

ARCTIC CAT[®]

Snowmobile Service Manual ▲ CD-ROM



2003

START

SECTION 2 — ENGINE

TABLE OF CONTENTS

| | |
|--|-------|
| Engine | 2-2 |
| Removing Engine (Table of Contents)..... | 2-2 |
| Disassembling Engine (Table of Contents) | 2-12 |
| Servicing Components (120 cc) | 2-44 |
| Servicing Top-Side Components (500/700 cc F-Chassis Models) | 2-53 |
| Cleaning and Inspecting Engine | 2-57 |
| Measuring Critical Components | 2-61 |
| 2003 Arctic Cat Engine Specifications | 2-65 |
| Assembling Engine (Table of Contents) | 2-66 |
| Assembly Schematics (Table of Contents)..... | 2-106 |
| Installing Engine (Table of Contents)..... | 2-122 |
| Troubleshooting Engine (120 cc)..... | 2-132 |
| Troubleshooting Engine (Carbureted Models)..... | 2-133 |
| Troubleshooting Engine (EFI Models) | 2-137 |
| Engine Information (Table of Contents)..... | 2-141 |

[Back to Table of Contents](#)

Engine

This engine servicing section has been organized into sub-sections which show a progression for the complete servicing of the Arctic Cat engine. For consistency purposes, this section shows a complete and thorough progression; however, for efficiency it may be preferable to remove the engine as a complete assembly, to remove and disassemble only those components which need to be addressed, and to service only those components. Also, some components may vary from model to model. The technician should use discretion and sound judgment.

■ **NOTE:** Some illustrations and photographs used in this section are used for clarity purposes only and are not designed to depict actual conditions.

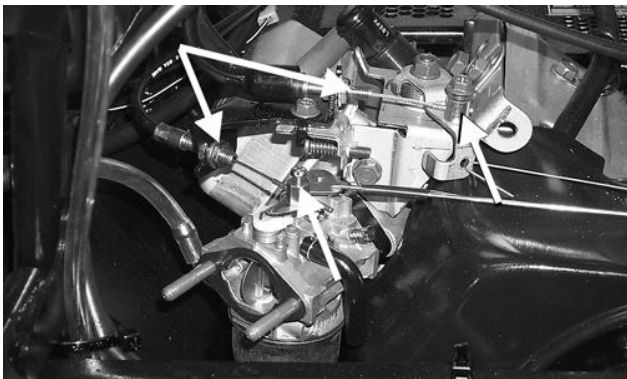
Removing Engine Table of Contents

| | |
|----------------------------------|-----|
| 120 cc Model..... | 2-2 |
| Twin F/C Models..... | 2-3 |
| 600/800/900 cc Models..... | 2-5 |
| 550 cc Models..... | 2-7 |
| 500/700 cc F-Chassis Models..... | 2-9 |

Removing Engine (120 cc Model)

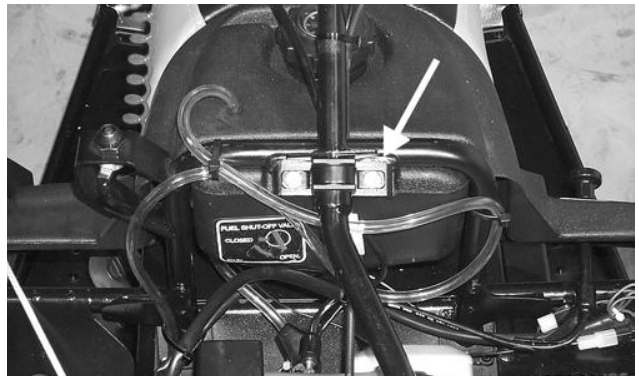
■ **NOTE:** The drive chain must be removed in order to remove the engine (see Drive Chain and Sprockets sub-section in Section 8).

1. Disconnect the choke and throttle cables from the carburetor; then on each cable, loosen the adjustment jam nut closest to the carburetor and remove the cables from the bracket. Route the cables out of the way.



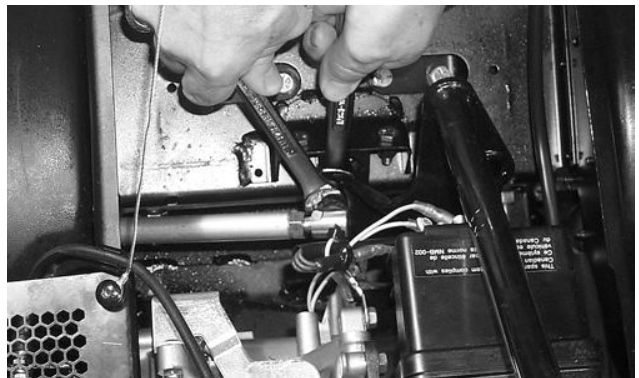
A046A

2. Remove the two cap screws securing the steering post to the steering post support. Account for two bearing halves, two lock nuts, and a bearing retainer.



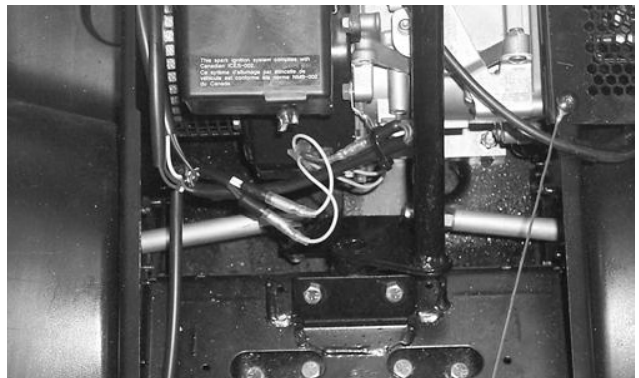
A023A

3. Pull the steering post up and back and then out of the lower steering post bearing.
4. Remove the two lock nuts securing the tie rods to the steering post; then remove the tie rods from the steering post. Place the steering post out of the way on the right-hand side of the engine compartment.



A024

5. Cut the cable tie; then disconnect all wires (a total of four) at the front of the engine. Route them out of the way.



A047

6. Turn the gas tank shut-off valve to the CLOSED position.

WARNING

Whenever any maintenance or inspection is made on a fuel system when there may be fuel leakage, there should be no welding, smoking, open flames, etc., in the area.

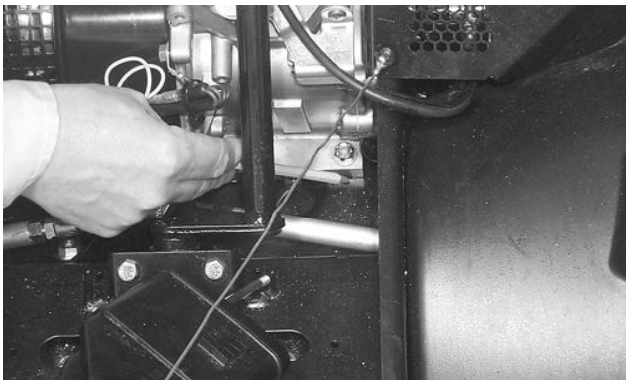
7. Disconnect the fuel hose from the carburetor.

■ **NOTE:** Be prepared to wipe up any fuel spillage.

8. Pull the recoil starter rope out approximately 60 cm (24 in.); then tie a slip-knot in the starter rope below the console and allow the rope to slowly retract against the starter case.

9. Remove the knot at the handle and remove the handle; then thread the rope through the bushing in the console.

10. At this point, scribe a line at the front of the engine and measure the distance between the crankshaft and the driveshaft. Record the measurement for installing purposes.

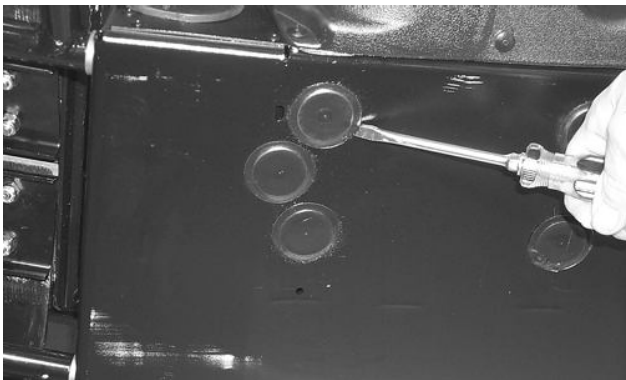


A048

11. Lay the snowmobile on its side.

■ **NOTE:** A piece of cardboard should be used to protect the finish.

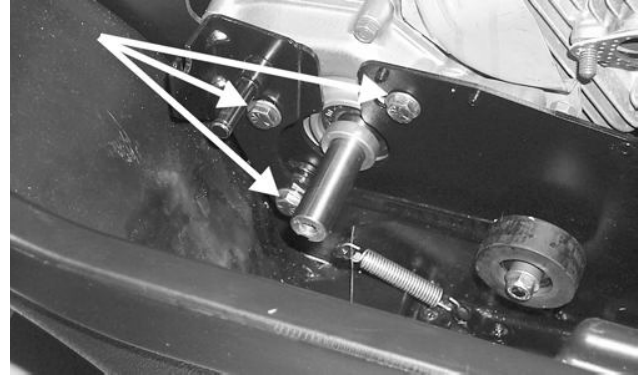
12. Using a flat-blade screwdriver, remove the four belly pan plugs covering the engine mounting cap screws; then remove the cap screws. Account for eight washers and four lock nuts.



A049

■ **NOTE:** The front center plug is to access the oil drain plug.

13. Place the snowmobile in the upright position; then on the left-hand side of the engine, remove the three cap screws securing the engine and brake bracket to the front end.



A050A

14. Remove the engine from the engine compartment.

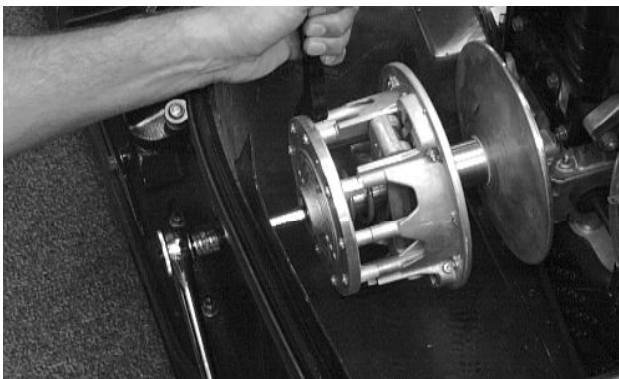
Removing Engine (Twin F/C Models)

■ **NOTE:** If equipped with electric start, disconnect the battery.

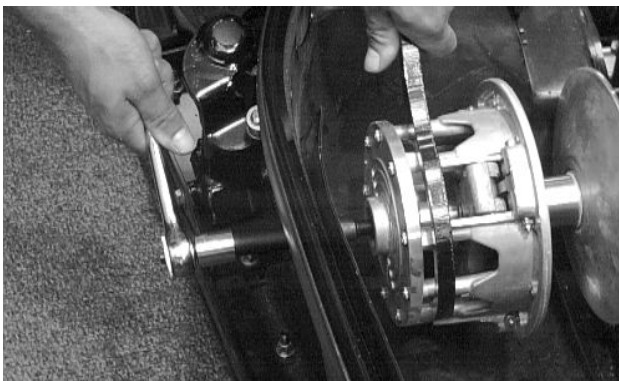
1. Turn the gas tank shut-off valve to the CLOSED position.
2. Open the belt guard.
3. Remove the drive belt; then remove the plug from the belly pan.

■ **NOTE:** Before installing the clutch puller, apply oil to the threads of the puller and a small amount of grease to the tip of the puller.

4. Remove the bolt and lock washers securing the drive clutch to the crankshaft; then using the Drive Clutch Puller (p/n 0644-207) and an impact wrench or a breaker bar and Drive Clutch Spanner Wrench (p/n 0644-136), tighten the puller. If the drive clutch will not release, sharply strike the head of the puller with a hammer. Repeat this procedure until the clutch releases.



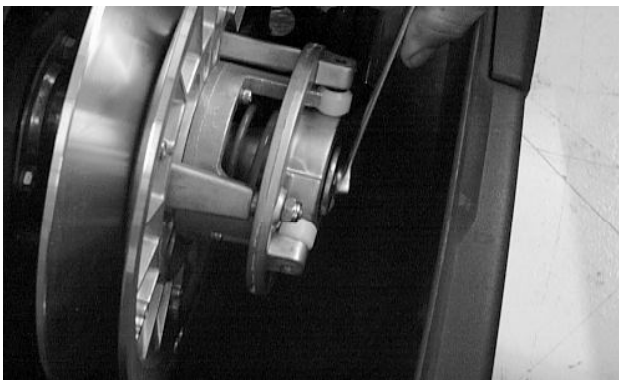
AF472D



AF476D

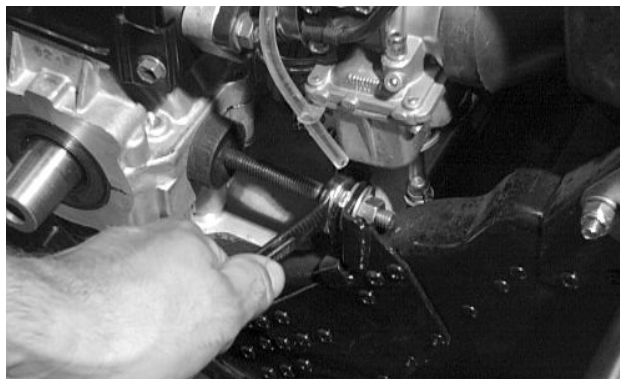
5. Remove the clutch from the engine compartment.
6. Remove the cap screw and washer securing the driven pulley; then slide the pulley off the driven shaft. Account for and note the position of any alignment washers.

■ **NOTE:** If the driven pulley will not slide off the driven shaft, use the Driven Pulley Puller (p/n 0744-023) for removal.



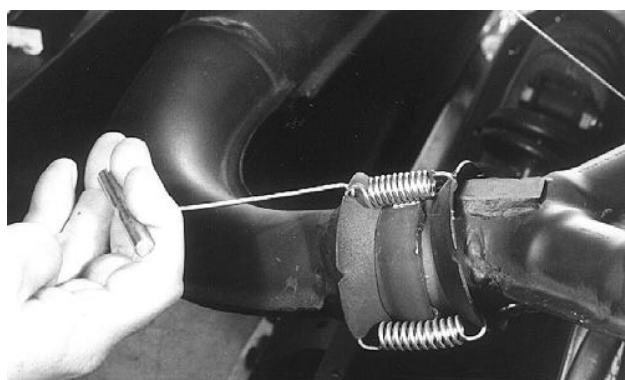
SC013D

7. Remove the torque bumper. Account for any engine mount shims.



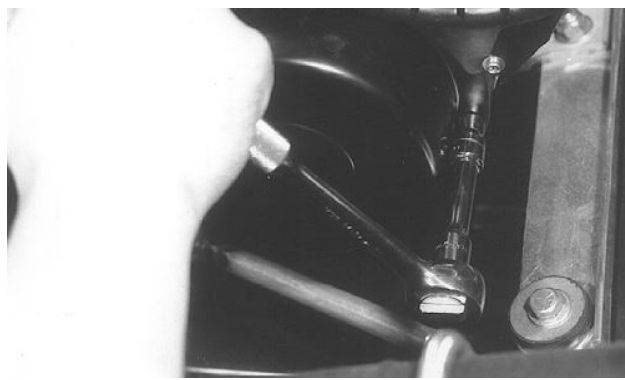
AF473D

8. Remove the springs securing the expansion chamber to the exhaust manifold and resonator; then remove expansion chamber.



AC067

9. Remove the cap screws and lock washers securing the recoil starter; then remove the starter. Leave it in the engine compartment.

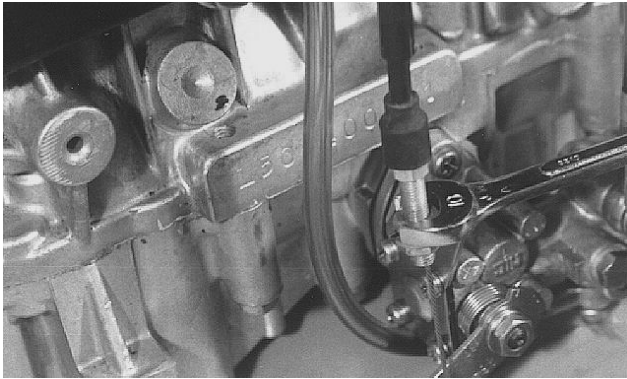


AB082

10. Disconnect the four-prong main wiring harness connector and the CDI unit wiring harness.
11. Disconnect the impulse hose from the crankcase.
12. Disconnect the spark plug caps.
13. Loosen the carburetor flange clamp(s). Remove the carburetor(s) from the intake flange(s) and carburetor boot(s). Place the carburetor(s) to the side in an upright position.

■ **NOTE:** If equipped with electric start, remove the lock nuts and washers securing the starter motor to the engine mounting bracket and remove the starter motor.

14. Disconnect the oil-injection cable from the oil-injection pump. Account for the E-clip and washer; then disconnect the oil supply hose from the pump and plug the hose to prevent leakage.



AB081

■ **NOTE:** If equipped with electric start, remove the two lock nuts and washers securing the starter motor bracket; then remove the three remaining cap screws, washers, and lock washers securing the starter motor bracket and ground cable. Remove the starter motor bracket.

15. Remove the cap screws securing the engine to the front end. Account for washers, cap screws, and lock nuts.



AL201D

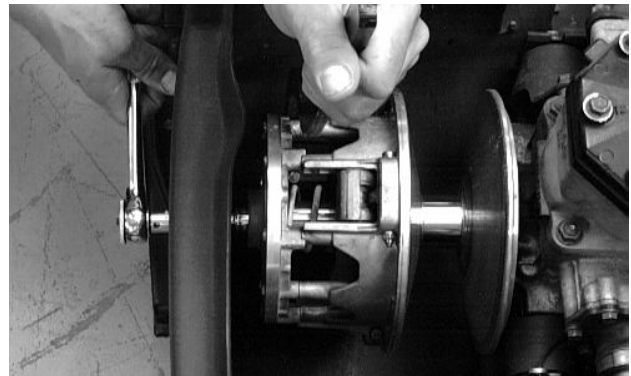
16. Lift the engine out of the engine compartment.
17. Remove the cap screws, washers, and lock washers securing the engine mounting brackets to the engine; then remove the brackets.

Removing Engine (600/800/900 cc Models)

■ **NOTE:** If applicable, disconnect the battery cables.

1. Remove all springs securing the expansion chamber(s) and remove the expansion chamber(s) from the engine compartment.
2. Open the belt guard; then remove the drive belt.
3. Remove the plug from the belly pan. Using a ½-in. 12-point socket, remove the cap screw and lock washer securing the drive clutch to the crankshaft.
4. Using Clutch Puller (p/n 0644-207) and an impact wrench or a breaker bar and Spanner Wrench (p/n 0644-136), tighten the puller. If the drive clutch will not release, sharply strike the head of the puller. Repeat this step until the clutch releases. Remove the drive clutch. If applicable, account for the two sleeves.

2



AN380D

5. Remove the cap screw and washer securing the driven pulley; then slide the driven pulley off the driven shaft. Account for a key, stub shaft, and alignment washers.



AF120D

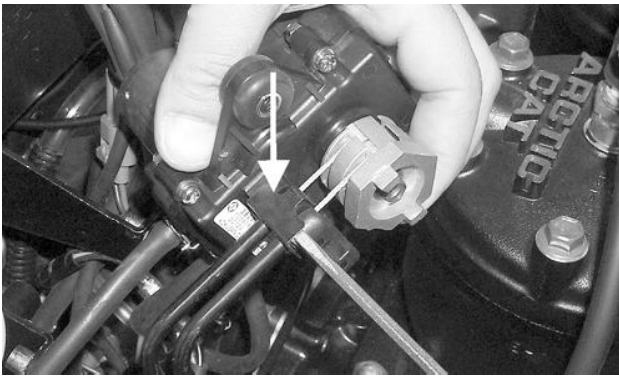
■ **NOTE:** If the driven pulley is tight on the driven shaft, pull the driven pulley off using the Driven Pulley Puller (p/n 0744-023).

6. Remove the two cap screws securing the servomotor cover.



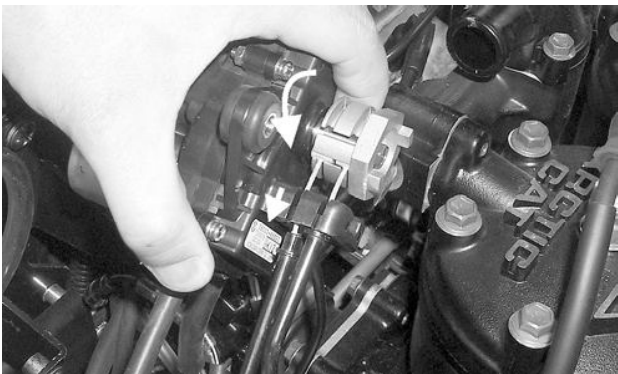
AP116A

7. Using a small screwdriver, pry off the cable retaining cover.



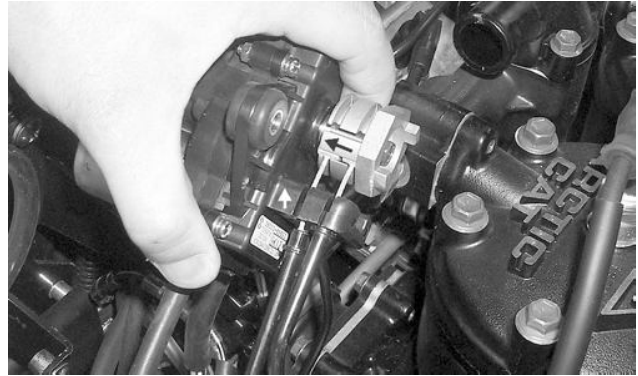
AP117A

8. Rotate the servomotor actuator counterclockwise to loosen the cable; then pull the cable housings out of the holder.



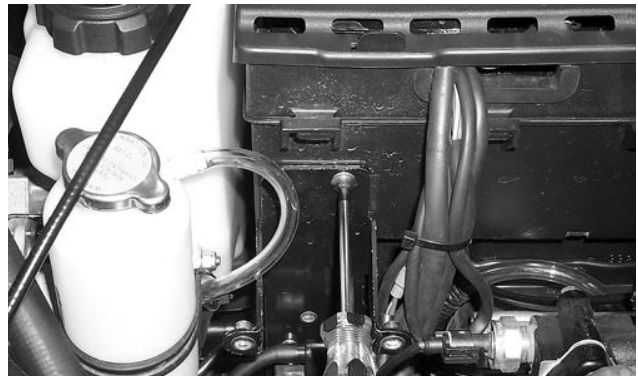
AP118A

9. Pull the cable up and out of the cable housing holder; then slide each cable drum to the left and out of the servomotor actuator.



AP118B

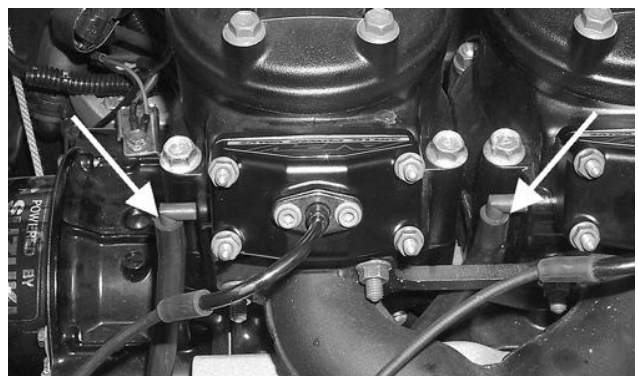
10. Remove the screw securing the servomotor mounting plate to the air-intake silencer; then pull the mounting plate forward and up to remove it from the silencer. Lay the mounting plate aside out of the way.



AP127

11. Lift the silencer cover and remove the CDI unit; then lay the unit aside out of the way.

12. Remove the two APV drain hoses and route them out of the way.



AP128A

13. If applicable, remove the machine screw and washer securing the mounting plate (for the ignition coil and fuel pump) to the air-intake silencer.

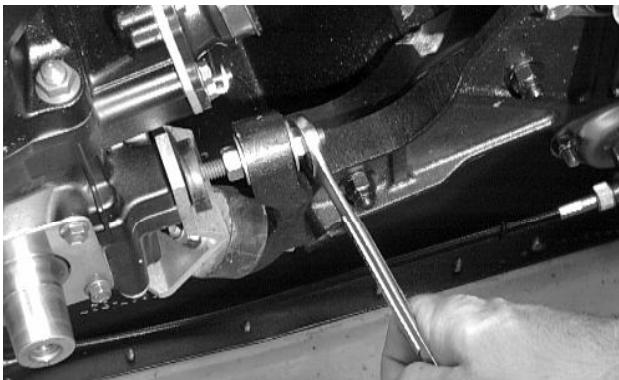
14. Remove the screws securing the air-intake silencer; then move the silencer forward and out of the engine compartment.

15. Disconnect the oil-injection cable/control rod from the oil-injection pump; then disconnect the oil-supply hose from the pump and plug the hose to prevent oil drainage.
16. Loosen the flange clamps securing the throttle body/carburetor to the flange; then remove the throttle body/carburetor. Place them to one side in an upright position.
17. On carbureted models, disconnect the impulse hose from the crankcase.



AN385D

18. Loosen the engine torque bumper and remove the left rear engine nut and washer.

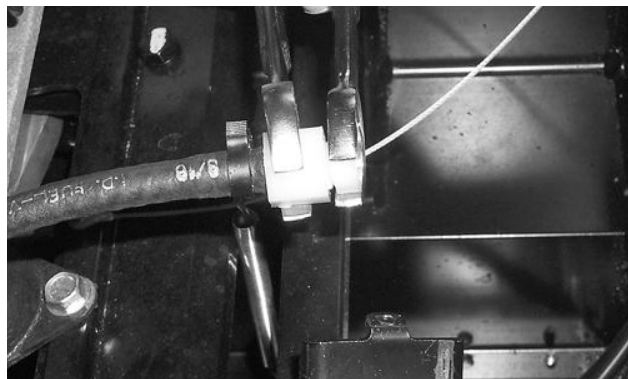


AN610D

19. Secure the hood with a tie-down strap; then remove the hood cable.
20. Disconnect all electrical wires from the engine.
21. Remove the recoil starter from the engine. Leave it in the engine compartment.

■ **NOTE:** If applicable, disconnect the solenoid-to-starter motor cable from the starter motor.

22. Loosen the cap screws/lock nuts securing the engine mounting brackets to the front end.
23. Remove the cap from the coolant drain hose and route the hose into a suitable container. Remove the filler cap; then once the coolant stops draining, install the drain hose cap.



AP126

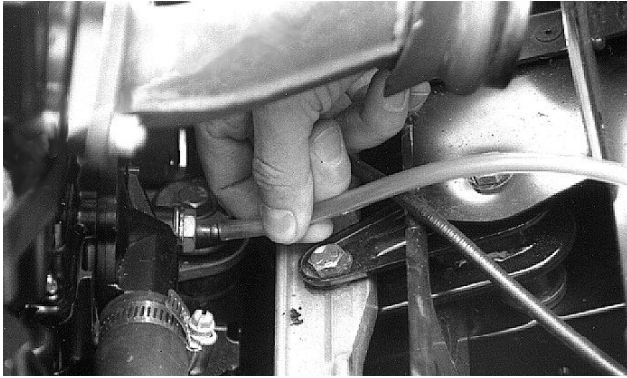
24. Loosen the clamp securing the supply hose to the coolant tank and remove the hose. Loosen the clamp securing the hose to the thermostat cap; then remove the hose from the cap.

■ **NOTE:** Inspect the engine to ensure all wires, hoses, and cables have been removed.

25. Lift the engine with mounting brackets out of the engine compartment.
26. Remove the cap screws securing the engine mounting brackets to the crankcase; then remove the brackets.
27. Remove the exhaust manifold from the engine. Account for nuts, washers, and gaskets.
28. Remove the clamp securing the coolant supply hose to the water pump. Then remove the hose from the pump.

Removing Engine (550 cc Models)

1. Disconnect the battery cables making sure to disconnect the negative cable first.
2. Turn the gas tank shut-off valve to the CLOSED position.
3. Remove the cable tie and positive battery cable from the starter motor.
4. Remove the springs securing the expansion chamber to the exhaust manifold, front end, and resonator. Remove the expansion chamber and grafoil gasket.
5. Attach a long piece of fuel hose to the engine coolant drain (located on the exhaust side of the engine). Route the hose outside the engine compartment and into a container. Open the drain and remove the filler cap. Once the coolant stops flowing, remove the hose and tighten the drain valve.



AP058

6. Open the belt guard: then remove the drive belt.

■ **NOTE:** Remove the rubber plug from the belly pan.

7. Using a ½-in. twelve-point socket, remove the bolt and lock washer securing the drive clutch to the crankshaft. Using the Clutch Puller (p/n 0644-207) and an impact wrench or a breaker bar and the Flywheel Pulley/Spanner Wrench (p/n 0144-310), tighten the puller. If the drive clutch will not release, sharply strike the head of the puller. Repeat this step until the clutch releases. Remove the drive clutch. If applicable, account for the two sleeves.

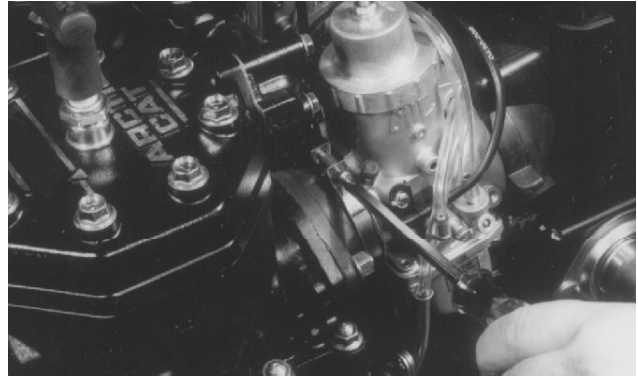
8. Remove the cap screw and washer securing the driven pulley; then slide the driven pulley off the driven shaft. Account for a key and alignment washers.



AF120D

■ **NOTE:** If the driven pulley is tight on the driven shaft, pull the driven pulley off using the Driven Pulley Puller (p/n 0744-023).

9. Loosen the flange clamp securing each carburetor to its flange; then remove the carburetors. Position the carburetors to one side in an upright position.



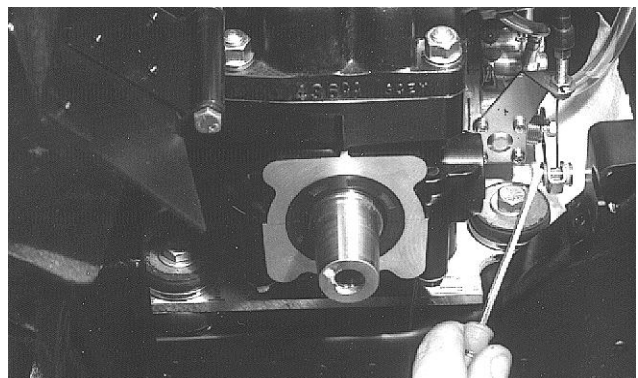
AJ172

10. Disconnect the impulse hose from the crankcase.

11. Remove the cable tie securing the engine and CDI wiring harnesses to the engine; then disconnect the main wiring harness from the engine and CDI wiring harnesses.

12. Remove the spark plug caps and the cable tie securing the temperature-gauge sender wire; then disconnect the sender wire.

13. Remove the E-clip and washer securing the oil-injection cable; then disconnect the oil-injection cable from the pump. Disconnect the oil-supply hose from the pump and plug the hose to prevent oil drainage.



AN009

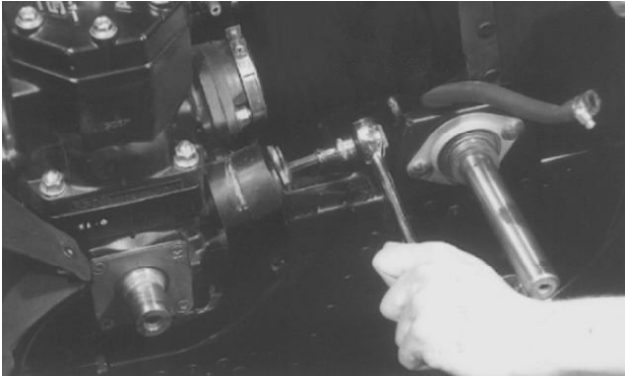
14. Loosen the clamp securing the supply hose to the water pump housing; then remove the hose from the water pump. Loosen the clamp securing the hose to the thermostat cap; then remove the hose from the cap.

15. Remove the four cap screws and lock washers securing the recoil starter; then remove the starter from the engine. Leave it in the engine compartment.

■ **NOTE:** On the Pantera 550, account for the ground wire.

16. Support the hood; then remove the hood cable from the exhaust manifold.

17. Remove the mounting hardware securing the engine to the front end.



AR321

- Lift the engine with mounting brackets out of the engine compartment.

CAUTION

Do not use the starter motor shaft to lift the engine. Damage may occur.

- Remove the engine mounting brackets.

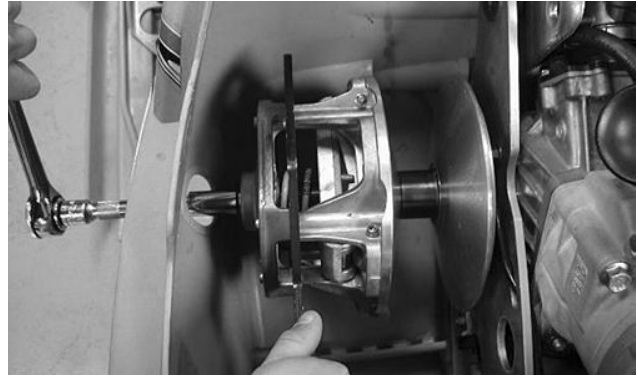
Removing Engine (500/700 cc F-Chassis Models)

- Remove all springs securing the expansion chamber and resonator; then remove these components from the engine compartment.



FC001

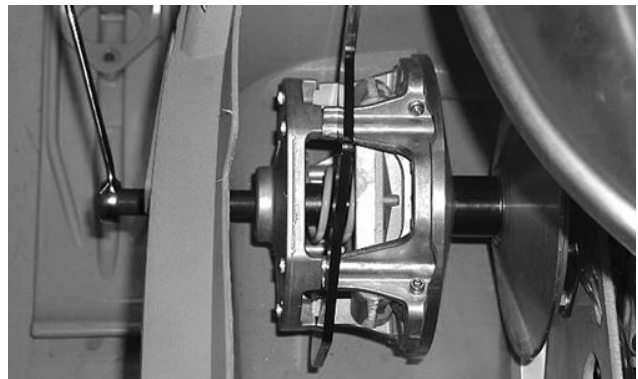
- Open the belt guard; then remove the drive belt.
- Remove the plug from the belly pan. Using a 1/2-in. 12-point socket, remove the cap screw and lock washer securing the drive clutch to the crankshaft.



FC002A

- Using Clutch Puller (p/n 0644-207) and an impact wrench or a breaker bar and Spanner Wrench (p/n 0644-136), tighten the puller. If the drive clutch will not release, sharply strike the head of the puller. Repeat this step until the clutch releases. Remove the drive clutch. If applicable, account for the two sleeves.

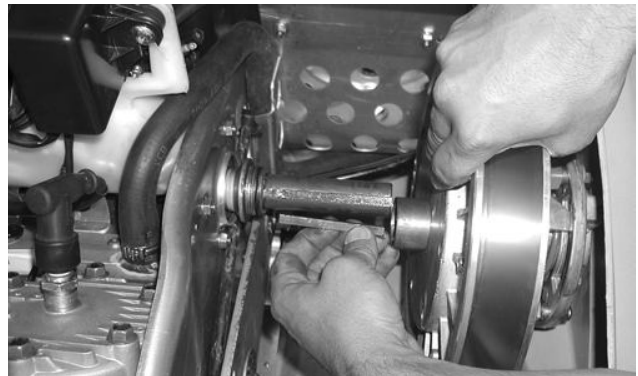
2



FC002

■ **NOTE:** If attempting to remove the drive clutch without removing the expansion chamber, use a clutch compressor and compress the clutch.

- Remove the cap screw and washer securing the driven pulley; then slide the driven pulley off the driven shaft. Account for a key, stub shaft, alignment washers, and an inner and outer O-ring.



FC003

■ **NOTE:** If the driven pulley is tight on the driven shaft, pull the driven pulley off using the Driven Pulley Puller (p/n 0744-023).

6. Loosen the two cap screws securing the servomotor and cover; then remove the cover.



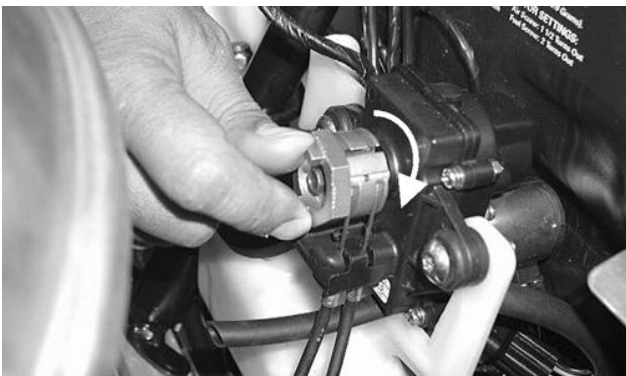
FC004

7. Using a small screwdriver, pry off the cable retaining cover.



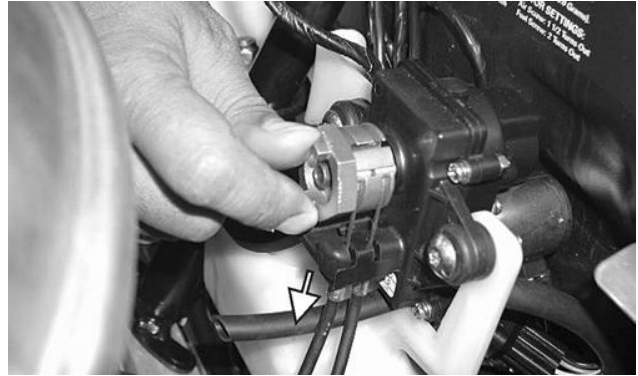
FC005

8. Rotate the servomotor actuator counterclockwise to loosen the cable; then pull the cable housings out of the holder.



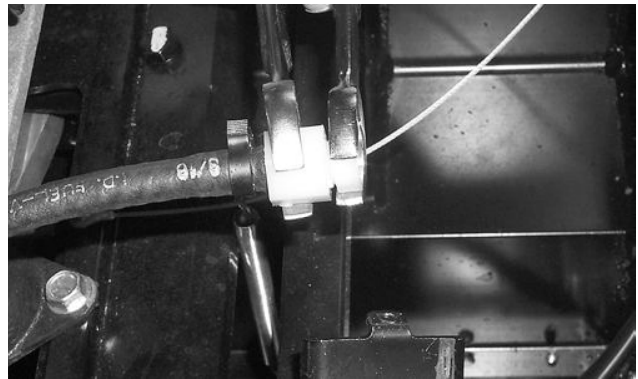
FC006A

9. Pull the cable up and out of the cable housing holder; then slide each cable drum back and out of the servomotor actuator.



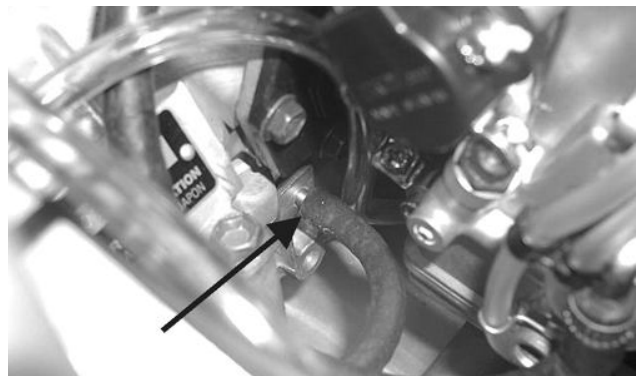
FC006B

10. Remove the cap from the coolant drain hose and route the hose out of the exhaust outlet in the belly pan into a suitable container. Remove the filler cap; then once the coolant stops draining, install the drain hose cap.



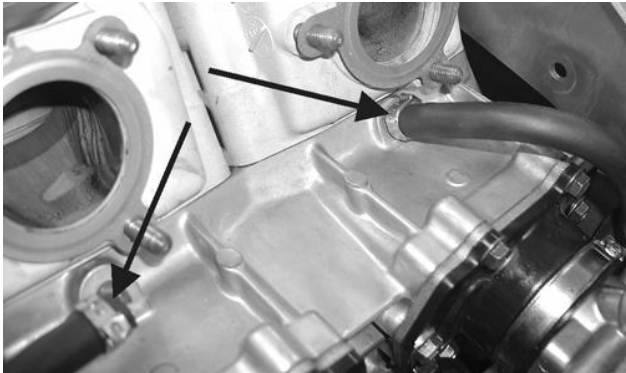
AP126

11. Loosen the flange clamps securing the throttle body/carburetor assembly to the flange; then move the throttle body/carburetor assembly forward to allow room to disconnect the oil injection cable/control rod from the oil-injection pump.
12. On the 500 cc, disconnect the impulse hose from the crankcase.



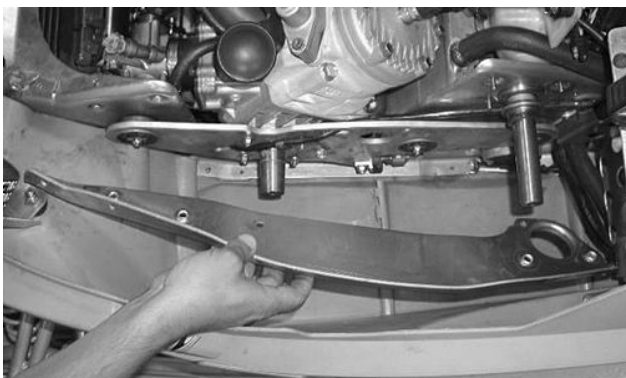
FC007A

- Loosen the clamps securing the coolant hoses connected to the cylinders beneath the exhaust ports; then remove the vent tube from the top of the cylinder head.

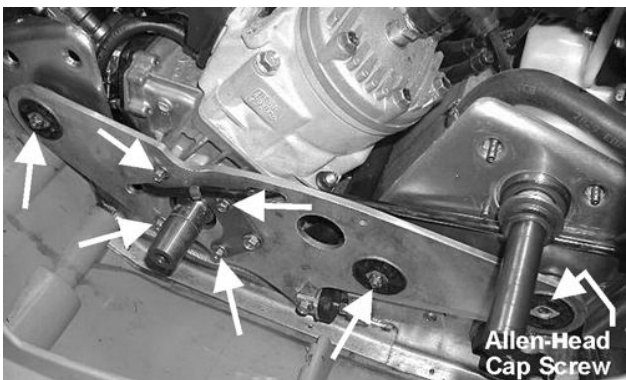


FC050A

- Move the throttle body/carburetor assembly to one side out of the way to a secure position.
- Remove the recoil starter and ground wire from the engine. Leave it in the engine compartment.
- Remove the four torx-head screws and the three cap nuts securing the side-plate brace to the chassis; then remove the hardware securing the left-side engine mounting bracket. Remove the bracket.

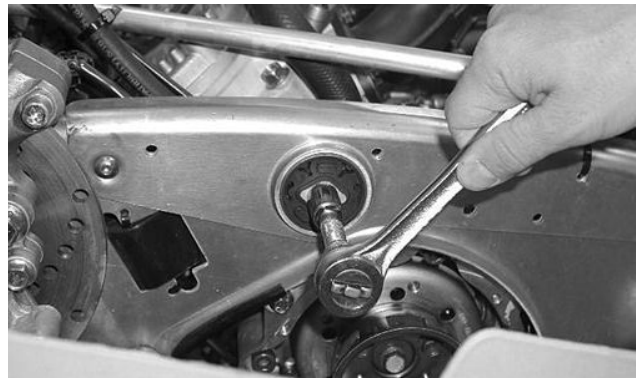


FC009



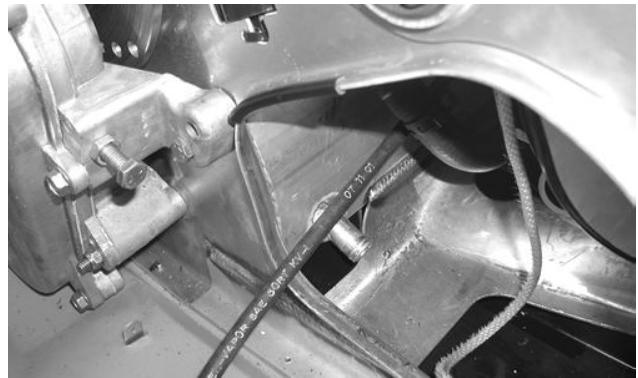
FC010A

- Loosen the cap screw/lock nut securing the right-side engine mounting bracket to the front end.

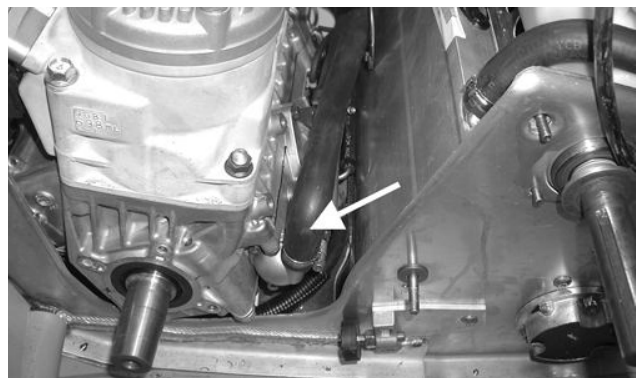


FC011

- Disconnect all electrical wires from the engine.
- Disconnect the lower coolant hose; then move the engine toward the left and up to allow enough room to remove the remaining coolant hose.



FC013A



FC012A

■ **NOTE:** Inspect the engine to ensure all wires, hoses, and cables have been removed.

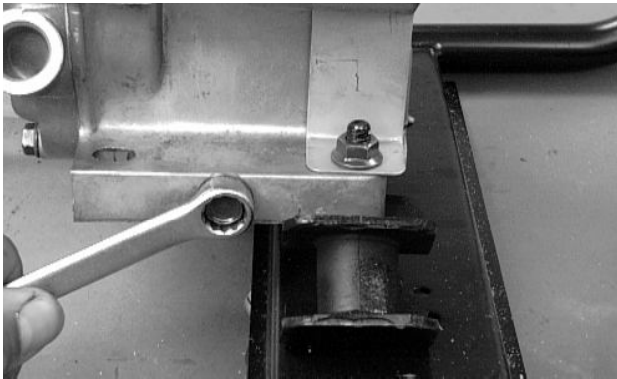
- Lift the engine out of the engine compartment.
- Remove the exhaust manifold from the engine. Account for nuts, washers, and gaskets.
- Remove the clamp securing the coolant supply hose from the cylinder head to the water pump. Then remove the hose from the engine.

Disassembling Engine Table of Contents

| | |
|----------------------------------|------|
| 120 cc Model..... | 2-12 |
| 370/440 cc Models..... | 2-17 |
| 550 cc Models..... | 2-20 |
| 570 cc Models..... | 2-23 |
| 600 cc Models..... | 2-29 |
| 800/900 cc Models..... | 2-33 |
| 500/700 cc F-Chassis Models..... | 2-39 |

Disassembling Engine (120 cc Model)

1. Remove the oil drain plug and drain the oil; then install the oil plug and tighten securely.



GM300D

2. Remove the wing nut securing the air cleaner end cap to the air cleaner housing.
3. Remove the cap screw and flange nuts securing the air cleaner housing to the carburetor and engine.

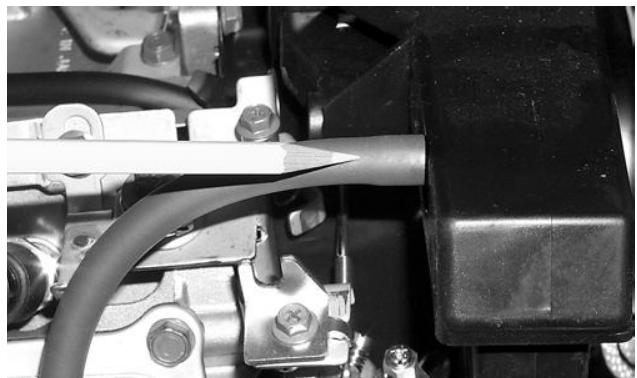


A002

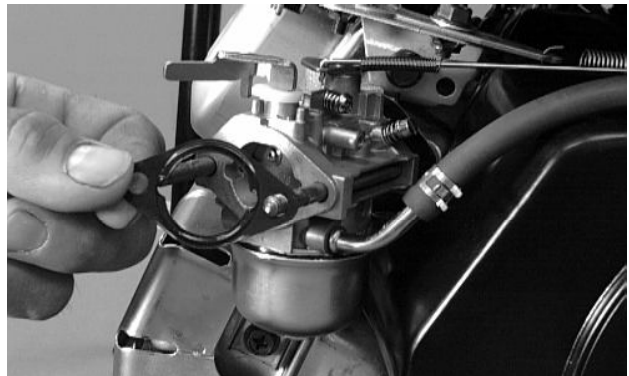


GF314D

4. Remove the air breather hose from the air cleaner housing; then remove the air cleaner housing from the carburetor. Account for the gasket.

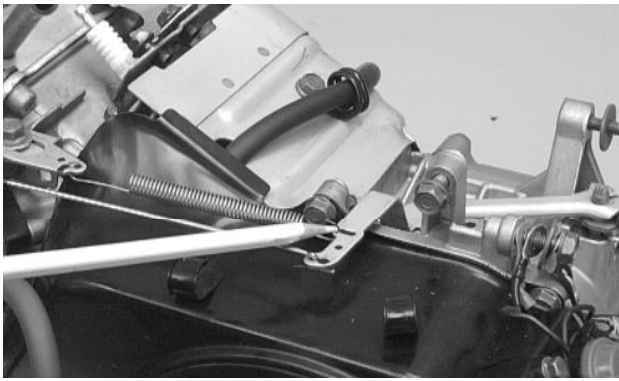


A001



GF316D

5. Mark the locations of the springs for assembly; then disconnect the rod and spring from the carburetor.



GF208D

6. Slide the carburetor off the mounting studs. Account for a gasket, insulator block, and a gasket.



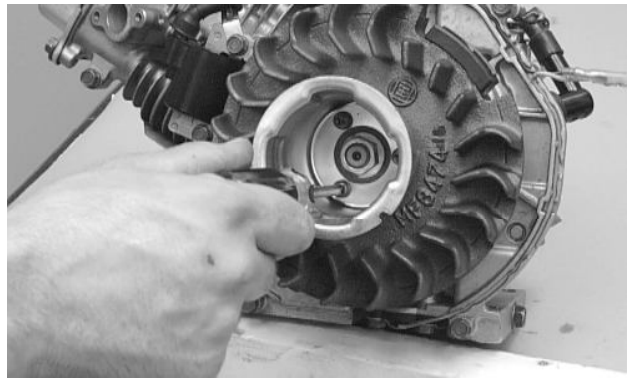
GF318D

7. Remove the recoil starter/fan housing assembly.

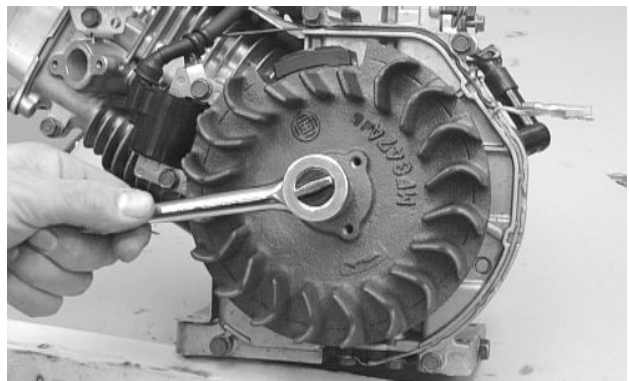


GM201D

8. Remove the screws securing the recoil starter pulley to the flywheel; then remove the nut securing the flywheel to the crankshaft.

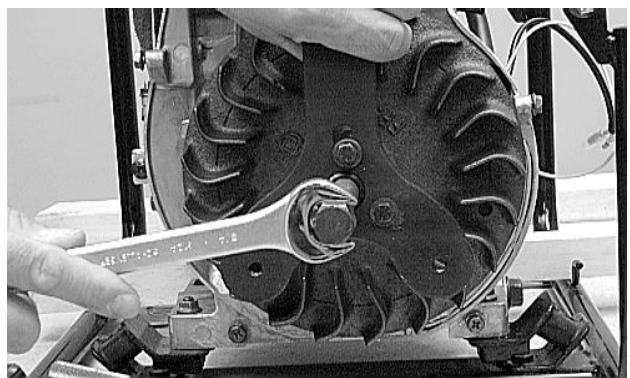


GM202D



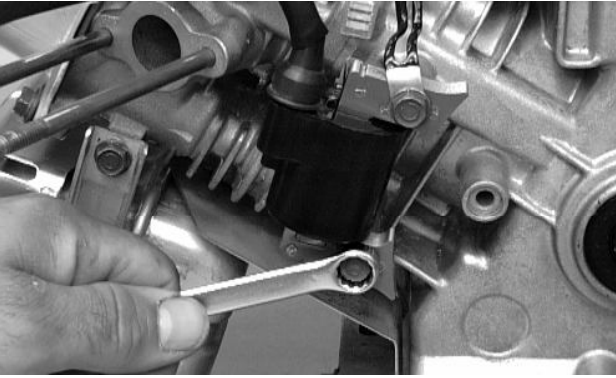
GM203D

9. Using a flywheel puller, remove the flywheel.



GM110D

10. Remove the high tension lead from the spark plug and two wire forms; then disconnect the ignition coil wire.
11. Remove the cap screws securing the ignition coil to the crankcase housing.



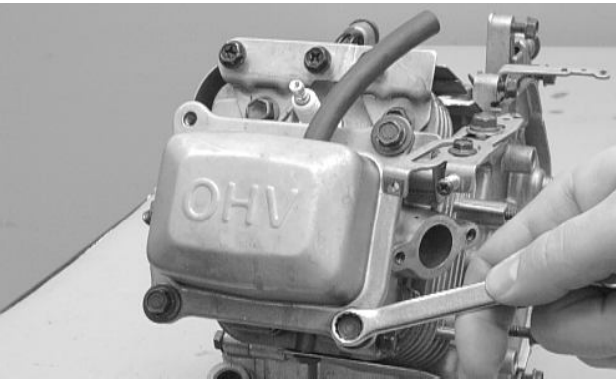
GE318D

12. Remove the cylinder head cover.



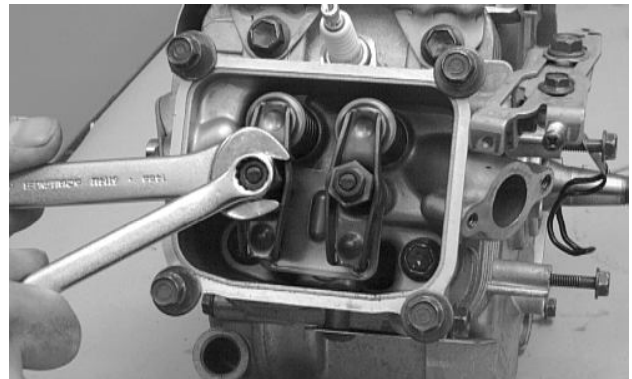
GM207D

15. Remove the lock nuts and pivots securing the rocker arms to the cylinder head.



GM205D

13. Remove the air breather body assembly from the cylinder head cover. Account for a gasket.



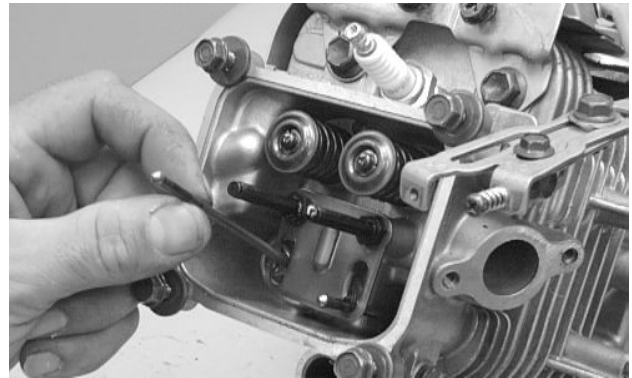
GM208D

16. Remove the push rods.



GM206D

14. Remove the screws securing the reed stopper to the air breather body assembly.



GM209D

17. Remove the cap screws securing the head to the cylinder; then remove the head and account for a gasket. Note the location of the dowel pins.

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