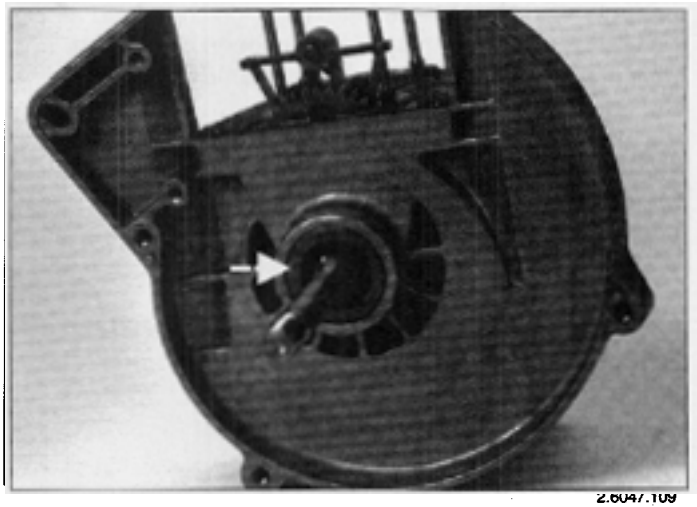
1. Install Seal
2. Install Cam Bracket Assembly
3. Install Piston/Connecting Rod
4. Install Cylinder
5. Install Oil Pan
6. Cylinder Head Assembly
7. Install Rocker Arm Assembly
8. Rocker Arm to Valve Clearance
9. Install Spark Plug
10. Install Muffler1
11. Install Intake Baffle
12. Install Carburetor Mount Insulator
13. Install Flywheel
14. Install Ignition Module
15. Install Fan Housing
16. Install Fuel Tank and Fuel Tank Bracket
17. Install Starter Module Assembly
18. Install Clutch
19. Install Primer Bulb, Carburetor, and Connect Fuel Lines
20. Install Air Filter Base, Air Filter and Air Filter Cover
21. Install Lower Handle
22. Install Upper Handle
23. Install Engine Cover
24. Prepare Unit for Operation

ENGINE REASSEMBLY

Install Seal

1. If the seal was removed in *Part 3 - Disassembly*, press a **new** seal into the crankcase until it is **flush with the crankcase surface** (with the metal surface facing out).

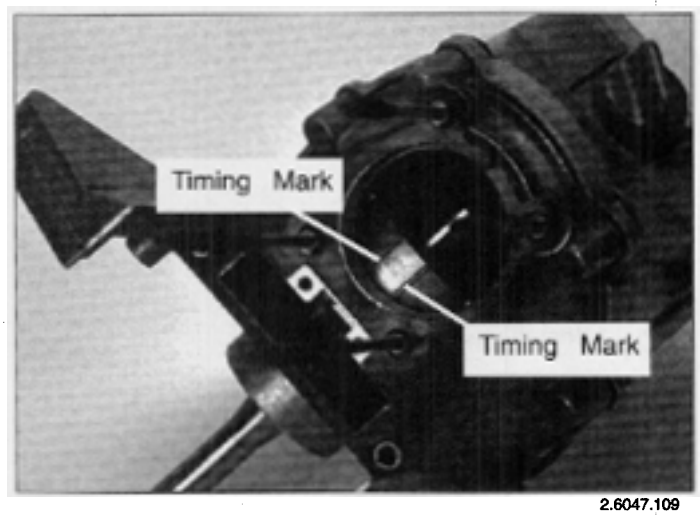
NOTE: To make the installation of the seal easier, grease the inner ring of the seal with Mobilgrease® HP or an equivalent.



2.6047.109

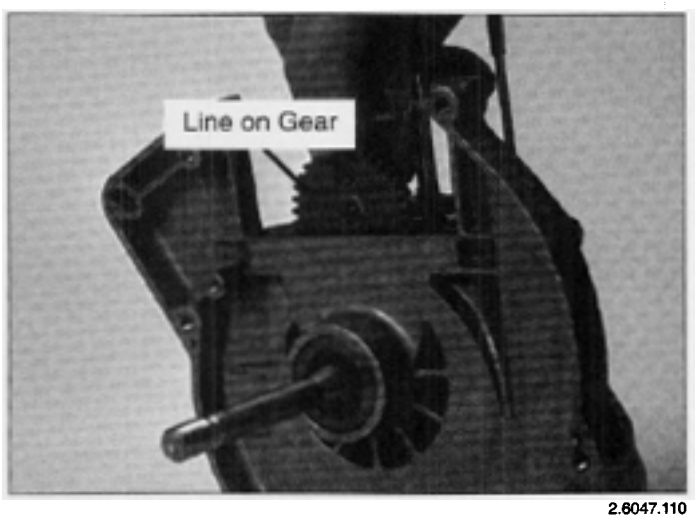
Install Cam Bracket Assembly

1. Rotate the crankshaft until the crankpin is at top dead center between the timing marks



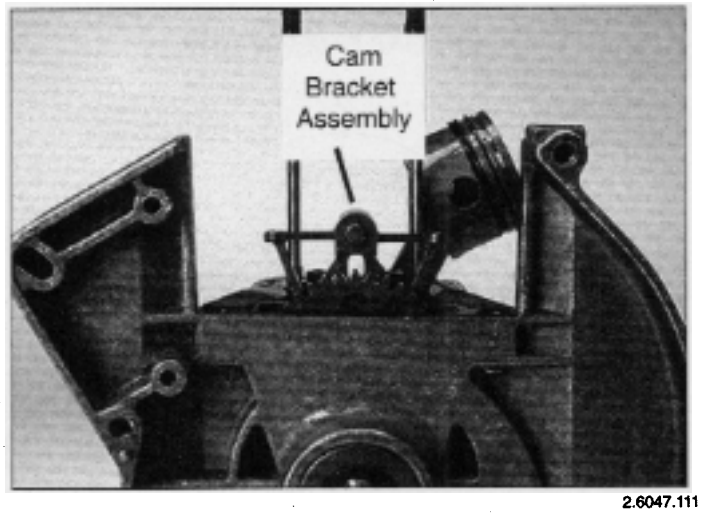
2.6047.109

2. Slide the cam bracket assembly into the crankcase with the open hole of the cam gear down (6 o'clock) and the blocked hole at the top (12 o'clock).



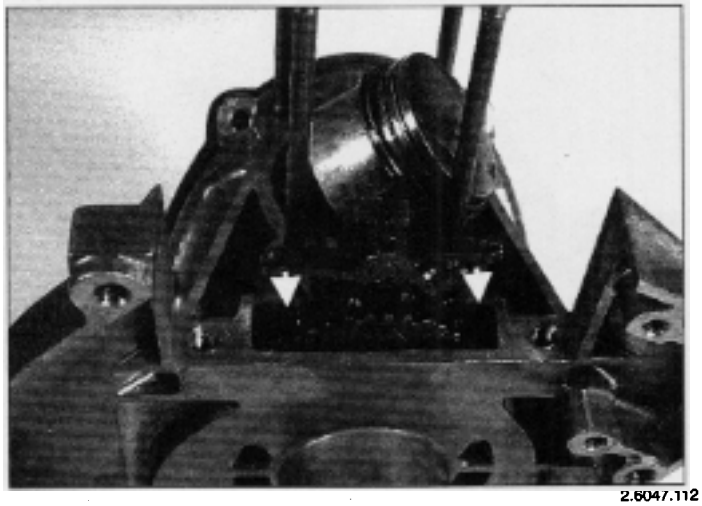
2.6047.110

ENGINE ASSEMBLY (cont)



2.6047.111

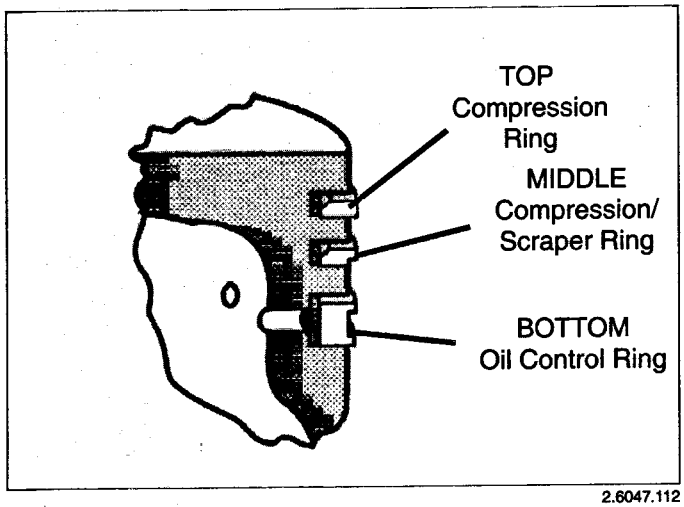
Make sure the line below the blocked hole of the cam gear is parallel to the crankcase without turning the engine.



2.6047.112

3. Install the cam bracket assembly into the crankcase with the two (2) screws.

   Torque the screws to **15-20 in•lb (1.7-2.2 N•m)**.



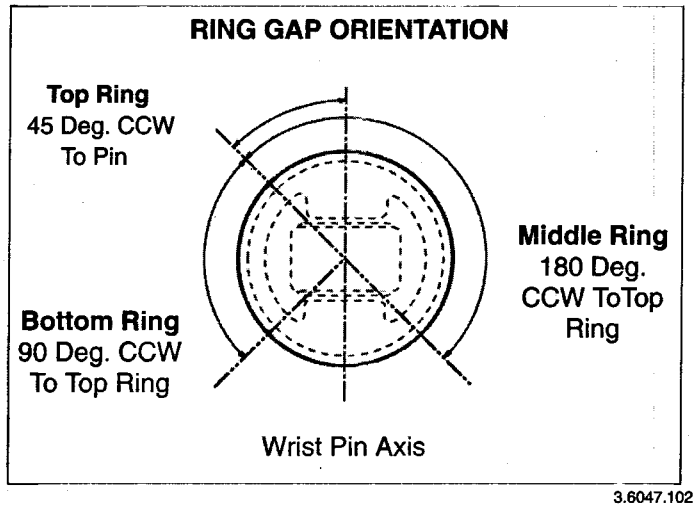
2.6047.112

Install Piston/Connecting Rod

1. Make sure the piston rings are installed correctly as shown.

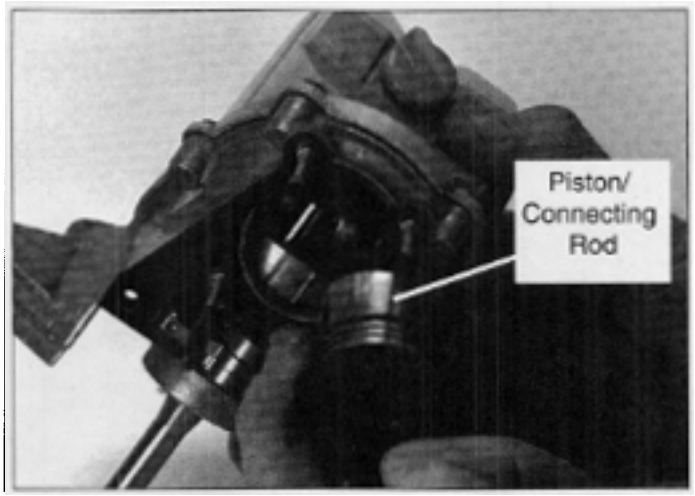
ENGINE ASSEMBLY (cont)

2. Orient the ring gaps as shown



3.6047.102

3. Install the piston/connecting rod assembly into the crankcase with the lettering on the bearing of the connecting rod facing the crankshaft counterweight. Slide it down in the crankcase. Angle it slightly and roll it into place. Be sure not to dislodge the wrist pin buttons.



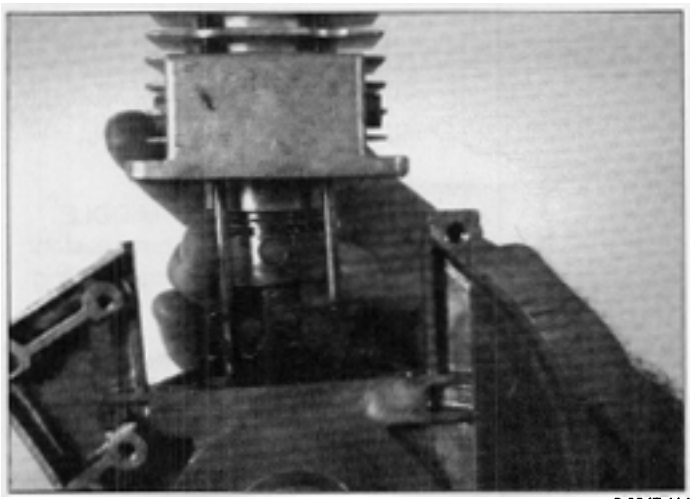
2.6047.113

5

Install Cylinder

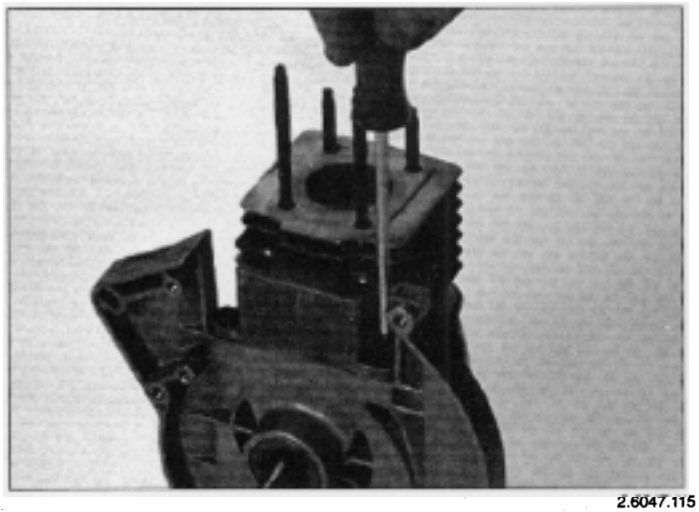
1. Install the cylinder to crankcase gasket. Always use a new gasket. While holding the piston/connecting rod in place, slide the cylinder into the crankcase.

NOTE: Hold the wrist pin buttons in place as you install the cylinder.



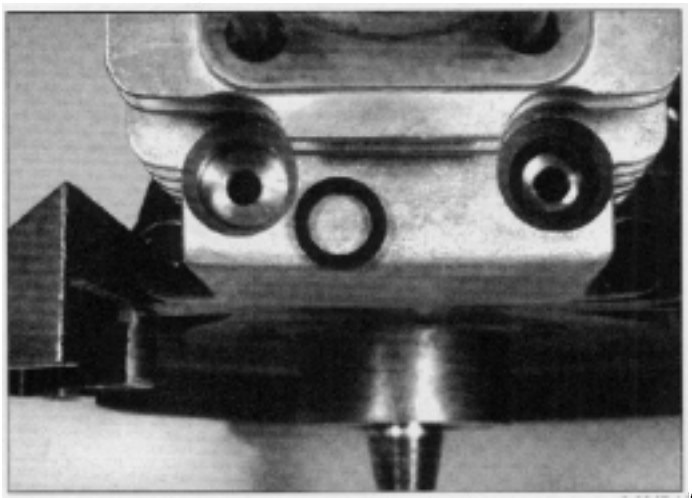
2.6047.114

ENGINE ASSEMBLY (cont)



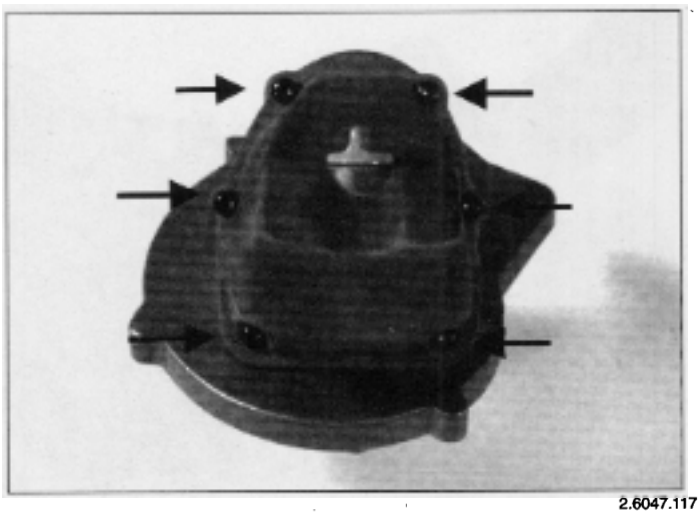
2.6047.115

2. Install the the cylinder with the two (2) screws into the crankcase. Do not tighten.



2.6047.116

3. Place two (2) new O-rings on the cylinder. Oil them lightly.



2.6047.117

Install Oil Pan

1. Install the six (6) screws into the oil pan.

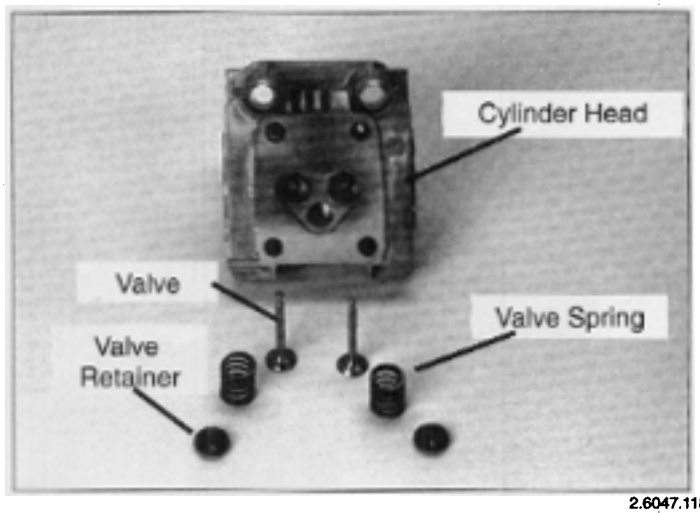
   Torque the screws to **35-45 in•lb (3.9-5.0 N•m).**

ENGINE ASSEMBLY (cont.)

Cylinder Head Assembly

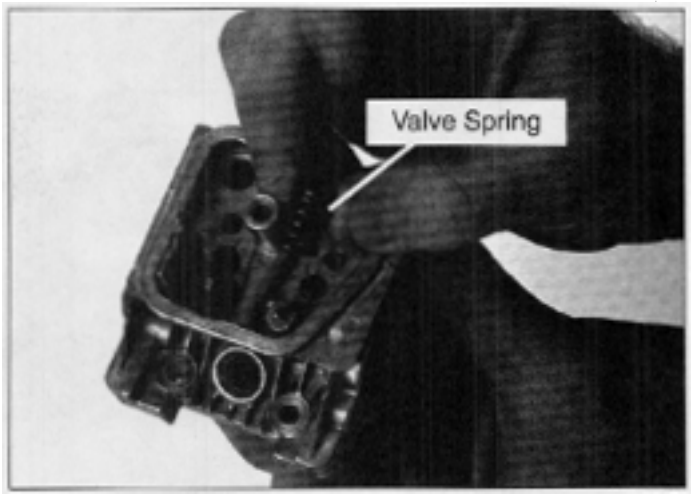
1 . Make sure you have all of necessary parts to assemble the cylinder head, which include two (2) valves, valve springs and retainers .

NOTE: Always match intake and exhaust parts when assembling the cylinder head.



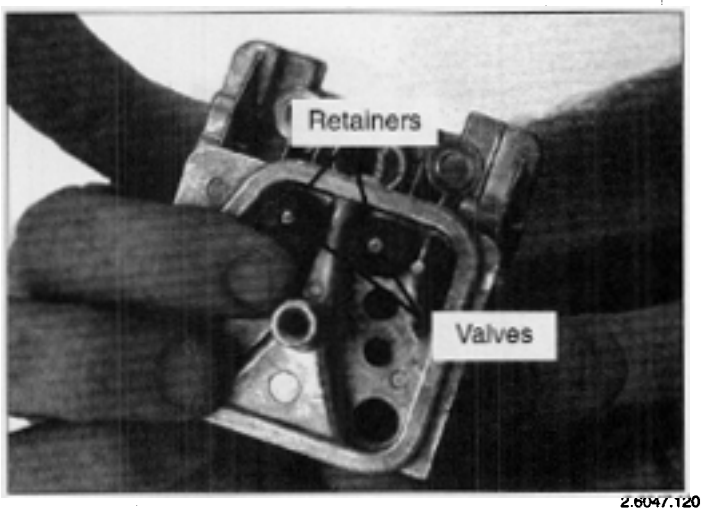
2.6047.118

2. Install the valves and valve springs.



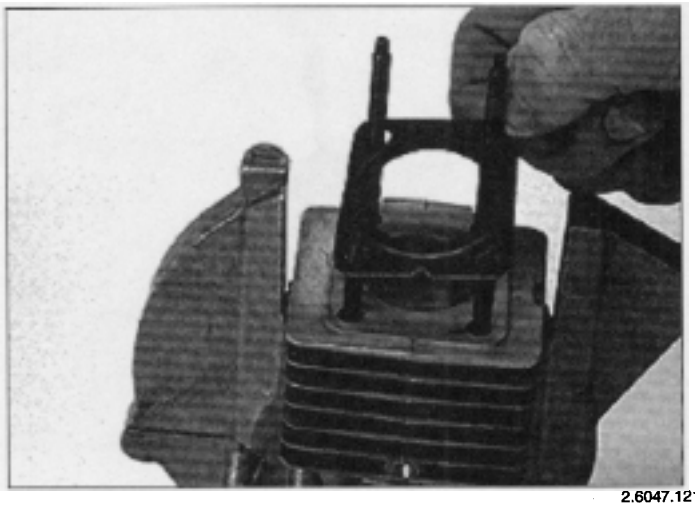
2.6047.119

3. Install the two (2) valve spring retainers . Make sure the retainers lock onto the valve stems properly.



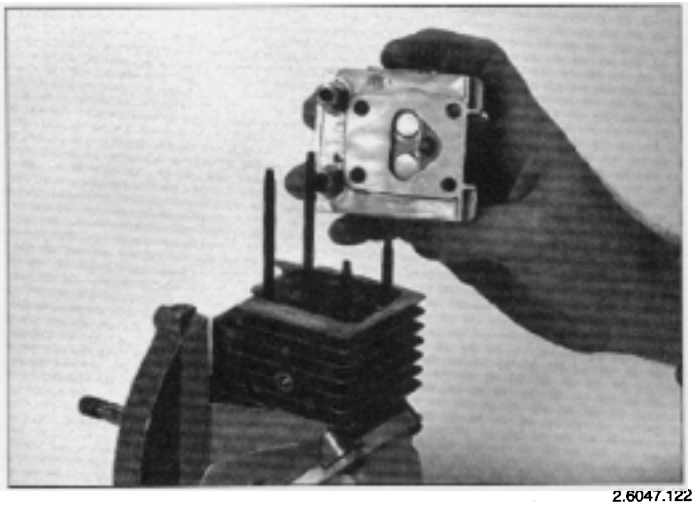
2.6047.120

ENGINE ASSEMBLY (cont.)



2.6047.121

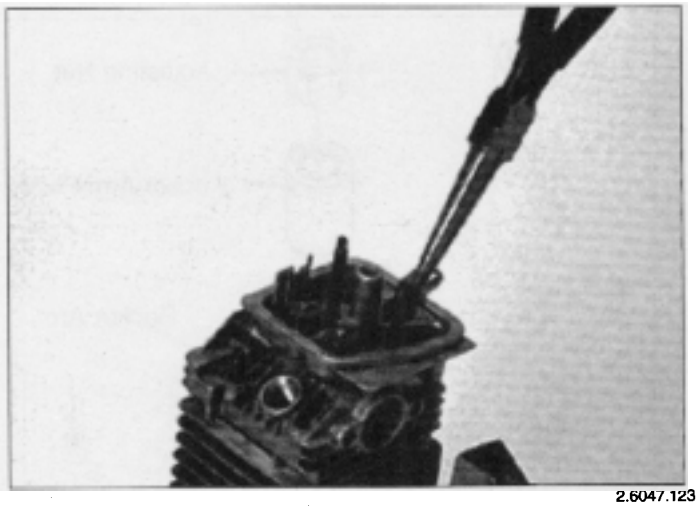
4. Install a new cylinder head gasket. The notch on the gasket goes to the spark plug side of the cylinder and the dome side of the gasket should be up.



2.6047.122

5. Place the cylinder head over the four (4) studs.

6. Seal the two (2) cylinder studs in the rocker box with RTV sealing.



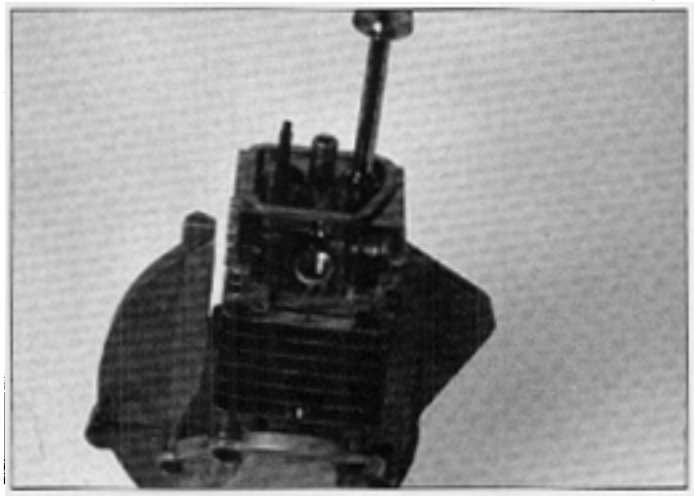
2.6047.123

7. Install the push rod guides over the cylinder studs.

ENGINE ASSEMBLY (cont.)

8. Install the cylinder head with the four (4) cylinder hex nuts and washers.

NOTE: If the washers need to be replaced, use **Genuine Toro hardened** washers. These washers have special dimensions that are critical to the engine's tolerances.



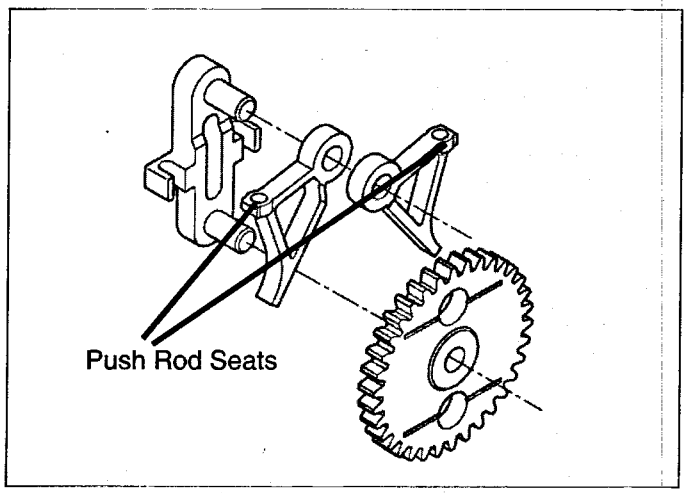
2.6047.124

9. Install the push rods into the push rod guides.

NOTE: Make sure the push rods are seated into the cam followers. Refer to "Cam Bracket Disassembly and Reassembly" in *Part 4 - Inspection and Repair.*

Torque the cylinder head hex nuts to **35-40 in•lb (3.9-4.5 N•m)**. Torque the nuts in an "X" pattern.

Torque the two (2) cylinder screws to **35-40 in•lb (3.9-4.5 N•m)**.



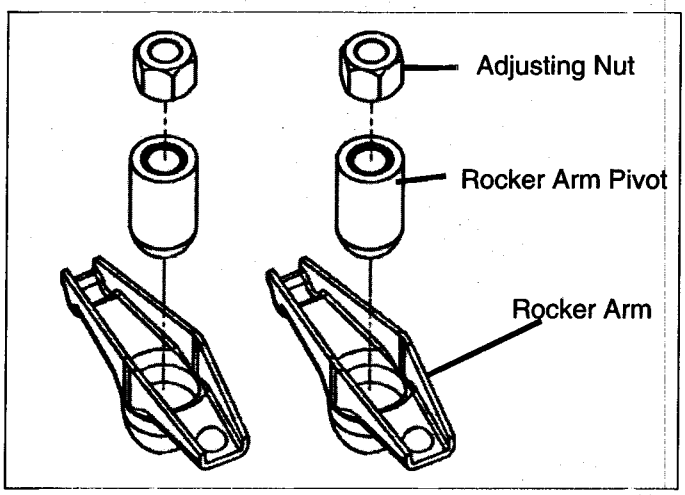
3.6047.106

Install Rocker Arm Assembly

1. Install the rocker arm adjusting nuts, rocker arm pivots and rocker arms.

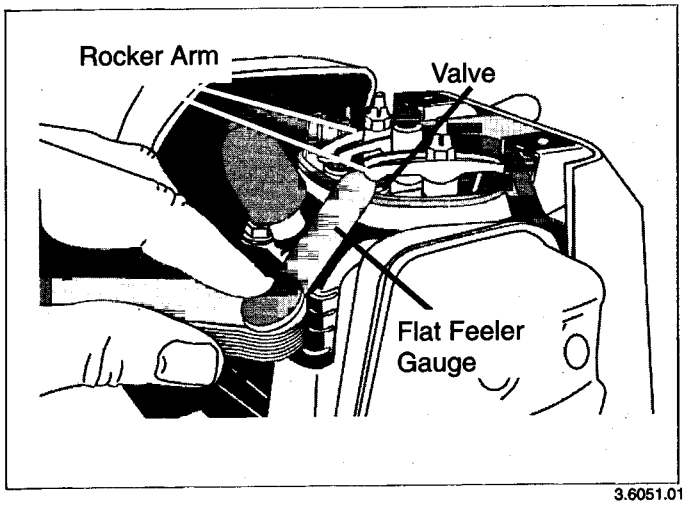
NOTE: Always match intake and exhaust parts when assembling the rocker arm assembly.

NOTE: Oil the rocker arm adjusting nuts before installing the rocker arm assembly.



3.6047.059

ENGINE ASSEMBLY (cont.)



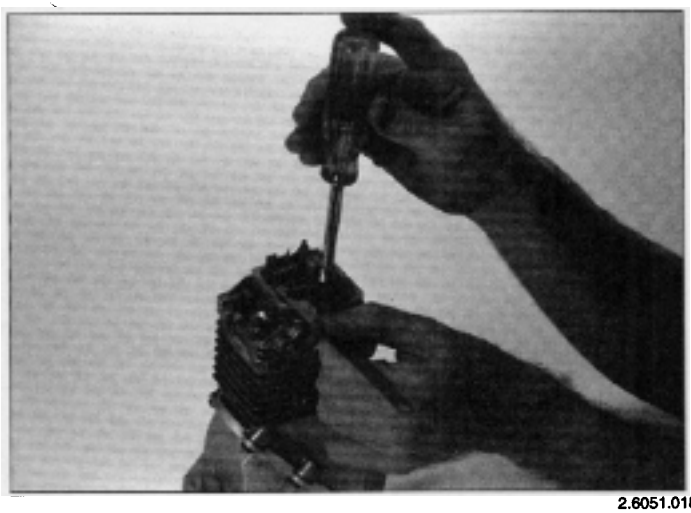
3.6051.017

Rocker Arm to Valve Clearance Adjustment

Every **50 hours** of operation, remove the rocker arm cover and check the rocker arm to valve clearance.

1. Position the crankshaft so that the piston is at the top of the compression stroke (both rocker arms are free and loose).
2. Measure the clearance between the valve stems and rocker arms, *using a flat feeler gauge* .

The recommended rocker arm to valve clearance for both the intake and exhaust is **.003-.006 in(.076 mm-.152 mm).**



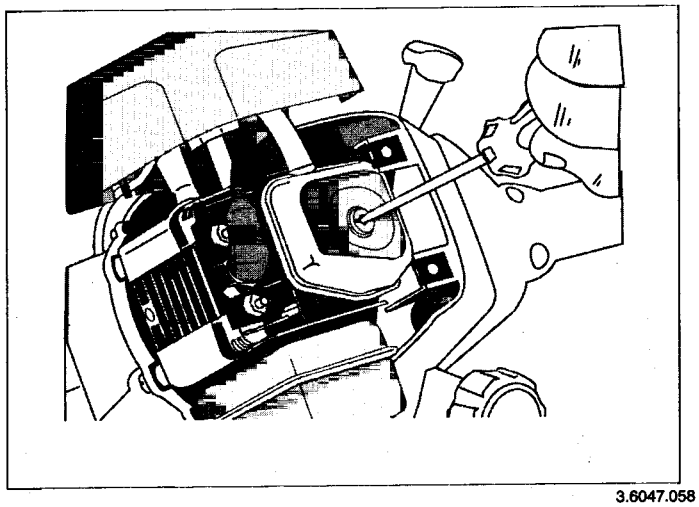
2.6051.018

3. If the clearance is not within specification, adjust as follows:
   a. Turn the adjusting nut, using a 5/16 in (8 mm) wrench or nut driver.

      To increase the rocker arm to valve clearance, turn the adjusting nut counterclockwise.

      To decrease the rocker arm to valve clearance, turn the adjusting nut **clockwise.**

   b. Recheck the clearance with a *flat feeler gauge* and readjust as necessary.



3.6047.058

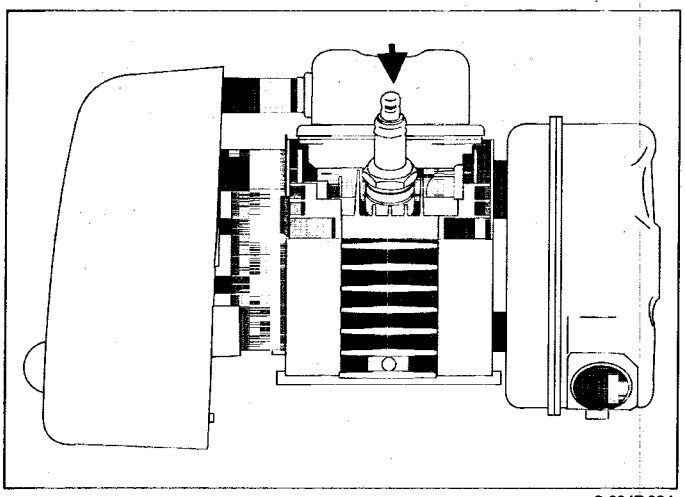
5. Reinstall the rocker arm cover, using a new gasket. Torque the rocker arm cover screw to **20-30 in•lb (2.2-3.4 N•m).**

ENGINE ASSEMBLY (cont.)

Install Spark Plug

1. Make sure the spark plug gap is set to **0.025 in (.0635 mm).**

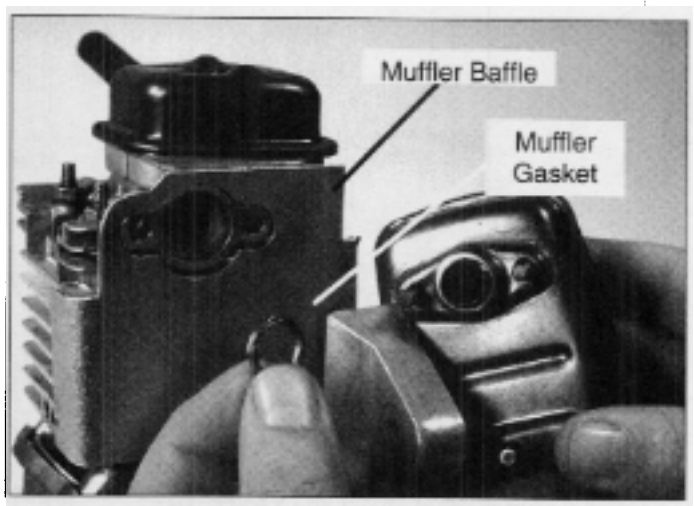
2. Install the spark plug into the cylinder and torque to **100-110 in•lb (11.2-12.3 N•m).**



3.6047.024

Install Muffler

1. Install a new muffler gasket and place the muffler baffle in place.



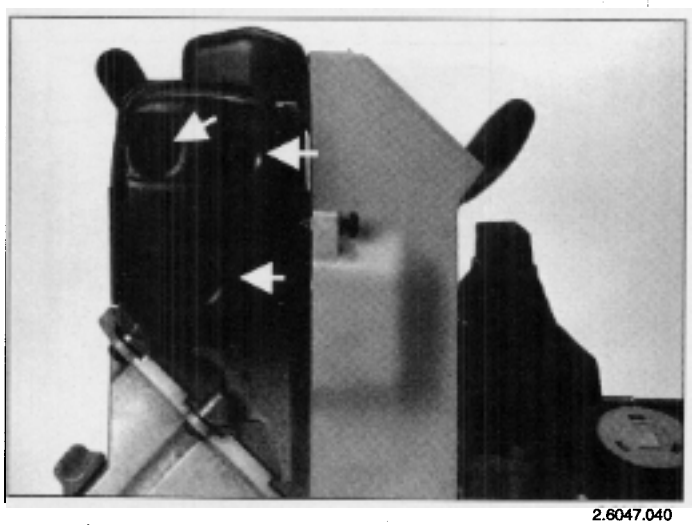
2.6047.125

2. Install the muffler with the three (3) mounting bolts. Install the lower bolt first to ease the installation of the top two (2) bolts.

NOTE: The 5 mm nut must be held in the slot next to the spark plug before installing the top rear muffler bolt.

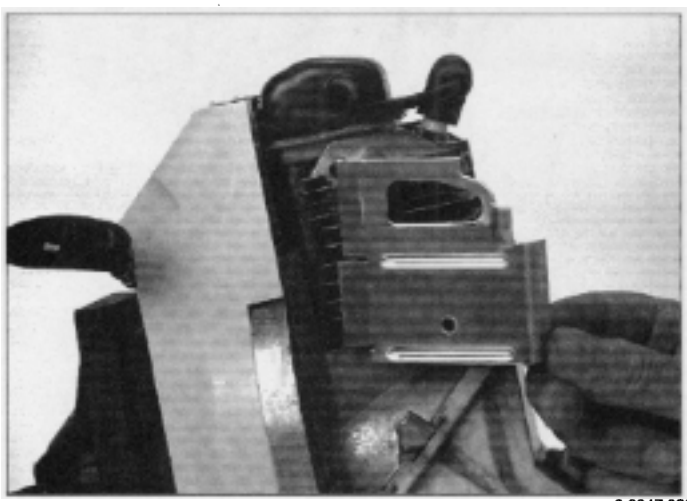
NOTE: Be careful not to crossthread the muffler mounting bolts.

Torque the muffler mounting bolts to **40-45 in•lb (4.5-5.0 N•m).**



2.6047.040

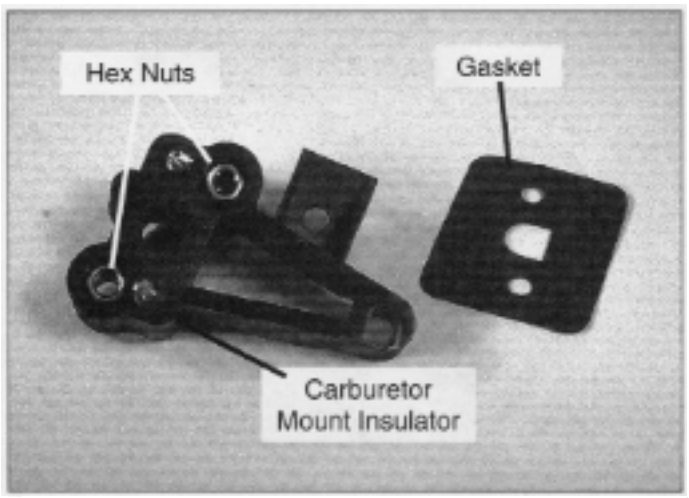
ENGINE ASSEMBLY (cont.)



2.6047.039

Install Intake Baffle

1. Install the intake baffle on the other side of the cylinder.

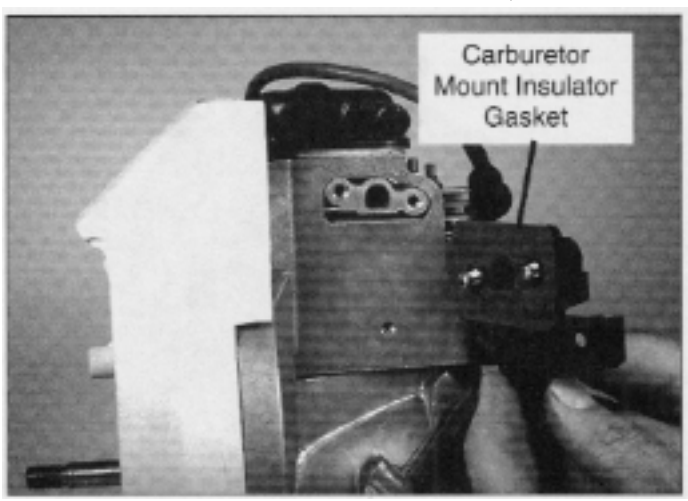


2.6047.038

Install Carburetor Mount Insulator

1. Install the two (2) hex nuts on the back of the carburetor mount insulator.

   For Units with Engine Serial Number 405000001 and Greater–The two (2) hex nuts are retained in the carburetor mount insulator.



2.6047.126

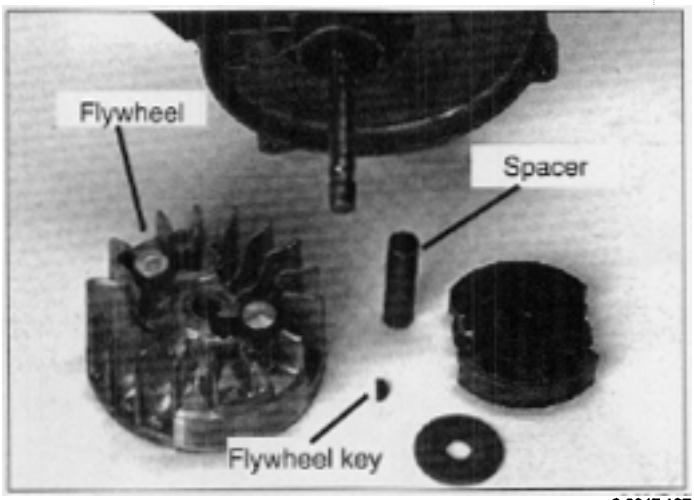
2. Install a new gasket to the back of the carburetor mount insulator. Install the carburetor mount insulator to the crankcase with the two (2) screws .

   Torque the screws to **30-35 in•lb (3.3-3.9 N•m).**

ENGINE ASSEMBLY (CONT.)

WARNING: CRACKED OR BROKEN COOLING FINS ARE A HAZARD! Be careful not to crack or break any cooling fins. They could fly off during operation. If cooling fins are cracked or broken, replace the flywheel.

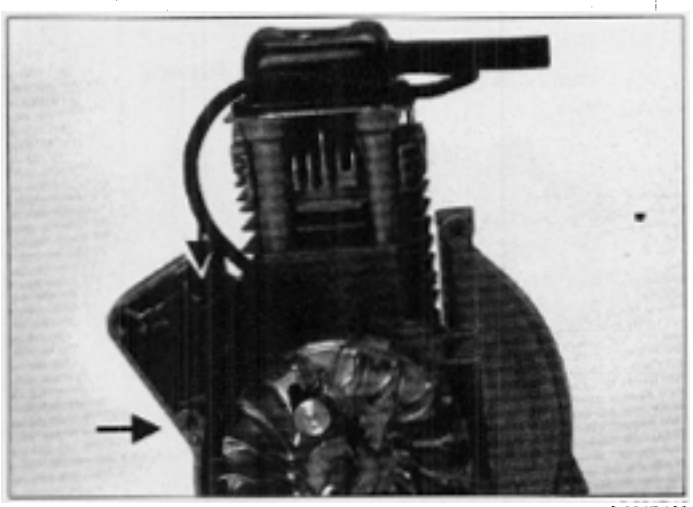
1. Install the flywheel key into the keyway on the crankshaft.
2. Position the flywheel so that the key slot in the flywheel aligns with crankshaft key. Place the flywheel onto the crankshaft.
3. Install the flywheel spacer and clutch rotor to hold the flywheel in place.



2.6047.127

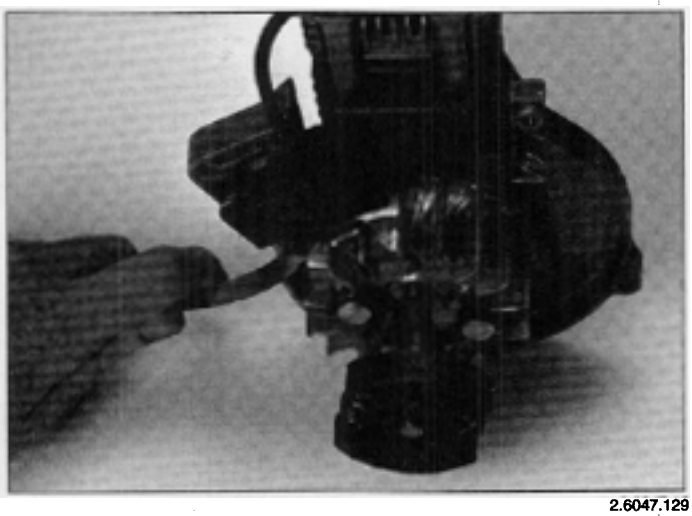
Install Ignition Module

1. Install the ignition module ground lead tab terminal and module fastening screws.
2. Move the ignition module away from the flywheel as far as possible. Tighten the fastening screws slightly.

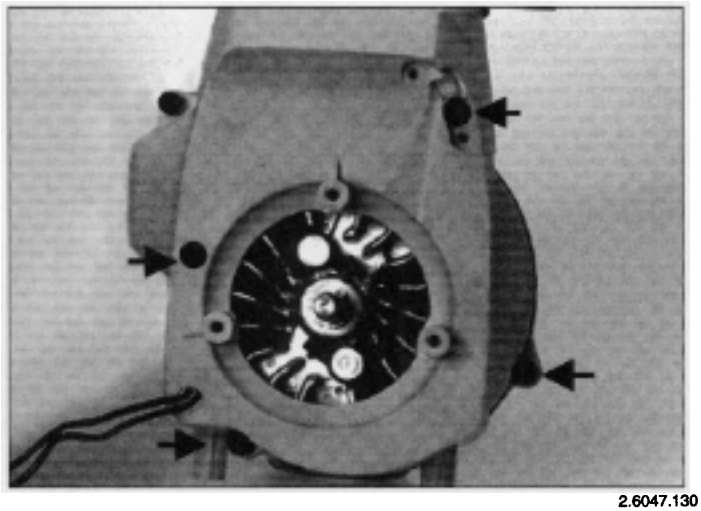

2.6047.128

3. Insert a **0.008-0.012 in (0.201-0.305 mm)** feeler gauge or shim stock between the ignition module and the flywheel magnet surfaces.
4. Loosen the module fastening screws and push the ignition module tight against the feeler gauge or shim shock.

   Torque the screws to **30-40 in•lb (3.3-4.5 N•m)**.
5. Connect the switch lead wires as necessary. Remove the clutch rotor.


2.6047.129

ENGINE ASSEMBLY (cont.)

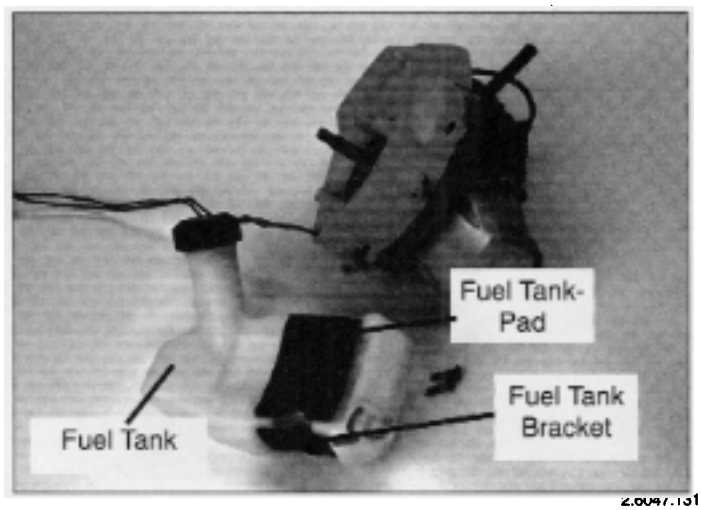


2.6047.130

Install Fan Housing

1. Install the fan housing with the four (4) screws to the crankcase.

   Torque the fan housing screws to **40-45 in•lb (4.5-5.0 N•m).**

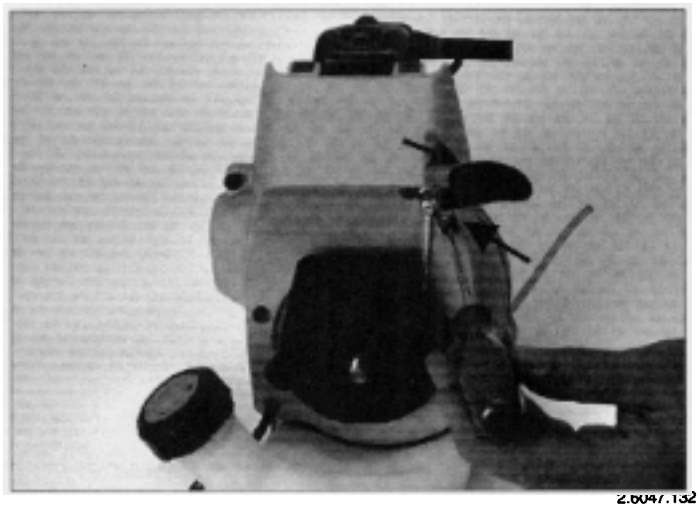


2.6047.131

Install Fuel Tank And Fuel Tank Bracket

1. Install the rubber fuel tank pad to the fuel tank.
2. Install the fuel tank and fuel tank bracket with the two (2) screws.

   Torque the screws to **25-35 in•lb (2.8-3.3 N•m).**



2.6047.132

Install Starter Module Assembly

1. Place the starter module over the crankshaft.
2. Install the starter rope eyelet bracket with the two (2) screws.

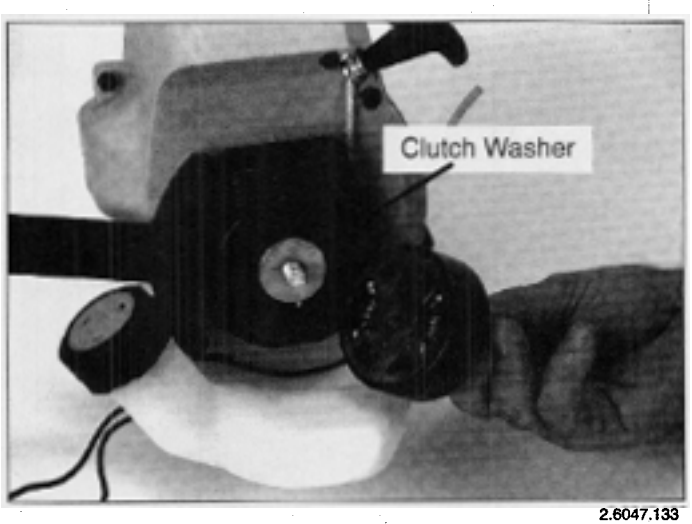
   Torque the screws to **15-20 in•lb (2.0-2.5 N•m).**

NOTE: It may be necessary to pull the starter rope slightly to enable the starter housing to drop into position.

ENGINE ASSEMBLY (cont.)

Install Clutch

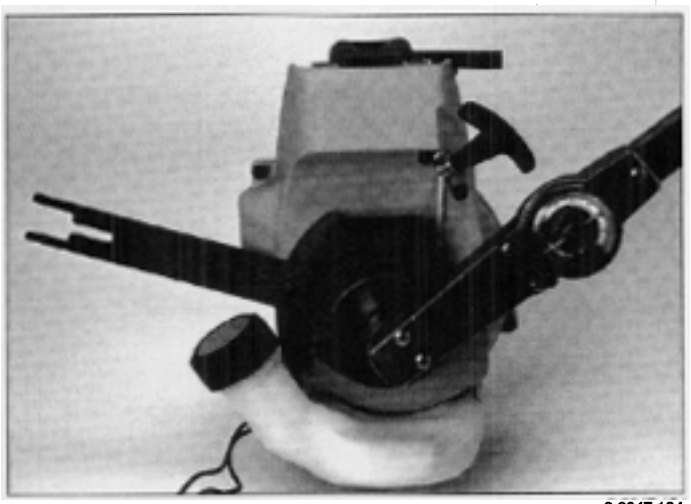
1. Install the washer and clutch rotor to the crankshaft. Make sure the spacer is installed on the crankshaft.



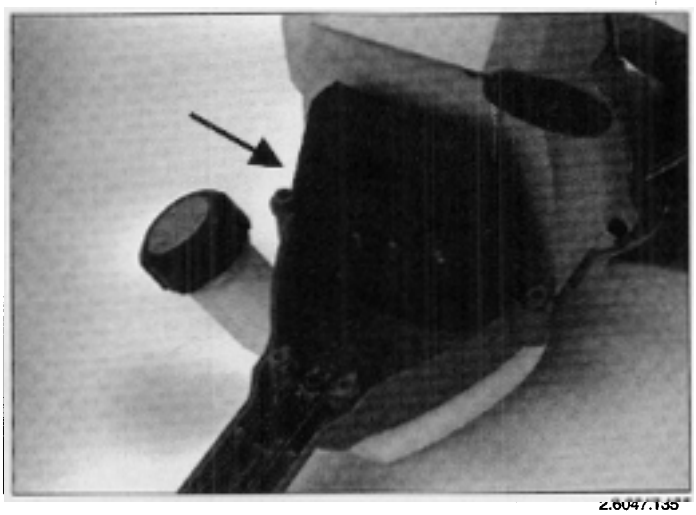
2.6047.133

2. Install the flywheel holder, P/N 180919.

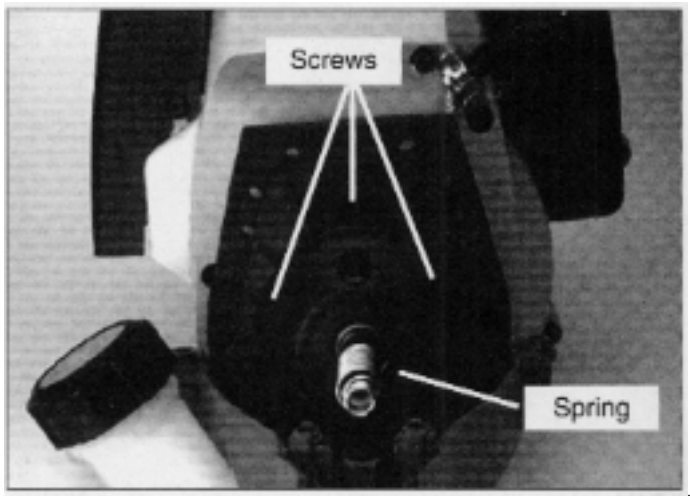
   Using clutch tool, P/N 180918, torque the clutch rotor to **140-150 in•lb (15.8-16.9 N•m)**.


2.6047.134

3. Install the isolator onto the starter housing.


2.6047.135

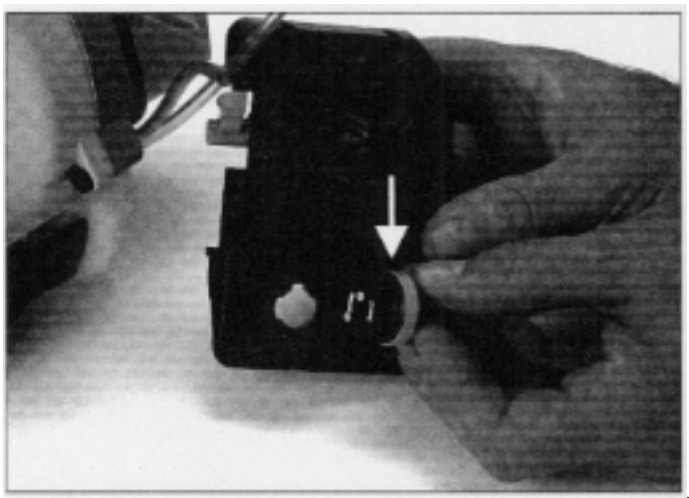
ENGINE ASSEMBLY (cont.)



2.6047.136

4. Install the clutch cover with the three (3) screws. If the unit is equipped with a spring, install the spring.

   Torque the screws to **35-45 in•lb (3.3-5.0 N•m).**

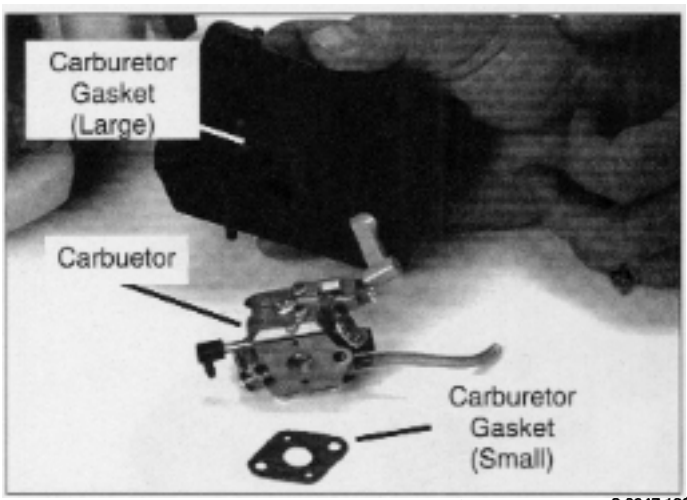


2.6047.137

Install Primer Bulb, Carburetor And Connect Fuel Line

Use the following procedure to install the primer bulb, carburetor and fuel lines into the air filter base.

1. Install the primer bulb into the air filter base.

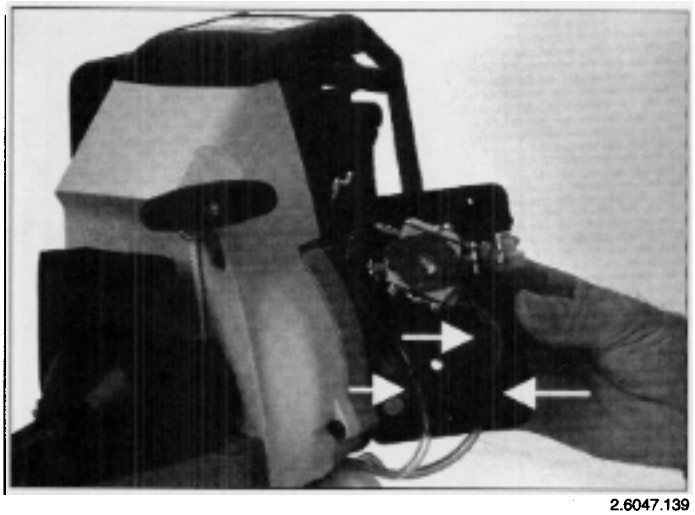


2.6047.138

2. Install two new carburetor gaskets and the carburetor into the air filter base. The larger gasket goes on the air filter base side and the small one on the carburetor to isolator side.

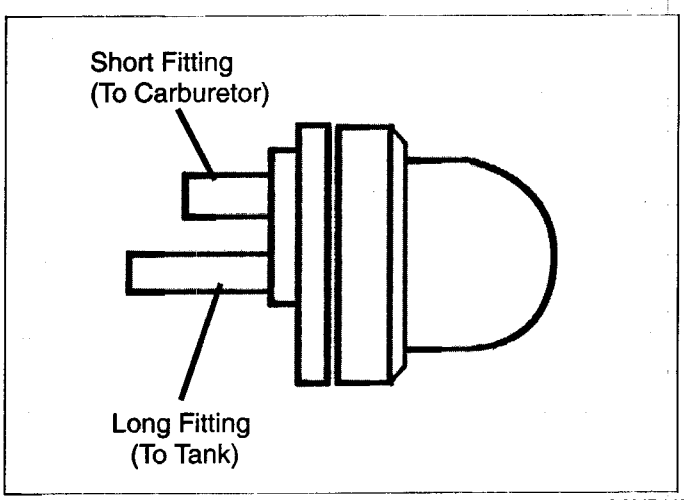
ENGINE ASSEMBLY (cont.)

3. Connect the fuel lines to the carburetor and primer bulb.



2.6047.139

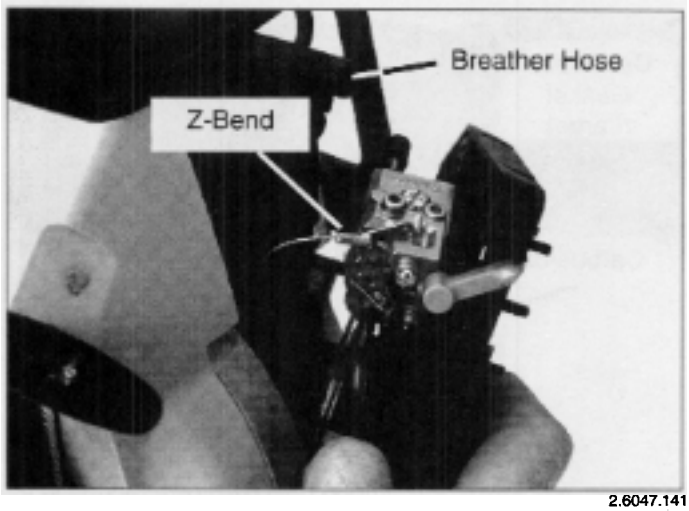
NOTE: This unit has two fuel lines to the fuel tank. The clear line provides normal fuel flow. The blue line provides a return line for excess fuel flow during the primer operation. The short fitting on the primer bulb comes from the carburetor and the long fitting goes to the fuel tank.



3.6047.140

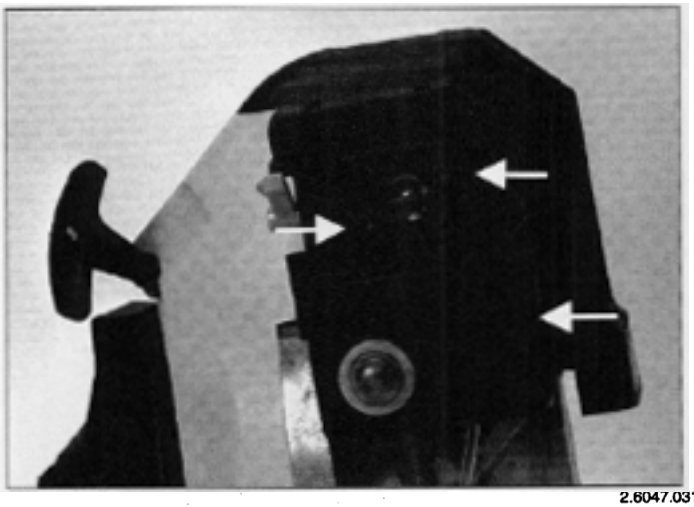
Install Air Filter Base, Air Filter and Air Filter Cover

1. Install the Z-bend of the throttle cable into the third hole from the top in the carburetor throttle lever.



2.6047.141

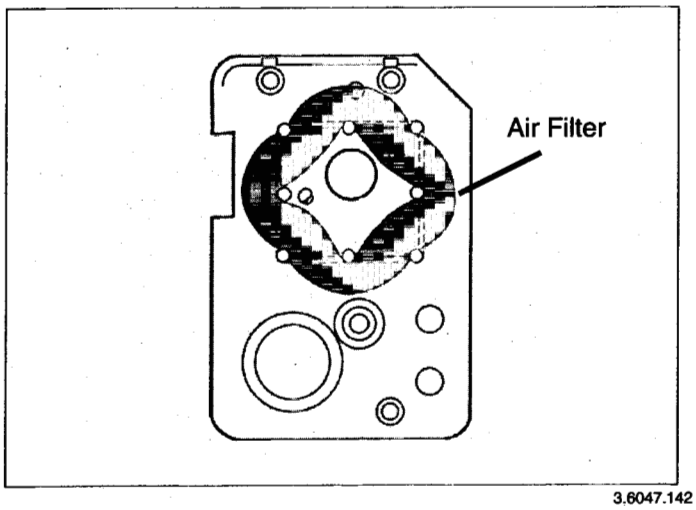
INSTALL AIR FILTER BASE, AIR FILTER AND AIR FILTER COVER



2.6047.031

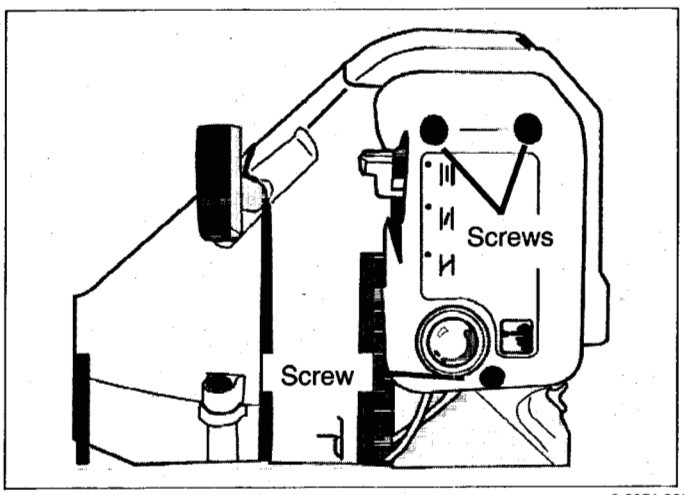
2. Install the air filter base, primer bulb and carburetor to the carburetor mount insulator with the three (3) screws. The breather hose must be mounted to the air filter base at the same time.

   Torque the screws to **30-35 in•lb (3.3-3.8 N•m).**



3.6047.142

3. Install the air filter element onto the air filter base.



3.6051.009

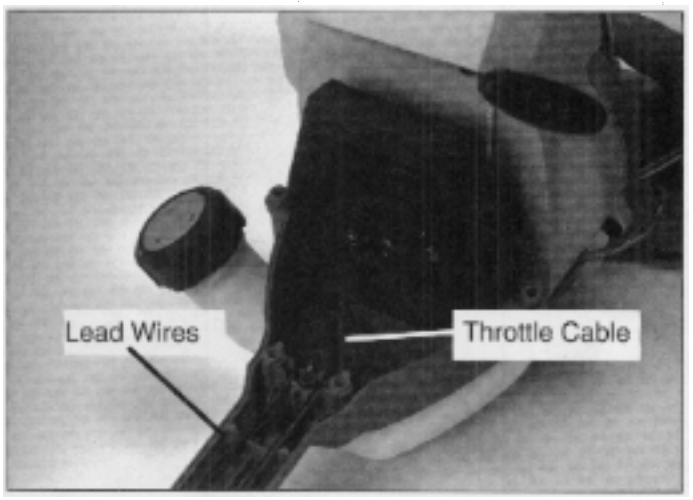
4. Install the air filter cover with the three (3) screws.

   Torque the screws to **25-30 in•lb (2.8-3.3 N•m).**

ASSEMBLE HANDLE

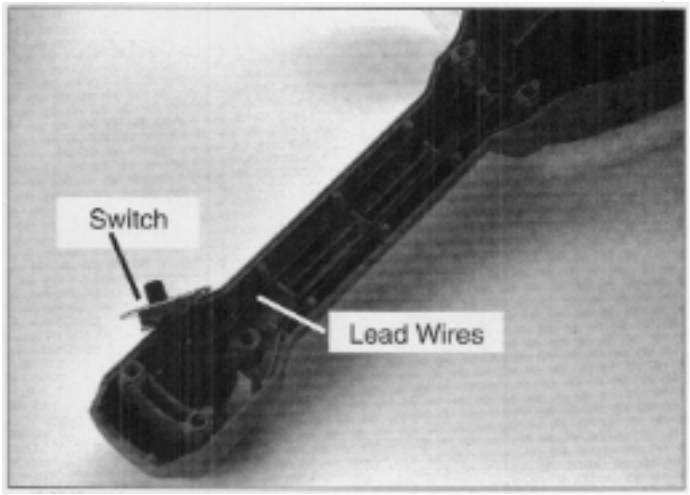
Install Lower Handle

1. Pull the throttle cable and lead wires through the housing and place them into the grooves in the bottom of the lower handle. Place the switch wire in the bottom of the slot and then the throttle cable.



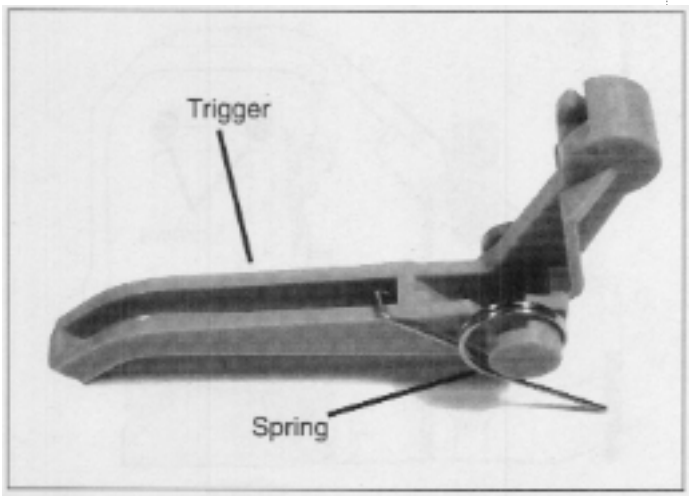
2.6047.143

NOTE: Make sure the wires are placed to the rear of the switch. This will ensure that the switch is in the correct on/off position.



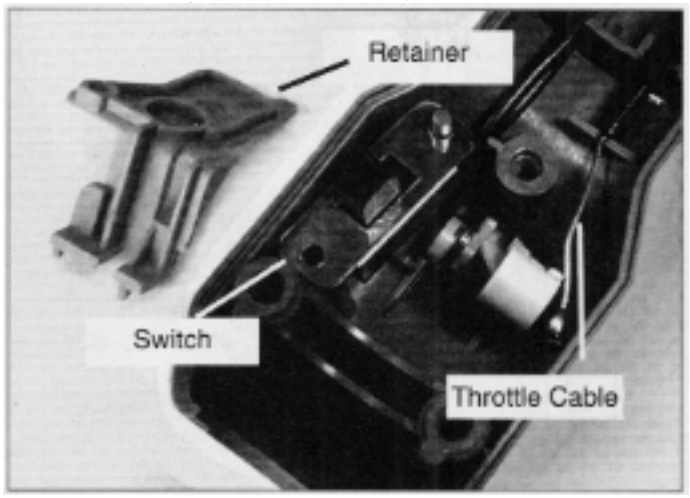
2.6047.144

2. Install the spring into the trigger.



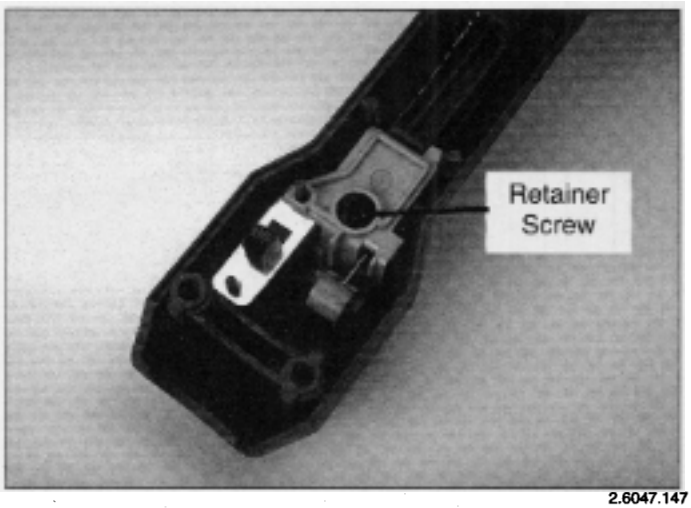
2.6047.145

ASSEMBLE HANDLE (cont.)



2.6047.146

3. Assemble the trigger (with the spring), switch and retainer and place the assembly into the bottom of the lower handle. The throttle cable must go through the retainer.



2.6047.147

4. Install the retainer screw, which holds the switch and throttle trigger assembly in the lower handle.

   Torque the retainer screw to **15-20 in•lb (1.7-2.2 N•m)**.



2.6047.148

Install Upper Handle

1. Install the upper boom into the handle.

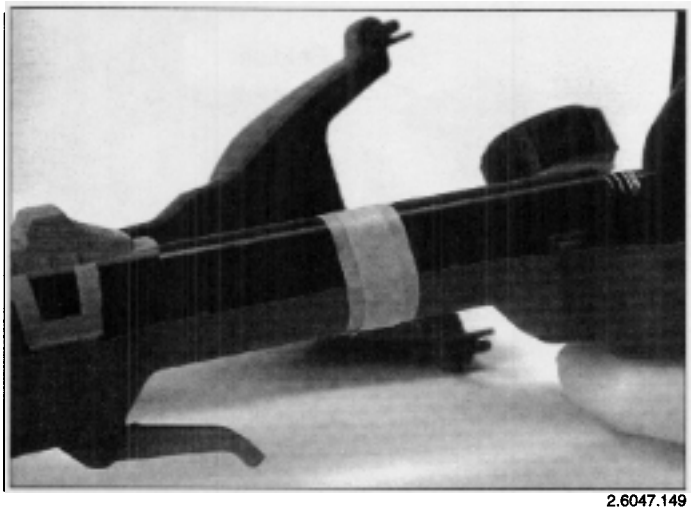
   NOTE: For units that take attachments, make sure the spring is installed in the clutch housing/drum assembly before installing the upper boom.

2. Locate the anti-rotation cap screw and place the boom onto the cap screw.

   Torque the screw to **15-20 in•lb (1.7-2.2 N•m).**

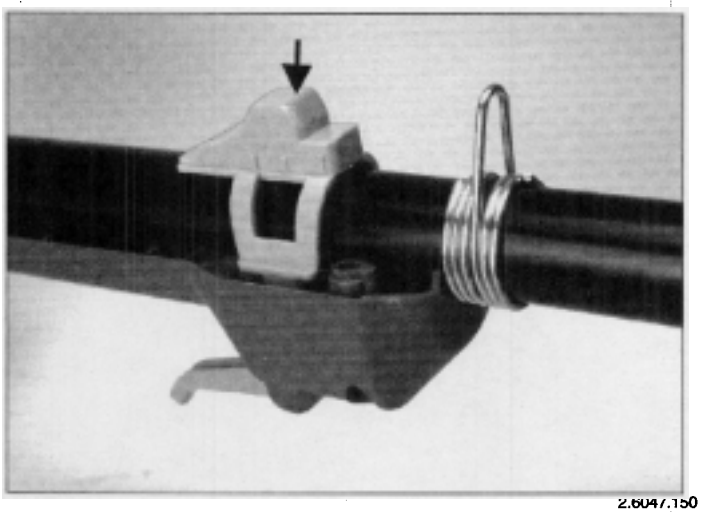
ASSEMBLE HANDLE (cont.)

3. Wrap some masking tape around the boom and the lower handle. This will hold the boom onto the anti-rotation cap screw.



2.6047.149

4. Install the switch slide onto the upper boom



2.6047.150

5. Install the upper handle with the six (6) screws. To aid in the installation of the upper handle, lubricate the isolator with soap and water.

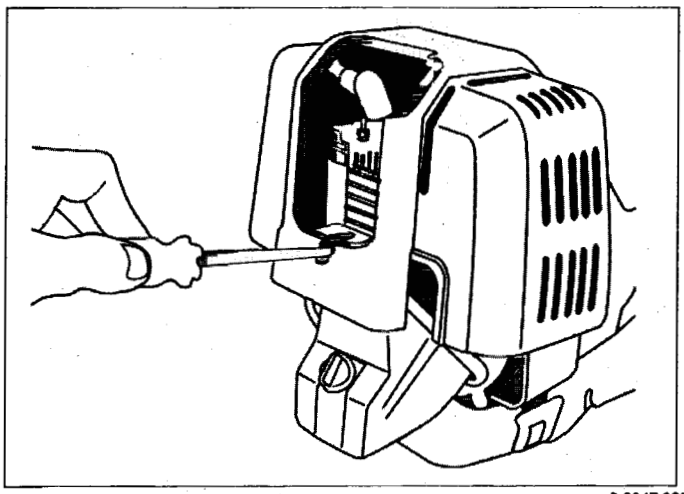
   Torque the screws to **20-25 in•lb (2.2-2.8 N•m).**

6. Cut the tape and remove it from the lower handle.



2.6050.025

ASSEMBLE COVERS

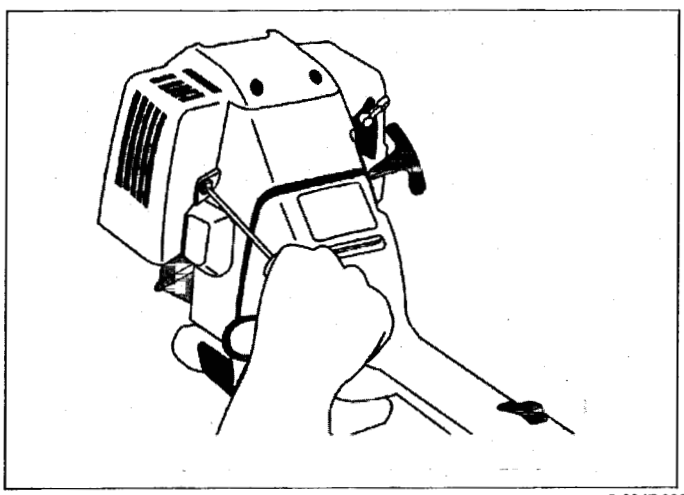


3.6047.035

Install Engine Cover

1. Install the engine cover with the four (4) screws.

   Torque the rear engine cover screw to **30-35 in•lb (3.5-4.0 N•m)**.



3.6047.036

Torque the **top** engine cover screws to **15-20 in•lb (1.7-2.2 N•m)**.

Torque the **side** engine cover screw to **20-25 in•lb (2.5-3.0 N•m)**.



2.6065.167

Before placing the unit back into service, be sure to do the following:

1. Make sure all of the fasteners are tightened securely.
2. Fill the fuel tank with fresh gasoline and check the oil level in the oil pan. Refer to "Oil and Fuel Recommendations" in *Part 1 - General Information.*
3. Adjust the carburetor high speed mixture, idle speed mixture and idle speed settings. Refer to "Carburetor Adjustment" in *Part 1 - General Information.*