

SECTION 4 — FUEL SYSTEMS

TABLE OF CONTENTS

| | |
|---|------|
| Fuel System (Carbureted) | 4-2 |
| Fuel System (Batteryless EFI) | 4-33 |
| Fuel System (Related Items) | 4-66 |

Fuel System (Carbureted)

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

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

Fuel System (Carbureted) Table of Contents

| | |
|--|------|
| Pre-Maintenance Checks | 4-2 |
| Changing Main Jet(s)(VM-Style) | 4-3 |
| Changing Main Jets (TM-Style) | 4-4 |
| Carburetor Schematics | 4-4 |
| Removing Carburetor (VM-Style) | 4-6 |
| Removing Carburetors (TM-Style) | 4-7 |
| Disassembling Carburetor (VM-Style) | 4-8 |
| Dissassembling Carburetors (TM-Style) | 4-10 |
| Cleaning Carburetor | 4-12 |
| Inspecting Carburetor | 4-13 |
| Assembling Carburetor (VM-Style) | 4-13 |
| Assembling Carburetors (TM-Style) | 4-15 |
| Installing Carburetor (VM-Style) | 4-18 |
| Installing Carburetors (TM-Style) | 4-18 |
| Adjusting Carburetor(s) (VM-Style) | 4-19 |
| Adjusting Carburetors (TM-Style) | 4-23 |
| Throttle Cable (VM-Style) | 4-25 |
| Throttle Cable (TM-Style) | 4-26 |
| Choke Cable (VM-Style) | 4-26 |
| Choke Cable (TM-Style) | 4-27 |
| 2000 Carburetor Specifications | 4-28 |
| Mikuni Tuning Components | 4-29 |
| Major Tuning Components | 4-30 |
| Troubleshooting Fuel System (Carbureted) | 4-31 |

Pre-Maintenance Checks

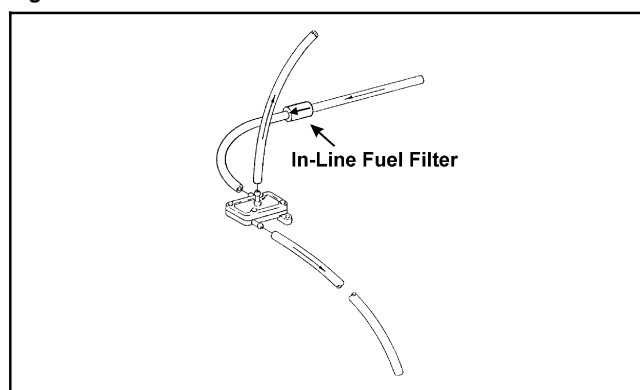
Before troubleshooting the fuel system, several simple checks should be performed. Many times what appears to be a serious problem is only a minor one.

1. Make sure the fuel shut-off valve was in the OPEN position.
2. Turn the fuel shut-off valve to the CLOSED position; then remove the in-line fuel filter. If the filter is dirty, replace the filter.

■ **NOTE:** Determine which style in-line fuel filter is being replaced and remove and install accordingly.

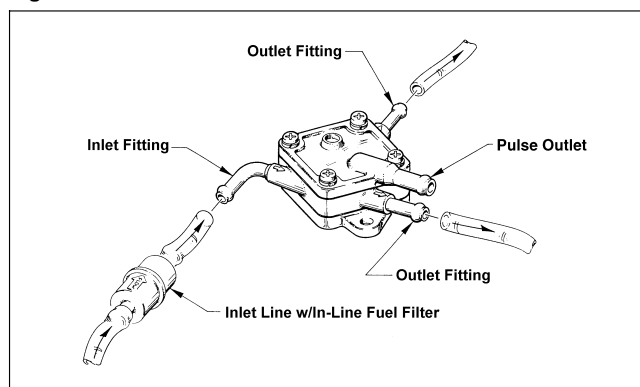
3. Install a new filter making sure the arrow on the filter is directed toward the fuel pump.

Fig. 4-1



726-065A

Fig. 4-2



728-272A

Fig. 4-3

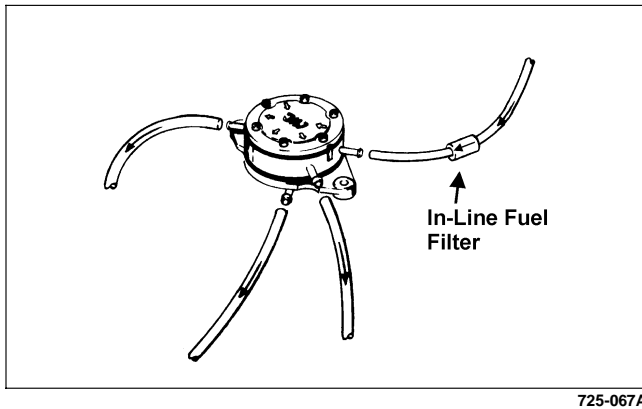


Fig. 4-4

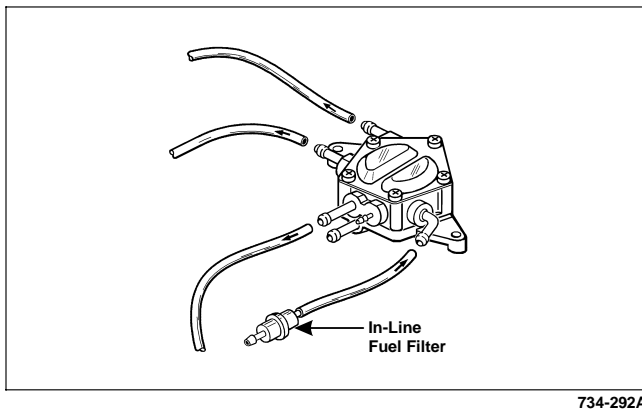
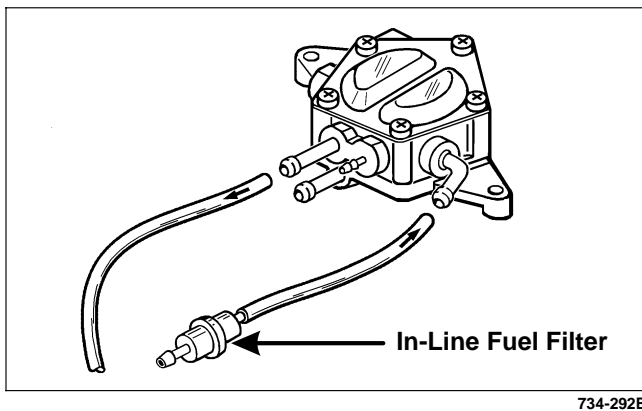


Fig. 4-5



4. Check the hoses to ensure that all are correctly connected; then check for cracks. If any cracks are evident in the hoses, replace them making sure none are against any hot or moving parts. Hoses must fit tightly. If hoses do not fit tightly, cut 6 mm (1/4 in.) from the end and install.
5. Check the impulse hose for cracks or any possible air leaks. The hose must fit tightly at both ends. If loose or cracked, replace the hose.

6. Check each carburetor vent hose for kinks or obstructions; remove any obstructions.
7. Check each carburetor float chamber drain hose for water or debris. If seen, clean by removing the plug and draining the drain hose into a small container.
8. Check the gas tank vent hose and fuel hose for obstructions; remove any obstructions.
9. Turn the fuel shut-off valve to the OPEN position.

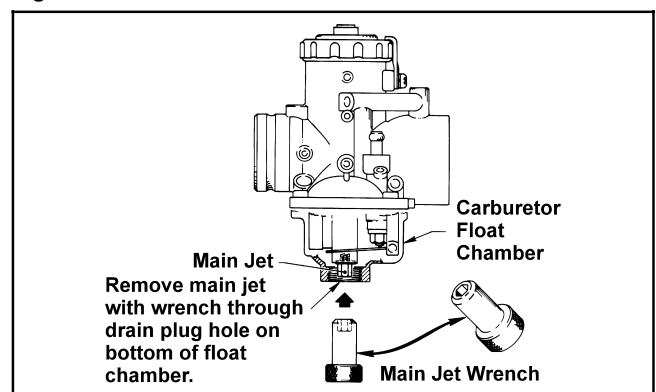
Changing Main Jet(s) (VM-Style)

The carburetor main jet(s) must be changed in conjunction with the changes in temperature, altitude, and type of gasoline being used.

1. Loosen each carburetor flange clamp and remove each carburetor from the intake flange and boot.
2. Remove the drain plug and O-ring from each carburetor float chamber and drain the gas into either a small container or an absorbent towel.
3. Using the Main Jet Wrench (p/n 0644-065), thread the main jet out of each carburetor. Account for the baffle ring. Install the new main jet with baffle ring and tighten securely.
4. Install the drain plug and O-ring; then tighten securely.

4

Fig. 4-6



5. Install and secure each carburetor.

Changing Main Jets (TM-Style)

The carburetor main jets must be changed in conjunction with the changes in temperature, altitude, and type of gasoline being used.

1. Remove the machine screw and washer securing the mounting plate (for the ignition coil and fuel pump) to the air-intake silencer.

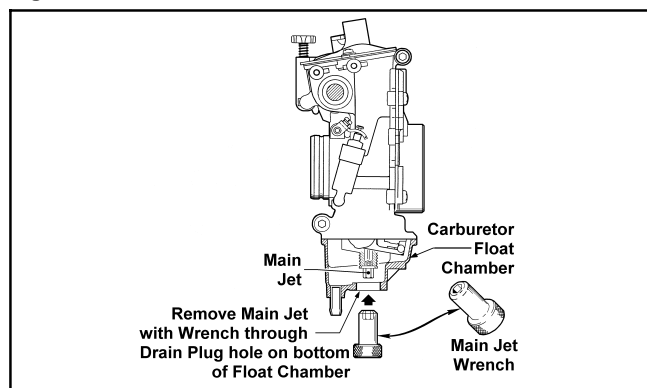
Fig. 4-7



AN613D

2. Remove the screws securing the air-intake silencer; then move the silencer forward and out of the engine compartment.
3. Loosen the carburetor flange clamps and slide the carburetors out of the intake flanges. Tilt the carburetors forward to access the main jets.
4. Remove the drain plug (with O-ring) from each carburetor float chamber and drain the gas into either a small container or an absorbent towel.
5. Using the Main Jet Wrench (p/n 0644-065), thread the main jet out of each carburetor. Account for the washer. Install the new main jet and washer and tighten securely.

Fig. 4-8



0734-280

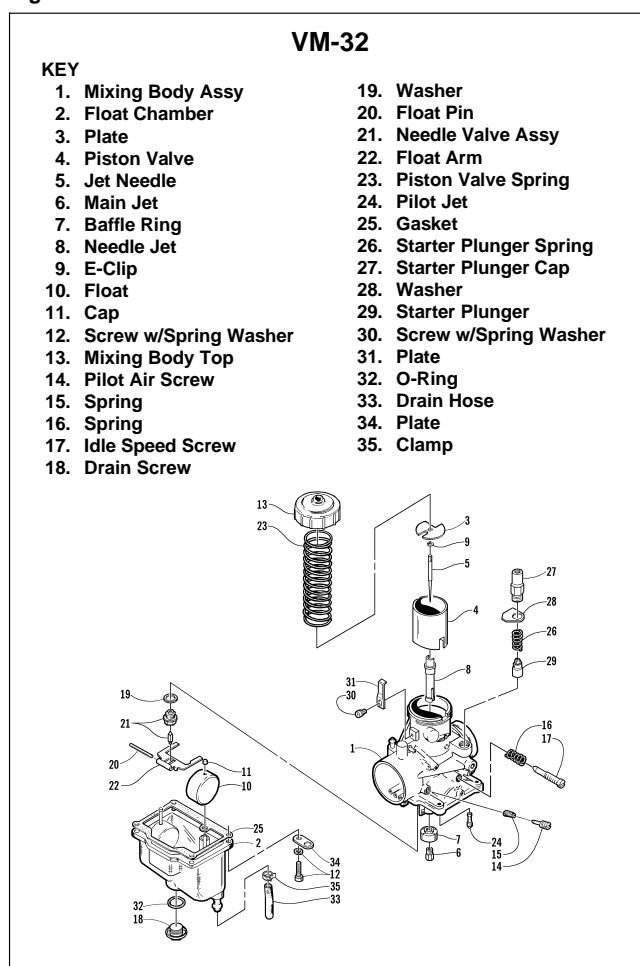
6. Install the drain plug with O-ring; then tighten securely.
7. Push the carburetors back into position and into the intake flanges; then tighten the flange clamps.
8. Place the air-intake silencer into position in the engine compartment making sure the carburetors are properly positioned in the boot and secure with the screws.

■ **NOTE: Make sure the pilot air jet hoses are properly positioned in the air-intake silencer.**

9. Place the ignition coil/fuel pump mounting plate into position on the air-intake silencer and secure with the machine screw and washer.

Carburetor Schematics

Fig. 4-9



0734-559

Fig. 4-10

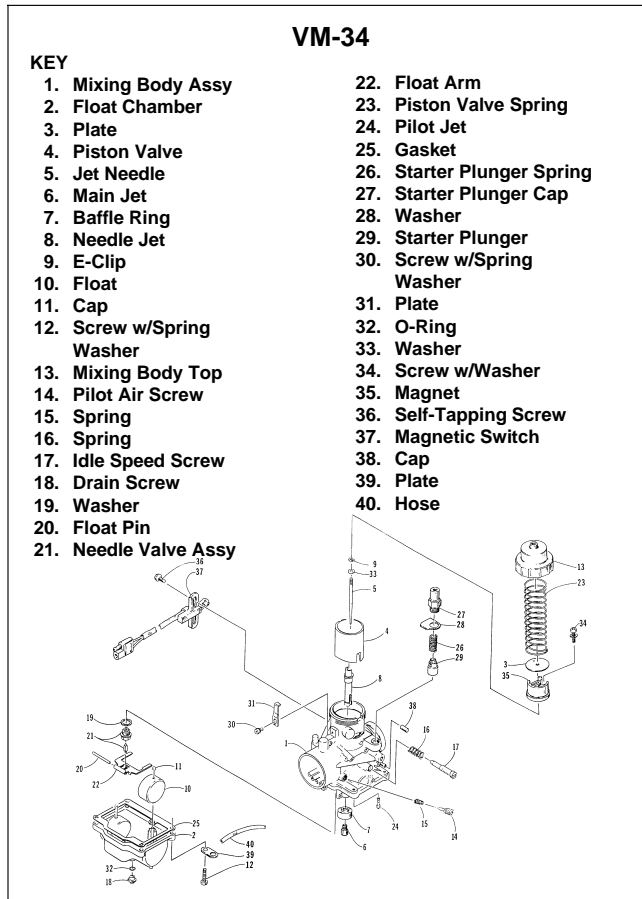


Fig. 4-12

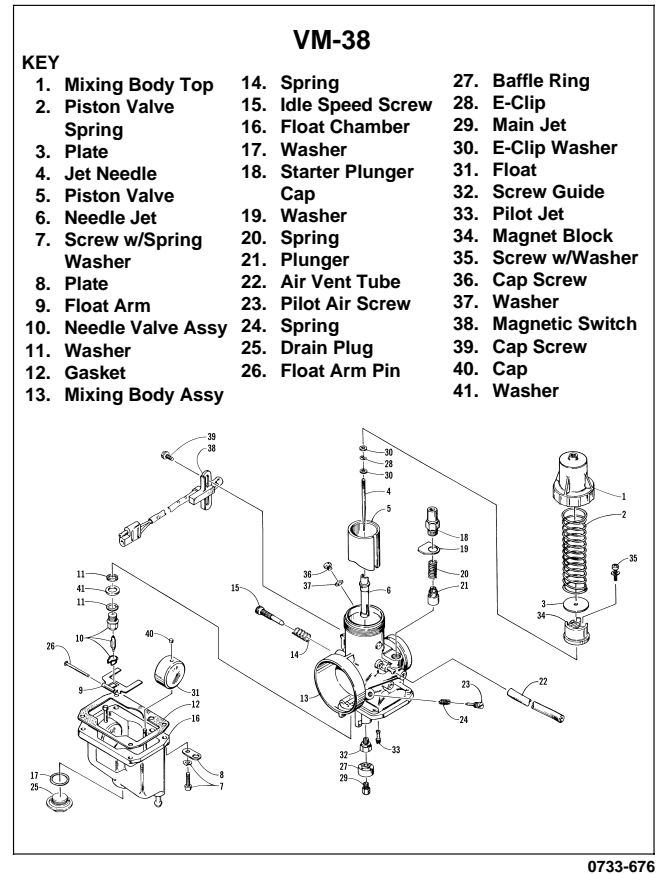


Fig. 4-11

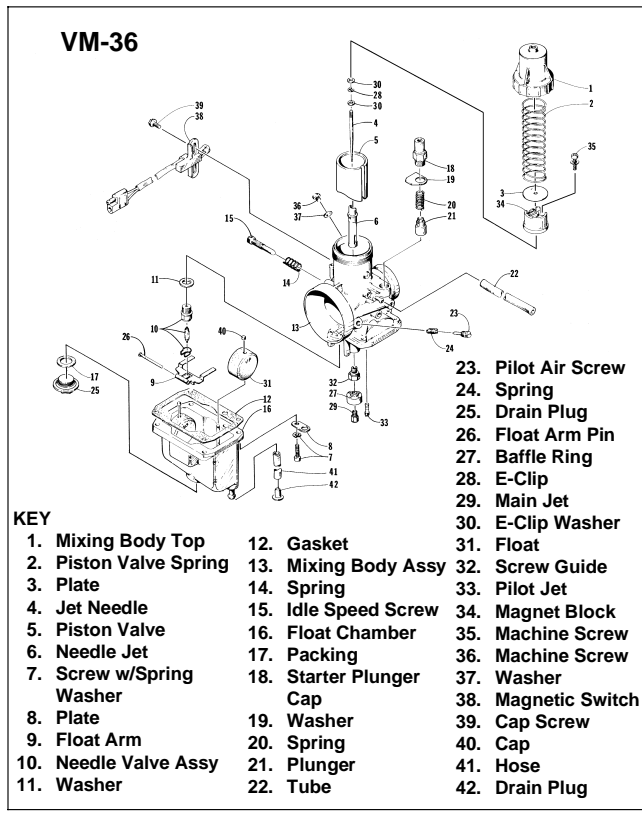


Fig. 4-13

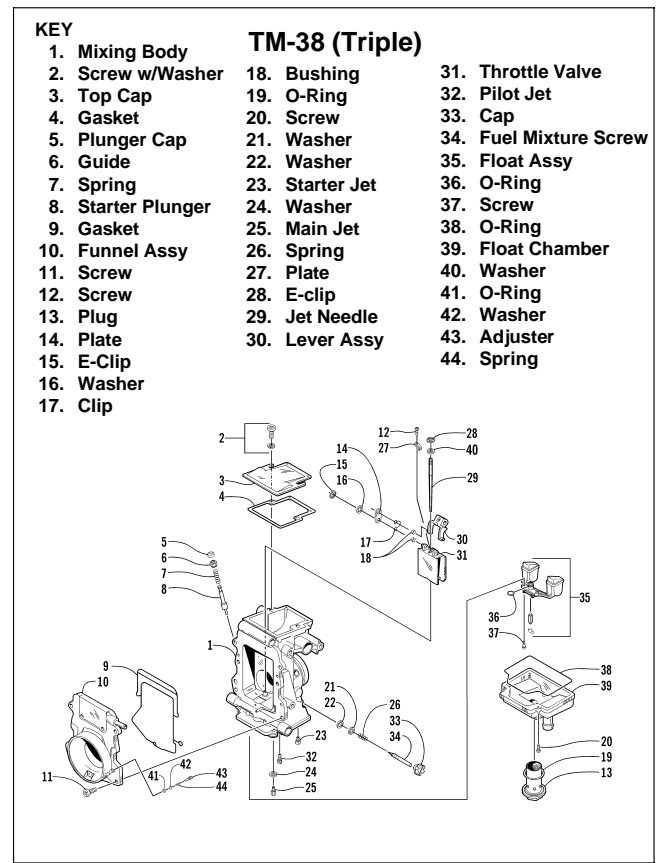


Fig. 4-14

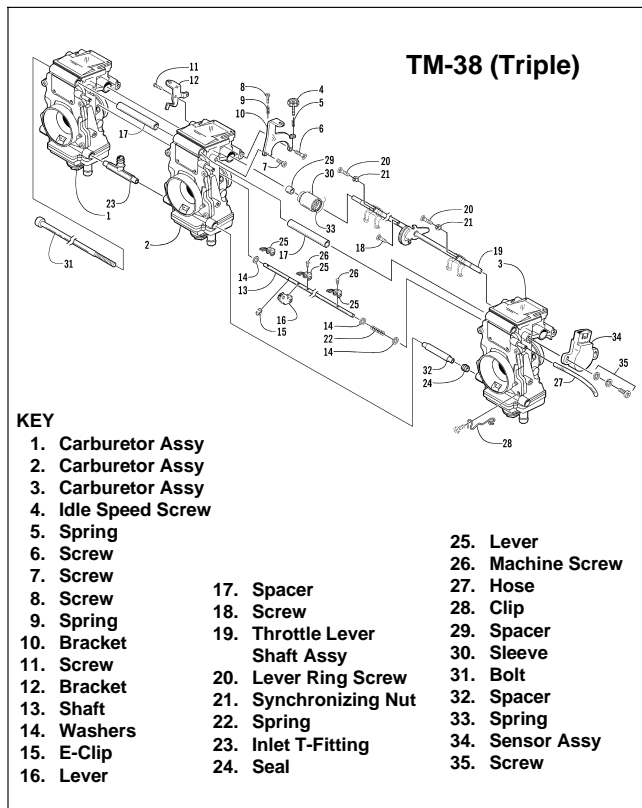


Fig. 4-15

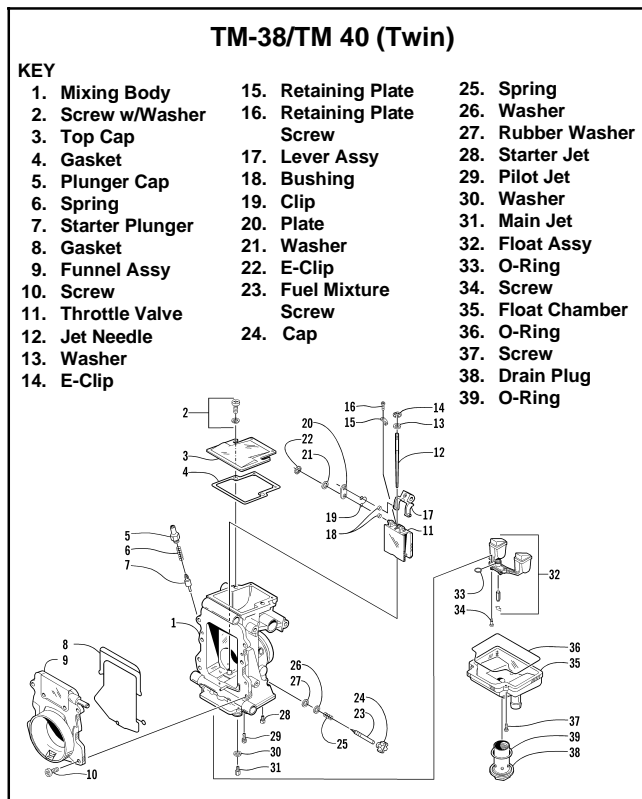
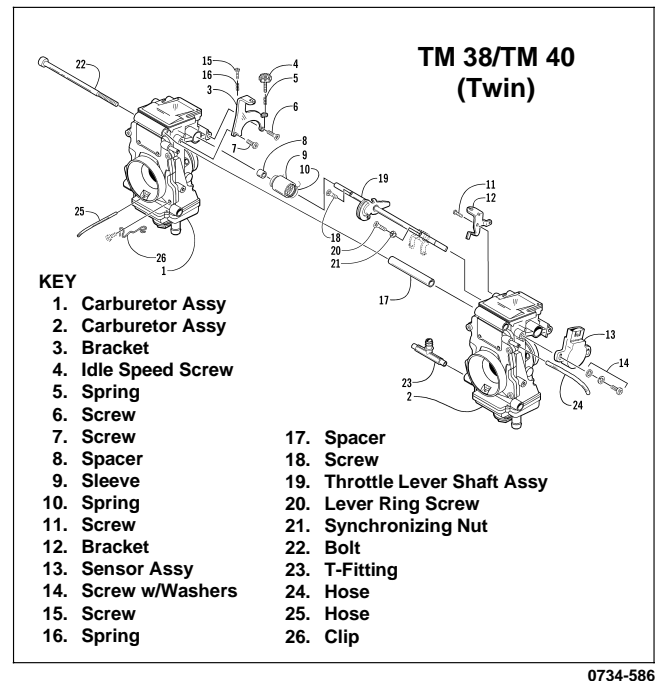


Fig. 4-16

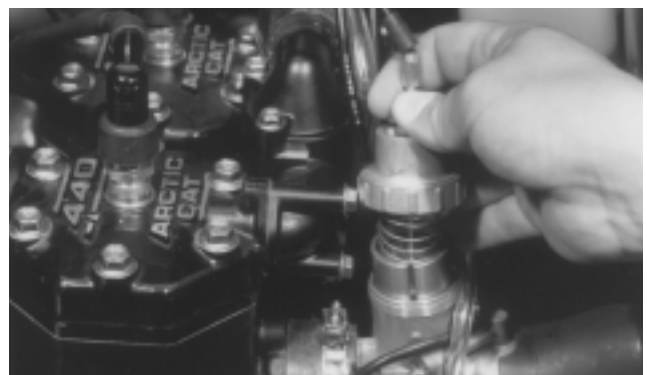


Removing Carburetor (VM-Style)

NOTE: On twin and triple carburetor models, remove the carburetors using this basic procedure.

1. Turn the fuel shut-off valve to the CLOSED position.
2. Loosen the screw and lock plate securing the mixing body top.
3. Remove the mixing body top by rotating it counterclockwise; then remove the top with spring, plate, jet needle with E-clip, and piston valve from the carburetor.

Fig. 4-17



AH100

4. Remove the brass choke-cable housing from the carburetor. Account for a washer.

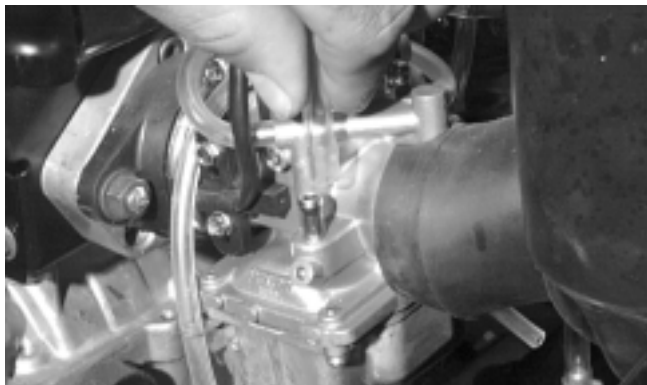
Fig. 4-18



AH099

5. Disconnect the fuel hose from the carburetor inlet fitting.

Fig. 4-19



AH284D

6. If applicable, disconnect the safety switch wiring harness connector from the main wiring harness.
7. Loosen the carburetor-flange clamp; then remove the carburetor.

Fig. 4-20



AH283D

■ **NOTE:** Slide the carburetor into the air-intake silencer boot until free of the flange; then remove carburetor.

CAUTION

Keep MAG-side, center (if applicable), and PTO-side carburetors identified for installation purposes.

Removing Carburetors (TM-Style)

1. Remove the machine screw and washer securing the mounting plate (for the ignition coil and fuel pump) to the air-intake silencer.

Fig. 4-21



AN613D

2. Remove the screws securing the air-intake silencer; then move the silencer forward and out of the engine compartment.
3. Disconnect the throttle cable and choke cable.
4. Remove the fuel supply hose from the fuel inlet T-fitting.
5. Loosen the carburetor flange clamps; then slide the carburetors out of the flanges and out of the engine compartment.
6. Remove the air jet and float chamber vent hoses.

Disassembling Carburetor (VM-Style)

■ **NOTE:** On twin and triple carburetor models unless there is a problem with the safety switches, do not loosen or remove the screws securing the switch to the carburetor.

1. Remove the four screws and lock washers securing the float chamber; then remove the float chamber and gasket.

Fig. 4-22



AH144

■ **NOTE:** The floats should be removed only if replacement is necessary or the float chamber requires cleaning with carburetor cleaner.

2. Remove the caps from the float towers; then remove the floats. Remove the drain plug and O-ring.

Fig. 4-23



B344

3. Remove the float arm pin; then remove the float arm.

CAUTION

Use care when removing the float arm pin or the towers may break. Also, the pin must be removed from its flattened side.

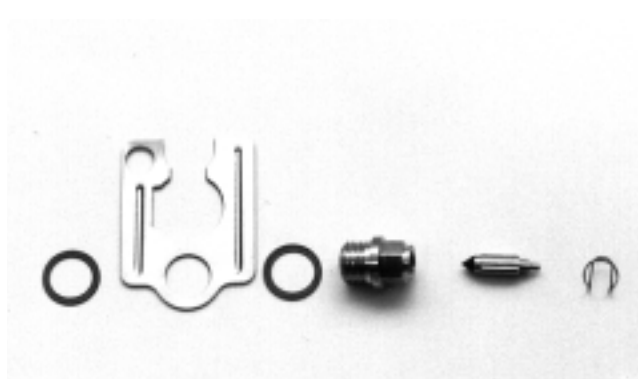
Fig. 4-24



AH138

4. Remove the needle valve retainer; then remove the needle valve. Remove the seat and account for two washers and a plate.

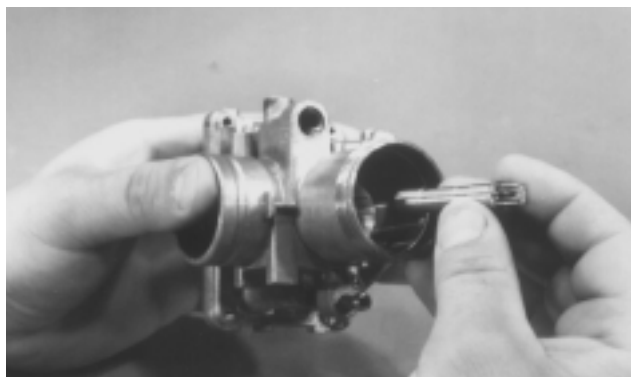
Fig. 4-25



B347

5. Remove the main jet and baffle ring; then remove the main jet extender guide from the needle jet. Push the needle jet out through the top of the carburetor.

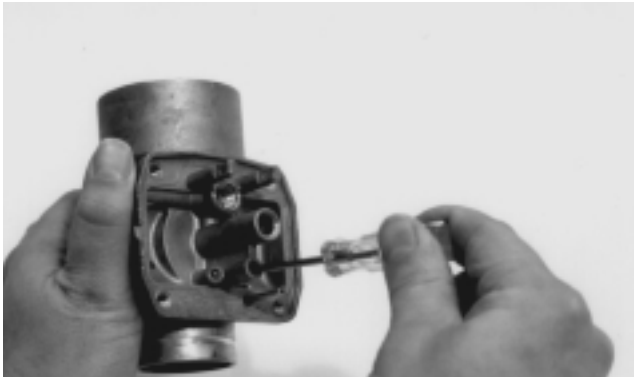
Fig. 4-26



AH084

6. Remove the pilot jet.

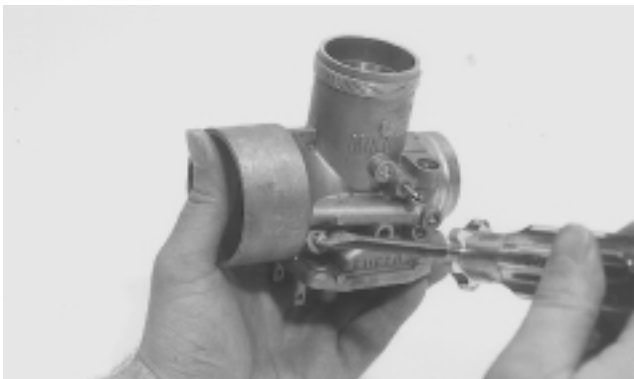
Fig. 4-27



B352

7. While counting the rotations for installing purposes, rotate the pilot air screw clockwise until lightly seated; then remove the pilot air screw and spring.

Fig. 4-28



B350

8. Remove the idle speed screw and spring.

Fig. 4-29



B351

9. Remove the throttle cable from the piston valve; then remove the valve.

Fig. 4-30

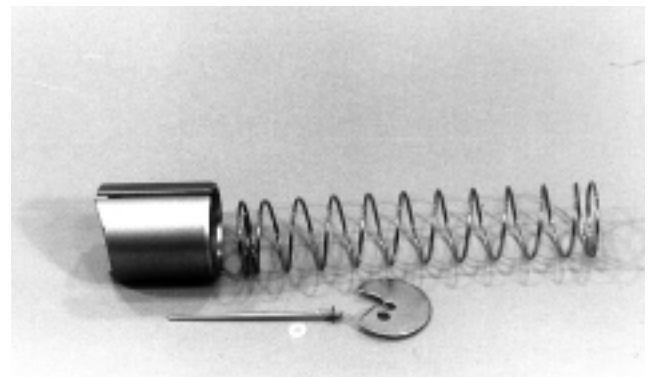


AH074

10. Remove the Phillips-head screw securing the throttle cable retainer to the piston valve; then remove the retainer. Account for the jet needle with E-clip and two washers.

■ **NOTE:** Note the position of the E-clip on the jet needle for assembly purposes.

Fig. 4-31



AH042

⚠ CAUTION

If an engine problem has been experienced due to improper gas/air mixture, verify the carburetor jetting and E-clip position with the Specification Chart and Main Jet Chart on the snowmobile for altitude, temperature, and type of gasoline.

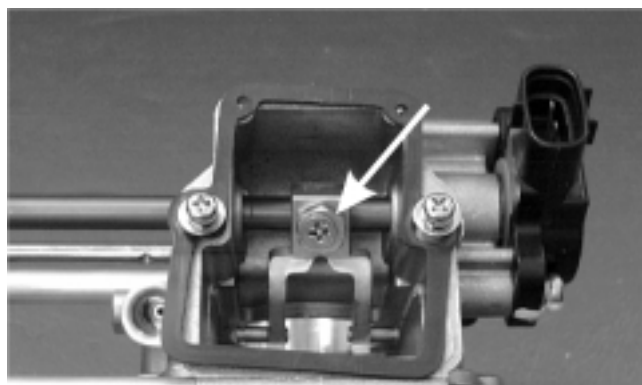
11. Separate the starter plunger assembly from the choke cable by compressing the spring and removing the plunger from the cable; then remove the spring. Thread the plunger cap off the cable.

Disassembling Carburetors (TM-Style)

⚠ CAUTION

Do not loosen the lever assembly from the throttle lever shaft. If the lever assembly is loosened, the carburetors must be synchronized.

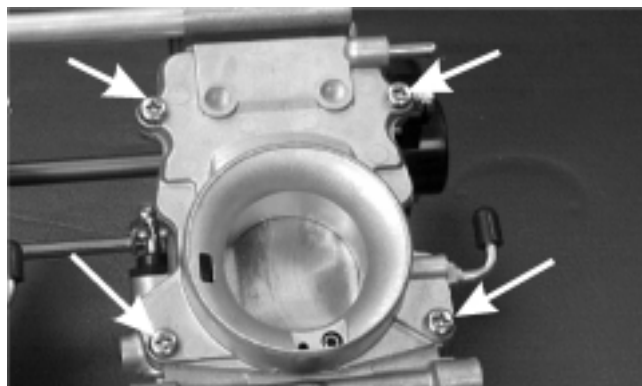
Fig. 4-32



AH631DA

■ **NOTE:** The carburetors do not have to be removed to change jet needles or main jets; however, changing throttle valves requires removing the funnel assemblies. The clearance between the throttle valve, mixing body, and funnel assembly (approximately 0.50 mm or 0.020 in.) is normal and should not be a concern.

Fig. 4-33

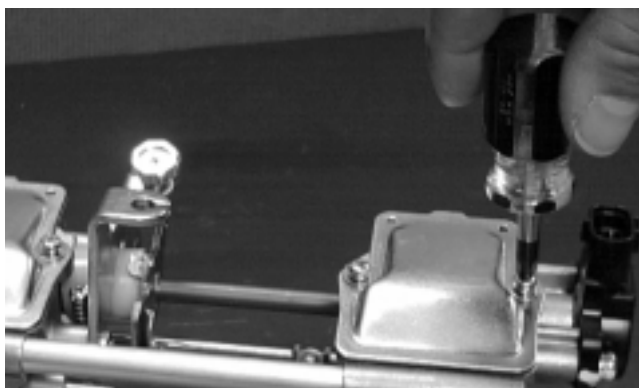


AH622D

■ **NOTE:** Disassemble the carburetors using this basic procedure.

1. Loosen the screws (with washers) securing the top cap to the mixing body; then slide the cap off the body. Account for the gasket.

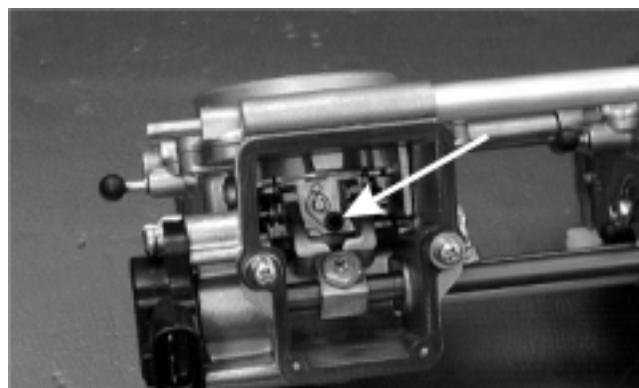
Fig. 4-34



AH615D

2. Loosen the screw securing the jet needle retaining plate; then slide the plate out of the way.

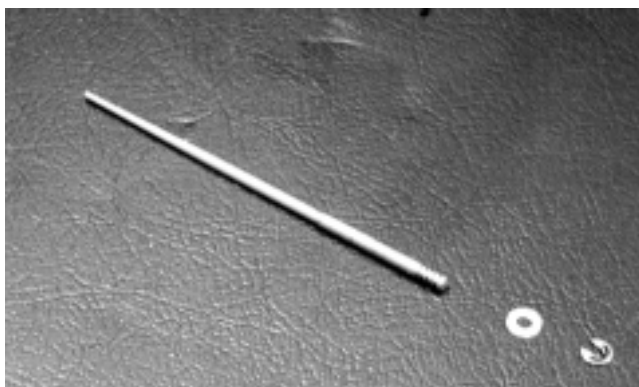
Fig. 4-35



AH616DA

3. Using a pair of needle-nose pliers, remove the jet needle assembly. Account for the E-clip and washer.

Fig. 4-36



AH617D

4. Remove the Phillips-head screw and the drain plug (with O-ring) securing the float chamber to the mixing body. Remove the chamber and account for the O-ring.

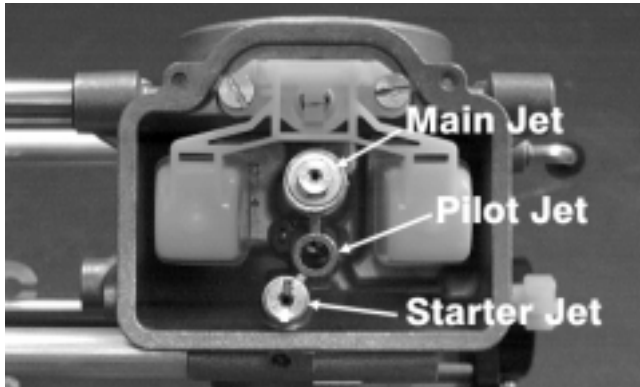
Fig. 4-37



AH618D

5. Remove the main jet (with washer), pilot jet, and starter jet.

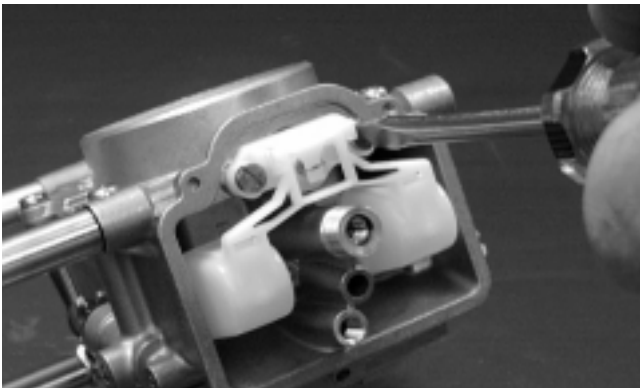
Fig. 4-38



AH619DA

6. Remove the screws securing the float assembly.

Fig. 4-39



AH620D

7. Remove the float assembly by lifting it up and out of the mixing body. Account for the O-ring.

Fig. 4-40



AH621D

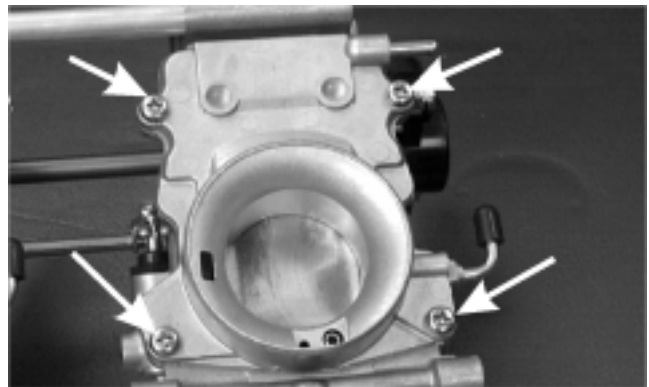
■ **NOTE:** It may be necessary to use a spray lubricant such as WD-40 to aid in removing the float assembly.

CAUTION

To remove the throttle valve, the jet needle must be removed or damage to the jet needle will result.

8. Remove the Phillips-head screws securing the funnel assembly to the mixing body.

Fig. 4-41

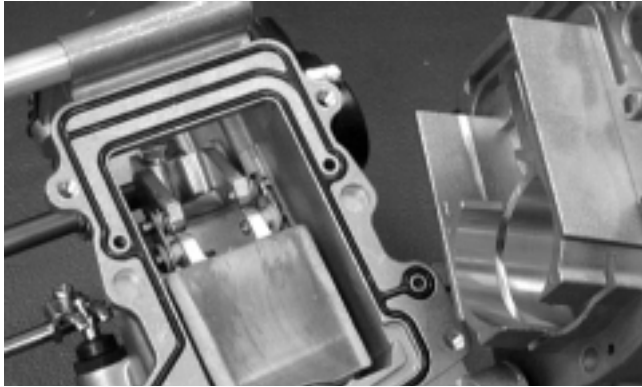


AH622DA

9. Move the throttle lever to the full-open position; then remove the funnel assembly. Account for the gasket.

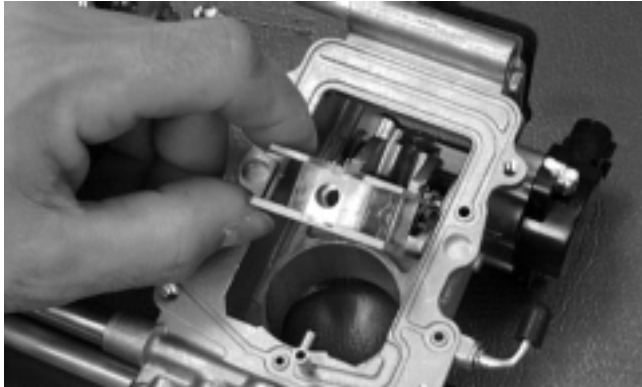
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Fig. 4-42



10. Move the throttle lever slightly open; then rotate the throttle valve out of the mixing body.

Fig. 4-43

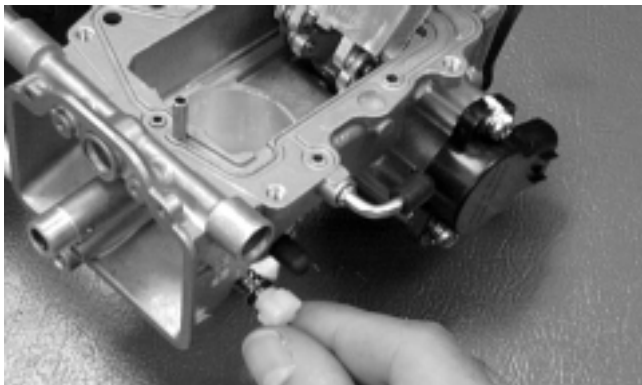


11. While counting the rotations for installing purposes, rotate the fuel mixture screw clockwise until lightly seated; then remove the mixture screw. Account for a rubber washer, washer, spring, and cap.

⚠ CAUTION

Do not force a mixture screw when seating. Forcing a mixture screw may result in damage to the screw taper and/or mixing body.

Fig. 4-44



■ **NOTE:** In the following step, only one E-clip needs to be removed to free the throttle valve from the lever assembly.

12. Remove the E-clip securing the plate to the throttle valve; then slide the throttle valve to one side and remove. Account for the plate, washer, clip, and bushings.

Fig. 4-45

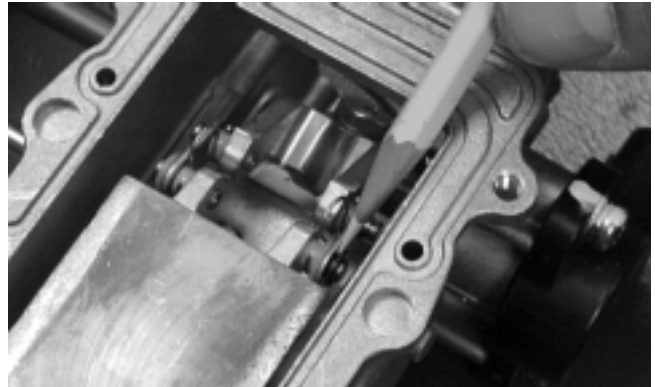
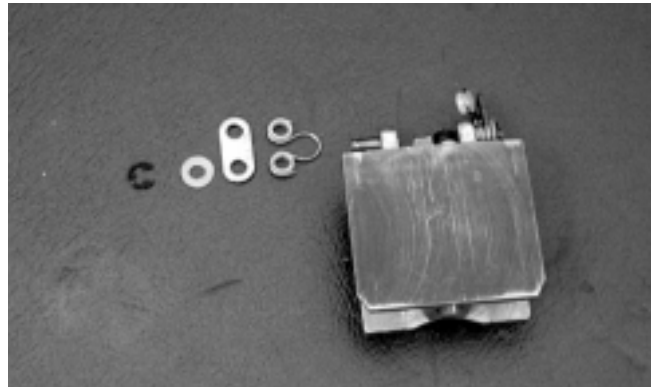


Fig. 4-46



Cleaning Carburetor

⚠ CAUTION

DO NOT place any non-metallic components in parts-cleaning solvent or carburetor cleaner because damage or deterioration will result.

1. Place all metallic components in a wire basket and submerge in carburetor cleaner.
2. Soak for approximately 30 minutes; then rinse with fresh parts-cleaning solvent.
3. Wash all non-metallic components with soap and water. Rinse thoroughly.

4. Dry all components with compressed air only making sure all holes, orifices, and channels are unobstructed.
5. Blow compressed air through all hoses to remove any obstructions.

⚠ WARNING

Always wear safety glasses when drying components with compressed air.

⚠ CAUTION

DO NOT use wire or small drill bits to clean carburetor orifices, holes, or channels. Distorted or damaged orifices, holes, or channels can result in poor carburetor operation.

Inspecting Carburetor

■ **NOTE:** Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.

1. Inspect the mixing body for cracks, nicks, stripped threads, and any other imperfections in the casting.
2. Inspect the piston/throttle valve for cracks, score marks, or imperfections in the casting.
3. Inspect the condition of the piston valve spring (VM-style).
4. Inspect the float for damage.
5. Inspect the gaskets, O-rings, and washers for distortion, tears, or noticeable damage.
6. When applicable, inspect the tips of the idle speed screw, jet needle, pilot air screw, needle valve, and fuel mixture screw for wear, damage, or distortion.

■ **NOTE:** On the VM-style when inspecting the inlet needle, inspect the side guides and tip for wear. If the guides show any sign of wear, replace the inlet needle.

7. Inspect the pilot jet and main jet for obstructions or damage.
8. Inspect the starter plunger and seat for wear or damage.
9. Inspect the carburetor mounting flanges for damage and tightness.

⚠ CAUTION

An air leak between the carburetor and engine will cause a lean condition and severe engine damage will result.

10. On the TM-style, inspect the throttle shaft seal for damage and signs of leaking.

Assembling Carburetor (VM-Style)

1. Install the idle speed screw and spring.

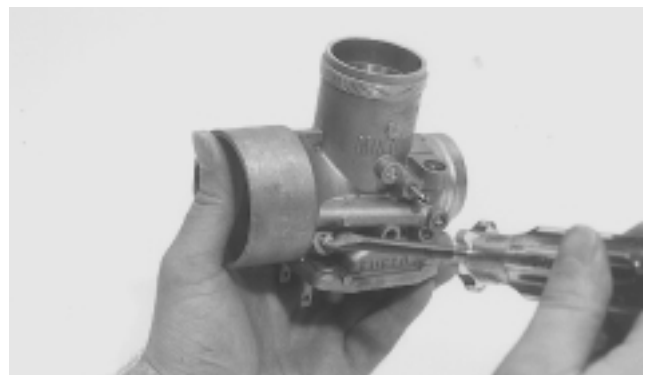
Fig. 4-47



B351

2. Install the pilot air screw and spring. Rotate clockwise until lightly seated; then turn counterclockwise the same number of turns as noted in disassembling for an initial setting.

Fig. 4-48



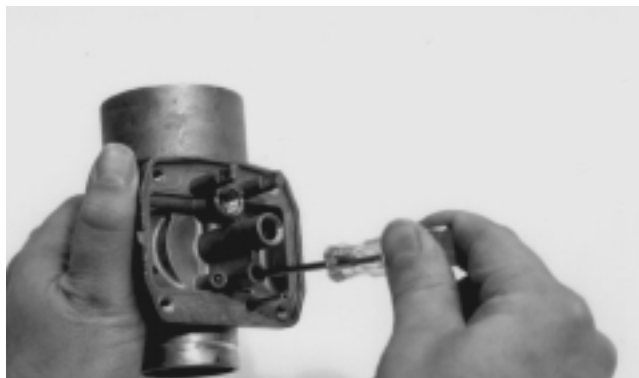
B350

⚠ CAUTION

DO NOT force the pilot air screw when seating. Forcing the screw will result in damage to the carburetor body.

3. Install the pilot jet.

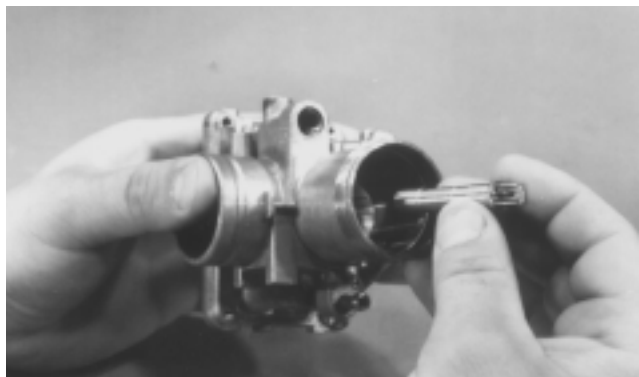
Fig. 4-49



B352

4. Insert the needle jet into position from the top of the carburetor making sure the groove in the needle jet is aligned with the pin in the mixing body; then place the jet extender, baffle ring, and main jet into position and secure.

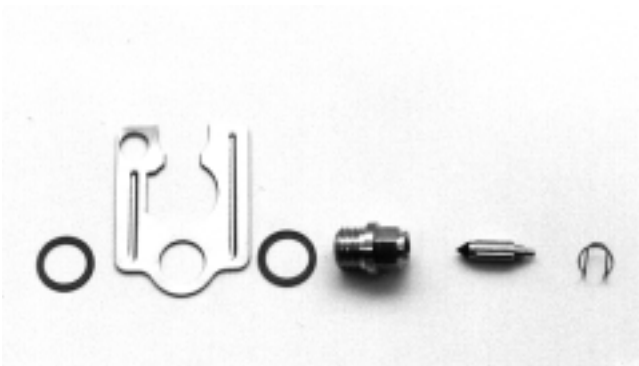
Fig. 4-50



AH084

5. In order, place a washer, plate, washer, and inlet seat into position and secure. Install the inlet needle valve and secure with the retainer.

Fig. 4-51



B347

6. Place the float arm into position and secure with the pin.

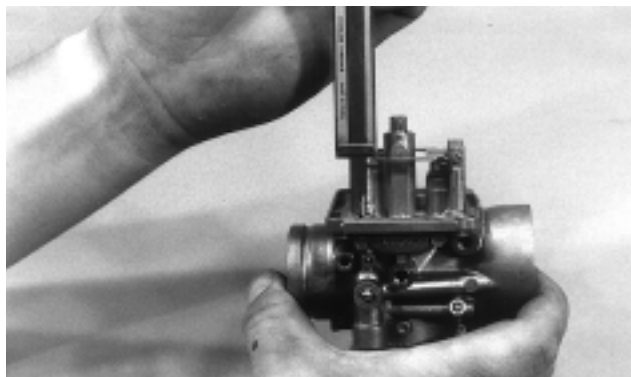
Fig. 4-52



AH138

7. Check the float arm height. Using a calipers, measure the distance from the gasket surface to the top of the float arm (with the carburetor inverted). If measurement is not within specifications, adjust by bending the actuating tab.

Fig. 4-53



AH046

| FLOAT ARM HEIGHT | |
|------------------|--------------------------|
| VM-32/34 | 22-24 mm (0.86-0.94 in.) |
| VM-36/38 | 17-19 mm (0.66-0.74 in.) |

8. Place the O-ring and drain plug into position and secure; then place the floats into position making sure the word UP is properly positioned. Press the caps onto the float towers.

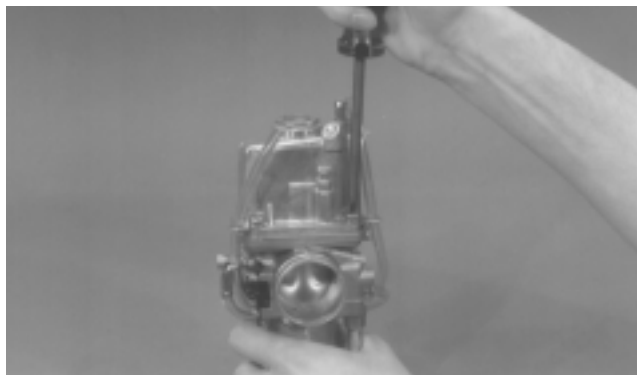
Fig. 4-54



B344

9. Place the gasket and float chamber into position and secure with the four screws and lock washers making sure the hose plates are properly positioned on the two front screws. Install the vent hoses.

Fig. 4-55

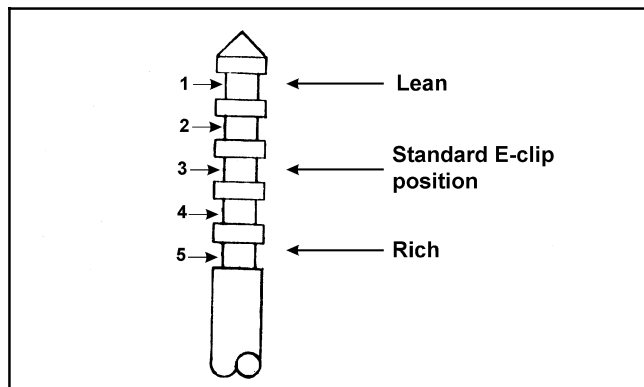


AH137

10. Place the E-clip into position on the jet needle. From the bottom of the jet needle, slide the E-clip washer up against the E-clip. Place the jet needle into the piston valve. Place an E-clip washer on the jet needle above the E-clip.

■ **NOTE:** Place the E-clip in the proper position as noted in disassembly.

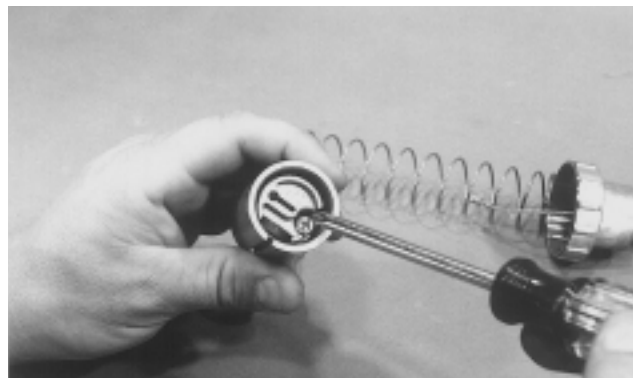
Fig. 4-56



725-266C

11. Place the cable retainer into the piston valve and secure with the Phillips-head screw. Place the spring and plate over the throttle cable and compress the spring. Guide the cable end down into the cable retainer slot and slide the cable end to the center of the piston valve. Release the spring and retainer plate to lock the cable in position.

Fig. 4-57



AH075

■ **NOTE:** The round part of the cable end must come through the hole in the plate. If it doesn't, the cable isn't assembled to the piston valve correctly.

12. Thread the plunger cap onto the choke cable. Place the spring over the cable end and compress. Position the cable end into the starter plunger and release the spring.

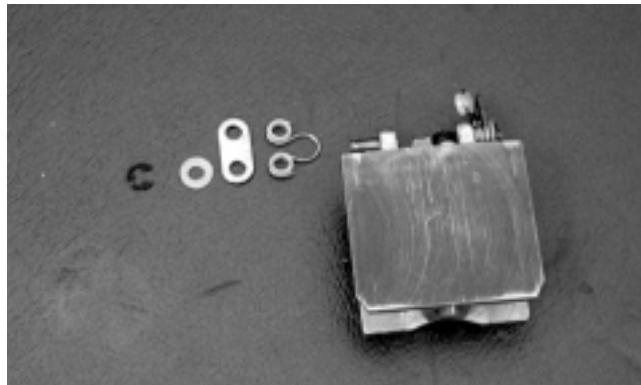
Assembling Carburetors (TM-Style)

4

1. Place the throttle valve into the mixing body making sure the cutaway faces the funnel assembly side; then slide the bushing assembly/plate onto the lever assembly. Secure the assembly with the remaining bushings with clip, plate, washer, and E-clip.

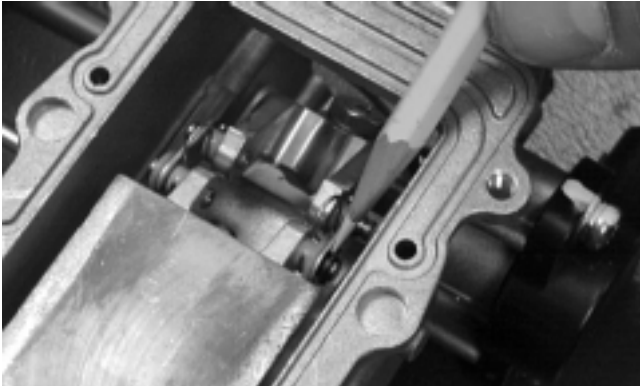
■ **NOTE:** When installing the throttle valve, the cutaway must face the funnel assembly side.

Fig. 4-58



AH628D

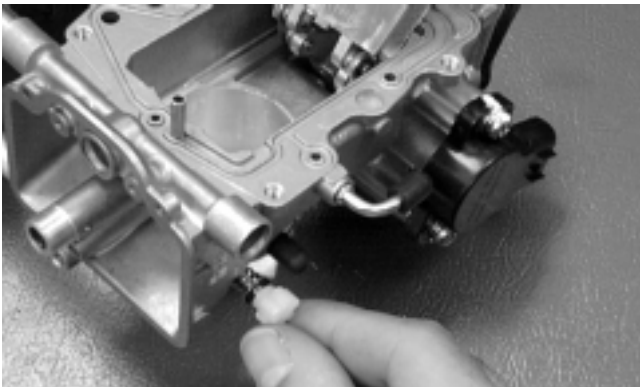
Fig. 4-59



AH627D

2. Making sure the cap, spring, washer, and rubber washer are accounted for from disassembly, install the fuel mixture screw in the mixing body.

Fig. 4-60



AH626D

3. Rotate the fuel mixture screw clockwise until lightly seated; then rotate the mixture screw counterclockwise the same number of turns as noted in disassembling for an initial setting.

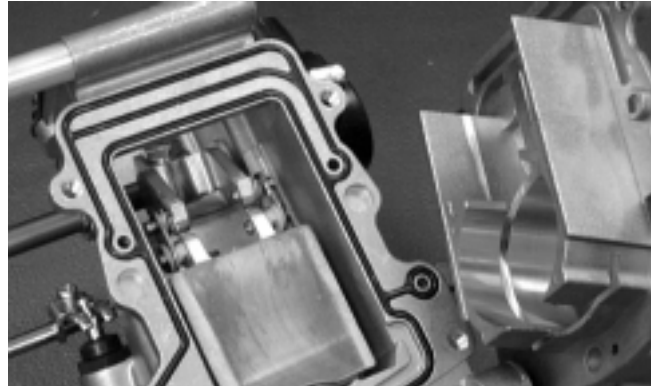


CAUTION

Do not force the mixture screw when seating. Forcing the mixture screw may result in damage to the screw taper and/or mixing body.

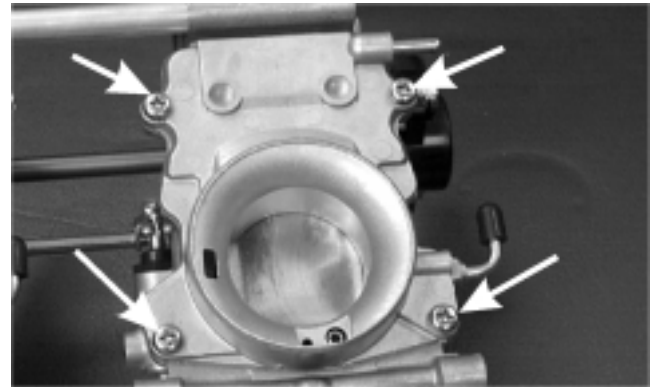
4. Move the throttle lever to the full-open position; then secure the funnel assembly w/gasket to the mixing body.

Fig. 4-61



AH623D

Fig. 4-62



AH622D

5. Accounting for the O-ring from disassembly, install the float assembly by pressing in on the screw mounting holes; then secure the float assembly with the screws.

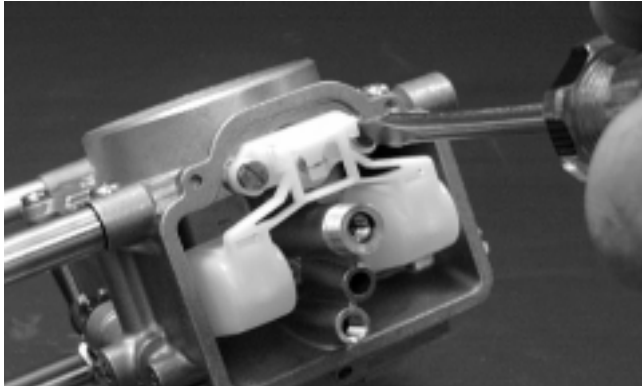
NOTE: It may be necessary to use a spray lubricant such as WD-40 to aid in installing the float assembly.

Fig. 4-63



AH621D

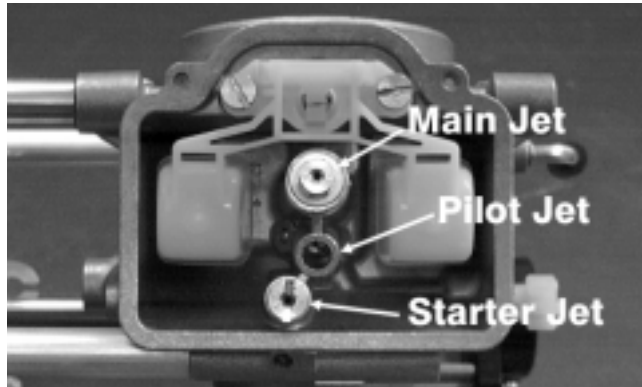
Fig. 4-64



AH620D

6. Install the starter jet, pilot jet, and main jet (with washer).

Fig. 4-65



AH619D

7. Place the float chamber and O-ring into position on the mixing body; then secure with the screw and drain plug (with O-ring).

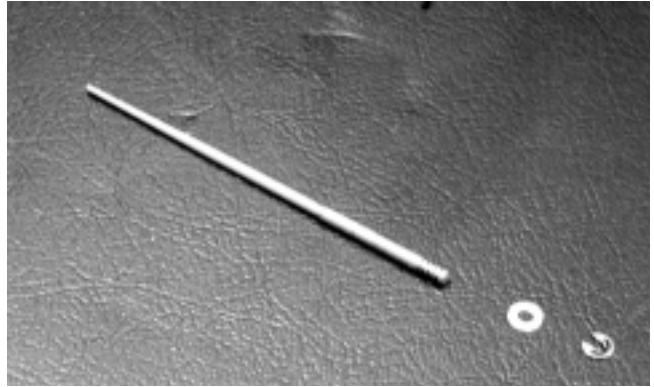
Fig. 4-66



AH618D

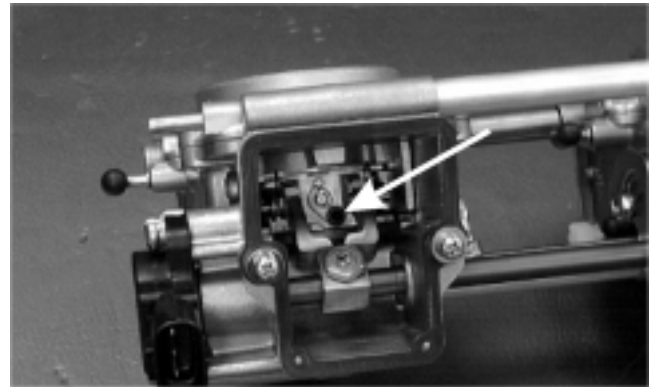
8. Place the washer and E-clip (above the washer) onto the jet needle; then install the jet needle assembly into the mixing body. Secure with the retaining plate and screw.

Fig. 4-67



AH617D

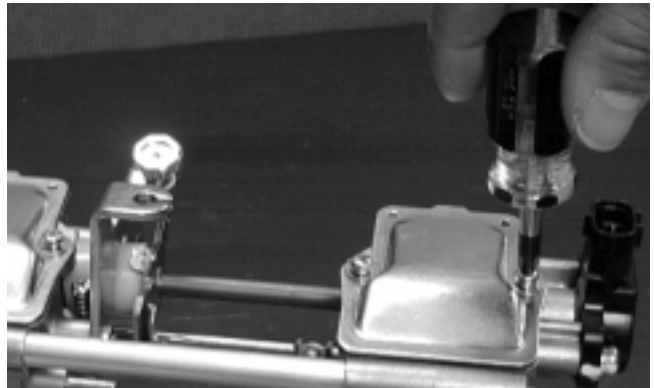
Fig. 4-68



AH616DA

9. Place the top cap and gasket on the mixing body; then secure with the screws (with washers).

Fig. 4-69



AH615D

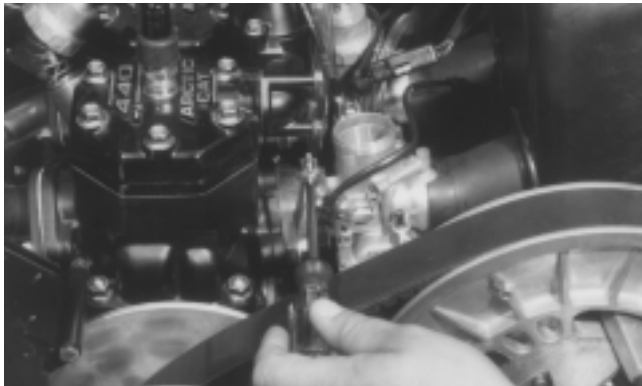
■ **NOTE:** If the lever assembly was loosened from the throttle lever shaft, the carburetors must be synchronized.

Installing Carburetor (VM-Style)

■ **NOTE:** On twin and triple carburetor models, install the carburetors using this basic procedure.

1. Place the carburetor into position in the flange and air-intake silencer boot; then tighten the flange clamp making sure the carburetor is level. Do not over-tighten the flange clamp as it will damage the carburetor flange.

Fig. 4-70



AH103

■ **NOTE:** Slide the carburetor into the air-intake silencer boot; then slide the carburetor into the flange.

2. Connect the fuel hose to the carburetor inlet fitting.
3. Thread the brass choke-cable housing into the carburetor making sure the washer is properly positioned and tighten securely.

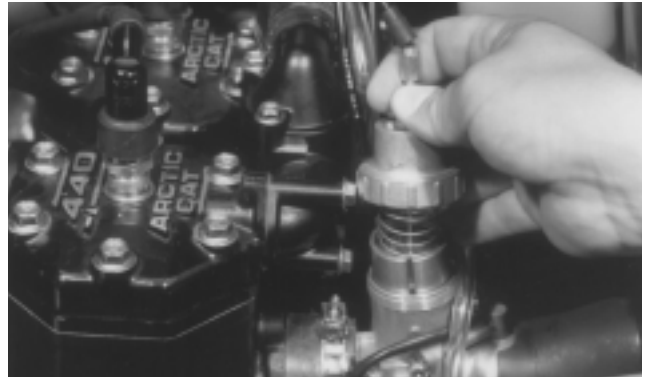
Fig. 4-71



AH099

4. Place the piston valve into position making sure the full-length groove in the piston valve is aligned with the pin in the mixing chamber bore.

Fig. 4-72



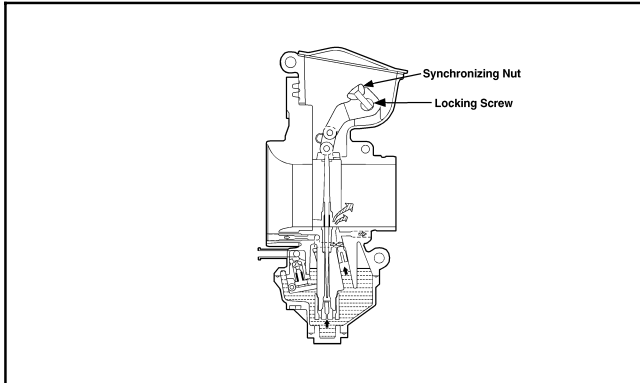
AH100

5. Secure the mixing body top by tightening the screw and lock washer making sure the mixing body top plate is properly positioned.
6. If applicable, connect the safety switch harness to the main wiring harness.
7. Turn the fuel shut-off valve to the OPEN position.
8. Adjust the carburetors (see appropriate Adjusting Carburetors in this sub-section).

Installing Carburetors (TM-Style)

1. Prior to installing the carburetors, the carburetor throttle valves must be checked for synchronization.
 - A. With the throttle in the idle position, select a small drill bit that will just fit under the cutaway of the fixed throttle valve.
 - B. Using the same drill bit, check the clearance under the adjustable throttle valve cutaway. If clearance is different from the first carburetor checked, adjust the throttle valve by loosening the lever ring locking screw; then using an open-end wrench, rotate the synchronizing nut in either direction until the clearance is the same as the first carburetor checked.

Fig. 4-73



0734-445

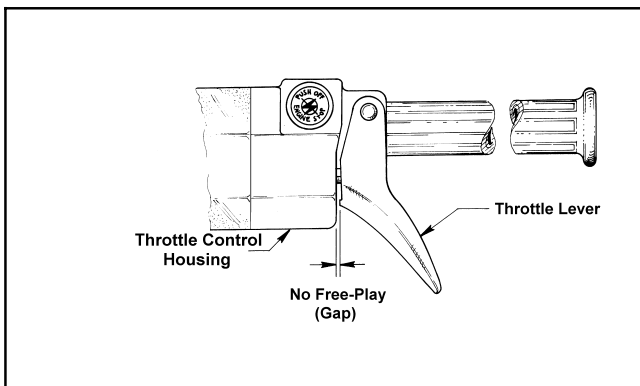
C. After synchronization has been attained, hold the synchronizing nut with the open-end wrench and tighten the lever ring locking screw.

2. Place the carburetors (with air jet and float chamber vent hoses) in the engine compartment and into the carburetor boot; then tighten the clamps.

■ **NOTE:** If the air jet hoses are not properly installed, the jets may become plugged from ice and snow buildup.

3. Connect the fuel supply hose to the fuel inlet T-fitting.
4. Connect the throttle cable and choke cables.
5. At this point, there must be no free-play gap in the throttle lever.

Fig. 4-74



733-081D

■ **NOTE:** If throttle cable free-play is incorrect, the throttle safety switch will be activated prematurely and the engine will not start.

■ **NOTE:** If cable free-play must be corrected, utilize the jam nuts on the throttle cable bracket until no free-play is attained.

6. Place the air-intake silencer into position in the engine compartment making sure the carburetors are properly positioned in the boot and secure with screws.

7. Place the ignition coil/fuel pump mounting plate into position on the air-intake silencer and secure with the machine screw and washer.

Fig. 4-75



AN613D

8. Adjust the carburetors (see appropriate Adjusting Carburetors in this sub-section).

Adjusting Carburetor(s) (VM-Style)

4

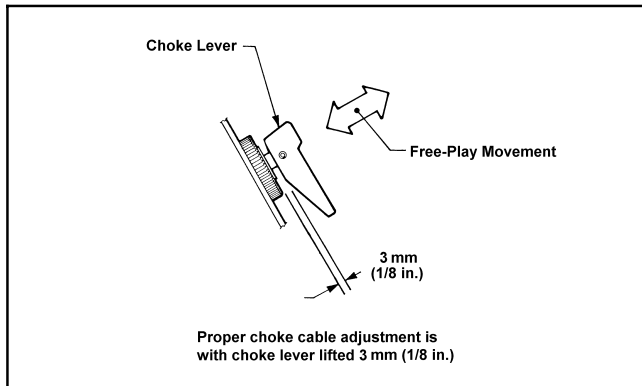
⚠ CAUTION

The air-intake silencer and boots must be in position whenever the engine is run. If the silencer is removed and the engine is run, a lean condition will result. Therefore, DO NOT run the engine when the air-intake silencer is removed.

ADJUSTING CHOKE CABLE(S)

1. Be sure the ignition switch key is in the OFF position and the brake lever lock is set.
2. Loosen the jam nut securing the choke cable adjuster. Rotate the choke cable adjuster clockwise until it bottoms against the brass plunger cap.
3. Slowly rotate the choke cable adjuster counterclockwise while checking the choke lever for free-play. As soon as all free-play has been removed from the end of the lever, stop rotating the adjuster.
4. With free-play removed from the lever, slowly rotate the choke cable adjuster once again clockwise while checking the choke cable lever for free-play. Adjust until 3 mm (1/8 in.) free-play between front bottom edge of lever and housing is attained. Securely tighten the adjuster jam nut.

Fig. 4-76



0732-848

- On twin and triple models, repeat steps 3 and 4 on each carburetor.

■ **NOTE:** On twin and triple models if a carburetor choke cable is adjusted too tight, the engine will only operate on 1 cylinder at idle.

ADJUSTING PISTON VALVE(S)

■ **NOTE:** On some models, the air-intake silencer is a one-piece unit, and the silencer boot(s) can be removed to access the intake bore(s). Remove the boots; then proceed to step 4.

■ **NOTE:** On some models, the air-intake silencer includes a cover/tool tray assembly and a baffle/resonator, and the silencer boot cannot be removed to access the intake bores. Proceed to step 1.

- Open the air-intake silencer cover; then remove the 3 Phillips-head screws securing the cover/tool tray assembly to the silencer.
- Tip the cover/tool tray assembly forward and out of its slots and remove the assembly.
- Using a large flat-blade screwdriver, remove the resonator tabs from the air-intake silencer slots and remove the resonator to access the intake bores.

■ **NOTE:** The resonator can be removed more easily by removing the back tabs first.

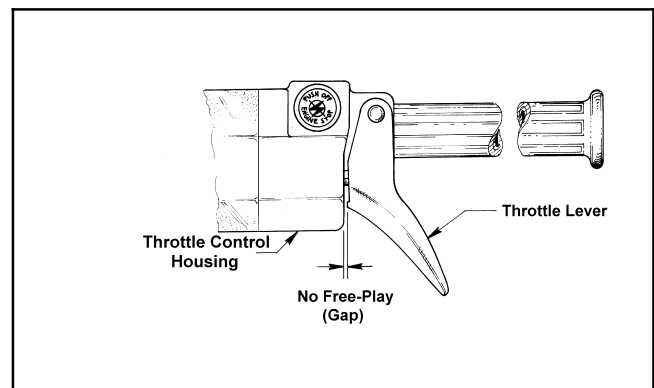
- Rotate each idle speed screw counterclockwise until all spring tension is removed.
- Loosen the jam nut securing each throttle cable swivel adapter; then rotate the swivel adapter clockwise until the piston valve bottoms in the piston valve bore.
- In turn on each carburetor, place a finger lightly against the side of the piston valve; then rotate the carburetor swivel adapter counterclockwise until slight upward movement of the valve is noted.

- In turn on each carburetor, place a finger against either piston valve. Rotate the idle speed screw clockwise until it contacts the valve.

- Compress the throttle lever to the full-open position; then rotate each idle speed screw clockwise 2 complete turns. Release the throttle lever.

■ **NOTE:** On single carburetor models, the throttle control is equipped with a 2-wire throttle control switch connector. There must be no free-play between the lever and the control housing.

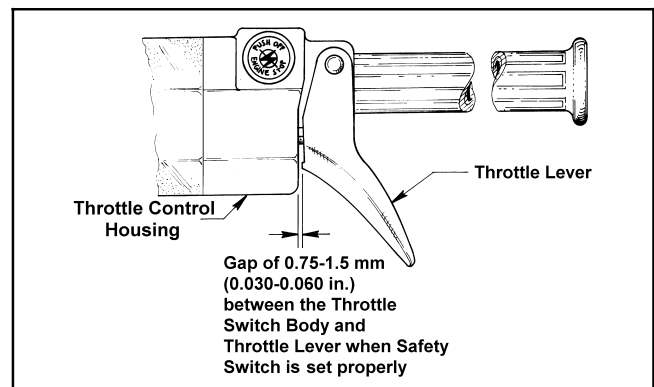
Fig. 4-77



733-081D

■ **NOTE:** On twin and triple models, the throttle control is equipped with a 3-prong emergency stop switch connector. There must be 0.75-1.5 mm (0.030-0.060 in.) free-play between the lever and the control housing.

Fig. 4-78



733-081C

■ **NOTE:** If cable free-play gap is not correct, rotate each swivel adapter an equal amount until recommended free-play is achieved. Each piston valve must be resting against the tip of its idle speed screw.

■ **NOTE:** On twin and triple models if throttle cable free-play is incorrect, the carburetor safety switches will be activated prematurely and the engine will not start.

9. On some models, install the air-intake silencer boot(s); on some models, install the baffle/resonator and the cover/tool tray assembly.

SYNCHRONIZING PISTON VALVES (Sight Glass Method)

■ **NOTE:** Arctic Cat recommends using the Carburetor Synchronizer (p/n 0644-069). If the carburetor synchronizer is not available, use the following procedure.

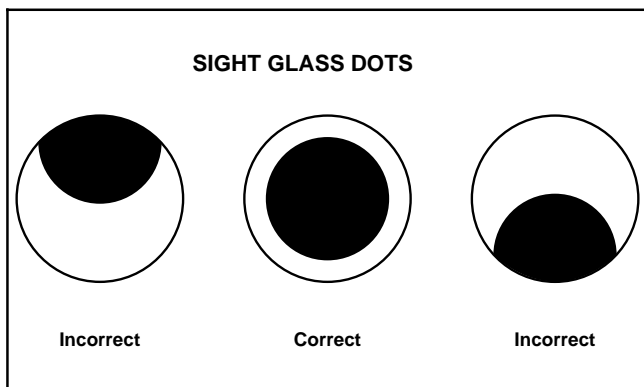
1. Compress the throttle lever until the dot in each sight glass on the side of the carburetors is visible.
2. Rotate each swivel adapter until the dots are equally centered in each sight glass.

Fig. 4-79



AL127D

Fig. 4-80



0000-084

■ **NOTE:** It is important that the dots are entirely within sight glasses, are as equally centered as possible in the sight glasses, and that one dot is not significantly higher or lower than another.

3. With the piston valves synchronized, tighten the swivel adapter jam nuts securely. Slide the rubber throttle cable caps down over the swivel adapters.

■ **NOTE:** There must be free-play in the throttle lever on all models using carburetor safety switches.

WARNING

Be sure to tighten the swivel adapter jam nuts securely. If a swivel adapter jam nut is not tightened, the adjuster can rotate out of the carburetor cap causing the piston valve not to return to the full-closed position.

SYNCHRONIZING PISTON VALVES (Mechanical Method)

■ **NOTE:** Arctic Cat recommends using the Carburetor Synchronizer (p/n 0644-069). If the carburetor synchronizer is not available, use the following procedure.

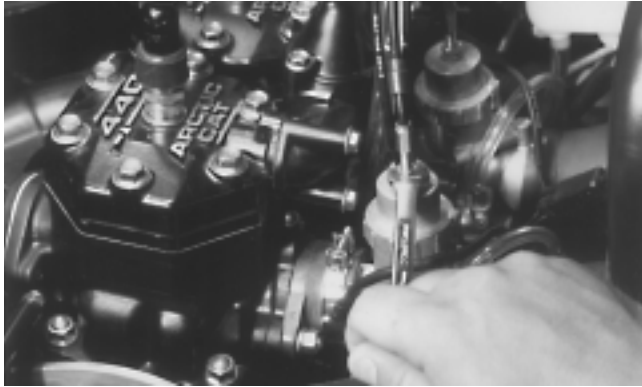
1. Open the air-intake silencer cover; then remove the 3 Phillips-head screws securing the cover/tool tray assembly to the silencer.
2. Tip the cover/tool tray assembly forward and out of its slots and remove the assembly.
3. Using a large flat-blade screwdriver, remove the resonator tabs from the air-intake silencer slots and remove the resonator to access the intake bores.

■ **NOTE:** The resonator can be removed more easily by removing the back tabs first.

4

4. Check to make sure the piston valves start to open at the exact same moment by placing a thumb and finger against the valves; then lightly compress the throttle lever.
5. With slight pressure being applied to the throttle lever, the piston valves should start to open at the exact same time. Compress and release the throttle lever several times to assure accurate determination of piston valve opening.
6. If a piston valve starts to open before another, rotate the swivel adapter on the valve which is lifting first clockwise, just enough to synchronize the valves. Recheck by repeating steps 4-6.
7. Tighten the swivel adapter jam nuts securely. Slide the rubber throttle cable caps down over the swivel adapters.

Fig. 4-81



■ **NOTE:** There must be free-play in the throttle lever on all models using carburetor safety switches.

⚠ WARNING

Be sure to tighten the swivel adapter jam nuts securely. If a swivel adapter jam nut is not tightened, the adjuster can rotate out of the carburetor cap causing the piston valve not to return to the full-closed position.

8. After synchronization has been attained, install the resonator and cover/tool tray assembly.

ADJUSTING PILOT AIR SCREW(S)

1. While counting the rotations, carefully rotate each pilot air screw clockwise until lightly seated.

Fig. 4-82



⚠ CAUTION

Do not force a pilot air screw when rotating it clockwise; damage to the pilot air screw needle tip will result.

2. Rotate each pilot air screw counterclockwise the same number of turns as noted in step 1 for an initial setting.
3. Synchronize the oil-injection pump (see Related Items in this section).

ADJUSTING ENGINE IDLE SPEED

1. With the snowmobile on a shielded safety stand, start the engine, release the brake lever lock, and thoroughly warm up. "Fine-tune" each idle speed screw and each pilot air screw until the engine idles smoothly at the desired RPM (1500 RPM is recommended).

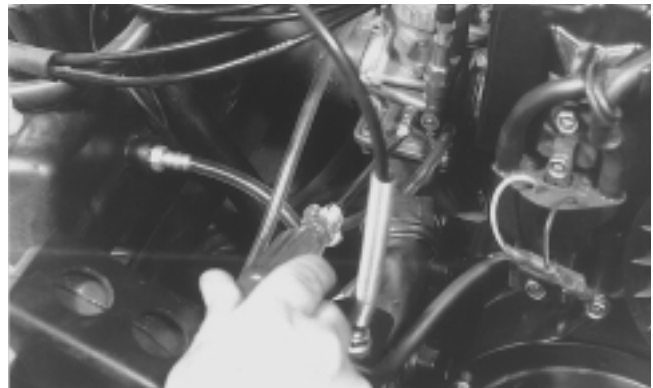
■ **NOTE:** Make engine idle adjustment only after the engine has reached running temperature. Since the idle speed screw(s) have not been adjusted, apply slight throttle pressure to keep the engine running. Allow engine to warm up for 2-3 minutes.

2. On twin and triple models after the engine has been allowed to warm up for 2-3 minutes, adjust engine idle by first rotating the PTO-side carburetor idle speed screw clockwise until the tachometer reads 1480 RPM.

■ **NOTE:** On triple models, rotate the center carburetor idle speed screw clockwise until the tachometer reads 1500 RPM.

3. On twin and triple models, rotate the MAG-side carburetor idle speed screw clockwise until tachometer reads 1500 RPM.

Fig. 4-83



4. On twin and triple models, rotate the PTO-side carburetor idle speed screw clockwise until the tachometer reads slightly above 1500 RPM; then rotate the idle speed screw counterclockwise to achieve exact 1500 RPM reading. The piston valves should now be synchronized and the engine should idle without holding any throttle pressure.

■ **NOTE:** If the engine has no ignition spark with the throttle in the idle position but has proper spark with the throttle lever slightly compressed, the carburetor safety switches must be repositioned (see Section 5).

5. Test the throttle control lever by compressing and releasing it several times. The lever must return to the idle position quickly and completely.

WARNING

DO NOT operate the snowmobile when any component in the throttle system is damaged, frayed, kinked, worn, or improperly adjusted. If the snowmobile is operated when the throttle system is not functioning properly, personal injury could result.

Adjusting Carburetors (TM-Style)

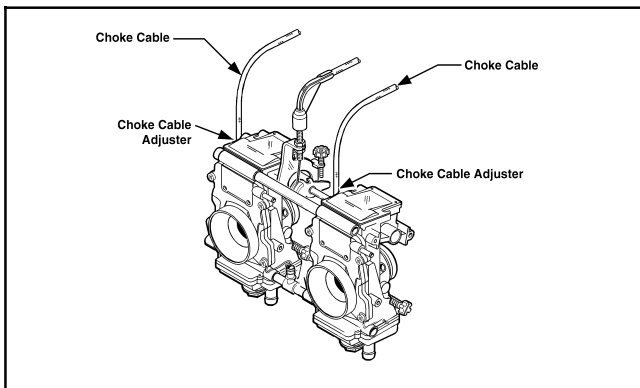
CAUTION

The air-intake silencer and boots must be in position whenever the engine is run. If the silencer is removed and the engine is run, a lean condition will result. Therefore, **DO NOT** run the engine when the air-intake silencer is removed.

ADJUSTING CHOKE CABLES (Twin)

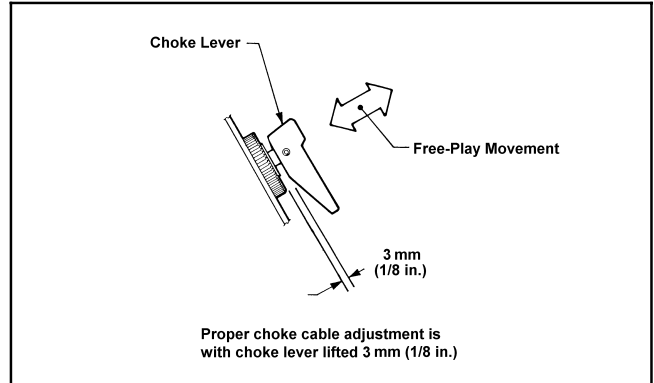
1. Be sure ignition switch key is in the OFF position and the brake lever lock is set.
2. Loosen the jam nut securing each choke cable adjuster.

Fig. 4-84



3. Slowly rotate one choke cable adjuster while checking the choke lever for free-play. As soon as all free-play has been removed from the end of the choke lever, stop rotating the adjuster.
4. With free-play removed from the lever, slowly rotate the adjuster again while checking the choke lever for free-play. Adjust until 3 mm (1/8 in.) free-play between front bottom edge of lever and housing is attained. Securely tighten the jam nut.

Fig. 4-85

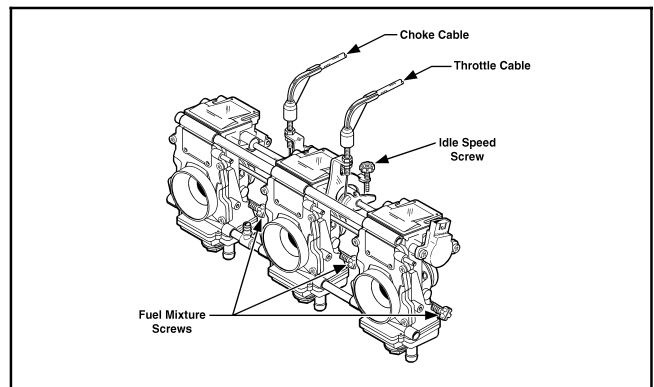


5. Repeat steps 3 and 4 on the other carburetor.

ADJUSTING CHOKE CABLE (Triple)

1. Be sure ignition switch key is in the OFF position and the brake lever lock is set.
2. Loosen the jam nuts securing the choke cable to the bracket at the carburetor.

Fig. 4-86



3. Slowly rotate one jam nut while checking the choke lever for free-play. As soon as all free-play has been removed from the end of the choke lever, stop rotating the jam nut.
4. With free-play removed from the lever, slowly rotate the jam nut again while checking the choke lever for free-play. Adjust until 3 mm (1/8 in.) free-play between front bottom edge of lever and housing is attained. Securely tighten the jam nuts.

SYNCHRONIZING THROTTLE VALVES

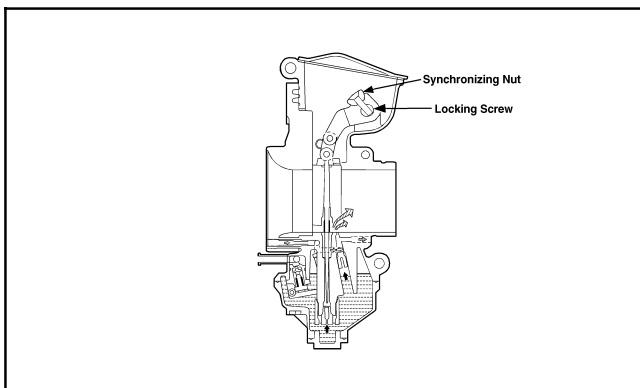
1. Open the air-intake silencer cover; then remove the 3 Phillips-head screws securing the cover/tool tray assembly to the silencer.
2. Tip the cover/tool tray assembly forward and out of its slots and remove the assembly.

- Using a large flat-blade screwdriver, remove the resonator tabs from the air-intake silencer slots and remove the resonator to access the intake bores.

■ **NOTE:** The resonator can be removed more easily by removing the back tabs first.

- With the throttle in the idle position, select a small drill bit that will just fit under the cutaway of the fixed throttle valve.
- Using the same drill bit, check the clearance under each adjustable throttle valve cutaway. If clearance is different from the first carburetor checked, adjust the throttle valve by loosening the lever ring locking screw; then using an open-end wrench, rotate each synchronizing nut in either direction until the clearance is the same as the first carburetor checked.

Fig. 4-87



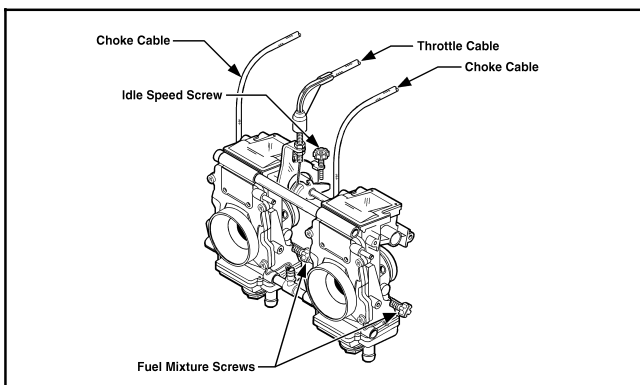
0734-445

- After synchronization has been attained, hold the synchronizing nut with the open-end wrench and tighten the lever ring locking screw.
- Install the resonator and cover/tool tray assembly.

ADJUSTING FUEL MIXTURE SCREWS

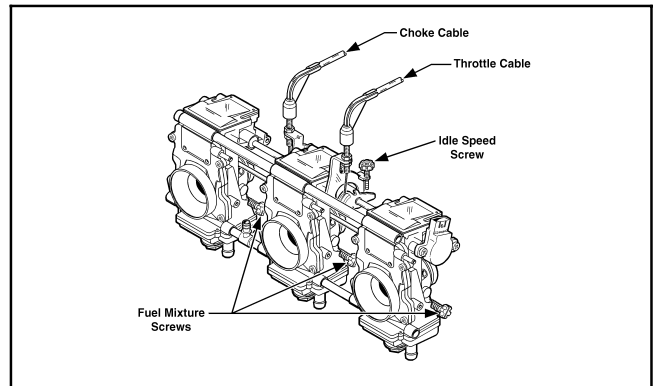
- While counting the rotations, carefully rotate the fuel mixture screws clockwise until lightly seated.

Fig. 4-88



734-496B

Fig. 4-89



0734-317

CAUTION

Do not force a fuel mixture screw when rotating it clockwise; damage to the mixture screw taper may result.

- Rotate each fuel mixture screw counterclockwise the same number of turns as noted in step 1 for an initial setting.

ADJUSTING ENGINE IDLE SPEED

■ **NOTE:** Make engine idle adjustment only after the engine has reached running temperature. Since the idle speed screw has not been adjusted, apply slight throttle pressure to keep the engine running. Allow engine to warm up for 2-3 minutes.

- After the engine has been allowed to warm up for 2-3 minutes, fine-tune the idle speed screw until the tachometer reads 1500 RPM.
- Test the throttle control lever by compressing and releasing it several times. The lever must return to the idle position quickly and completely.

WARNING

DO NOT operate the snowmobile when any component in the throttle system is damaged, frayed, kinked, worn, or improperly adjusted. If the snowmobile is operated when the throttle system is not functioning properly, personal injury could result.

Throttle Cable (VM-Style)

REMOVING

Fig. 4-90

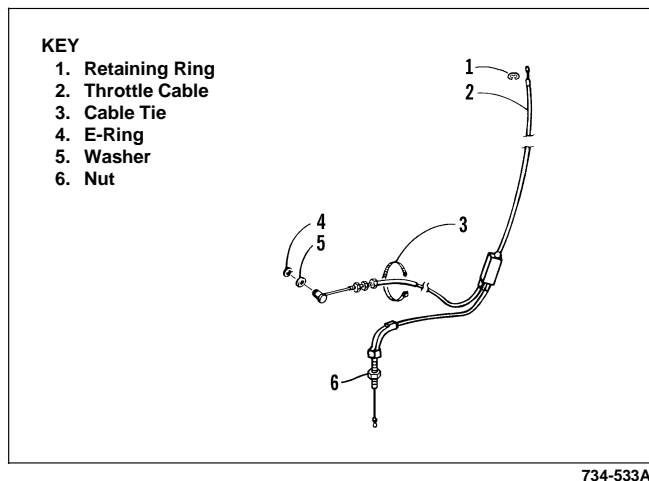


Fig. 4-91

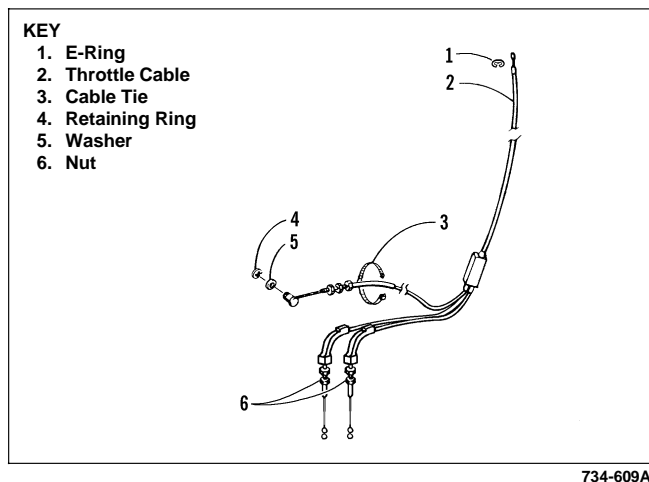
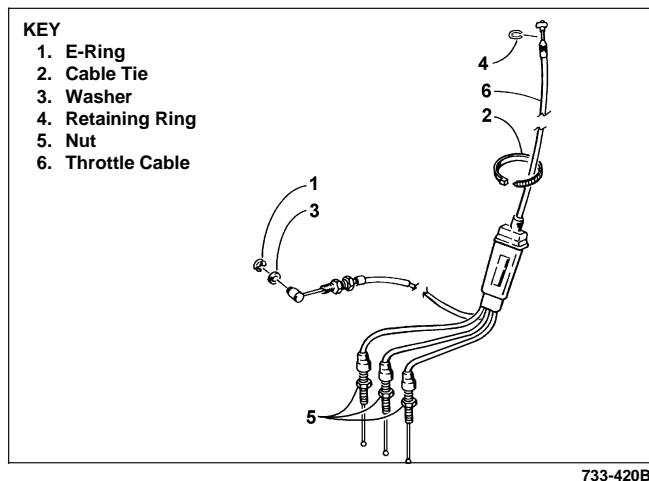


Fig. 4-92



1. Loosen the throttle cable adjuster jam nuts.
2. Remove the mixing body tops.
3. Remove the throttle cables from the piston valves.
4. Remove the throttle cables from the mixing body tops.
5. Remove the handlebar pad and console.
6. Remove the cable ties securing the throttle cable.
7. Remove the throttle cable end from the throttle lever.
8. Remove the retaining ring securing the cable to the throttle switch assembly; then remove the cable from the throttle switch assembly.
9. On twin and triple carburetor models, it may be necessary to remove the PTO-side carburetor.
10. Remove the E-ring securing the oil-injection cable to the control arm. Account for a washer.
11. Loosen the jam nut securing the adjustment cable; then remove the cable from the oil-injection pump.

INSTALLING

1. Route the throttle cable from the throttle switch assembly to the carburetors and oil-injection pump; avoid any sharp bends or moving parts.
2. Install the oil-injection adjustment cable on the oil-injection pump; secure with the jam nuts.
3. Install the oil-injection cable on the control arm; secure with a washer and E-ring.
4. Install the PTO-side carburetor if removed.
5. Install the throttle cable into the throttle switch assembly. Secure with a retaining ring.
6. Install the throttle cable end on the throttle lever.
7. Secure the throttle cable to the steering post with cable ties.
8. Install the handlebar pad and console.
9. Attach the throttle cable to each throttle valve. The valve must seat in the groove of the throttle cable end; then thread the throttle cable into each mixing body top.
10. Install each piston valve and mixing body top on the carburetor(s). Tighten securely.
11. Adjust the carburetor(s) (see appropriate Adjusting Carburetors in this sub-section).

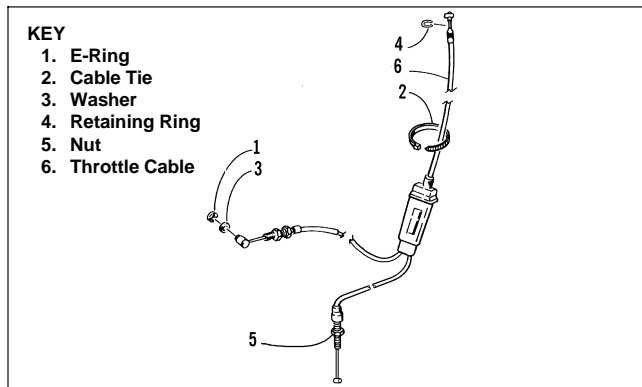
⚠ CAUTION

Compress the throttle control lever to ensure free movement. If the throttle cable sticks or binds, correct the problem before starting the engine.

12. Synchronize the oil-injection pump (see Related Items in this section).

Throttle Cable (TM-Style)

Fig. 4-93



734-240A

REMOVING

1. Loosen the throttle cable adjuster jam nuts at the bracket.
2. Remove the throttle cable from the pulley on the throttle lever shaft.
3. Remove the handlebar pad and console.
4. Remove the throttle cable from the throttle lever.
5. Remove the retaining ring securing the cable to the throttle switch assembly; then remove the cable from the throttle switch assembly.
6. Open the belt guard; then remove the drive belt.
7. Remove the E-ring securing the oil-injection cable to the control arm. Account for a washer.
8. Loosen the jam nut securing the adjustment cable; then remove the cable from the oil-injection pump.

INSTALLING

1. Install the oil-injection adjustment cable on the oil-injection pump; secure with the jam nuts.
2. Install the oil-injection cable on the control arm; secure with a washer and E-ring.

3. Route the throttle cable from the carburetor to the throttle switch assembly. Secure with a retaining ring.

⚠ CAUTION

Avoid any sharp bends and hot or moving components or damage may occur.

4. Install the throttle cable on the throttle lever.
5. Install the handlebar pad and console.
6. Install the throttle cable into the throttle lever shaft pulley.
7. Install the throttle cable into the bracket; then adjust the jam nuts to attain no free-play between the throttle lever and the control housing.

■ **NOTE:** There must be no free-play between the lever and the control housing.

⚠ CAUTION

Compress the throttle control lever to ensure free movement. If the throttle cable sticks or binds, correct the problem before starting the engine.

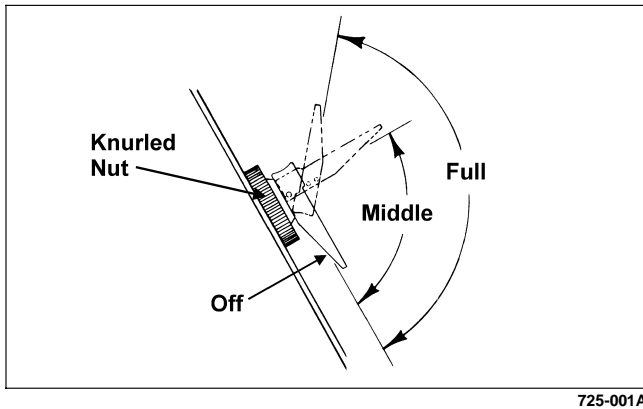
8. Synchronize the oil-injection pump (see Related Items in this section).
9. Install the drive belt; then close and secure the belt guard.

Choke Cable (VM-Style)

REMOVING

1. Bend down the lock tabs locking each brass choke cable housing on each carburetor.
2. Using a 12-mm wrench, remove each brass choke cable housing from each carburetor. Account for the lock tab washers.
3. Remove each brass plunger and spring from the cable end; then remove each brass choke cable housing.
4. Remove the screws securing the console.
5. Position the choke lever in the middle-choke position; then remove the knurled nut securing the choke lever housing to the console.

Fig. 4-94



6. Slide the choke lever housing from the console.
7. Cut any cable ties used to secure the choke cable and remove the choke cable from the engine compartment.

INSTALLING

1. Position the choke lever in the middle-choke position; then from the back side of the console, insert the choke lever housing through the console. Secure with the knurled nut.
2. Route the choke cable from the console to each carburetor; avoid any sharp bends or moving parts.
3. Install each brass choke cable housing onto the cable end; then install each spring and brass plunger.
4. Place the lock tab washer on each brass housing and insert a choke plunger into each carburetor.
5. Thread each brass choke cable housing into each carburetor and tighten. Bend the lock tab up to secure the brass housing. Adjust the choke cable (see appropriate Adjusting Carburetors in this sub-section).
6. Place the console into position and secure with the screws.

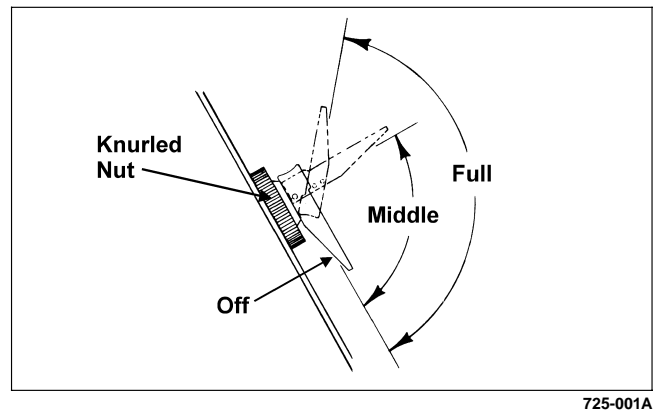
Choke Cable (TM-Style)

REMOVING

1. Loosen the jam nuts securing the choke cable to the bracket.

2. Remove the cable from the starter plunger lever.
3. Position the choke lever in the middle-choke position; then remove the knurled nut securing the choke housing to the console.

Fig. 4-95

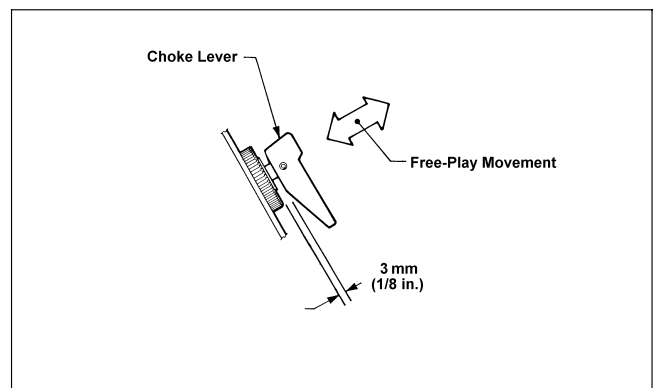


4. Remove the console.
5. Slide the choke cable from the console.

INSTALLING

1. Position the choke lever in the middle-choke position; then from the back side of the console, insert the choke lever housing through the console. Secure with the knurled nut.
2. Route the choke cable from the console to the carburetors; avoid any sharp bends or moving parts.
3. Install the choke cable into the bracket; then secure with jam nuts making sure the choke lever has 3 mm (1/8 in.) free-play between the edge of the lever and the housing.

Fig. 4-96



4. Place the console into position and secure.

2000 CARBURETOR SPECIFICATIONS

| MODEL | TYPE | PRODUCTION MAIN JET ¹ | NEEDLE JET | JET NEEDLE | | PILOT JET | | CUTAWAY | | VENT SYSTEM | PILOT CIRCUIT SCREW (TURNS OUT) | |
|---|-------|-------------------------------------|---|------------|--|-----------|------------------------------------|---------|------|----------------|---------------------------------------|--|
| | | | | LOW | HIGH | LOW | HIGH | LOW | HIGH | | LOW | HIGH |
| Panther 340 | VM-32 | 310 | P-6 (159) | 6DH2-4 | 6DH2-4 | 25 | 35 ² | 2.5 | 2.5 | External | 1 1/2 | 1 1/2 |
| Bearcat 340 | VM-32 | 300 | P-6 (159) | 6DH2-5 | 6DH2-3 ² | 30 | 35 ² | 2.5 | 2.5 | External | 1 | 1 |
| Bearcat 440 I | VM-34 | 340 | P-4 (166) | 6DH7-4 | 6DH7-3 ² 6DH7-2 ³ | 30 | 30 | 3.0 | 3.0 | External | 1 | 1 |
| Panther 440 | VM-34 | 280 | P-4 (480) | 6DH2-3 | 6DH2-2 ² | 25 | 30 | 2.5 | 2.5 | External | 1 | 1 |
| Bearcat 440 II | VM-34 | 300 | P-4 (480) | 6DH2-3 | 6DH2-2 ² | 30 | 30 | 2.5 | 2.5 | External | 1 | 1 |
| Z 370 | VM-32 | 240 | P-6 (159) | 6DH7-3 | 6DH7-3 | 40 | 40 | 2.5 | 2.5 | External | 1 | 1 |
| Z 440 | VM-34 | 320 | P-4 (166) | 6DH7-4 | 6DH7-3 ² 6DH7-2 ³ | 35 | 35 | 3.0 | 3.0 | External | 1 | 1 |
| ZL 440 | VM-36 | 260 | Q-5 (480) Q-3 (480) ² | 6DH7-3 | 6DH7-3 | 40 | 40 | 3.0 | 3.0 | External | 1 | 1 |
| ZL 500 ZR 500 | VM-38 | 350 | Q-2 (480) P-6 (480) ² P-5 (480) ³ | 6DH41-3 | 6DH41-2 ² | 35 | 40 ² 45 ³ | 2.5 | 2.5 | External | 1 | 1 1/2 ² 1 ³ |
| ZL 600 ZR 600 | TM-38 | 350 | Q-2 (Fixed) | 9EGY1-57-4 | 9DH2-4 ² 9DH2-3 ³ | 35 | 40 ² 45 ³ | 3.0 | 3.0 | External | 2 | 2 1/2 ² 3 ³ |
| Bearcat Wide Track | VM-38 | 340 | P-2 (480) P-0 (480) ² | 6DH8-3 | 6DH8-2 ² | 40 | 40 | 3.0 | 3.0 | External | 1 | 1 |
| Panther 550 ZL 550 | VM-38 | 330 | P-2 (480) P-0 (480) ² | 6DH8-3 | 6DH8-22 | 40 | 40 | 3.0 | 3.0 | External | 1 | 1 |
| Triple Touring 600 ZRT 600 | VM-36 | 360 | P-2 (480) O-8 (480) ² O-6 (480) ³ | 6DH8-3 | 6DH8-2 ³ | 40 | 45 ² | 2.0 | 2.0 | External | 1 1/2 | 1/2 |
| ZRT 800 | TM-38 | 350 | Q-0 (Fixed) | 9DFH1-56-3 | 9DFH2-58-3 ² 9DFH2-59-3 ³ | 35 | 45 ³ | 3.5 | 3.5 | External | 1 1/2 | 1 3/4 ² 1 1/2 ³ |
| Pantera 1000 Thundercat | TM-38 | 320 | Q-0 (Fixed) | 9DFH3-56-3 | 9DFH2-58-32 9DFH2-59-3 ³ | 35 | 35 | 3.0 | 3.0 | External | 2 | 1 3/4 ² 2 1/4 ³ |
| ZL 700 ZR 700 | TM-40 | 320 | Q-4 (Fixed) | 9DH5-61-3 | 9EH7-62-3 ² 9EH7-62-2 ³ | 40 | 40 | 2.0 | 2.0 | External | 1 1/2 | 2 1/2 |
| Powder Special 700 (w/Altitude Compensator) | TM-40 | 330 | Q-2 (Fixed) | 9EH6-59-4 | 9EH6-59-4 | 40 | 40 | 2.0 | 2.0 | External | 2 1/2 | 2 1/2 |
| Powder Special 600 (w/Altitude Compensator) | TM-38 | 390 | Q-2 (Fixed) | 9EGJ1-57-3 | 9EGJ1-57-3 | 40 | 40 | 3.0 | 3.0 | External | 2 1/4 | 2 1/4 |
| Thundercat M/C* | TM-38 | 320 260 ² | Q-0 (Fixed) | 9DFH3-56-3 | 9DFH2-58-3 ² 9DFH2-59-3 ³ | 35 | 35 | 3.0 | 3.0 | External | 2 | 1 3/4 ² 2 1/4 ³ |

1 Refer to Main Jet Chart Decal

2 Elevations over 1524 m
(5000 ft) above sea level

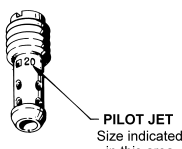
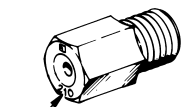
3 Elevations over 2743 m
(9000 ft) above sea level

* Initially set up at the
factory for operation between
5000-9000 feet

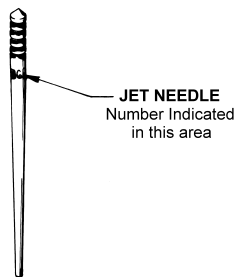
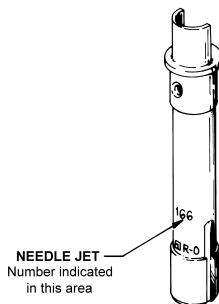
| MODEL | TYPE | MAIN JET | MAIN AIR JET | PILOT OUTLET | PILOT JET | THROTTLE VALVE | PILOT SCREW (TURNS OUT) |
|-----------|-------|-------------|-----------------|-----------------|--------------|-------------------|----------------------------|
| Kitty Cat | BV-18 | 72.5 | 1.0 | 1.0 | 40 | 100 | 1 |
| Z 120 | BV-18 | 72.5 | 1.5 | 1.0 | 37.5 | 130 | 1 1/4 |

MIKUNI TUNING COMPONENTS

| MAIN JETS AVAILABLE | | | |
|---------------------|----------|-----|----------|
| JET | P/N | JET | P/N |
| 120 | 6505-270 | 390 | 6505-078 |
| 130 | 6505-216 | 400 | 6505-124 |
| 140 | 6505-217 | 410 | 6505-212 |
| 150 | 6505-168 | 420 | 6505-125 |
| 160 | 6505-064 | 430 | 6505-146 |
| 170 | 6505-065 | 440 | 6505-126 |
| 180 | 6505-056 | 450 | 6505-147 |
| 190 | 6505-066 | 460 | 6505-127 |
| 200 | 6505-144 | 470 | 6505-148 |
| 210 | 6505-145 | 480 | 6505-149 |
| 220 | 6505-137 | 490 | 6505-150 |
| 230 | 6505-067 | 500 | 6505-151 |
| 240 | 6505-079 | 520 | 6505-530 |
| 250 | 6505-068 | 530 | 6505-170 |
| 260 | 6505-017 | 540 | 6505-531 |
| 270 | 6505-069 | 560 | 6505-172 |
| 280 | 6505-080 | 580 | 6505-211 |
| 290 | 6505-123 | 590 | 6505-173 |
| 300 | 6505-128 | 600 | 6505-532 |
| 310 | 6505-136 | 620 | 6505-174 |
| 320 | 6505-074 | 640 | 6505-533 |
| 330 | 6505-070 | 650 | 6505-534 |
| 340 | 6505-076 | 660 | 6505-535 |
| 350 | 6505-071 | 680 | 6505-169 |
| 360 | 6505-038 | 700 | 6505-536 |
| 370 | 6505-072 | 710 | 6505-537 |
| 380 | 6505-077 | 720 | 6505-538 |

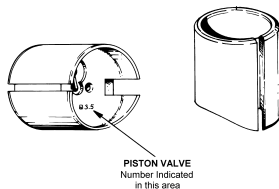
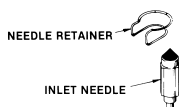


| PISTON VALVES AVAILABLE (VM-Style) | | |
|------------------------------------|----------------------|-----------|
| SLIDE | CARBURETOR SIZE (mm) | P/N |
| 2.0 | 28-30 | 6505-048 |
| 3.0 | 28-30 | 6505-161 |
| 3.0 | 30 | 6505-510 |
| 3.5 | 30 | 6505-528 |
| 1.5 | 32-34 | 6505-256 |
| 2.5 | 32-34 | 6505-246 |
| 3.0 | 32-34 | 6505-439 |
| 3.5 | 32-34 | 6505-248 |
| 2.5 | 34 | 6505-500 |
| 2.5 | 34 | 6505-614* |
| 3.0 | 34 | 6505-507 |
| 3.0 | 34 | 6505-561* |
| 2.0 | 36 | 6505-177 |
| 3.0 | 36 | 6505-592* |
| 2.5 | 38 | 6505-254 |
| 3.0 | 38 | 6506-643 |
| 3.5 | 38 | 6505-436 |
| 3.5 | 38 | 6505-525 |
| 3.5 | 38 | 6505-526 |
| 3.5 | 38 | 6505-554 |
| 3.5 | 38 | 6505-613* |
| 4.0 | 38 | 6505-504 |
| 3.5 | 40 | 6505-575* |
| 1.0 | 40-44 | 6505-092 |
| 2.0 | 40-44 | 6505-179 |
| 2.5 | 40-44 | 6505-570 |
| 3.5 | 40-44 | 6505-548 |



| PISTON VALVES AVAILABLE (TM-Style) | | |
|------------------------------------|----------------------|----------|
| SLIDE | CARBURETOR SIZE (mm) | P/N |
| 2.0 | 38 | 6506-119 |
| 3.0 | 38 | 6506-120 |
| 3.5 | 38 | 6506-210 |

* For models with carburetor switch.



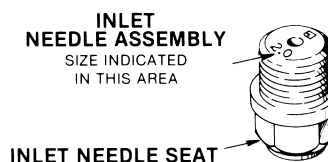
| NEEDLE JETS AVAILABLE (VM-Style) | | | |
|----------------------------------|----------|------------|----------|
| NEEDLE JET | P/N | NEEDLE JET | P/N |
| O-6 (480) | 6505-931 | Q-2 (480) | 6505-641 |
| O-8 (182) | 6505-181 | Q-3 (480) | 6505-599 |
| O-8 (480) | 6505-824 | Q-4 (166) | 6505-214 |
| P-0 (159) | 6505-155 | Q-4 (480) | 6505-636 |
| P-0 (166) | 6505-007 | Q-5 (159) | 6505-119 |
| P-0 (169) | 6505-051 | Q-5 (166) | 6505-520 |
| P-0 (480) | 6505-598 | Q-5 (480) | 6505-580 |
| P-2 (480) | 6505-600 | Q-6 (166) | 6505-506 |
| P-4 (159) | 6505-221 | Q-8 (480) | 6506-112 |
| P-4 (166) | 6505-502 | R-0 (166) | 6505-505 |
| P-4 (480) | 6505-540 | Z-4 (224) | 6505-808 |
| P-4 (169) | 6505-164 | Z-5 (224) | 6505-541 |
| P-5 (480) | 6505-542 | Z-6 (224) | 6505-597 |
| P-6 (159) | 6505-247 | Z-8 (224) | 6505-572 |
| P-6 (166) | 6505-268 | Z-9 (224) | 6505-618 |
| P-6 (480) | 6505-539 | AA-0 (224) | 6505-544 |
| P-6 (251) | 6505-235 | AA-1 (224) | 6505-609 |
| P-8 (159) | 6505-298 | AA-2 (224) | 6505-545 |
| P-8 (166) | 6505-433 | AA-3 (224) | 6505-604 |
| P-8 (480) | 6505-543 | AA-4 (224) | 6505-605 |
| Q-0 (159) | 6505-260 | AA-5 (224) | 6505-099 |
| Q-0 (166) | 6505-190 | AA-8 (224) | 6505-571 |
| Q-0 (480) | 6505-529 | BB-0 (224) | 6505-182 |
| Q-2 (166) | 6505-508 | BB-5 (224) | 6505-180 |

| JET NEEDLES AVAILABLE | | | |
|-----------------------|----------|-----------------------|----------|
| JET NEEDLE (VM-Style) | P/N | JET NEEDLE (TM-Style) | P/N |
| 6CH3 | 6505-519 | 9CFH1 | 6506-116 |
| 6DH2 | 6505-252 | 9DH2 | 6506-110 |
| 6DH3 | 6505-509 | 9DH5 | 6506-114 |
| 6DH4 | 6505-003 | 9DEH1 | 6506-118 |
| 6DH7 | 6505-215 | 9DEH2 | 6506-115 |
| 6DH8 | 6505-236 | 9EGY1 | 6506-192 |
| 7DJ2 | 6505-549 | 9EHO9 | 6506-173 |
| 7DH2 | 6505-097 | 9EH2 | 6506-111 |
| 7DH5 | 6505-641 | 9EH6 | 6506-117 |
| | | 9EH7 | 6506-113 |
| | | 9DFH1 | 6506-221 |
| | | 9DFH2-58 | 6506-200 |
| | | 9DFH2-59 | 6506-201 |
| | | 9DFH3 | 6506-186 |

| INLET NEEDLE ASSEMBLIES AVAILABLE (VM-Style) | | |
|--|-----------------|----------|
| SEAT DIA. | CARB. SIZE (mm) | P/N |
| 1.5 mm (Steel) | 28, 30, 32, 34 | 6505-026 |
| 1.5 mm (Viton) | 28, 30, 32, 34 | 6505-160 |
| 1.5 mm (Steel) | 28 — 34 GVM | 6505-245 |
| 1.5 mm (Steel) | 36, 38, 40, 44 | 6505-103 |
| 1.5 mm (Viton) | 36, 38, 40, 44 | 6505-171 |
| 1.8 mm (Viton) | 36, 38, 40, 44 | 6505-175 |
| 2.0 mm (Viton) | 36, 38, 40, 44 | 6505-176 |

| INLET NEEDLE ASSEMBLIES AVAILABLE (TM-Style) | | |
|--|-----------------|----------|
| SEAT DIA. | CARB. SIZE (mm) | P/N |
| 1.5 mm (Steel) | 38 | 6506-121 |
| 1.8 mm (Steel) | 40 | 6506-144 |

| PILOT JETS AVAILABLE | | | |
|----------------------|----------|---------|----------|
| JET NO. | P/N | JET NO. | P/N |
| 17.5 | 6505-218 | 35 | 6505-029 |
| 20 | 6505-138 | 40 | 6505-047 |
| 22.5 | 6505-310 | 45 | 6505-278 |
| 25 | 6505-075 | 50 | 6505-262 |
| 27.5 | 6505-503 | 52.5 | 6505-261 |
| 30 | 6505-073 | 55 | 6505-255 |



4

MAJOR TUNING COMPONENTS

To assist you in selecting four major tuning components of the VM-style and TM-style carburetors, we have listed the jet needles, needle jets, pilot jets, and piston/throttle valves (slides) on charts below according to their size.

| NEEDLE JETS | TYPE-159-166-480 VM30-32-34-38 | TYPE 224 VM40-44 |
|-------------|---|--|
| Lean | N-4 N-6 N-8 O-0 O-2 O-4 O-5 O-6 O-7 O-8 P-0 P-2 P-4 P-5 P-6 P-8 Q-0 Q-2 Q-3 Q-4 Q-5 Q-6 Q-8 R-0 R-2 R-4 R-5 R-6 R-8 | Z-0 Z-5 Z-6 Z-8 AA-0 AA-1 AA-2 AA-3 AA-5 AA-8 BB-0 BB-5 |
| Rich | | |

■ **NOTE:** The above needle jets may come in different types; for example, (159) - (166) - (480) - (224). When selecting a new needle jet, use the correct series or type.

| PILOT JETS | |
|------------|--|
| Lean | 12.5 15 17.5 20 22.5 25 27.5 30 32.5 35 37.5 40 45 50 55 60 65 70 |
| Rich | |

| PISTON/THROTTLE VALVES (SLIDES) | |
|------------------------------------|---|
| Lean | 4.0 3.5 3.0 2.5 2.0 1.5 1.0 |
| Rich | |

| JET NEEDLES (VM-Style) | | |
|------------------------|--|--|
| Lean | 6DH2 6DH3 6DH4 6DH7 6DH8 6DH41 6EGJ1 | 7F7 7DH2 7F6 7DH3 7DH5 7H2 7J2 |
| Rich | | |

■ **NOTE:** The above chart shows the average performance of a given needle between 1/4 and 3/4 throttle. Needles are constructed in such a way that at any given point, the needle could be richer or leaner than the rating it has.

Troubleshooting Fuel System (Carbureted)

4

| Problem: Carburetor Too Rich (0-1/4 Opening) | |
|--|---|
| Condition | Remedy |
| 1. Choke plunger will not seat | 1. Adjust—service—replace choke cable—plunger assembly |
| 2. Pilot air screw (VM-style) too far in | 2. Adjust pilot air screw |
| 3. Fuel mixture screw (TM-style) too far out | 3. Adjust fuel mixture screw |
| 4. Pilot air passage obstructed—damaged | 4. Remove obstruction—replace pilot air screw—carburetor |
| 5. Float/inlet needle obstructed—damaged—adjusted incorrectly | 5. Remove obstruction—replace inlet needle—float—adjust float tab |
| 6. Pilot jet loose | 6. Tighten pilot jet |
| Problem: Carburetor Too Rich (1/4-3/4 Opening) | |
| Condition | Remedy |
| 1. Pilot air screw (VM-style) too far in | 1. Adjust pilot air screw |
| 2. Fuel mixture screw (TM-style) too far out | 2. Adjust fuel mixture screw |
| 3. Needle jet—jet needle worn—adjusted incorrectly—incorrect | 3. Replace—adjust needle jet—replace jet needle |
| 4. Pilot air passage obstructed—damaged | 4. Remove obstruction—replace pilot air screw—carburetor |
| 5. Pilot jet loose | 5. Tighten pilot jet |
| 6. Float/inlet needle obstructed—damaged—adjusted incorrectly | 6. Remove obstruction—replace inlet needle—float—adjust float tab |
| 7. Main jet loose—too large | 7. Tighten—replace main jet |
| 8. Primary air passage obstructed | 8. Remove obstruction |
| Problem: Carburetor Too Rich (3/4-WOT Opening) | |
| Condition | Remedy |
| 1. Main jet loose—too large | 1. Tighten—replace with smaller main jet |
| 2. Float/inlet needle obstructed—damaged—adjusted incorrectly | 2. Remove obstruction—replace inlet needle—float—adjust float tab |
| 3. Needle jet—jet needle worn—adjusted incorrectly—incorrect | 3. Replace—adjust needle jet—replace jet needle |

| Problem: Carburetor Too Lean (0-1/4 Opening) | |
|---|---|
| Condition | Remedy |
| <ol style="list-style-type: none"> 1. Choke plunger remains seated 2. Pilot air screw (VM-style) too far out—damaged 3. Fuel mixture screw (TM-style) too far in—damaged 4. Throttle valve sticks open—damaged—worn 5. Pilot jet—outlet obstructed 6. Float/inlet needle obstructed—damaged—adjusted incorrectly 7. Float bowl vent hose (TM-style) obstructed—kinked—damaged | <ol style="list-style-type: none"> 1. Adjust—service choke cable—plunger assembly 2. Adjust—replace pilot air screw 3. Adjust—replace fuel mixture screw 4. Service—replace throttle valve—throttle cable—spring 5. Remove obstruction 6. Remove obstruction—replace inlet needle—float—adjust float tab 7. Service—replace float bowl vent hose |
| Problem: Carburetor Too Lean (1/4-3/4 Opening) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> 1. Pilot air screw (VM-style) too far out—damaged 2. Fuel mixture screw (TM-style) too far in—damaged 3. Needle jet obstructed 4. Pilot jet—outlet—main jet obstructed 5. Float/inlet needle obstructed—damaged—adjusted incorrectly 6. Jet needle E-clip position incorrect 7. Float bowl vent hose (TM-style) obstructed—kinked—damaged | <ol style="list-style-type: none"> 1. Adjust—replace pilot air screw 2. Adjust—replace fuel mixture screw 3. Remove obstruction 4. Remove obstruction 5. Remove obstruction—replace inlet needle—float—adjust float tab 6. Adjust E-clip 7. Service—replace float bowl vent hose |
| Problem: Carburetor Too Lean (3/4-WOT Opening) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> 1. Main jet obstructed—too small 2. Float/inlet needle obstructed—damaged—adjusted incorrectly 3. Needle jet—jet needle obstructed 4. Float bowl vent hose (TM-style) obstructed—kinked—damaged | <ol style="list-style-type: none"> 1. Remove obstruction—replace with larger main jet 2. Remove obstruction—replace inlet needle—float—adjust float tab 3. Remove obstruction 4. Service—replace float bowl vent hose |
| Problem: General Fuel System (Engine Cuts Out at High RPM) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> 1. Fuel delivery inadequate 2. In-line fuel filter obstructed—damaged 3. Gasoline contaminated 4. Gas-tank vent—hose obstructed | <ol style="list-style-type: none"> 1. Repair—replace fuel pump—impulse hose 2. Remove obstruction—replace in-line fuel filter 3. Replace gasoline—de-ice—clean carburetors 4. Remove obstruction—replace vent—hose |
| Problem: General Fuel System (One Cylinder Runs Lean) | |
| Condition | Remedy |
| <ol style="list-style-type: none"> 1. Carburetor-to-cylinder air leak 2. Carburetors (VM-style) not aligned vertically 3. Primary compression (crankcase) low 4. Carburetors not synchronized | <ol style="list-style-type: none"> 1. Repair—replace gaskets—flanges—service intake ports—tighten clamps 2. Align carburetors vertically 3. Troubleshoot engine 4. Synchronize carburetors |

Fuel System (Batteryless EFI)

For 2000, all EFI models will be equipped with the batteryless EFI system.

Fuel System (Batteryless EFI) Table of Contents

| | |
|---|------|
| Introduction | 4-33 |
| Arctic Cat Batteryless EFI System | 4-34 |
| Individual EFI Components | 4-35 |
| Self-Diagnostic EFI System | 4-39 |
| Trouble Codes | 4-40 |
| ECU | 4-41 |
| EPROM Chip | 4-42 |
| Testing Individual Components | 4-43 |
| EFI Analyzer | 4-48 |
| Recommended EFI Troubleshooting Sequence (Kokusen Mode) | 4-50 |
| Testing Individual EFI Components | 4-51 |
| Peak Voltage Tests and Specifications (1997-2000 Batteryless Models) | 4-54 |
| Throttle Position Sensor | 4-56 |
| Throttle Body Flange | 4-56 |
| Throttle Body Assembly | 4-57 |
| Throttle Cable | 4-58 |
| Basic EFI System Information | 4-59 |
| EFI Component Voltage/Resistance Chart Air Temperature | 4-60 |
| EFI Component Voltage/Resistance Chart Water Temperature | 4-61 |
| EFI EPROM Chip Usage Chart (1971-1998) | 4-62 |
| EFI EPROM Chip Usage Chart (1999-2000) | 4-63 |
| Troubleshooting Fuel System (EFI) | 4-63 |
| EFI Wiring Diagrams | 4-64 |

Introduction

The batteryless EFI system is lightweight in design and is made up of a number of components which are explained in this sub-section. The batteryless EFI system eliminates the worry of battery maintenance or changing main jets to compensate for altitude or temperature. This EFI system will provide quick and easy starting under all conditions.

The electrical control unit (ECU) has a self-diagnostic mode built in. It is a very valuable factor in troubleshooting. Once the problem area has been determined from the trouble code flashed by the LED (light emitting diode) located under the left end of the ECU, follow the troubleshooting procedure in this sub-section.

When troubleshooting the batteryless EFI system, special tools are required. These special tools are the following.

- A. EFI Analyzer (p/n 0644-212)
- B. Fuel Pressure Tester (p/n 0644-203)
- C. Fluke Model 73 Multimeter (p/n 0644-191)
- D. Peak Voltmeter (p/n 0644-300)

If the EFI analyzer at your dealership was purchased before February 1, 1998, it must be updated with an Update Kit (p/n 0644-256) before it can be used to troubleshoot any of the 1997-2000 batteryless EFI models. The update kit consists of a wiring harness and a new EPROM chip. The update kit can be ordered from your distributor or the Arctic Cat Parts Department.

Fig. 4-97



AE131

Fig. 4-98



AE124

Fig. 4-99



AE114

Fig. 4-100



AE141D

Arctic Cat Batteryless EFI System

The Arctic Cat Batteryless EFI System operates off a series of coils located on the stator.

The batteryless EFI system is made up of the following components.

1. Low and high speed coils which are located on the stator provide AC voltage to operate the CDI unit. The CDI unit is located within the ECU. The AC voltage is converted to DC voltage within the ECU.
2. A fuel pump coil located on the stator operates the low voltage, high output fuel pump. At cranking speed, the high output fuel pump provides enough fuel to charge the fuel rail.
3. An injector coil located on the stator provides the injectors with DC voltage for operation through the ECU.
4. A lighting coil located on the stator plate provides 175 watt output to operate accessories and the lighting system.

5. An electrical control unit (ECU) consisting of a circuit board and EPROM chip calculates input from five sensors (intake air temperature sensor, water temperature sensor, throttle position sensor, crankshaft positioning sensor, barometric pressure sensor) to provide the engine with the correct fuel mixture and timing for optimum operation.

EFI FEATURES

1. Automatic compensation for temperature.
2. Automatic compensation for altitude.
3. Optimum throttle response through high pressure injection.
4. Quick starting in every condition.
5. Improved fuel efficiency with maximum mileage in every condition.
6. Engine RPM more stable in every condition.

PRECAUTIONS

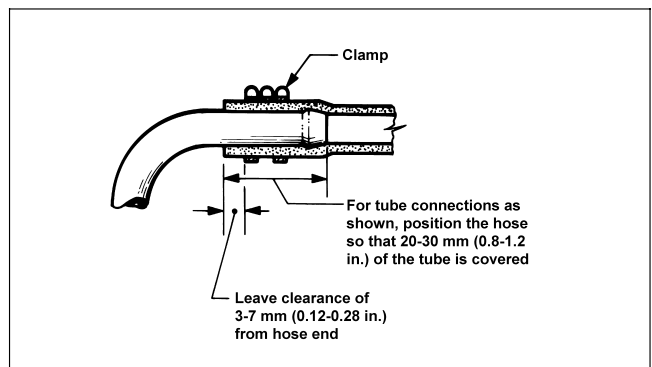
WARNING

Whenever working on the fuel system if a fuel hose is removed from any component, slowly bleed the pressure from the hose into an absorbent towel before removing the hose from the component.

WARNING

Always tighten fuel hose clamps securely.

Fig. 4-101



0729-325

CAUTION

Always use resistor-type spark plugs and spark plug caps. Non-resistor components will cause the ECU to malfunction.

STARTING

1. To start an engine for the first time or after performing service work on the fuel system, place the emergency stop switch and the ignition switch in the ON position. Disconnect the yellow water temperature sensor lead wire at the ECU. Crank the engine over 6-8 times with the recoil starter. With the water temperature sensor lead disconnected, the fuel system will call for maximum mixture and the system will charge faster. After 6-8 brisk pulls on the recoil starter, reconnect the yellow sensor lead. The engine should start in 2-3 additional pulls. After charging the fuel system, the engine should start in 3-4 pulls when cold.
2. Start the engine without compressing the throttle. When the engine starts for the first time, do not touch the throttle. It will idle slowly and may stop. Repeat this procedure until the engine starts and builds RPM on its own. This may require 3-4 restarts. Once the engine has been started and run, the next cold start should occur in 2-3 pulls of the recoil starter.

FLOODED ENGINE

If the engine should become flooded, set the brake lever lock, compress the throttle lever to the full-open position, and crank the engine over until it starts and clears itself. Release the brake lever lock.

FUEL SYSTEM

The EFI fuel system consists of the following components.

1. Gas tank
2. Electric high output fuel pump
3. Two pick-up valves with micron screens
4. High-pressure fuel hose
5. Fuel rail
6. Fuel pressure regulator
7. Throttle body assembly
8. Injectors
9. Fuel return hose
10. ECU

These above components are grouped into the fuel handling system. They work together along with five electrical sensors (listed below) and the ECU to provide the engine with a precise fuel mixture for combustion. The five sensors are the following.

1. Crankshaft Positioning Sensor
2. Intake Air Temperature Sensor

3. Water Temperature Sensor
4. Throttle Position Sensor
5. Barometric Pressure Sensor

The fuel is first drawn into the electric fuel pump through two pick-up valves and hoses. The fuel is then routed through a high-pressure fuel hose to the fuel rail.

The fuel pressure is maintained at 37.9 ± 2.2 psi in the fuel rail by the fuel regulator. If pressure exceeds this amount, the regulator opens and returns excess fuel to the gas tank through the fuel return hose.

With the fuel pressure maintained at a constant 37.9 ± 2.2 psi, the ECU evaluates the information it receives from the five electrical sensors and opens the injectors for precise periods of time (pulse widths) to meet engine demands.

■ **NOTE:** The entire EFI system depends on all coils functioning properly on the stator.

Individual EFI Components

4

ECU

The ECU is the brain of the EFI system. It uses five sensor inputs to determine the correct fuel/air ratio for the engine given the existing conditions of altitude and temperature.

Fig. 4-102

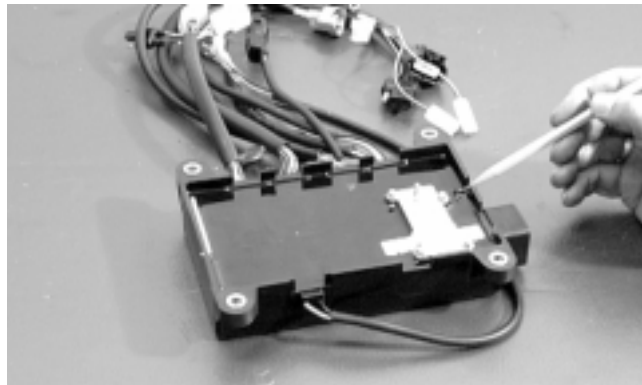


AO152D

If any of the sensors should fail while the engine is running, the ECU will sense a problem and go into a “limp home” mode. This is an over-rich condition and will greatly reduce performance. However, the engine will be protected from a possible lean condition and engine damage.

The ECU is equipped with a light emitting diode (LED), which will flash a series of pulses when a problem exists with any of the sensors. By observing the code, the technician can determine the problem sensor by comparing the code flashed with the trouble code chart (see Trouble Codes in this sub-section).

Fig. 4-103



AO153D

There are no repairs that can be made to the ECU other than replacement of the EPROM chip.

If the ECU is not receiving current from one of the output coils on the stator, that circuit will not operate. Coils on the stator are the capacitor charge coil which operates the CDI within the ECU, the injector coil which operate the injectors, the fuel pump coil which operate the fuel pump, and the lighting coil which operates all accessories and the lighting system. Refer to the wiring diagram in this sub-section.

Fig. 4-104

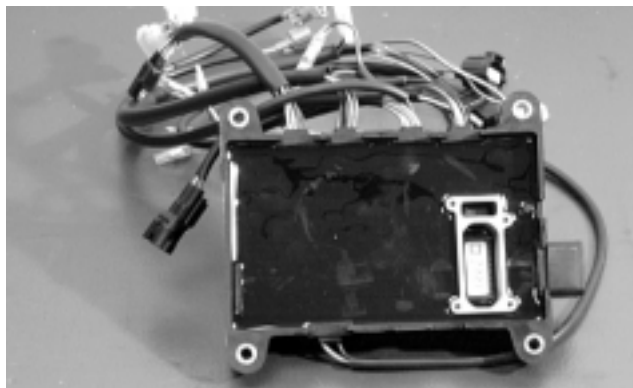


AO132D

EPROM CHIP

The EPROM chip is located inside the ECU. When replacing the chip, replace the chip with the same symbol (■—●—▲) as found on the ECU body (see EFI EPROM Chip Usage Chart in this sub-section).

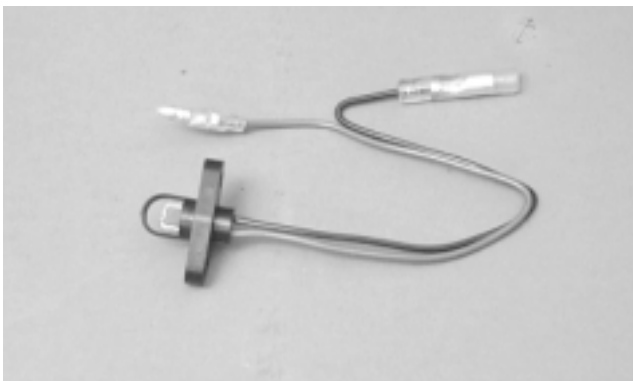
Fig. 4-105



AO154D

INTAKE AIR TEMPERATURE SENSOR

Fig. 4-106

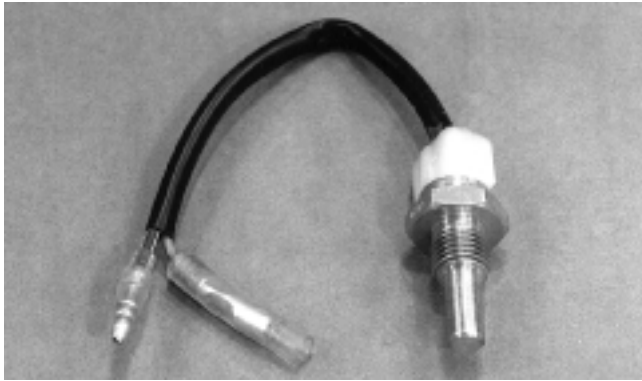


AO135D

The intake air temperature sensor is mounted on the front of the air-intake silencer. Its purpose is to sense air temperature entering the air-intake silencer and engine. The ECU sends current to this sensor, and (depending on the temperature) the sensor will pass a certain amount of current through the sensor to ground. The ECU measures how much current passes through the sensor to ground. From this measurement, the ECU determines the air temperature and calculates the fuel/air mixture ratio. This sensor is very sensitive to temperature change. Resistance will drop as the temperature rises.

WATER TEMPERATURE SENSOR

Fig. 4-107



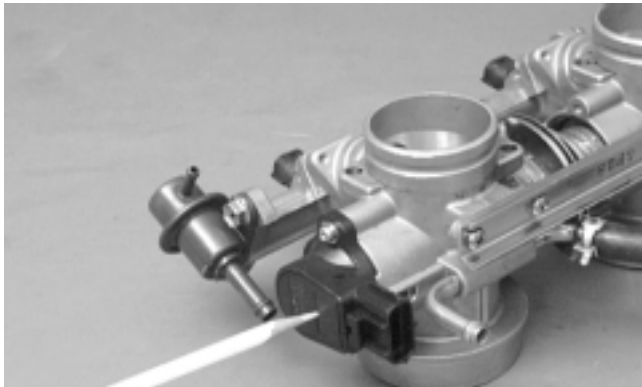
AO069

The water temperature sensor is located on the bottom of the thermostat manifold. This sensor is very sensitive to temperature change. The ECU measures the current flow through the sensor to ground. From this measurement, the ECU can determine the engine coolant temperature and calculate the correct fuel/air mixture ratio.

■ **NOTE:** If the coolant temperature rises above 80°C (176°F), the temperature sensor starts to close which also will start to richen the fuel mixture. Once the engine coolant temperature reaches 93°C (200°F), the temperature sensor is fully closed which will signal the ECU to go into the rich mode to protect the engine from overheating. At this time, the overheat light will be illuminated. The overheat sensor, which illuminates the overheat light, closes at 93°C (200°F) ± 6°F.

THROTTLE POSITION SENSOR

Fig. 4-108



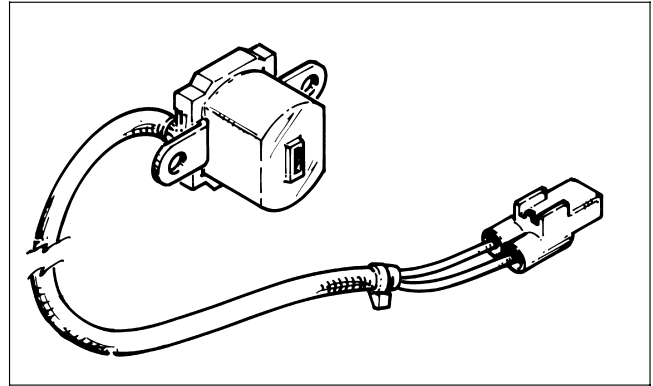
AO136D

The throttle position sensor, located at the end of the throttle shaft, is a potentiometer (a potentiometer is, essentially, a voltage divider). This sensor transforms the throttle-valve position into output voltage to the ECU. In addition, the sensor detects the opening or closing speed of the throttle valve and feeds that rate of voltage change to the ECU.

■ **NOTE:** The input from the throttle position sensor is one of the main inputs for the ECU calculation of fuel/air mixture ratio.

CRANKSHAFT POSITIONING SENSOR

Fig. 4-109



0729-627

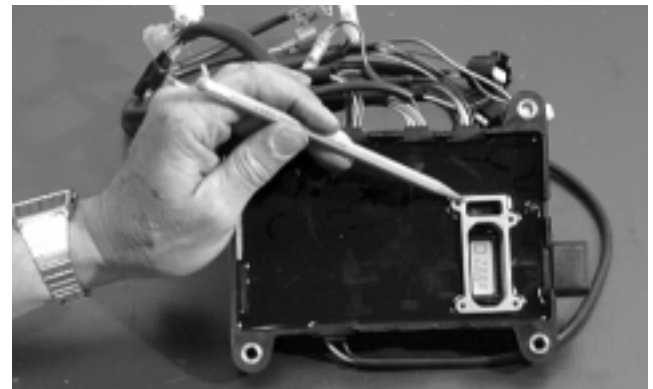
This sensor is located on the top of the magneto case near the cylinder.

This sensor is triggered by a small metal disc precisely mounted to the flywheel flange. Each time the metal disc rotates past the sensor, a signal is sent to the ECU. From this signal, the ECU determines ignition and injection timing and RPM.

4

BAROMETRIC PRESSURE SENSOR

Fig. 4-110



AO155D

This sensor is located inside the ECU and is part of the ECU unit. Its purpose is to sense atmospheric pressure. From this information, the ECU determines the correct fuel/air mixture ratio.

■ **NOTE:** This sensor is not replaceable. If it should fail, the ECU must be replaced.

FUEL INJECTORS

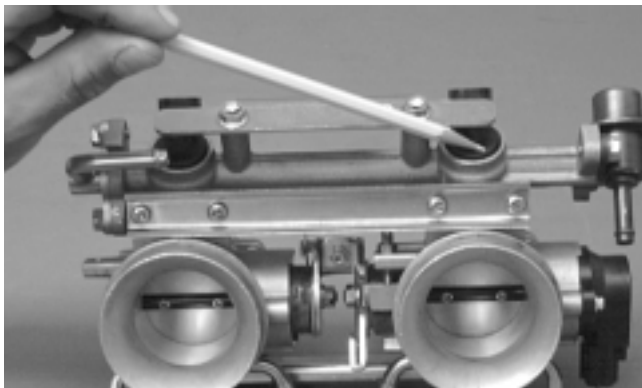
Fig. 4-111



AO139D

The fuel injectors are positioned in the top of each throttle body. O-rings seal the top and bottom of each injector, and they are held in position by a locking plate secured to the fuel rail.

Fig. 4-112



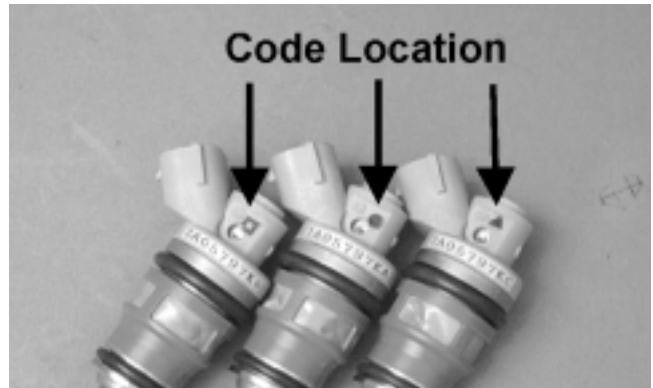
AO140D

The fuel injector is an electromagnetic injection valve controlled by a signal from the ECU. The coil used in the injector is a high-pressure resistance type. The ECU determines the optimum fuel injection time and duration based on signals from the five sensors.

When voltage is sent to the fuel injector, it energizes the coil and opens the needle valve, thereby injecting fuel. Because the fuel pressure (pressure differential between fuel line and manifold) is kept constant, the amount of fuel injected is determined by the duration of time the valve is open.

The injectors are coded with symbols (■—●—▲). When replacement of a fuel injector is necessary, the injector must be replaced with an injector of the same code symbol.

Fig. 4-113

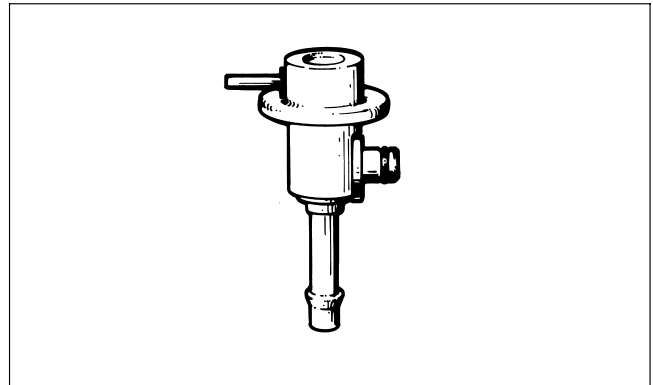


AO138DA

NOTE: It is very important that the correct injector is used as it has been matched with the EPROM chip used in the ECU.

FUEL PRESSURE REGULATOR

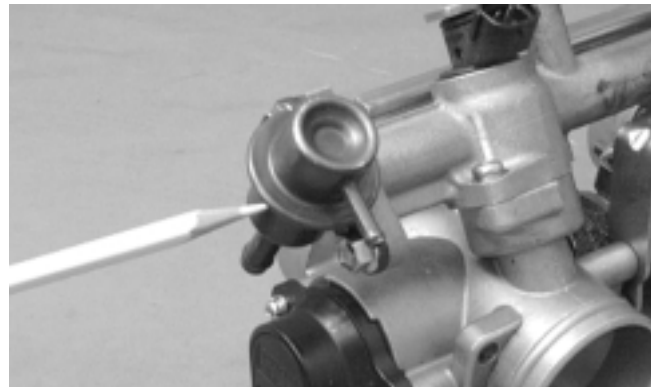
Fig. 4-114



0728-727

The fuel pressure regulator is attached to the end of the fuel rail. The fuel pressure regulator maintains the fuel pressure at a constant level of 37.9 ± 2.2 psi.

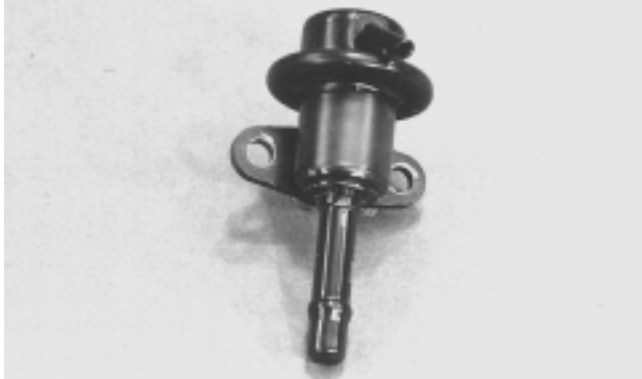
Fig. 4-115



AO141D

When fuel pressure exceeds the specification, the spring-loaded diaphragm in the regulator releases allowing fuel to flow through the return hose back to the gas tank.

Fig. 4-116



AO030

FUEL PUMP CIRCUIT

The fuel pump and its circuit are provided with current from the fuel pump coil on the stator.

Fig. 4-117



AO142D

For this circuit to function correctly, five components must be in good working order.

Check the following components before considering the fuel pump assembly to be defective.

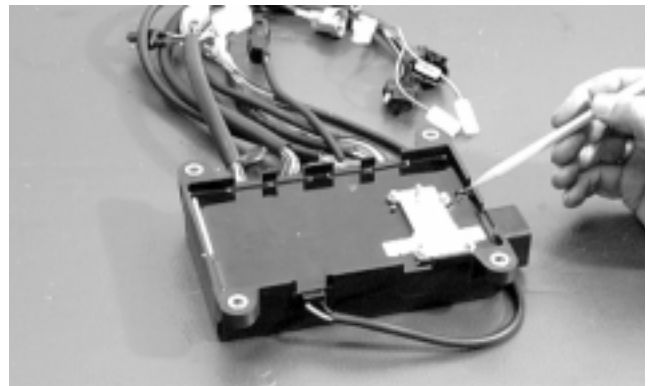
- A. Fuel pump coil - see coil test procedure.
- B. Emergency stop switch and ignition switch must be ON and in good working order.
- C. Fuel pump - see fuel pump test procedure.
- D. Wiring harness and connectors - clean the connectors and test the harness.
- E. ECU.

Self-Diagnostic EFI System

INTRODUCTION

The Electronic Control Unit (ECU) contains a built-in, self-diagnostic system which detects trouble within the five-sensor signal network and then flashes a code on the LED signal light, located under the left end of the ECU.

Fig. 4-118



AO153D

The fuel system and the ignition system remain two separate systems. In a no-start situation, first determine if the problem is caused by lack of ignition or by a fuel delivery problem.

Using the EFI Ignition Analyzer, equipped with the update EPROM (chip) and test harness, connect the test harness to the ECU diagnostic connectors. Connect the test harness red external lead to the positive terminal of a 12-volt battery and connect the black external test harness lead to the negative terminal.

If any of the circuits are faulty, a trouble code will now be flashed by the LED.

If no code is flashed, turn on the analyzer. Press the MENU SELECT buttons until the words KOKUSAN appear on the display; then press the TEST button. The analyzer is now programmed for testing the Arctic Cat Batteryless EFI System.

Using the MENU SELECT buttons, press the button repeatedly until Memory Problem Diagnosis Test appears on the display; then press the TEST button. If any sensors have intermittent problems, they will be indicated on the display.

Proceed to individual components test procedures covered throughout this section.

The code flashed from the LED will first be a number of flashes. Count the number of flashes and refer to Trouble Codes in this section. The code repeats itself with approximately a 2-second delay between each series of flashes.

NOTE: When reading the LED flash sequence, have paper and pencil available to write down the codes being flashed. More than one code may be flashed.

Once the problem area has been determined, check the components involved using the Fluke Model 73 Multimeter (p/n 0644-191) or the EFI Analyzer (p/n 0644-302) depending on which test is being made.

NOTE: If the EFI analyzer has been updated with the new EPROM chip, select the proper EFI system being tested (ARCTCO for Battery System and KOKUSAN for Batteryless System). Press the TEST button on the analyzer and the analyzer will remain on the system selected until it is turned off. If the analyzer is turned off during the test procedure, reselect the proper system being tested before proceeding.

Trouble Codes

| Number of Flashes | Trouble |
|-------------------|---|
| 1 | Open or short circuit in throttle position sensor. |
| 2 | Open or short circuit in water temperature sensor. |
| 3 | Open or short circuit in intake air temperature sensor. |
| 4 | Open or short circuit in barometric pressure sensor. |
| 5 | Failure in injector(s). |

TROUBLESHOOTING INDIVIDUAL COMPONENTS

NOTE: With the Arctic Cat Batteryless EFI System, it is extremely important that the ECU receives the proper current output from four coils (two capacitor charge coils, an injector coil, and a fuel pump coil) to function as designed. If a problem exists, these coils should be checked using the following procedures.

Low/High Speed Charge Coils

The low/high speed charge coils power the CDI system and the ECU. To test these coils, disconnect the 3-wire connector from the ECU to the stator.

1. Set the meter selector to the OHMS scale and test between the black and green wires in the 3-wire connector.
2. The meter must show $46 \text{ ohms} \pm 20\%$.
3. Test between the green and brown wires in the 3-wire connector.
4. The meter must show $450 \text{ ohms} \pm 20\%$.

NOTE: If either test is not within specifications, the stator must be replaced. Refer to the wiring diagram in the back of this section.

Injector Coil Resistance Test

The injector coil located on the stator powers the two injectors.

NOTE: With the engine running, there should be 12.4-12.9 DC volts at the injector leads. To test the injector coil resistance, use the following procedure.

1. Disconnect the double-wire plug with two blue/white leads from the stator to the ECU.
2. Set the meter selector to the OHMS scale.
3. Connect a meter lead to each of the blue/white leads. The meter must show $21 \text{ ohms} \pm 20\%$.

NOTE: If reading is not within the specification, recheck to confirm test results. If still out of tolerance, replace the stator.

NOTE: If the resistance test is good, a peak reading voltage test should also be made. Refer to Peak Voltage Tests and Specifications in this section.

Fuel Pump Coil Resistance Test

The fuel pump coil powers the fuel pump through the ECU.

NOTE: With the engine running, there should 12.3-12.9 DC volts supplied to the fuel pump for operation. To test fuel pump coil resistance, use the following procedure.

1. Disconnect the double-plug with the two orange wires from the ECU.
2. Set the meter selector to the OHMS scale. Connect a meter lead to each of the two orange leads in the double plug.
3. The meter must show $1.8 \text{ ohms} \pm 20\%$.

NOTE: If reading is out of tolerance, recheck to confirm reading. If still out of tolerance, replace the stator.

■ **NOTE:** If the resistance test is good, a peak reading voltage test should also be made. Refer to Peak Voltage Tests and Specifications in this section.

Lighting Coil Resistance Test

The lighting coil located on the stator provides AC power to the lighting system and accessories through a 175 watt charging system. To test the lighting coil resistance, follow this procedure.

1. Disconnect the 3-wire connector at the engine.
2. Set the meter selector to the OHMS scale.
3. Test between the two yellow leads in the 3-wire connector.
4. The meter must show 0.09 ohm \pm 20%.

■ **NOTE:** If reading is out of tolerance, recheck to confirm reading. If still out of tolerance, replace the stator.

ECU

ACTIVATING ECU MEMORY

■ **NOTE:** The ECU memory on the 1997- 2000 Arctic Cat Batteryless EFI system can be activated only by using the EFI Analyzer (p/n 0644-212) which has had the updated EFI Analyzer Test Harness and EPROM Update Kit (p/n 0644-256) installed.

The ECU has a self-diagnostic mode built into the unit. It is a very valuable tool in troubleshooting. Once the problem area code has been flashed by the light emitting diode (LED) located at the end of the ECU, follow the troubleshooting procedure in this section.

The ECU also has a memory mode for determining if any of the five sensors have intermittently failed. To activate the memory system, follow these steps.

1. Connect the analyzer test harness to the ECU diagnostic connector.
2. Connect the analyzer test harness red and black leads to a 12-volt battery.
3. Turn the analyzer switch ON.
4. Press the analyzer MENU SELECT buttons repeatedly until KOKUSAN appears on the display. Once the word KOKUSAN appears on the display, press the TEST button. The analyzer is now set up to test the batteryless EFI system.

5. Press the analyzer MENU SELECT buttons repeatedly until the words Memory Problem Diagnosis Test appears on the display.

Memory Problem Diagnosis Test

6. Press the analyzer TEST button. If all sensors are good, SENSORS ALL O.K. will appear on the display. If any of the sensors have intermittently failed or are faulty, they will appear on the display. Proceed then to checking the faulty sensor individually as covered in this section.

■ **NOTE:** Once problem areas have been determined, always check the component(s) for clean and tight connections.

7. To erase the memory of the ECU, press the TEST button once again; then push the MENU SELECT buttons until Diagnosis Memory Clear appears on the display. Turn the analyzer OFF and then back ON again. Reselect KOKUSAN mode; then proceed to the Memory Problem Diagnosis Test and push the TEST button. The display should indicate SENSORS ALL O.K. which indicates the memory has been cleared.

REMOVING

■ **NOTE:** There isn't a test for the ECU. If a problem is suspected in this unit, try another ECU. When using another ECU, it must be a 1997, 1998, 1999, and/or 2000 model with a batteryless system. The ECU may be sent to the Arctic Cat Service Department for testing. Please contact the Service Department before sending any units.

1. Remove the screws and lock nuts securing the ECU to the mounting bracket.
2. Tip the ECU up and forward; then disconnect the leads.
3. Remove the ECU from the bracket.

■ **NOTE:** If there are any questions concerning lead or harness connections, there is an batteryless EFI system wiring diagram in the back of this section.

INSTALLING

1. Secure the ECU to the mounting bracket with the cap screws and nuts making sure the short black ground lead is secured by the inner rear cap screw.

■ **NOTE:** Make sure the diagnostic connector plug faces the oil reservoir.

2. Route all wiring harnesses under the ECU.
3. Connect the wiring harness connectors to the ECU.

4. Place the ECU mounting bracket into position and secure with cap screws and nuts.

■ **NOTE:** Make sure all connectors are clean and tight. Apply dielectric grease to all connectors.

EPROM Chip

REMOVING

■ **NOTE:** Before touching the EPROM chip, use a screwdriver to discharge all static electricity from your body by grounding yourself to a good ground on the engine.

⚠ CAUTION

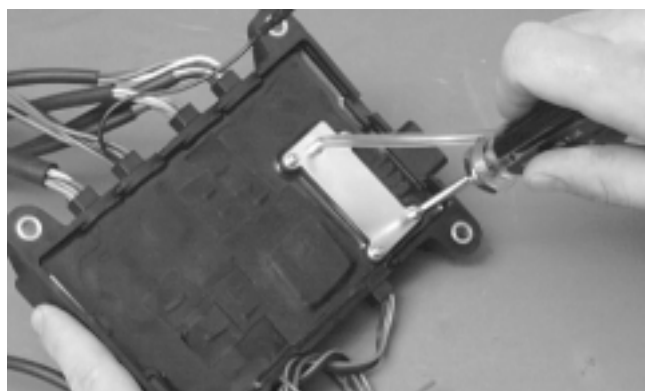
Failing to discharge static electricity from your body before handling the EPROM chip may ruin the chip being removed or the new chip being installed.

⚠ CAUTION

If the analyzer is connected to the ECU, disconnect it during EPROM chip removal and installation or damage to the ECU or EPROM chip may occur.

1. Remove the four screws securing the ECU to the mounting bracket.
2. Turn the ECU over and from the underside, remove the screws securing the small cover to the bottom of the ECU.

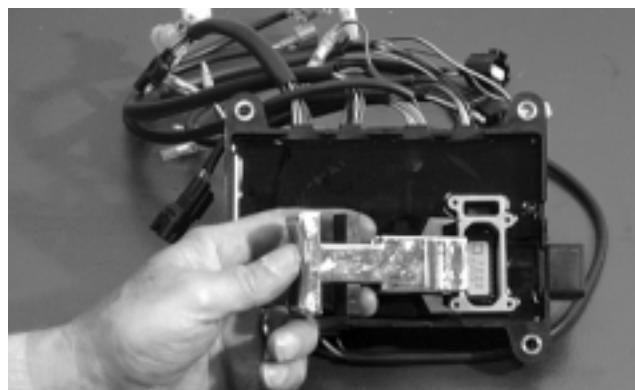
Fig. 4-119



AO134D

3. Remove the cover and gasket; then using the Chip Puller (p/n 0644-188), pull the chip straight up out of its mounting sockets.

Fig. 4-120



AO156D

INSTALLING

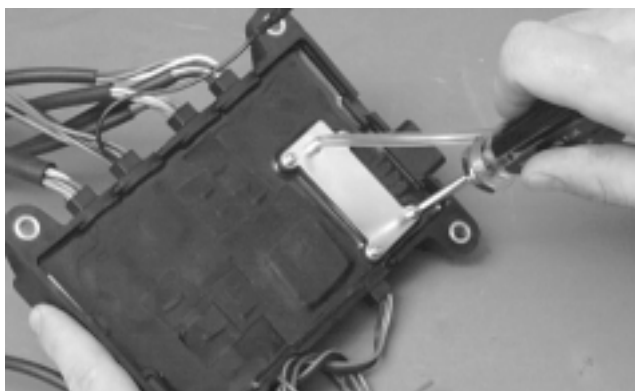
■ **NOTE:** Before touching the EPROM chip, use a screwdriver to discharge all static electricity from your body by grounding yourself to a good engine ground.

■ **NOTE:** Both the EPROM chip and its mounting plate are notched. When installing the chip, the notched end must align with the notch in the mounting plate.

■ **NOTE:** The original EPROM chip must always be used as recommended in the Illustrated Parts Manual for the EFI model being worked on.

1. Insert the pins straight down into the mounting socket being careful to assure each pin is started into its socket.
2. Once all pins are in their sockets, press the chip down firmly.
3. Install the ECU gasket and cover; then secure with the screws.

Fig. 4-121



AO134D

4. Secure the ECU to its mounting bracket using the cap screws. Make sure the short black ground wire is secured by the rear inner cap screw.

Testing Individual Components

■ **NOTE:** For the following tests, use the Fluke Model 73 Multimeter (p/n 0644-191) or a multimeter of the same quality.

FUEL INJECTORS

Fig. 4-122



AO139D

Testing Resistance/Voltage

1. Disconnect the fuel injector wiring harness.
2. Set the meter selector to the OHMS scale.
3. Test between the two injector terminals. Test specification is 2.4 - 3.3 ohms.

Fig. 4-123



AO144D

4. If not within specifications, replace the injector.

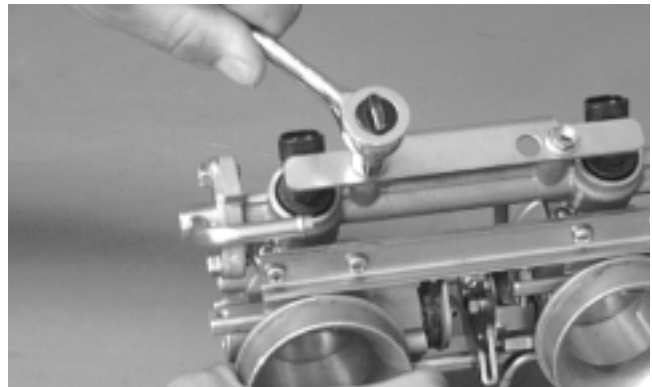
Removing

⚠ CAUTION

The fuel supply hose may be under pressure. Place an absorbent towel around the connection to absorb fuel; then remove the hose slowly to release the pressure.

1. Loosen the clamp securing the fuel supply hose to the fuel rail; then remove the hose from the fuel rail.
2. Disconnect the wiring harness from each injector.
3. Remove the two screws securing the injector hold-down plate to the throttle body assembly; then remove the plate from the injectors.

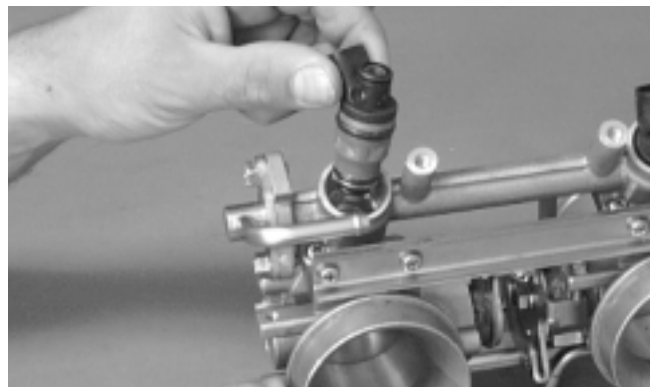
Fig. 4-124



AO145D

4. Remove the fuel injectors from the throttle body assembly.

Fig. 4-125



AO146D

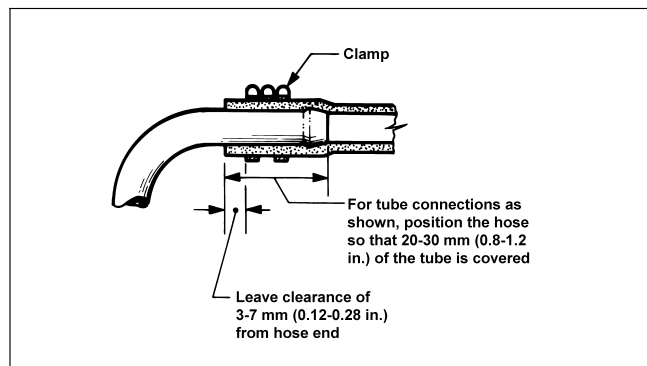
Installing

1. Apply a light coat of oil to all O-rings; then install the upper and lower O-rings onto each injector.
2. Install the injectors into the throttle body assembly.

- Place the injector hold-down plate into position on top of the injectors and secure with two screws.
- Connect the fuel delivery hose to the fuel rail and secure with a clamp.

■ **NOTE:** When securing the fuel delivery hose, position the clamp as shown.

Fig. 4-126

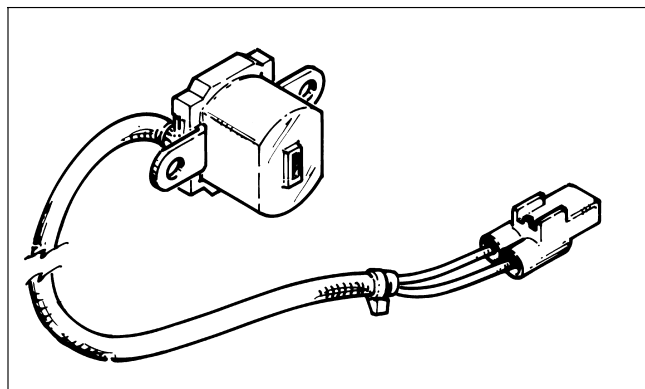


0729-325

- Connect the wiring harness to the injectors making sure the number 1 harness is connected to the MAG-side injector.

CRANKSHAFT POSITIONING SENSOR

Fig. 4-127



0729-627

■ **NOTE:** The sensor is located on the top of the magneto housing PTO-side.

Testing Resistance

- Disconnect the two leads from the sensor to the main wiring harness.
- Set the meter selector to the OHMS scale.
- Test between the green/white and brown leads from the sensor. Test specification is 80.8-121.2 ohms.

Fig. 4-128



AO147D

Removing

- Open the rubber boot that protects the main wiring harness connections; then disconnect the ignition timing sensor from the ECU wiring harness.
- Remove the two screws securing the sensor to the magneto housing.
- Remove the sensor.

Installing

- Using two screws coated with blue Loctite #242, secure the sensor to the magneto housing (inner mounting hole).
- Connect the sensor to the ECU wiring harness; then close the rubber boot.
- Secure loose wires with cable ties.

ELECTRIC FUEL PUMP

Fig. 4-129



AO142D

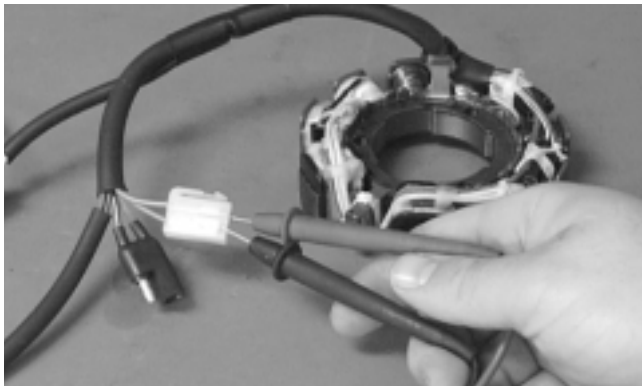
Testing

If the fuel pump fails to operate, check the following items.

- Disconnect the two-wire connector with the two orange wires from the ECU.

2. Set the meter selector to the OHMS scale; then test between the two orange leads in the two-wire connector from the stator.
3. The meter must show 1.4-2.2 ohms.

Fig. 4-130



AO148D

■ **NOTE:** If the fuel pump coil tests within specifications, proceed to test the fuel pump. If the pump coil resistance test is not within specifications, retest to confirm. If still out of tolerance, replace the stator.

4. To test the fuel pump, remove screws securing the right side of the console; then lift console high enough to disconnect the fuel pump harness.
5. Set the meter selector to the OHMS scale; then test between the two fuel pump leads. The meter must indicate continuity.

■ **NOTE:** If continuity is not indicated, replace the fuel pump. If both the fuel pump coil and fuel pump test within specifications and the fuel pump still fails to operate, replace the ECU.

■ **NOTE:** As a final test with the fuel pump removed from the fuel tank and using jumper leads, connect a 12-volt battery to the fuel pump with the positive lead to the fuel pump terminal marked + and the negative lead to the fuel pump terminal marked -. If the pump now operates, recheck the fuel pump coil for continuity. If good, replace the ECU.

Testing Fuel Pressure

⚠ CAUTION

The fuel pump should never be operated dry for a long period of time or damage will result.

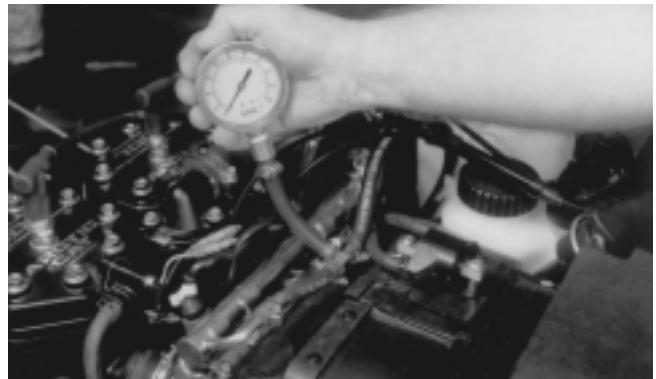
⚠ CAUTION

If the fuel pump or hose is to be removed from the system, slowly release the fuel hose pressure by loosening the inlet hose clamp and covering the connection with an absorbent towel.

■ **NOTE:** Fuel pressure can be tested by installing a pressure gauge between the fuel supply hose and fuel rail.

1. Position hose clamps back 3 mm (0.120 in.) from the end of the fuel hose and tighten clamps securely.

Fig. 4-131



AO011

2. Start the engine and observe the fuel pressure. If fuel pressure exceeds or falls below 37.9 ± 2.2 psi, the fuel pressure regulator may be defective (see Fuel Pressure Regulator in this sub-section) or the fuel return hose may be obstructed (remove obstruction).

Removing

1. Remove the console.
2. Disconnect the fuel pump wiring harness from the fuel pump.
3. Label the fuel hoses "supply" and "return"; then loosen the clamps and remove the fuel hoses.

⚠ WARNING

The fuel supply hose may be under pressure. Cover with an absorbent towel while removing to collect any fuel.

Fig. 4-132



AH201

4. Remove the screws and washers securing the fuel pump; then remove the fuel pump assembly. Account for a gasket.

Fig. 4-133



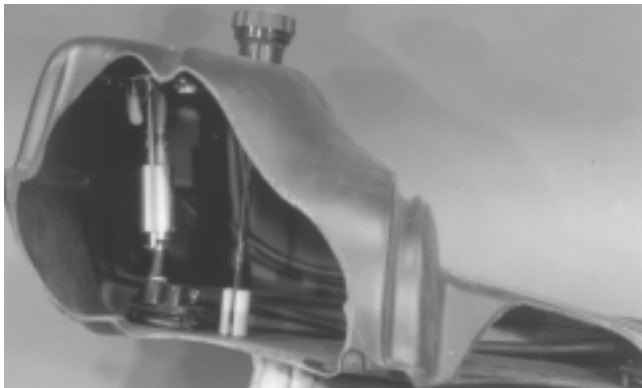
AH203

Installing

1. Install the gasket on the gas tank; then install the fuel pump assembly with the screens on the two fuel pick-up valves facing down. The long pick-up hose and screen must be positioned to the rear of the tank.

■ **NOTE:** The screens on the two fuel pick-up valves must face down in the gas tank.

Fig. 4-134



AH207

2. Secure the fuel pump with screws and washers. Tighten to 0.1 kg-m (12 in.-lb).

⚠ WARNING

Do not over-tighten the screws securing the fuel pump to the tank.

Fig. 4-135



AH203

3. Connect the fuel pump wiring harness to the fuel pump.
4. Connect the fuel supply and return hoses to their respective fittings and secure with clamps.

Fig. 4-136

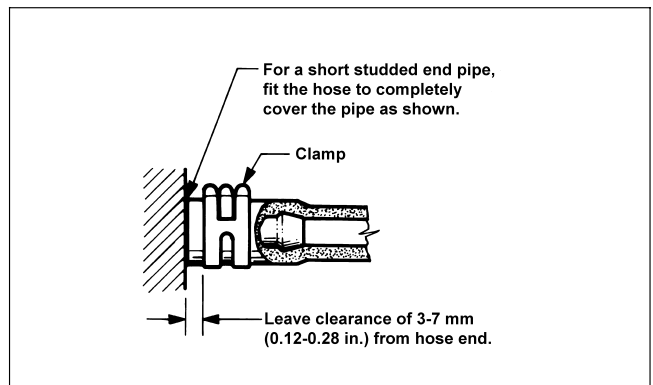


AH201

⚠ CAUTION

Check fuel hose connections to ensure they are tight and properly connected.

Fig. 4-137



0729-324

5. Place the console into position. Connect all wires to their respective switches.

- Secure the console.

FUEL PRESSURE REGULATOR

Removing

- Loosen the clamp securing the fuel return hose to the fuel regulator; then remove the hose.
- Remove the two screws securing the fuel pressure regulator to the fuel rail; then slowly remove the regulator. Account for the O-ring.

Fig. 4-138



AO149D



CAUTION

Since the regulator may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb fuel.

Testing Fuel Pressure Regulator

- Using the Fuel Pressure Tester (p/n 0644-203), connect the tester to the regulator fuel inlet.

Fig. 4-139



AO053

■ **NOTE:** A short piece of 3/8 in. I.D. hose will be needed to make the above connections.

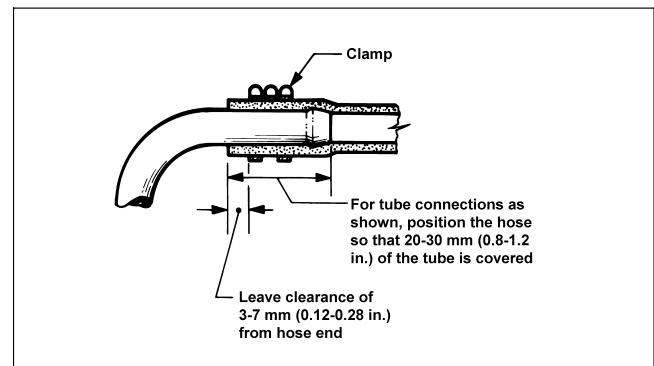
- Pressurize the regulator to 2.0-2.2 kg/cm² (28-31.3 psi). Turn the pressure tester shut off valve to the OFF position. Observe the gauge for several minutes and note if there is any loss of pressure. If pressure begins to drop, the cause may be a ruptured diaphragm, worn spring, or leaking valve. If the regulator fails to build or maintain pressure, replace the regulator.

■ **NOTE:** If there is a drop in pressure, check the hose connections to ensure there are no leaks.

Installing

- Position the O-ring on the fuel pressure regulator; then place the regulator into position on the fuel rail. Secure with two screws.
- Connect the fuel return hose to the regulator; then secure with a clamp.

Fig. 4-140



0729-325

WATER TEMPERATURE SENSOR

Testing Resistance

■ **NOTE:** The water temperature sensor is very sensitive to temperature change. Before the resistance test is conducted, it is important to know the coolant temperature. If the engine has been operated recently and the coolant is warm, the resistance will measure lower than if the coolant was at room temperature or colder. For accurate test results, check the coolant temperature in the filler neck using a thermometer.

- Disconnect the water temperature sensor wiring harness from the main harness.
- Set the meter selector to the OHMS position and test the resistance between the two leads from the sensor.
- Compare the resistance reading to the EFI Component Voltage/Resistance Chart Water Temperature in this section. If resistance is not within the specification, replace the sensor.

■ **NOTE:** A water temperature sensor voltage test can be made using the EFI Analyzer. Please refer to the analyzer test procedures provided on the following pages.

Removing

1. Drain the cooling system.
2. Remove the throttle body assembly.
3. Disconnect the wiring harness from the water temperature sensor.
4. Remove the sensor from the water temperature case.

Installing

1. Apply teflon tape to the threads of the water temperature sensor; then install the sensor.
2. Connect the wiring harness to the sensor.
3. Install the throttle body assembly.
4. Fill the cooling system.

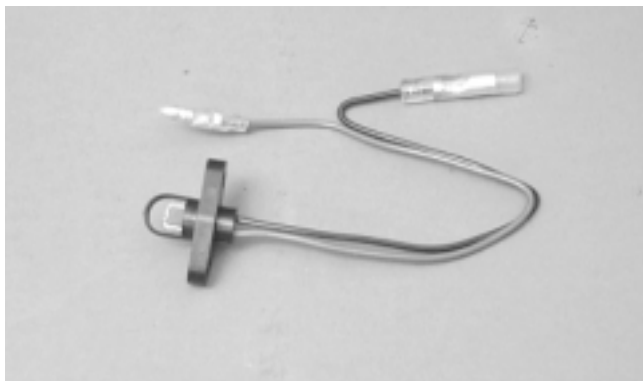
INTAKE AIR TEMPERATURE SENSOR

Testing Resistance

■ **NOTE:** It is very important to know the component temperature before conducting this test. Allow the engine to reach room temperature.

1. Disconnect the wiring harness from the intake air temperature sensor.

Fig. 4-141



AO135D

2. Set the meter selector in the OHMS position and test the two leads located in the sensor connector. Compare with the EFI Component Voltage/Resistance Chart Air Temperature in this section.

■ **NOTE:** The intake air temperature sensor employs a thermistor, which is very sensitive to temperature changes. Resistance will change as temperature varies.

Removing

1. Disconnect the wiring harness from the intake air temperature sensor.
2. Using a standard screwdriver, pry the sensor end to end to remove it from the air-intake silencer. Account for two push pins.

Installing

1. Place the sensor into position in the air-intake silencer and secure with push pins.
2. Connect the wiring harness to the intake air temperature sensor. Secure the sensor leads with cable ties so they do not rub on any other components.

EFI Analyzer

GENERAL INFORMATION

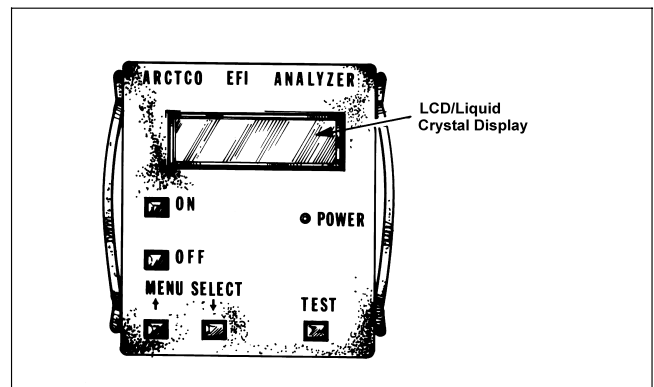
The EFI Analyzer (p/n 0644-302) makes it possible for technicians to easily perform EFI system troubleshooting in a short period of time.

Before an EFI analyzer purchased prior to February 1, 1998, can be used on the batteryless EFI system, it must be updated with the Harness and EPROM Update Kit (p/n 0644-301) available from your Arctic Cat Parts Department. All analyzers purchased after June 1, 1998, were updated at Arctic Cat.

To use the analyzer on the batteryless EFI system, a 12-volt battery to power the analyzer is necessary. Follow the instructions under Analyzer Setup for testing the batteryless EFI system.

Analyzer Nomenclature

Fig. 4-142



730-222A

1. LCD - Liquid Crystal Display.

2. Power-Light illuminates when the analyzer is properly connected to the snowmobile EFI analysis test plug.
3. On/Off Switches.
4. Menu Select (up/down) - Enables selection of a test function quickly.
5. Test - Once the test function is selected, push the button to complete the test. The button also cancels the current test so the next test function can be selected.

Analyzer Test Function (Batteryless System)

If the EFI analyzer has been updated with the 1998 Harness and EPROM chip, it can be used to troubleshoot the 1997-2000 batteryless EFI system. There is, however, special information which can be retrieved from the 2000 ECU such as total running time on engine, running times by temperature, maximum RPM by temperature, EPROM chip change check, number of fuel changes by wire disconnect, and last fuel type used. This information can only be retrieved with an EFI analyzer which has been updated with either the 1999 Harness and EPROM Chip Update Kit (p/n 0644-301) or the 1999 EFI Analyzer EPROM chip (p/n 0643-068).

If the EFI analyzer has been updated with the new EPROM chip (p/n 0643-068) when the MENU SELECT buttons are pressed, there will be three modes to select from. First mode, ARCTCO, is used to troubleshoot the battery style EFI systems used in 1998 and prior year models. The second mode, KOKUSAN, is used to troubleshoot the 1997-2000 batteryless EFI system. The third mode, KOKUSAN SPECIAL, is used only to retrieve special information (explained earlier) found only on the 2000 batteryless EFI system ECU.

At this point, select one of the modes by pushing the TEST button, or the analyzer will not continue past this point. If testing a batteryless EFI system, select KOKUSAN on the display by pushing the TEST button. The entire system can now be tested by moving to the next test using the MENU SELECT buttons.

If the analyzer is turned off during the test procedure, the test function on the display will automatically start over at the top of the list when turned back on. This means the selection of the system being tested must be repeated before continuing.

Once a test has been completed, press the TEST button again to cancel the test, which allows the selection of a different test using one of the MENU SELECT buttons.

NOTE: If the new updated EPROM chip has not been installed, the EFI (Battery System) can be tested; however, without the new Test Harness and EPROM Update Kit (p/n 0644-301), the new Arctic Cat Batteryless EFI System cannot be tested. All EFI analyzers purchased after February 1, 1998, were updated at Arctic Cat.

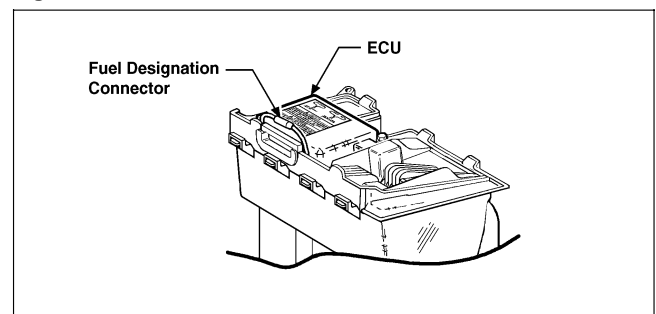
Menu List Organization (Kokusan Mode)

1. Engine RPM
2. Diagnosis memory clear
3. Memory problem diagnosis test
4. Existing problem diagnosis test
5. Barometric pressure
6. Water temperature
7. Intake air temperature
8. Throttle valve angle in degrees
9. Ignition timing

Kokusan Special Mode

The 2000 batteryless EFI system has an updated ECU. With the 2000 ECU, the snowmobile can be run with either regular gasoline or oxygenated gasoline without changing the EPROM (chip). Special instructions located on top of the tool box lid will instruct to disconnect two wires located in front of the ECU if oxygenated gasoline is used. If regular gasoline is to be used, the two wires in front of the ECU must remain connected or the mixture will be too rich.

Fig. 4-143



734-482A

Menu List Organization (Kokusan Special Mode)

1. Throttle Adjust - given in both volts and degree.
2. Fuel Change Number - number of times fuel leads have been switched between regular gasoline and oxygenated gasoline.
3. Last Gasoline Type - in case of engine failure, what the system was last set for - regular gasoline or oxygenated gasoline.

4. Other Rom Check - will indicate if the EPROM chip has been changed. If none appears on the display, the EPROM chip has not been changed since the ECU was assembled.
5. Maximum Revolutions by Temperature - provides a range in increments of 10° from -30° C to -101° C. Will show engine RPM for each temperature range and if the engine has been operated in the range.
6. Running Time by Temperature - will indicate how long the engine has been run in each temperature range from 40° C to 101° C in increments of 10°.
7. Total Running Time - will show total hours on the engine.
8. Barometric Pressure - provides current air pressure.

To test an batteryless EFI system using the EFI Analyzer, follow all instructions carefully and completely.

Analyzer Setup

1. Before connecting the analyzer to the snowmobile, always check to make sure the analyzer is OFF; then connect the analyzer batteryless test harness (equipped with red and black external leads) to the ECU diagnosis connector.
2. Attach the red external lead to the positive terminal of a 12-volt battery; then connect the negative external lead to the negative post.
3. Press the ON button of the analyzer. At this point, the power light of the analyzer must be illuminated.
4. Push either MENU SELECT button on the analyzer until KOKUSAN mode appears on the display; then push the TEST button. The analyzer is now ready to test the batteryless EFI system.
5. To retrieve information found under Kokusan Special Mode, push Menu Select button until Kokusan Special Mode appears on the display; then push the TEST button. The analyzer is now ready to test the special areas shown on the menu list under Kokusan Special Mode.

■ **NOTE:** When testing the batteryless EFI system, KOKUSAN mode must be on the display. Once the TEST button is pressed with KOKUSAN mode on the display, the analyzer will stay in this mode until it is turned OFF.

■ **NOTE:** Each time the analyzer is turned OFF, reselection of the KOKUSAN mode is necessary. The ARCTCO mode, which will also appear on the display when the MENU SELECT buttons are pressed, is for testing an EFI (battery system).

EFI Components Not Tested by Analyzer

When troubleshooting the EFI system with the EFI Analyzer, there are EFI components the analyzer will NOT diagnose. These components, (in the following list) must be tested using a good digital volt/ohmmeter or a fuel pressure gauge using recommended procedures in this section.

1. Fuel Pump Coil - Injection Coil - Timing Sensor.
2. CDI Ignition Coil.
3. External Ignition Coil.
4. Fuel Pressure Regulator - Maintains fuel pressure at 37.9 ± 2.2 psi.
5. Electric Fuel Pump - Located in the gas tank. Supplies fuel under pressure to fuel injectors.
6. Switches and Stator Coils - Supplies all systems with current.

Recommended EFI Troubleshooting Sequence (Kokusan Mode)

When troubleshooting the batteryless EFI system, use the following troubleshooting sequence to locate problems quickly and efficiently.

EXISTING PROBLEM DIAGNOSIS TEST

This should be the first test made. In this mode, the analyzer tests the following components all at once.

- A. Throttle Position Sensor
- B. Intake Air Temperature Sensor
- C. Water Temperature Sensor
- D. Barometric Pressure Sensor
- E. Fuel Injectors

After pushing the TEST button on the analyzer, the display will indicate either SENSORS ALL O.K. or which of the sensors are defective. Check these components individually using the recommended procedures in this section.

MEMORY PROBLEM DIAGNOSIS TEST

This should be the second test made. In this mode, the analyzer will reveal any problems in the sensor area which might have occurred intermittently as the snowmobile was being operated.

If there were any such intermittent problems, the problem area will be shown on the display. Check the indicated area for a wire connection problem or loose or corroded connections.

Testing Individual EFI Components

■ **NOTE:** For all of the following tests using the EFI Analyzer, the analyzer power light must be illuminated. If not illuminated, the problem must be corrected before proceeding. Also, the analyzer must be properly connected to a 12-volt battery.

ENGINE RPM FUNCTION

This test can be used to verify the snowmobile tachometer or can be used when checking several of the EFI components. When checking the RPM, use the following procedure.

1. Place the rear of the snowmobile on a safety stand.
2. Start the engine.
3. Connect the analyzer harness (analyzer OFF) to the diagnosis test plug. Connect the external leads of the harness to a good 12-volt battery.
4. Switch the analyzer ON.
5. With the analyzer power light illuminated and using an analyzer with the new updated EPROM chip, select KOKUSAN by pressing the MENU SELECT buttons until KOKUSAN appears on the display; then press the TEST button. Press the MENU SELECT buttons repeatedly until Engine RPM appears on the display.

Engine RPM

6. Press the TEST button. Actual engine RPM should now be indicated. Slowly compress the throttle lever and the display should indicate the increased engine RPM.

■ **NOTE:** The test harness must be connected to the ECU after the engine has been started. If connected prior, the engine may be very difficult to start.

■ **NOTE:** If proceeding to another test, first press the TEST button once again to cancel the present test. To select a different test function, use the MENU SELECT buttons.

IGNITION TIMING TEST FUNCTION (Engine Running)

■ **NOTE:** When using an analyzer which has been updated with the new EPROM chip, first select KOKUSAN by pressing the TEST button. This will allow the testing of the batteryless EFI system.

1. Place the rear of the snowmobile on a safety stand.
2. Start the engine.
3. Connect the analyzer harness (analyzer OFF) to the diagnosis test plug. Connect the external leads of the harness to a good 12-volt battery.
4. Switch the analyzer ON.
5. With the analyzer power light illuminated, press the MENU SELECT buttons repeatedly until the words Ignition Timing appear on the display.

Ignition Timing

6. Press the TEST button; then increase the engine RPM to the specification given. Actual engine timing in degrees will now appear on the display.

Timing Specifications

| Model | Degrees | @ RPM |
|---------|---------|-------|
| 500 EFI | 24 ± 2 | 3500 |
| 580 EFI | 30 ± 2 | 4000 |
| 600 EFI | 20 ± 2 | 5000 |

■ **NOTE:** The test harness must be connected to the ECU after the engine has been started. If connected prior, the engine may be very difficult to start.

■ **NOTE:** Ignition timing remains the same on either a hot or cold EFI engine. Always verify timing at 4000 RPM using a timing light. Timing is not adjustable. If timing is off by more than 2°, the problem may be either the ignition timing sensor or the CDI unit.

■ **NOTE:** If proceeding to another test, first press the TEST button once again to cancel the present test. To select a different test function, use the MENU SELECT buttons.

EXISTING PROBLEM DIAGNOSIS TEST (ENGINE OFF) FUNCTION

■ **NOTE:** When using an analyzer which has been updated with the new EPROM chip, first select KOKUSAN by pressing the TEST button. This will allow the testing of the batteryless EFI system.

1. With the analyzer OFF, connect its harness to the diagnosis test plug. Connect the external leads of the harness to a good 12-volt battery.
2. Switch the analyzer ON.
3. With analyzer power light illuminated, press the MENU SELECT buttons repeatedly until the words Existing Problem Diagnosis Test appear on the display.

Existing Problem Diagnosis TEST

4. Press the TEST button. If all sensors are good, SENSORS ALL O.K. will appear on the display. If any of the sensors listed under Existing Problem Diagnosis Test are defective, that sensor will be indicated on the display. Proceed then to check the defective sensor individually as covered in this section.

■ **NOTE:** If proceeding to another test, first press the TEST button once again to cancel the present test. To select a different test function, use the MENU SELECT buttons.

MEMORY PROBLEM DIAGNOSIS TEST (ENGINE OFF) FUNCTION

■ **NOTE:** When using an analyzer which has been updated with the new EPROM chip, first select KOKUSAN by pressing the TEST button. This will allow the testing of the batteryless EFI system.

1. With the analyzer OFF, connect its wiring harness to the diagnosis test plug. Connect the external leads of the harness to a good 12-volt battery.
2. Switch the analyzer ON.
3. With both indicator lights illuminated, press the MENU SELECT buttons repeatedly until Memory Problem Diagnosis Test appears on the display.

Memory Problem Diagnosis TEST

4. Press the analyzer TEST button. If there has been an intermittent problem in a sensor, that sensor will be indicated on the display. Make necessary repairs.

■ **NOTE:** If proceeding to another test, first press the TEST button once again to cancel the present test. To select a different test function, use the MENU SELECT buttons.

CLEARING MEMORY

1. With the analyzer harness attached to the diagnosis test plug, press the MENU SELECT buttons until the words Diagnosis Memory Clear appear on the display.

Diagnosis Memory Clear

2. Press the analyzer TEST button and the words Please Key Off should appear on the LCD; then turn the analyzer switch to the OFF position. Immediately turn the analyzer switch to the ON position and the memory should now be clear.

Please Key Off

■ **NOTE:** To check if the memory is clear, perform Memory Problem Diagnosis Test to see if all sensors test good. If a problem still remains on memory, repeat Clearing Memory procedure.

THROTTLE VALVE ANGLE TEST (DEGREES/VOLTS) FUNCTION

The correct throttle valve angle is extremely important for proper engine operation. If the throttle valve angle isn't correct in the idle position, the engine may be very difficult to start "cold." If the throttle valve angle isn't correct in any of the off-idle positions, engine damage or poor performance may result because of an incorrect mixture.

■ **NOTE:** When using an analyzer which has been updated with the new EPROM chip, first select KOKUSAN by pressing the TEST button. This will allow the testing of the batteryless EFI system.

1. Connect the analyzer harness to the diagnosis test plug. Make sure the analyzer is OFF.
2. Switch the analyzer ON.
3. With the analyzer power light illuminated, press the MENU SELECT buttons on the analyzer repeatedly until the words Throttle Valve Angle appear on the display.

Throttle Valve Angle

■ **NOTE:** When performing the Throttle Valve Angle Test, test both the idle and full-open throttle positions. Specifications are given for both positions in degrees and volts.

- With the throttle in the “idle” position (engine not running), press the analyzer TEST button. The throttle valve angle should now appear on the display.

| Throttle Valve Angle - Degrees | | |
|--------------------------------|-----------------|-------------------|
| Model | Idle | Full-Open (Volts) |
| 500 EFI | 3.715° - 4.065° | 77.265° - 86.135° |
| 580 EFI | 7.85° - 8.00° | 75.37° - 86.135° |
| 600 EFI | 3.715° - 4.065° | 77.265° - 86.135° |

| Throttle Valve Angle - Voltage | | | |
|--------------------------------|---------------|-------------------|---------------------|
| Model | Idle (Volts) | Full-Open (Volts) | Full-Closed (Volts) |
| 500 EFI | 0.625 - 0.647 | 3.575 - 3.937 | 0.404 |
| 580 EFI | 0.780 | 3.575 - 3.937 | 0.544 |
| 600 EFI | 0.625 - 0.647 | 3.575 - 3.937 | 0.404 |

- If the “idle” position throttle valve angle or voltage isn’t within test specifications, push down on the throttle shaft to make sure it is fully closed. If the test specifications are now within tolerance, loosen the throttle cable.
- If the “idle” position throttle valve angle test specification remains out of tolerance, adjust the idle speed screw. If the throttle valve angle cannot be corrected by either an idle speed screw or cable adjustment, replace the throttle body assembly.
- Compress the throttle lever to the “full-open” position (engine not running). The test specification must be within the tolerance shown in chart. If the test specification is out of tolerance, grasp the throttle cable next to the throttle shaft and pull on the cable. If the test specification is now within tolerance, adjust the throttle cable. If the throttle valve angle remains out of tolerance, replace the throttle body assembly.
- If the specifications listed below ARE DISPLAYED during the test, replace the throttle body assembly.

| Throttle Valve Angle - Degrees/Volts | |
|--------------------------------------|--------------|
| Degrees/Volts | RPM Range |
| 2.25/0.570 | Idle to 3000 |

■ **NOTE:** If the Throttle Position Sensor should fail, the ECU will go into the “limp home” mode and the above readings in the idle position will be displayed.

■ **NOTE:** If proceeding to another test, first press the TEST button once again to cancel the present test. To select a different test function, use the MENU SELECT buttons.

INTAKE AIR TEMPERATURE SENSOR (ENGINE OFF) FUNCTION

■ **NOTE:** When using an analyzer which has been updated with the new EPROM chip, first select KOKUSAN by pressing the TEST button. This will allow the testing of batteryless EFI system.

- With the analyzer OFF, connect its harness to the diagnosis test plug. Connect the external leads of the harness to a good 12-volt battery.
- Switch the analyzer ON.
- With the analyzer power light illuminated, press the MENU SELECT buttons repeatedly until Intake Air Temperature appears on the display.

Intake Air Temperature

- Press the analyzer TEST button and the intake air temperature will be indicated on the display.

■ **NOTE:** Intake air temperature will be displayed in both °C and °F.

■ **NOTE:** The temperature indicated should be close to room temperature if the snowmobile hasn’t recently been run. Consider what temperature the snowmobile is actually at.

- If when testing the intake air temperature sensor, an indicated temperature of -40°C and °F is noted and the actual snowmobile temperature isn’t close to this temperature, replace the sensor. The ECU will automatically go to -40°C and °F when the intake air temperature sensor fails.

■ **NOTE:** If proceeding to another test, first press the TEST button once again to cancel the present test. To select a different test function, use the MENU SELECT buttons.

WATER TEMPERATURE SENSOR TEST (ENGINE RUNNING) FUNCTION

■ **NOTE:** The water temperature sensor can be checked in both Celsius and Fahrenheit. Perform this test on a engine that has not been run in several hours and has coolant at room temperature.

■ **NOTE:** When using an analyzer which has been updated with the new EPROM chip, first select KOKUSAN by pressing the TEST button. This will allow the testing of the batteryless EFI system.

- Place the rear of the snowmobile on a safety stand.

2. Attach the analyzer harness (analyzer OFF) to the diagnosis test plug.
3. Switch the analyzer ON.
4. With the analyzer power light illuminated, press the analyzer MENU SELECT buttons repeatedly until the words Water Temperature appear on the display.

Water Temperature

5. Press the TEST button and the display will indicate coolant temperature in both °C and °F. If the temperature displayed doesn't seem close to the actual coolant temperature, replace the sensor.

■ **NOTE:** If the water temperature sensor has failed, the ECU will automatically indicate the specifications following for each RPM. If these specifications ARE INDICATED at the RPM shown, replace the water temperature sensor.

| Celsius | Fahrenheit | RPM |
|---------|------------|--------------|
| 0° | 32° | Idle to 3000 |
| 30° | 86° | 3000 to 5000 |
| 60° | 140° | over 5000 |

■ **NOTE:** If proceeding to another test, first press the TEST button once again to cancel the present test. To select a different test function, use the MENU SELECT buttons.

BAROMETRIC PRESSURE SENSOR TEST (ENGINE OFF) FUNCTION

■ **NOTE:** When using an analyzer which has been updated with the new EPROM chip, first select KOKUSAN by pressing the TEST button. This will allow the testing of the batteryless EFI system.

1. With the analyzer OFF, attach its harness to the diagnosis test plug.
2. Switch the analyzer ON.
3. With the analyzer power light illuminated, press the MENU SELECT buttons repeatedly until the words Barometric Pressure appear on the display.

Barometric Pressure

4. Press the analyzer TEST button and actual area barometric pressure will be indicated.

■ **NOTE:** Actual area barometric pressure can be obtained from a local airport, radio station, etc.

5. If the barometric pressure sensor has failed, the ECU will automatically go to the barometric pressure shown below. If these readings APPEAR on the display, replace the ECU.

| Model | Barometric Pressure | |
|---------|---------------------|----------------|
| 500 EFI | 880 mm/hg | (34.65 in./hg) |
| 580 EFI | 880 mm/hg | (34.65 in./hg) |
| 600 EFI | 880 mm/hg | (34.65 in./hg) |

Peak Voltage Tests and Specifications (1997-2000 Batteryless Models)

■ **NOTE:** Use external jacks (red and black) on all tests except trigger coil output test. Use green and black jacks for the trigger coil output test.

Fuel Pump Coil Test (Static)

1. Remove the spark plugs and ground them to the cylinder heads.
2. Unplug orange leads from stator and test between the two orange wires from the stator.
3. Pull the recoil briskly. Reading should be 13 volts or higher.

Fuel Pump Coil Test (Running)

1. Connect the two orange leads from the stator to the ECU.
2. Insert a paper clip into each orange wire connector making contact with its terminal.
3. Start the engine and test between the two orange leads. Reading should be approximately 13 to 15 volts.

ECU Output To Fuel Pump (Running)

1. With the engine running, test between the red and black leads in the pump connector.
2. Reading should be 12 to 15 volts.

■ **NOTE:** If the output between the orange leads to the ECU are within tolerance but the ECU output is low, replace the ECU. If the ECU output is within specifications but the fuel pump fails to operate, replace the fuel pump.

Injector Coil Output Test (Static)

1. Remove the spark plugs and ground them to the cylinder heads.
2. Unplug the double lead connector at the ECU having two blue/white wires.
3. Test between the two blue/white leads in the connector harness from the stator plate.
4. Pull the recoil briskly. Reading should be approximately 80 volts.

Injector Coil Output Test (Running)

1. Install the spark plugs and tighten securely.
2. Connect the double lead connector to the ECU leaving just enough room to make contact with the meter test probes.
3. Start the engine and test between the two blue/white leads in the double connector. Reading should be approximately 20 to 22 volts.

ECU Output To The Injectors (Number 1 Injector)

1. Using two paper clips, insert them into the number 1 (MAG-side) connector (yellow and yellow/red leads) at the injector from the back side. Leave the connector attached to the injector. Touch red meter lead to yellow and black to yellow/red.
2. Start the engine. Reading should be approximately 20 volts.

■ **NOTE:** Repeat the same test as above for injector number 2. Switch meter leads to the green and green/red leads. Reading should be approximately 20 volts.

High Speed Charge Coil Test (Static)

1. Remove the spark plugs and ground them to the cylinder heads.
2. Unplug the triple plug connector (brown - black - green) from the ECU.
3. Test between the green and black wires in the triple plug connector from the stator. Pull the recoil briskly. Reading should be 48 volts or higher.

High Speed Charge Coil Test (Running)

1. Install the spark plugs and tighten securely.
2. Connect the triple lead connector to the ECU; then using two paper clips enter the connector from the back side and make contact with the green and black wire terminals.
3. Start the engine and test between the green and black wires in the triple lead connector. Readings should be as follows:

| RPM | VOLTS |
|------|-------|
| 2000 | 112 |
| 3000 | 168 |
| 4000 | 216 |

Low Speed Charge Coil Test (Static)

1. Remove the spark plugs and ground them to the cylinder heads.
2. Unplug the triple plug connector (brown -black - green) from the ECU.
3. Test between the green and brown wires in the triple plug connector from the stator. Pull the recoil briskly. Reading should be 84 volts or higher.

Low Speed Charge Coil Test (Running)

1. Install the spark plugs and tighten securely.
2. Using two small paper clips, enter the back side of the triple plug connector and make contact with the green and brown terminals. Be careful so paper clips don't contact each other.
3. Start the engine and test between the green and black wires. Readings should be as follows:

| RPM | VOLTS |
|------|-------|
| 2000 | 104 |
| 3000 | 176 |
| 4000 | 200 |

ECU Output To External Coil (Static)

1. Remove the spark plugs and ground them to the cylinder heads.
2. Leaving the external coil connected to the ECU, contact one small lead with the black meter probe and the other small lead with the red probe. Pull the recoil briskly. Reading should be 145 volts or higher.

ECU Output To External Coil (Running)

1. Install the spark plugs and tighten securely.
2. Connect the black meter probe to one small lead and the red probe to the other small lead.
3. Start the engine. Readings should be as follows:

| RPM | VOLTS |
|------|-------|
| 2000 | 154 |
| 3000 | 152 |
| 4000 | 156 |

■ **NOTE:** If the CDI unit isn't within specifications and if the high and low speed charge coil readings were within specifications, replace the ECU.

Ignition Timing Sensor Output (Static)

1. Remove the spark plugs and ground them to the cylinder heads.
2. Unplug the 2-lead connector of the timing sensor harness. Test between the green/white and brown wires in the connector from the sensor.
3. Pull the recoil briskly. Reading should be 1.5 volts or higher.

Air Temperature Sensor Output Voltage Test From ECU

1. Remove the spark plugs and ground them to the cylinder heads.
2. Unplug the blue and black leads from the air temperature sensor.
3. Test between the blue and black leads from the ECU. Pull the recoil briskly. Reading should be approximately 4.5 to 5 volts.

Water Temperature Sensor Output Voltage Test From ECU

1. Remove the spark plugs and ground them to the cylinder heads.
2. Unplug the yellow and black leads from ECU to the water temperature sensor. Test between the yellow and black leads from the ECU. Pull the recoil briskly. Reading should be approximately 4.5 to 5 volts.

■ **NOTE:** If either the air temperature or water temperature sensor output test is low, retest to confirm results. If either test remains out of specifications, replace the ECU.

Throttle Position Sensor

Arctic Cat does not recommend replacement of the throttle position sensor on the batteryless EFI system. If the sensor should malfunction, the complete throttle body assembly must be replaced.

■ **NOTE:** It is important to order a throttle body assembly with the same symbol marking on the injectors as the ones being replaced. The symbol is located on the side of the injector top.

Throttle Body Flange

REMOVING

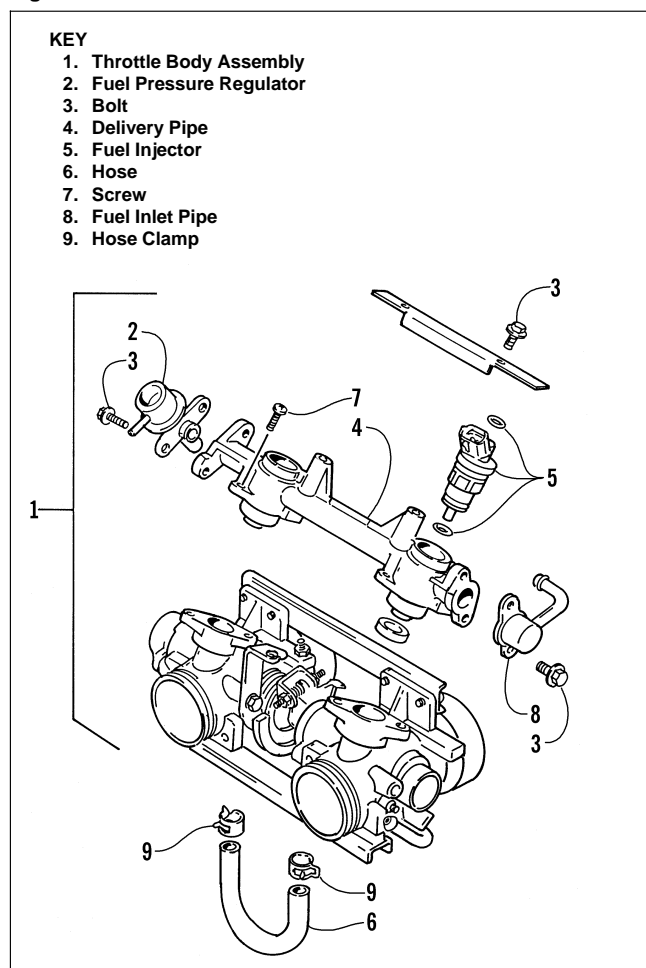
1. Loosen the clamps securing the throttle body assembly to the throttle body flanges.
2. Remove the throttle body assembly from the flanges.
3. In turn on each flange, remove the two nuts, lock washers, and flat washers securing the intake flange to the cylinder; then remove the flange.

INSTALLING

1. Apply a thin coat of high-temperature silicone to the cylinder side of each flange; then attach each flange to a cylinder and secure each with two flat washers, lock washers, and nuts. Tighten to 1.5-1.9 kg-m (11-14 ft-lb).
2. Install the flange clamps on the flanges; then place the throttle body assembly into the flanges and secure with the clamps.
3. Secure all wires and hoses with cable ties.

Throttle Body Assembly

Fig. 4-144



0735-159

REMOVING

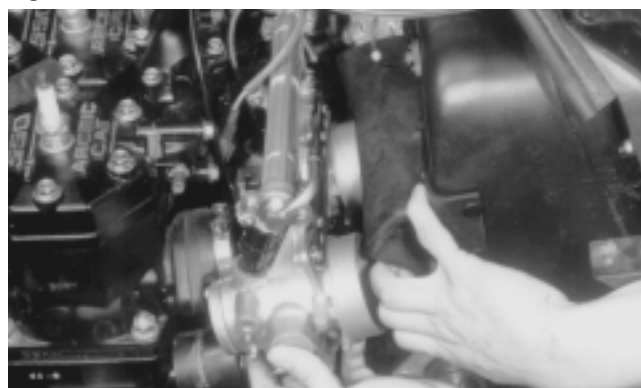
1. Disconnect the wiring harness from each injector and from the throttle valve sensor connector.
2. Remove the coolant hose from the PTO-side of the throttle body and plug it to prevent leakage.
3. Remove the fuel return and supply hoses from the fuel pressure regulator and delivery pipe. Label for assembly.

CAUTION

Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb fuel.

4. Loosen the flange clamps.
5. Slide the throttle body assembly out of the flanges; then loosen the jam nut securing the throttle cable and remove.
6. Remove the throttle body.

Fig. 4-145



AR113

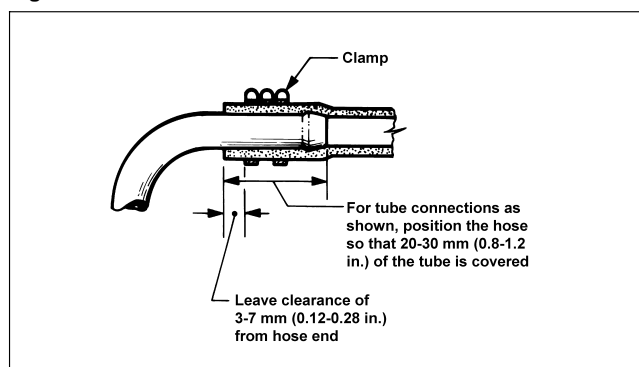
INSTALLING

1. Attach the throttle cable to the throttle body. Secure with jam nut.
2. Place the throttle body assembly into position. Make sure the flanges and boots are positioned properly. Secure with flange clamps.
3. Secure the fuel supply and return hoses to the delivery pipe and regulator.

CAUTION

These hoses must be connected to the correct fittings.

Fig. 4-146



0729-325

4. Secure the coolant hose to throttle body assembly.
5. Connect the wiring harness to each injector and throttle valve sensor.

6. Place the rear of the snowmobile on a shielded safety stand and start the engine without touching the throttle. It may idle slowly and stop. Restart using the same procedure until the engine starts and builds RPM on its own.

WARNING

Check all hose connections for leakage. Repair as necessary.

7. Check the cooling system.
8. Adjust the throttle cable as necessary.

Throttle Cable

REMOVING

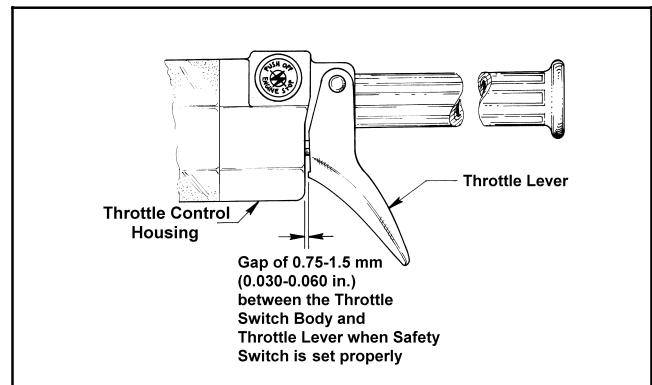
1. Open the belt guard and remove the belt.
2. Remove the driven pulley.
3. Remove the E-clip securing the oil-injection cable to the oil-injection pump control arm. Account for a washer.
4. Loosen the oil-injection cable jam nuts.
5. Loosen the throttle cable jam nuts.
6. Remove the throttle cable from the throttle body assembly.
7. Remove the handlebar pad.
8. Remove the cable ties securing the throttle cable.
9. Remove the throttle cable end from the throttle lever.
10. Remove the retaining ring securing the cable to the throttle switch assembly; then remove the cable from the throttle switch assembly.

INSTALLING/ADJUSTING

1. Install the throttle cable into the throttle switch assembly. Secure with a retaining ring.

2. Install the throttle cable end on the throttle lever.
3. Route the throttle cable from the throttle switch assembly to the throttle body assembly and oil-injection pump; avoid any sharp bends or moving components.
4. Attach the throttle cable to the throttle body.
5. Install the oil-injection cable adjuster on the oil-injection pump; secure with the jam nuts.
6. Install the oil-injection cable on the control arm; secure with a washer and E-clip.
7. Secure the throttle cable to the steering post with cable ties.
8. Install the handlebar pad.
9. Adjust the throttle cable tension by turning the jam nuts in the appropriate direction until there is 0.75-1.5 mm (0.030-0.060 in.) free-play in the throttle lever and the butterfly completely opens and closes. Tighten the jam nuts securely.

Fig. 4-147



733-081C

CAUTION

Compress the throttle control lever to ensure free movement. If the throttle cable sticks or binds, correct the problem before starting the engine.

10. Synchronize the oil-injection pump.
11. Install the driven pulley.
12. Install the belt and secure the belt guard.

BASIC EFI SYSTEM INFORMATION

| Item | | Description | |
|--------------------------------------|----------------------|---|--|
| Basic system | Fuel supply system | Electronically controlled multi-point injection | |
| | Ignition system | (CDI system) Digital | |
| Air/fuel flow meter | System | O/N (throttle opening/engine revolution) system & atmospheric pressure compensation | |
| | Component parts | Throttle opening sensor Atmospheric pressure sensor | |
| Injection system | | One time simultaneous injection per revolution (synchronized ignition) | |
| Fuel system | Fuel pressure | Regulated high pressure 37.9 ± 2.2 psi | |
| | Fuel return | Pressure regulated by pressure regulator. There are fuel returns. | |
| Throttle system | System | 1 stage x duplex (1 bore/cylinder) | |
| | Diameter of the bore | 46 x 2 (Effective area equivalent to 40) | |
| | Type of valve | Butterfly type | |
| | Operating angle | 80° (full closed angle 10°) | |
| | Radius of drum | R25 (at wire center) | |
| Adjusting system for idle revolution | | Throttle adjusting screw type | |
| Component parts and specifications | Control unit | | Fuel injection control |
| | Fuel system | Fuel pump | Gear type |
| | | Injection | Side feed type |
| | | Pressure regulator | Diaphragm type |
| | | Fuel filter | Fine screens on pick-up hose |
| | | Fuel piping | High pressure specification 37.9 ± 2.2 psi |
| | Throttle body | | 1 bore/cylinder x duplex |
| | Sensor, etc. | Throttle sensor | Revolution scrubbing type potentiometer |
| | | Pressure sensor | Semiconductor type |
| | | Water temperature sensor | Thermistor type |
| | | Intake air temperature sensor | Thermistor type |
| | Cable harness | | Equivalent to current harness |
| | Other | | Batteryless EFI System |

EFI COMPONENT VOLTAGE/RESISTANCE CHART AIR TEMPERATURE

| TEMP/C | TEMP/F | VOLTAGE | OHMS |
|--------|--------|---------|------|
| 100 | 212 | 0.113 | 555 |
| 98 | 208 | 0.121 | 595 |
| 96 | 205 | 0.128 | 635 |
| 94 | 201 | 0.136 | 675 |
| 92 | 198 | 0.143 | 715 |
| 90 | 194 | 0.151 | 755 |
| 88 | 190 | 0.162 | 819 |
| 86 | 187 | 0.173 | 883 |
| 84 | 183 | 0.184 | 947 |
| 82 | 180 | 0.195 | 1011 |
| 80 | 176 | 0.206 | 1075 |
| 78 | 172 | 0.222 | 1160 |
| 76 | 169 | 0.238 | 1245 |
| 74 | 165 | 0.253 | 1330 |
| 72 | 162 | 0.269 | 1415 |
| 70 | 158 | 0.285 | 1500 |
| 68 | 154 | 0.308 | 1640 |
| 66 | 151 | 0.331 | 1780 |
| 64 | 147 | 0.353 | 1920 |
| 62 | 144 | 0.376 | 2060 |
| 60 | 140 | 0.399 | 2200 |
| 58 | 136 | 0.432 | 2410 |
| 56 | 133 | 0.465 | 2620 |
| 54 | 129 | 0.498 | 2830 |
| 52 | 126 | 0.531 | 3040 |
| 50 | 122 | 0.564 | 3250 |
| 48 | 118 | 0.612 | 3595 |
| 46 | 115 | 0.659 | 3940 |
| 44 | 111 | 0.707 | 4285 |
| 42 | 108 | 0.754 | 4630 |
| 40 | 104 | 0.802 | 4975 |
| 38 | 100 | 0.869 | 5490 |
| 36 | 97 | 0.937 | 6005 |
| 34 | 93 | 1.004 | 6520 |
| 32 | 90 | 1.072 | 7035 |
| 30 | 86 | 1.139 | 7550 |

| TEMP/C | TEMP/F | VOLTAGE | OHMS |
|--------|--------|---------|--------|
| 28 | 82 | 1.230 | 8540 |
| 26 | 79 | 1.322 | 9530 |
| 24 | 75 | 1.413 | 10520 |
| 22 | 72 | 1.505 | 11510 |
| 20 | 68 | 1.596 | 12500 |
| 18 | 64 | 1.716 | 14020 |
| 16 | 61 | 1.836 | 15540 |
| 14 | 57 | 1.955 | 17060 |
| 12 | 54 | 2.075 | 18580 |
| 10 | 50 | 2.195 | 20100 |
| 8 | 46 | 2.323 | 23060 |
| 6 | 43 | 2.452 | 26020 |
| 4 | 39 | 2.580 | 28980 |
| 2 | 36 | 2.709 | 31940 |
| 0 | 32 | 2.837 | 34900 |
| -2 | 28 | 2.969 | 39940 |
| -4 | 25 | 3.101 | 44980 |
| -6 | 21 | 3.233 | 50020 |
| -8 | 18 | 3.365 | 55060 |
| -10 | 14 | 3.497 | 60100 |
| -12 | 10 | 3.610 | 76080 |
| -14 | 7 | 3.722 | 92060 |
| -16 | 3 | 3.835 | 108040 |
| -18 | -0.4 | 3.947 | 124020 |
| -20 | -4 | 4.060 | 140000 |
| -22 | -8 | 4.142 | 156000 |
| -24 | -11 | 4.224 | 172000 |
| -26 | -15 | 4.306 | 188000 |
| -28 | -18 | 4.388 | 204000 |
| -30 | -22 | 4.470 | 220000 |
| -32 | -26 | 4.522 | 261000 |
| -34 | -29 | 4.574 | 302000 |
| -36 | -32 | 4.625 | 343000 |
| -38 | -36 | 4.677 | 384000 |
| -40 | -40 | 4.729 | 425000 |

EFI COMPONENT VOLTAGE/RESISTANCE CHART WATER TEMPERATURE

| TEMP/C | TEMP/F | VOLTAGE | OHMS |
|--------|--------|---------|------|
| 110 | 230 | 0.115 | 129 |
| 108 | 226 | 0.129 | 137 |
| 106 | 223 | 0.143 | 145 |
| 104 | 219 | 0.157 | 153 |
| 102 | 216 | 0.171 | 161 |
| 100 | 212 | 0.185 | 169 |
| 98 | 208 | 0.192 | 180 |
| 96 | 205 | 0.199 | 191 |
| 94 | 201 | 0.206 | 202 |
| 92 | 198 | 0.213 | 213 |
| 90 | 194 | 0.220 | 224 |
| 88 | 190 | 0.235 | 240 |
| 86 | 187 | 0.250 | 256 |
| 84 | 183 | 0.265 | 273 |
| 82 | 180 | 0.280 | 289 |
| 80 | 176 | 0.295 | 305 |
| 78 | 172 | 0.317 | 327 |
| 76 | 169 | 0.339 | 349 |
| 74 | 165 | 0.361 | 371 |
| 72 | 162 | 0.383 | 393 |
| 70 | 158 | 0.405 | 415 |
| 68 | 154 | 0.438 | 445 |
| 66 | 151 | 0.471 | 475 |
| 64 | 147 | 0.504 | 505 |
| 62 | 144 | 0.537 | 535 |
| 60 | 140 | 0.570 | 565 |
| 58 | 136 | 0.598 | 609 |
| 56 | 133 | 0.626 | 653 |
| 54 | 129 | 0.654 | 697 |
| 52 | 126 | 0.682 | 741 |
| 50 | 122 | 0.710 | 785 |
| 48 | 118 | 0.759 | 849 |
| 46 | 115 | 0.808 | 913 |
| 44 | 111 | 0.857 | 977 |
| 42 | 108 | 0.906 | 1041 |
| 40 | 104 | 0.955 | 1105 |
| 38 | 100 | 1.023 | 1214 |
| 36 | 97 | 1.091 | 1323 |
| 34 | 93 | 1.159 | 1432 |
| 32 | 90 | 1.227 | 1541 |
| 30 | 86 | 1.295 | 1650 |

| TEMP/C | TEMP/F | VOLTAGE | OHMS |
|--------|--------|---------|-------|
| 28 | 82 | 1.377 | 1800 |
| 26 | 79 | 1.459 | 1950 |
| 24 | 75 | 1.541 | 2100 |
| 22 | 72 | 1.623 | 2250 |
| 20 | 68 | 1.705 | 2400 |
| 18 | 64 | 1.806 | 2670 |
| 16 | 61 | 1.907 | 2940 |
| 14 | 57 | 2.008 | 3210 |
| 12 | 54 | 2.109 | 3480 |
| 10 | 50 | 2.210 | 3750 |
| 8 | 46 | 2.327 | 4170 |
| 6 | 43 | 2.444 | 4590 |
| 4 | 39 | 2.561 | 5010 |
| 2 | 36 | 2.678 | 5430 |
| 0 | 32 | 2.795 | 5850 |
| -2 | 28 | 2.901 | 6510 |
| -4 | 25 | 3.007 | 7170 |
| -6 | 21 | 3.113 | 7830 |
| -8 | 18 | 3.219 | 8490 |
| -10 | 14 | 3.325 | 9150 |
| -12 | 10 | 3.421 | 9422 |
| -14 | 7 | 3.517 | 9694 |
| -16 | 3 | 3.613 | 9966 |
| -18 | -0.4 | 3.709 | 10238 |
| -20 | -4 | 3.805 | 10510 |
| -22 | -8 | 3.885 | 13688 |
| -24 | -11 | 3.965 | 16866 |
| -26 | -15 | 4.045 | 20044 |
| -28 | -18 | 4.125 | 23222 |
| -30 | -22 | 4.205 | 26400 |
| -32 | -26 | 4.267 | 30520 |
| -34 | -29 | 4.329 | 34640 |
| -36 | -32 | 4.391 | 38760 |
| -38 | -36 | 4.453 | 42880 |
| -40 | -40 | 4.515 | 47000 |
| -42 | -44 | 4.553 | 55100 |
| -44 | -47 | 4.591 | 63200 |
| -46 | -51 | 4.629 | 71300 |
| -48 | -54 | 4.667 | 79400 |
| -50 | -58 | 4.705 | 87500 |

EFICOMP3

EFI EPROM CHIP USAGE CHART (1971-1998)

| PART NUMBER | MODEL | SYSTEM | FUEL | COLOR/ SYMBOL |
|-------------|----------|---------|---------|------------------|
| 3004-103 | 1991 700 | Battery | Gas | Red |
| 3004-104 | 1991 700 | Battery | Gas | Yellow |
| 3004-105 | 1991 700 | Battery | Gas | Blue |
| 3004-242 | 1991 700 | Battery | Ethanol | Red |
| 3004-243 | 1991 700 | Battery | Ethanol | Yellow |
| 3004-244 | 1991 700 | Battery | Ethanol | Blue |
| 3004-271 | 1992 550 | Battery | Gas | Red |
| 3004-272 | 1992 550 | Battery | Gas | Yellow |
| 3004-273 | 1992 550 | Battery | Gas | Blue |
| 3004-239 | 1992 550 | Battery | Ethanol | Red |
| 3004-240 | 1992 550 | Battery | Ethanol | Yellow |
| 3004-241 | 1992 550 | Battery | Ethanol | Blue |
| 3004-109 | 1992 700 | Battery | Gas | Red |
| 3004-110 | 1992 700 | Battery | Gas | Yellow |
| 3004-111 | 1992 700 | Battery | Gas | Blue |
| 3004-245 | 1992 700 | Battery | Ethanol | Red |
| 3004-246 | 1992 700 | Battery | Ethanol | Yellow |
| 3004-247 | 1992 700 | Battery | Ethanol | Blue |
| 3004-291 | 1993 700 | Battery | Gas | Red |
| 3004-292 | 1993 700 | Battery | Gas | Yellow |
| 3004-293 | 1993 700 | Battery | Gas | Blue |
| 3004-248 | 1993 700 | Battery | Ethanol | Red |
| 3004-248 | 1993 700 | Battery | Ethanol | Yellow |
| 3004-250 | 1993 700 | Battery | Ethanol | Blue |
| 3004-271 | 1993 550 | Battery | Gas | Red |
| 3004-272 | 1993 550 | Battery | Gas | Yellow |
| 3004-273 | 1993 550 | Battery | Gas | Blue |
| 3004-239 | 1993 550 | Battery | Ethanol | Red |
| 3004-240 | 1993 550 | Battery | Ethanol | Yellow |
| 3004-241 | 1993 550 | Battery | Ethanol | Blue |
| 3004-681 | 1994 700 | Battery | Gas | Red |
| 3004-682 | 1994 700 | Battery | Gas | Yellow |
| 3004-683 | 1994 700 | Battery | Gas | Blue |
| 3004-312 | 1994 700 | Battery | Ethanol | Red |
| 3004-313 | 1994 700 | Battery | Ethanol | Yellow |
| 3004-314 | 1994 700 | Battery | Ethanol | Blue |
| 3004-902 | 1994 580 | Battery | Gas | Red |
| 3004-903 | 1994 580 | Battery | Gas | Yellow |
| 3004-904 | 1994 580 | Battery | Gas | Blue |
| 3004-309 | 1994 580 | Battery | Ethanol | Red |
| 3004-310 | 1994 580 | Battery | Ethanol | Yellow |
| 3004-311 | 1994 580 | Battery | Ethanol | Blue |
| 3004-678 | 1994 550 | Battery | Gas | Red |
| 3004-679 | 1994 550 | Battery | Gas | Yellow |
| 3004-680 | 1994 550 | Battery | Gas | Blue |
| 3004-306 | 1994 550 | Battery | Ethanol | Red |
| 3004-307 | 1994 550 | Battery | Ethanol | Yellow |
| 3004-308 | 1994 550 | Battery | Ethanol | Blue |
| 3004-694 | 1994 440 | Battery | Gas | Red |
| 3004-695 | 1994 440 | Battery | Gas | Yellow |
| 3004-696 | 1994 440 | Battery | Gas | Blue |
| 3004-303 | 1994 440 | Battery | Ethanol | Red |
| 3004-304 | 1994 440 | Battery | Ethanol | Yellow |
| 3004-305 | 1994 440 | Battery | Ethanol | Blue |
| 3004-662 | 1995 700 | Battery | Gas | Red |
| 3004-663 | 1995 700 | Battery | Gas | Yellow |
| 3004-664 | 1995 700 | Battery | Gas | Blue |

| PART NUMBER | MODEL | SYSTEM | FUEL | COLOR/ SYMBOL |
|-------------|----------|-------------|---------|------------------|
| 3004-732 | 1995 700 | Battery | Ethanol | Red |
| 3004-733 | 1995 700 | Battery | Ethanol | Yellow |
| 3004-734 | 1995 700 | Battery | Ethanol | Blue |
| 3004-906 | 1995 580 | Battery | Gas | Red |
| 3004-907 | 1995 580 | Battery | Gas | Yellow |
| 3004-908 | 1995 580 | Battery | Gas | Blue |
| 3004-735 | 1995 580 | Battery | Ethanol | Red |
| 3004-736 | 1995 580 | Battery | Ethanol | Yellow |
| 3004-737 | 1995 580 | Battery | Ethanol | Blue |
| 3004-662 | 1996 700 | Battery | Gas | Red |
| 3004-663 | 1996 700 | Battery | Gas | Yellow |
| 3004-664 | 1996 700 | Battery | Gas | Blue |
| 3004-933 | 1996 580 | Battery | Gas | Red |
| 3004-934 | 1996 580 | Battery | Gas | Yellow |
| 3004-935 | 1996 580 | Battery | Gas | Blue |
| 3004-938 | 1996 580 | Battery | Ethanol | Red |
| 3004-939 | 1996 580 | Battery | Ethanol | Yellow |
| 3004-940 | 1996 580 | Battery | Ethanol | Blue |
| 3005-036 | 1997 580 | Battery* | Gas | Red |
| 3005-037 | 1997 580 | Battery* | Gas | Yellow |
| 3005-038 | 1997 580 | Battery* | Gas | Blue |
| 3005-092 | 1997 580 | Battery* | Ethanol | Red |
| 3005-093 | 1997 580 | Battery* | Ethanol | Yellow |
| 3005-094 | 1997 580 | Battery* | Ethanol | Blue |
| 3005-088 | 1997 580 | Batteryless | Gas | ● |
| 3005-089 | 1997 580 | Batteryless | Gas | ■ |
| 3005-090 | 1997 580 | Batteryless | Gas | ▲ |
| 3005-098 | 1997 580 | Batteryless | Ethanol | ● |
| 3005-099 | 1997 580 | Batteryless | Ethanol | ■ |
| 3005-100 | 1997 580 | Batteryless | Ethanol | ▲ |
| 3005-036 | 1998 580 | Battery | Gas | Red |
| 3005-037 | 1998 580 | Battery | Gas | Yellow |
| 3005-038 | 1998 580 | Battery | Gas | Blue |
| 3005-092 | 1998 580 | Battery | Ethanol | Red |
| 3005-093 | 1998 580 | Battery | Ethanol | Yellow |
| 3005-094 | 1998 580 | Battery | Ethanol | Blue |
| 3005-192 | 1998 580 | Batteryless | Gas | ● |
| 3005-193 | 1998 580 | Batteryless | Gas | ■ |
| 3005-194 | 1998 580 | Batteryless | Gas | ▲ |
| 3005-273 | 1998 580 | Batteryless | Ethanol | ● |
| 3005-274 | 1998 580 | Batteryless | Ethanol | ■ |
| 3005-275 | 1998 580 | Batteryless | Ethanol | ▲ |
| 3005-463 | 1998 600 | Batteryless | Gas | ● |
| 3005-464 | 1998 600 | Batteryless | Gas | ■ |
| 3005-465 | 1998 600 | Batteryless | Gas | ▲ |
| 3005-477 | 1998 600 | Batteryless | Ethanol | ● |
| 3005-478 | 1998 600 | Batteryless | Ethanol | ■ |
| 3005-479 | 1998 600 | Batteryless | Ethanol | ▲ |

■ NOTE: Kokusan EPROM must be marked K.

* DC EPROM will not interchange with previous years.

EFI EPROM CHIP USAGE CHART (1999-2000)

| PART NUMBER | MODEL | SYSTEM | FUEL | COLOR/ SYMBOL |
|-------------|----------|-------------|------|---------------|
| 3005-463 | 1999 600 | Batteryless | Both | ● |
| 3005-464 | 1999 600 | Batteryless | Both | ■ |
| 3005-465 | 1999 600 | Batteryless | Both | ▲ |
| 3005-466 | 1999 500 | Batteryless | Both | ● |
| 3005-467 | 1999 500 | Batteryless | Both | ■ |
| 3005-468 | 1999 500 | Batteryless | Both | ▲ |
| 3005-469 | 1999 580 | Batteryless | Both | ● |
| 3005-470 | 1999 580 | Batteryless | Both | ■ |
| 3005-471 | 1999 580 | Batteryless | Both | ▲ |

| PART NUMBER | MODEL | SYSTEM | FUEL | COLOR/ SYMBOL |
|-------------|----------|-------------|------|---------------|
| 3005-672 | 2000 600 | Batteryless | Both | ● |
| 3005-673 | 2000 600 | Batteryless | Both | ■ |
| 3005-674 | 2000 600 | Batteryless | Both | ▲ |
| 3005-615 | 2000 500 | Batteryless | Both | ● |
| 3005-616 | 2000 500 | Batteryless | Both | ■ |
| 3005-617 | 2000 500 | Batteryless | Both | ▲ |
| 3005-618 | 2000 580 | Batteryless | Both | ● |
| 3005-619 | 2000 580 | Batteryless | Both | ■ |
| 3005-620 | 2000 580 | Batteryless | Both | ▲ |

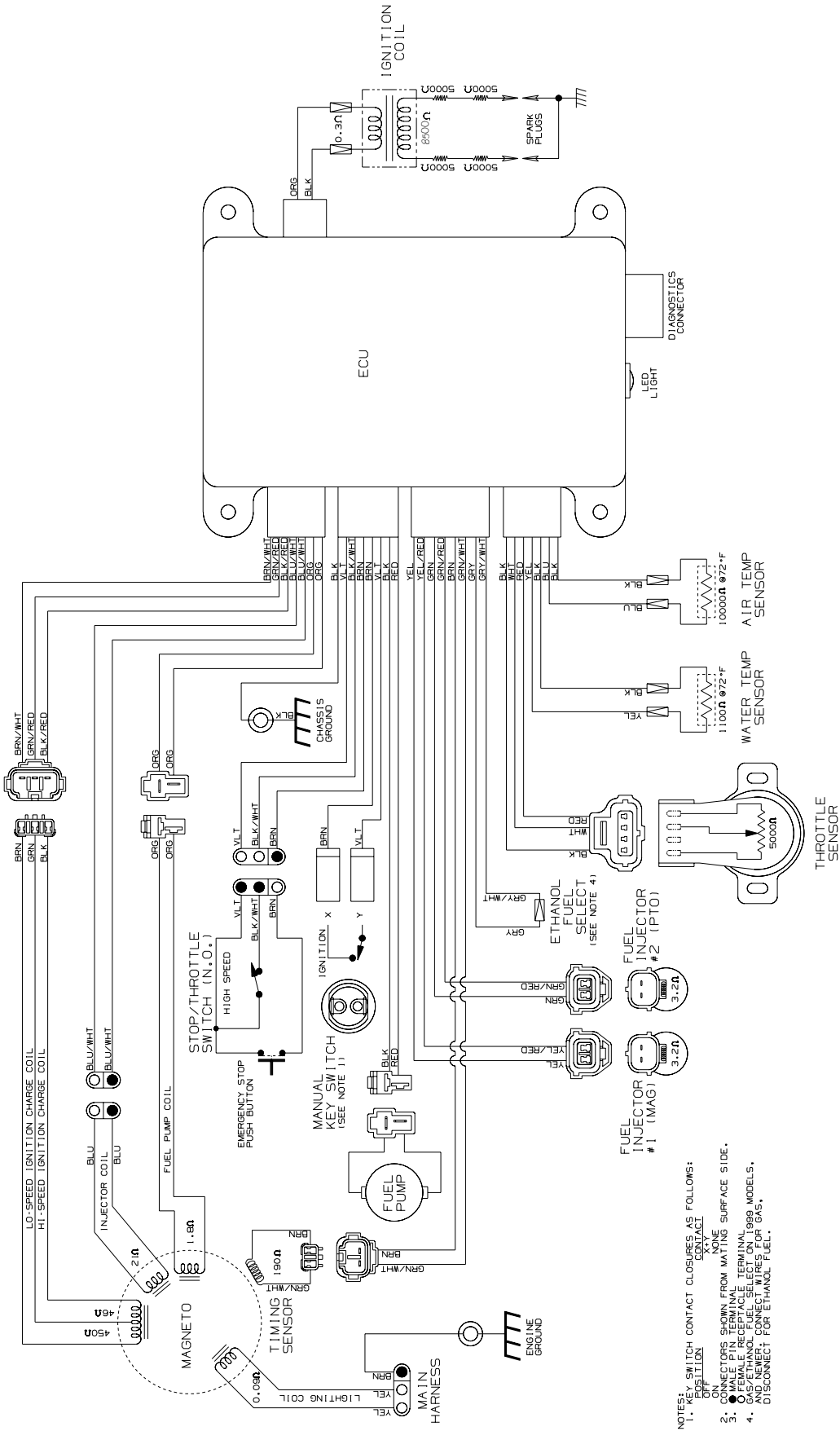
■ NOTE: Kokusan EPROM must be marked K.

Troubleshooting Fuel System (EFI)

4

| Problem: Too Rich | |
|--|---|
| Condition | Remedy |
| <ol style="list-style-type: none"> 1. LED trouble code 2. Fuel pressure too high 3. Fuel return hose obstructed 4. Injectors leaking | <ol style="list-style-type: none"> 1. Replace problem sensor 2. Replace regulator 3. Service — replace hose — remove obstruction 4. Replace injectors |
| Problem: Too Lean | |
| Condition | Remedy |
| <ol style="list-style-type: none"> 1. LED trouble code 2. Fuel pressure too low 3. Vent hose obstructed 4. Fuel filter(s) obstructed | <ol style="list-style-type: none"> 1. Replace problem sensor 2. Replace regulator/fuel pump 3. Remove obstruction 4. Replace fuel filter(s) |

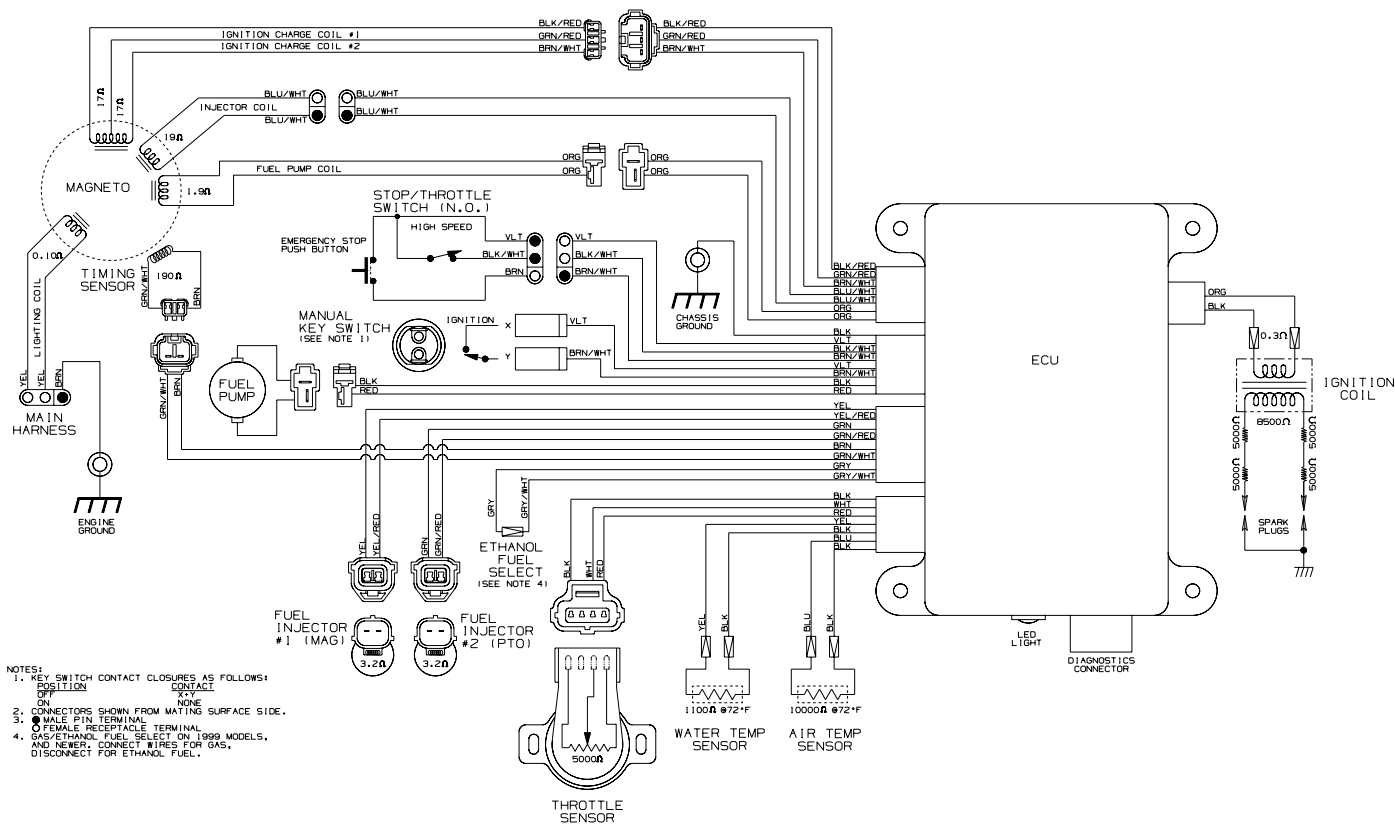
EFI Wiring Diagram (500/580 cc)



- NOTES:
1. KEY SWITCH CONTACT CLOSURES AS FOLLOWS:

| | |
|----------|---------|
| POSITION | CONTACT |
| OFF | X+Y |
| ON | NONE |
 2. CONNECTORS SHOWN FROM MATING SURFACE SIDE.
 3. GROUND PIN TERMINAL.
 4. GAS-ETHANOL FUEL SELECT ON 1989 MODELS.
AND NEWER. CONNECT WIRES FOR GAS.
DISCONNECT FOR ETHANOL FUEL.

EFI Wiring Diagram (600 cc)



Fuel System (Related Items)

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

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

Fuel System (Related Items) Table of Contents

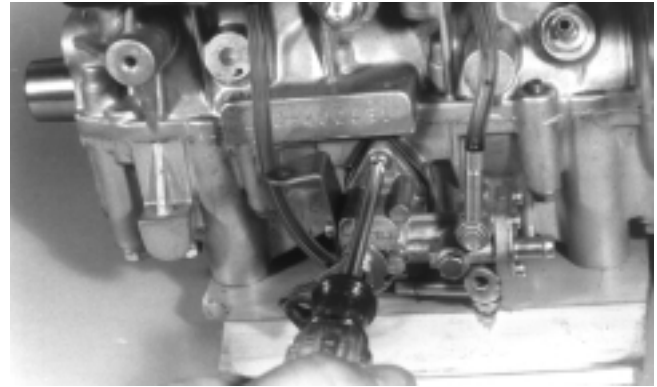
| | |
|---|------|
| Oil-Injection Pump | 4-66 |
| Synchronizing Oil-Injection Pump | 4-67 |
| Bleeding Oil-Injection System | 4-67 |
| Testing Oil-Injection Pump | 4-68 |
| Testing Oil-Injection Check Valves | 4-68 |
| Fuel Pump (Carbureted Models) | 4-69 |
| Air-Intake Silencer (One-Piece Style) | 4-71 |
| Air-Intake Silencer (Cover/Tool Tray Style) | 4-71 |
| Gas Tank/Seat Assembly | 4-72 |

Oil-Injection Pump

REMOVING

1. Turn the fuel shut-off valve to the CLOSED position.
2. If applicable, remove the carburetors.
3. Disconnect the oil-supply hose from the pump and plug to prevent oil drainage.
4. Remove the two oil-delivery hoses from the adapter plates.
5. Disconnect the oil-injection cable.
6. Remove the two screws, lock washers, and washers securing the oil-injection pump and retainer to the crankcase.

Fig. 4-148



7. Pull the oil-injection pump away from the engine and account for a gasket.
8. Turn the pump sideways; then remove the lower union bolt. Account for two gaskets. Remove the pump.
9. Remove the remaining union bolts securing the check valves to the pump. Account for two gaskets.
10. Remove the check valves. Account for two gaskets.

INSTALLING

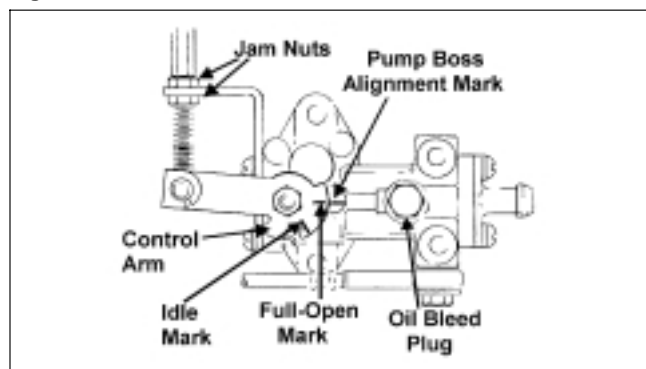
1. In turn on each front union bolt, install a gasket, check valve, and gasket; then install on the oil-injection pump.
2. Place the gasket and oil-injection pump near the engine; then install the lower union bolt through a gasket, check valve, and gasket.
3. Position the oil-injection pump on the engine making sure the oil-injection pump gear is correctly aligned with the oil-injection pump drive gear.
4. Secure the pump with two screws, lock washers, and washers. Tighten screws to 0.7 kg-m (5 ft-lb).
5. Connect the two oil-delivery hoses to the adapter plates. Secure with clamps.
6. Connect the oil-injection cable to the pump and secure with the washer and E-clip.
7. Connect the oil-supply hose to the oil-injection pump inlet fitting. Secure with the clamp.
8. Bleed the oil-injection system (see Bleeding Oil-Injection System in this sub-section).
9. Check the oil-injection system synchronization (see Synchronizing Oil-Injection Pump in this sub-section). Tighten the jam nuts securely.
10. If applicable, install the carburetors.
11. Turn the fuel shut-off valve to the OPEN position.

Synchronizing Oil-Injection Pump

CHECKING

1. With the ignition switch key in the OFF position, move the throttle lever to the full-open position.
2. Check the alignment of the mark on the pump housing and the mark on the control arm. If the marks align, the oil-injection pump is synchronized with the carburetors and no adjustment is necessary. If the marks do not align, adjust until alignment is attained.

Fig. 4-149



727-185C

ADJUSTING

1. Loosen the jam nuts securing the cable adjuster.
2. Move the throttle lever to the full-open position.
3. Rotate the jam nuts in the proper direction until the marks align.
4. Lock the jam nuts to secure the adjustment.

Bleeding Oil-Injection System

CAUTION

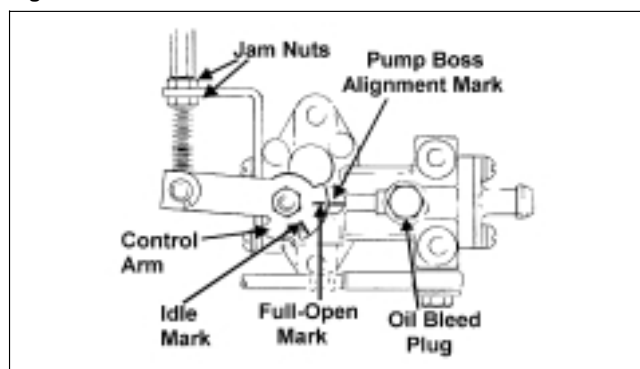
Whenever bleeding the oil-injection system, use a 100:1 gas/oil mixture in the gas tank to ensure adequate engine lubrication. Failure to use the 100:1 mixture during oil-injection system bleeding will result in severe engine damage.

1. Fill the oil reservoir with Arctic Cat 50:1 Injection Oil.
2. Place an absorbent towel below the oil bleed screw; then remove the bleed screw from the pump. Allow the oil to flow through the oil-supply hose until the hose is filled with oil and free of air bubbles; then install the bleed screw.

■ **NOTE.** To aid in bleeding the oil system, blow into the vent hose to force the oil toward the pump. The oil reservoir cap must be on for this procedure.

4

Fig. 4-150



727-185C

3. Using a shielded safety stand, raise the rear of the snowmobile. Engage the brake lever lock; then start the engine and allow it to idle.
4. Using a stiff wire with a hooked end, pull the control arm upward to the full-open position.

WARNING

Keep hands and clothing away from all moving or rotating parts.

5. Idle the engine until oil flowing to the top of the oil-delivery hoses is free of air bubbles.
6. When oil flows free of all air bubbles, shut the engine off and check for leakage.
7. Release the brake lever lock.

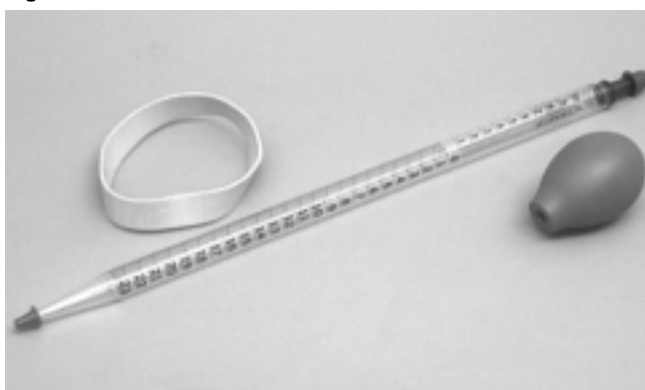
Testing Oil-Injection Pump

WARNING

Always wear safety glasses when performing this test.

1. Tighten the oil reservoir cap securely. Attach Vacuum Test Pump (p/n 0644-131) to the oil reservoir vent hose; then create vacuum in the reservoir.

Fig. 4-151



AE108

2. Place an absorbent towel under the oil reservoir supply hose fitting; then remove the oil-supply hose from the oil reservoir. Plug the fitting with the small red plug.
3. Fill the Oil Injection Usage Tool (p/n 0644-007) with Arctic Cat 50:1 Injection Oil to the 0 line.
4. Wipe the tip of the tool to remove excess oil; then attach the tool to the oil-supply hose and remove the bulb.
5. Secure the tool to the oil reservoir by twisting the rubber strap one half turn and placing the rubber strap around the tool and the oil reservoir filler neck.

WARNING

Keep hands and clothing away from all moving or rotating parts.

6. Start the engine and run the engine at 3000 RPM for 3 minutes with the control arm in the FULL-CLOSED position. Compare the amount of oil used against the specifications on the chart.

7. Using a stiff wire, pull the oil-injection control arm to the FULL-OPEN position. Run the engine at 3000 RPM for 2 minutes. Compare the amount of oil used against the specifications on the chart.

Oil Consumption @3000 RPM

| MODEL | FULL-CLOSED 3 Minutes | FULL-OPEN 2 Minutes |
|--------------------------------|--------------------------|------------------------|
| 340 cc | 1.5-2.8 cc | 4.2-6.3 cc |
| 370 cc F/C | 0.975-1.86 cc | 5.4-6.6 cc |
| 440 cc F/C | 2.5-4.6 cc | 6.2-9.2 cc |
| 440 cc F/C (Triple Carb) | 2.5-4.6 cc | 6.5-9.2 cc |
| 440 cc L/C | 1.5-3.0 cc | 8.0-12.7 cc |
| ZR 440- (Consumer Model) | 1.1-3.2 cc | 9.4-11.5 cc |
| 500 cc | 2.0-3.9 cc | 11.3-14.1 cc |
| 500 cc EFI | 1.956-3.413 cc | 11.275-14.122 cc |
| 550 cc | 2.0-4.3 cc | 10.2-15.5 cc |
| 580 cc | 2.0-4.3 cc | 10.2-15.5 cc |
| 600 cc (2 cyl) | 2.0-3.9 cc | 11.3-14.1 cc |
| 600 cc (3 cyl) | 1.1-2.2 cc | 11.3-14.1 cc |
| 600 cc EFI | 1.727-4.247 cc | 9.224-11.558 cc |
| 700 cc | 1.613-2.996 cc | 12.442-15.206 cc |
| 800 cc | 1.0-2.3 cc | 14.9-18.2 cc |
| 1000 cc | 1.3-3.7 cc | 16.2-19.8 cc |

8. If the oil-injection pump output does not meet the specifications, see Testing Oil-Injection Check Valves in this sub-section.
9. Disconnect the oil usage tool, remove the plug from the reservoir, attach the oil-supply hose to the oil reservoir, and remove the vacuum pump.
10. Bleed the oil-injection system (see Bleeding Oil-Injection System in this sub-section).

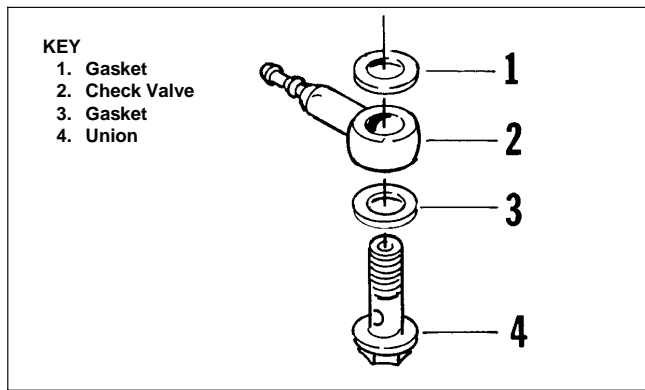
Testing Oil-Injection Check Valves

In the event there is an engine problem due to lack of lubrication, the oil-injection pump check valves should be tested using a vacuum pump to make sure the check valves are operating properly.

When testing the check valves, remove them from the pump assembly.

1. Remove the check valves from the oil-injection pump.

Fig. 4-152



2. Attach the vacuum test pump hose to the check valve.
3. Squeeze the vacuum pump handle and watch the pump gauge. The check valve should release at 4.5-5 lb and again reset itself at 3.5-4 lb. If "release" and "reset" are not within specifications, replace the check valve.
4. Record the "release" and "reset" readings for the valve; then perform the test on the other valve. The "release" and "reset" readings must fall within specifications and must be within 1.5 lb of each other. If either or both are not met, replace the check valves.
5. If the check valves are within specifications but the oil-injection usage is not, replace the oil-injection pump.

Fuel Pump (Carbureted Models)

■ **NOTE:** When servicing a fuel pump, determine which style pump is being serviced and follow the appropriate procedure.

PRELIMINARY CHECKS

1. Make sure the fuel shut-off valve is in the OPEN position.
2. Make sure there is adequate gasoline in the gas tank.
3. Make sure all hoses are clear and free of kinks and obstructions.
4. Make sure the fuel filter is not plugged or damaged.
5. Make sure fuel and impulse hoses are in good condition.

6. Make sure there is evidence of good impulse at the crankcase impulse fitting.

TESTING PRESSURE

1. Connect a pressure gauge between fuel pump and carburetor using a piece of fuel hose and a T-fitting.
2. Place snowmobile on a safety stand and start the engine. At the following engine speeds, the specified pressures must be indicated.

| RPM | psi | g/cm ² |
|-----------|---------|-------------------|
| 1000-2000 | 3.0-3.5 | 200-240 |
| 3000-4000 | 4.5-5.5 | 310-375 |
| 5000-6000 | 6.0-7.0 | 420-490 |

3. Remove gauge and hose and connect fuel hose to carburetor.

TESTING VACUUM

■ **NOTE:** Make sure adequate fuel is in the carburetor for this test.

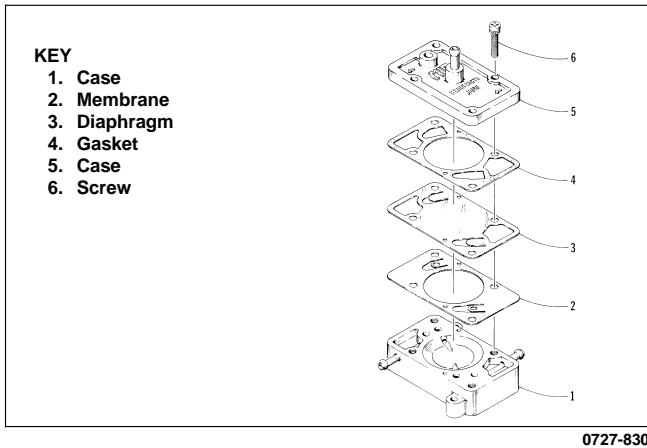
1. Turn the fuel shut-off valve to the CLOSED position; then disconnect fuel supply hose from the fuel shut-off valve.
2. Connect a vacuum gauge directly to the fuel pump inlet fitting.
3. With snowmobile on a safety stand, start the engine and accelerate to 2000-3000 RPM for a period of 30 seconds. Note maximum reading of gauge. Reading must be within the range listed.

| Acceptable Fuel Pump Vacuum (2-3000 RPM) | |
|--|---------|
| in.-hg | mm-hg |
| 7-10 | 175-250 |

4. Stop engine. Connect fuel hose. Turn the fuel shut-off valve to the OPEN position.

SERVICING

Fig. 4-153



1. Scribe a line across the fuel pump sections.
2. Remove the screws securing the fuel pump; then from the top of the fuel pump, remove the top case, gasket, diaphragm, and membrane.

■ **NOTE:** Be sure all fuel pump components are clean and the fittings are tight.

3. In sequence on the bottom case of the fuel pump, place the membrane, diaphragm, gasket, and top case.

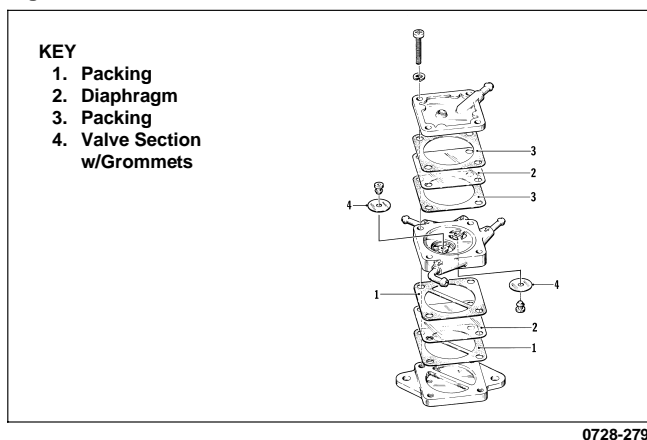
■ **NOTE:** Make sure the scribed line made during disassembly is aligned and the tabs on the two lower packings align with the tabs on the bottom and valve section of the pump.

4. Secure the fuel pump with the screws. Tighten securely.

SERVICING

1. Scribe a line across the fuel pump sections.

Fig. 4-154



2. Remove the screws securing the fuel pump; then from the top of the fuel pump, remove the top, packing, diaphragm, packing, valve section, packing, diaphragm, and packing.

■ **NOTE:** Be sure all fuel pump components are clean and the fittings are tight.

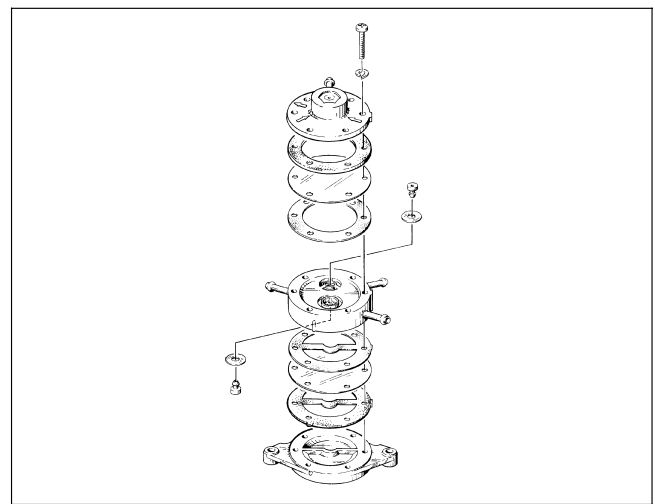
3. Push the grommets out of the valve section; then remove the valve from each grommet.
4. Place a valve onto each grommet; then push each valve with grommet into the valve section.
5. In sequence on the bottom of the fuel pump, place a packing, diaphragm, packing, valve section, packing, diaphragm, packing, and top.

■ **NOTE:** Make sure the scribed line made during disassembly is aligned.

6. Secure the fuel pump with the screws. Tighten securely.

SERVICING

Fig. 4-155



1. Scribe a line across the fuel pump sections.
2. Remove the screws and lock washers securing the fuel pump; then from the top of the fuel pump, remove the cap, thick packing, diaphragm, thin rubber packing, valve section, thin rubber packing, diaphragm, and thick packing.

3. Push the grommets out of valve section; then remove the valve from each grommet.

■ **NOTE:** Be sure all fuel pump components are clean and the fittings are tight.

4. Place a valve onto each grommet; then push each valve with grommet into the valve section of the fuel pump.

5. In sequence on the bottom of the fuel pump, place a thick packing, diaphragm, thin rubber packing, valve section, thin rubber packing, diaphragm, thick rubber packing, and cap.

■ **NOTE:** Make sure the scribed line made during disassembly is aligned and the tabs on the two lower packings align with the tabs on the bottom and valve section of the pump.

6. Secure the fuel pump with the screws and lock washers. Tighten securely.

SERVICING

Fig. 4-156

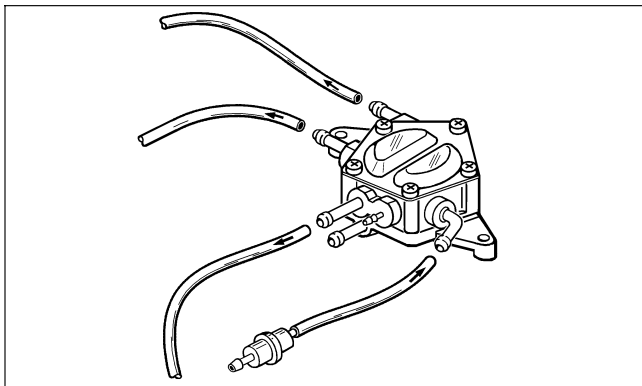
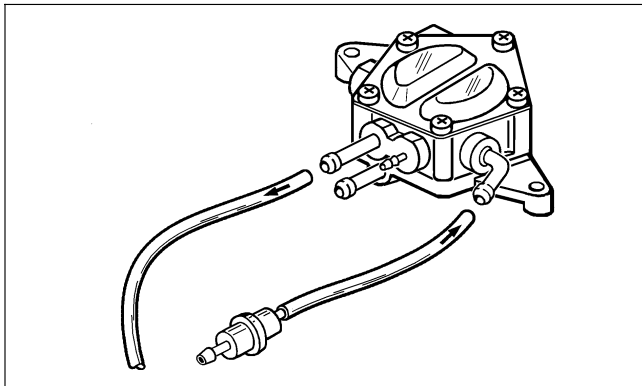


Fig. 4-157



1. Scribe a line across the fuel pump sections.
2. Remove the Phillips-head screws and lock washers securing the fuel pump sections; then from the top of the fuel pump, remove the cap, gasket, diaphragm, gasket, valve section, gasket, diaphragm, and gasket.

■ **NOTE:** Be sure all fuel pump components are clean and the fittings are tight.

3. Push the grommets out of the valve section; then remove the valve from each grommet.
4. Place a valve onto each grommet; then push each valve with grommet into the valve section of the fuel pump.

5. In sequence on the bottom of the fuel pump, place a gasket, diaphragm, gasket, valve section, gasket, diaphragm, gasket, and cap.

■ **NOTE:** Make sure the scribed line made during disassembly is aligned and the tabs on the two upper gaskets align.

6. Secure the fuel pump with the Phillips-head screws and lock washers. Tighten securely.

Air-Intake Silencer (One-Piece Style)

The air-intake silencer is a specially designed component used to silence the incoming fresh air and also to catch the fuel that “spits back” out of the carburetors. The carburetors are calibrated with the air-intake silencer in position; therefore, the engine must never be run with the air-intake silencer removed.

CLEANING AND INSPECTING

1. Check for holes or cracks in the silencer.
2. Periodically clean the silencer by blowing fresh air through it.

4

Air-Intake Silencer (Cover/Tool Tray Style)

The air-intake silencer is a specially designed component used to silence the incoming fresh air and also to catch the fuel that “spits back” out of the throttle body/carburetors. The throttle body/carburetors are calibrated with the air-intake silencer in position; therefore, the engine must never be run with the air-intake silencer removed.

CLEANING AND INSPECTING

1. Check for holes or cracks in the silencer.
2. Periodically clean the silencer by removing the cover/tool tray assembly and vacuuming the interior of the silencer.

Gas Tank/Seat Assembly

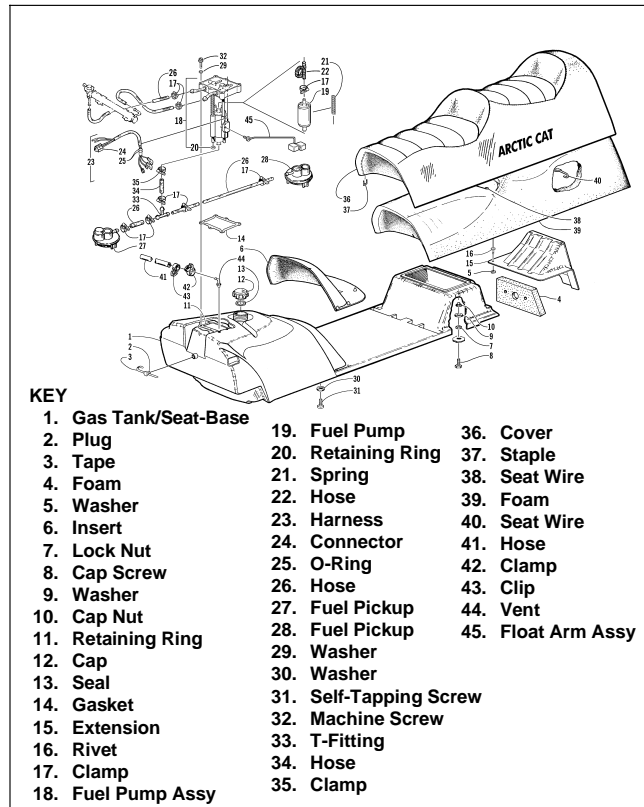
■ **NOTE:** Determine which style gas tank/seat assembly is being removed and installed and use the specific sub-section accordingly.

⚠ WARNING

Whenever any maintenance is performed on the fuel system, there should be no welding, smoking, open flames, etc., in the area.

REMOVING (EFI Models)

Fig. 4-158



0735-090

■ **NOTE:** If applicable, remove the backrest and rack (see Section 7).

1. Remove the console (see Section 7).
2. Remove the two cap screws, washers, and lock nuts (located in the rear compartment) securing the seat to the tunnel.
3. Remove the vent hose from the gas tank.
4. Disconnect the wiring harness from the fuel pump.

⚠ CAUTION

Since the fuel supply hose may be under pressure, remove it slowly to release the pressure. Place an absorbent towel around the connection to absorb fuel.

5. Label the fuel hoses “supply” and “return”; then remove the hoses from the fuel pump.
6. Raise the rear of the seat high enough to disconnect the taillight wiring harness; then remove the seat.

INSTALLING (EFI Models)

1. Place the seat in position on the tunnel; then connect the taillight wiring harness.
2. Connect the vent hose to the gas tank.
3. Connect the fuel supply and return hoses to the fuel pump. Secure with clamps.

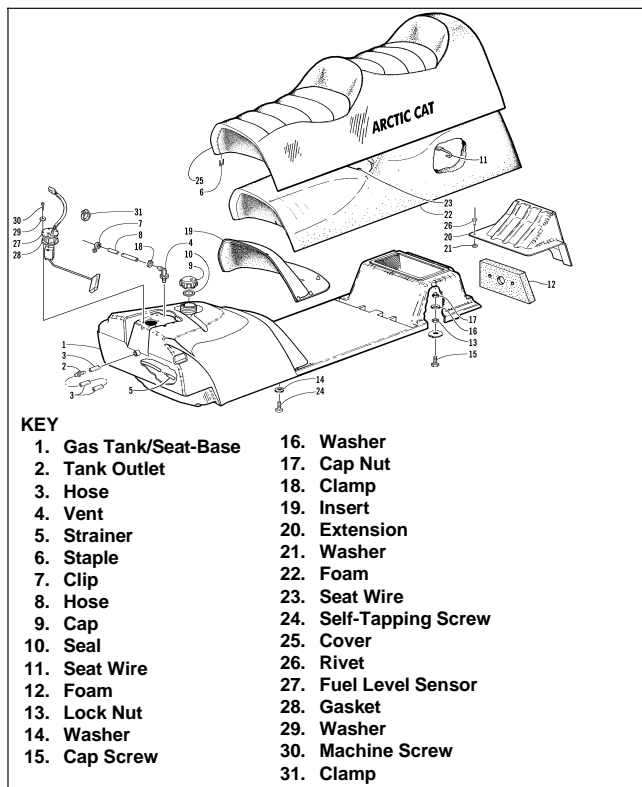
■ **NOTE:** The fuel hoses must be connected to their respective fittings and tightened securely or leakage will result.

4. Attach the wiring harness to the fuel pump.
5. Secure the seat to the tunnel with two screws, washers, and lock nuts.
6. Install the console (see Section 7).

■ **NOTE:** If applicable, install the backrest and rack (see Section 7).

REMOVING (Carbureted Models)

Fig. 4-159



0735-157

■ **NOTE:** If applicable, remove the backrest and rack (see Section 7).

1. Remove the two lock nuts and washers (located in the rear tool compartment) securing the seat to the tunnel.
2. Remove the hose from the gas tank shut-off valve. Plug the hose to prevent drainage.
3. Remove the screws securing the console; then remove the console.

Fig. 4-160



AL142D

4. Slide the gas tank/seat assembly rearward; then remove the vent hose from the gas tank fitting. Disconnect the taillight wiring harness and remove.
5. Drain all gasoline from the tank; then (if necessary) remove the tank outlet assembly and vent fitting.

INSTALLING (Carbureted Models)

1. If removed, apply teflon tape to the threads of the tank outlet fitting and vent fitting; then thread each into the tank.
2. Slide the gas tank/seat assembly into position. Install the vent hose on the vent fitting and connect the gas hose to the shut-off valve.

CAUTION

Check the vent and gas hoses to be sure they are not kinked or making contact with the driven shaft.

3. Place the gas tank/seat assembly into position, connect the taillight harness, and secure with lock nuts and washers.
4. Install and secure the console.

4

Fig. 4-161



AL142D

5. Turn the gas tank shut-off valve to the OPEN position.
6. Inspect the entire fuel system for leaks.

■ **NOTE:** If applicable, install the backrest and rack (see Section 7).