# SECTION 4 - FUEL/LUBRICATION/COOLING



## TABLE OF CONTENTS

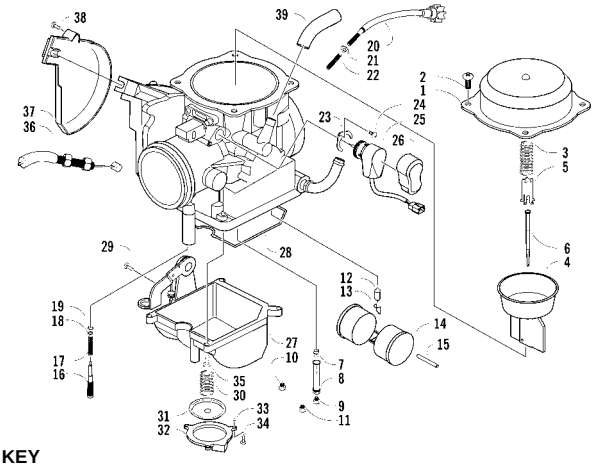


Back to TOC

# Carburetor Specifications

| ITEM | 400 | 500 | 650 H1 |
|---|---|---|---|
| Carburetor | Keihin CVK34 | Keihin CVK36 | Keihin CVK36 |
| Main Jet | 135 | 138 | 132 |
| Slow Jet | 38 | 40 | 40 |
| Pilot Screw Setting (turns) | 1 3/4 | 1 3/4 | 1 1/4 |
| Jet Needle | NAZG | NFKG | NFKS |
| Idle RPM (engine warm) | 1250-1350 | 1250-1350 | 1250-1350 |
| Starter Jet | 75 | 85 | 85 |
| Float Arm Height | 17 mm (0.7 in.) | 17 mm (0.7 in.) | 17 mm (0.7 in.) |
| Throttle Cable Free-Play (at lever) | 3-6 mm (1/8-1/4 in.) | 3-6 mm (1/8-1/4 in.) | 3-6 mm (1/8-1/4 in.) |

# Carburetor Schematics
## (400/500/650 H1)

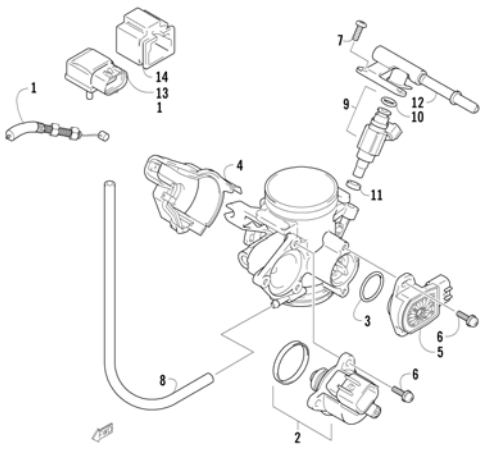


KEY

1. Cover
2. Screw
3. Spring
4. Vacuum Piston
5. Spring Seat
6. Jet Needle
7. Needle Jet
8. Jet Holder
9. Main Jet
10. Slow Jet
11. Starter Jet
12. Float Valve
13. Clip
14. Float
15. Float Pin
16. Pilot Screw
17. Spring
18. Washer
19. O-Ring
20. Idle Adjust Screw
21. Washer
22. Spring
23. Plate
24. Screw
25. Electric Choke
26. Choke Cover
27. Float Chamber Assy
28. O-Ring
29. Screw
30. Spring
31. Diaphragm Assy
32. Pump Housing
33. U-Ring
34. Screw
35. Screw
36. Throttle Cable
37. Cover
38. Screw
39. Vent Hose

0739-656

# Throttle Body Assembly
## (700 EFI)



KEY

1. Throttle Cable
2. ISC Valve
3. O-Ring
4. Cover
5. Sensor Assy
6. Screw
7. Screw
8. Hose
9. Injector Assy
10. O-Ring
11. Seal
12. Delivery Pipe
13. Air Pressure Sensor
14. Holder

0741-277

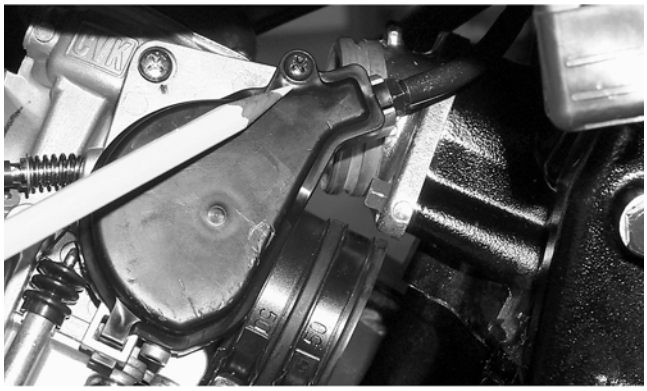
# Carburetor
## (400/500/650 H1)

**⚠ WARNING**

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

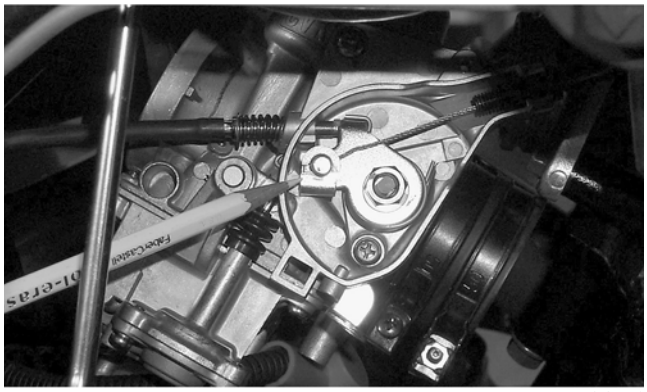
### REMOVING

1. Remove the seat.
2. As necessary to access the carburetor, remove the air-intake snorkel, the air cleaner housing cover, or the air cleaner housing.
3. Disconnect the gasline hose from the carburetor to the fuel pump.
4. Loosen the flange clamps; then remove the carburetor from the intake pipe.
5. Remove the screw securing the throttle actuator cover to the carburetor; then remove the cover.



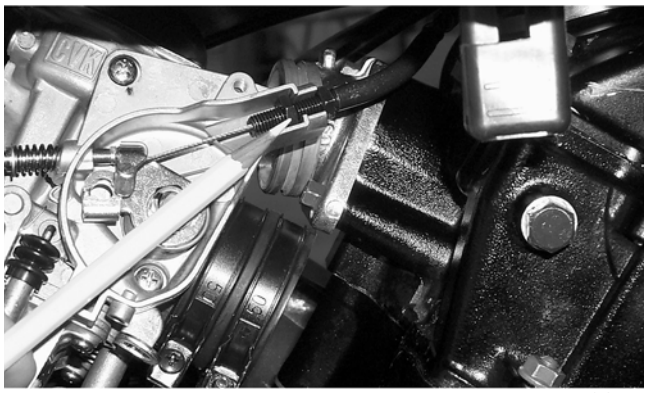
CC743

6. Remove the throttle cable from the actuator arm.



CC742

7. Loosen the outer jam nut securing the throttle cable to the carburetor body; then route the cable out of the way.



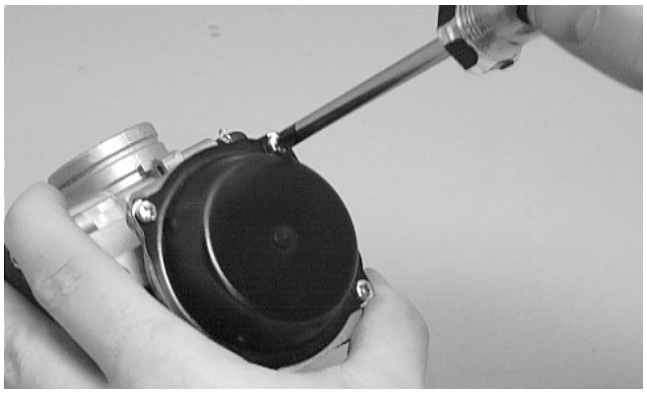
CC741

8. Disconnect the electric choke lead from the wiring harness.

9. Disconnect the vent hose; then remove the carburetor.

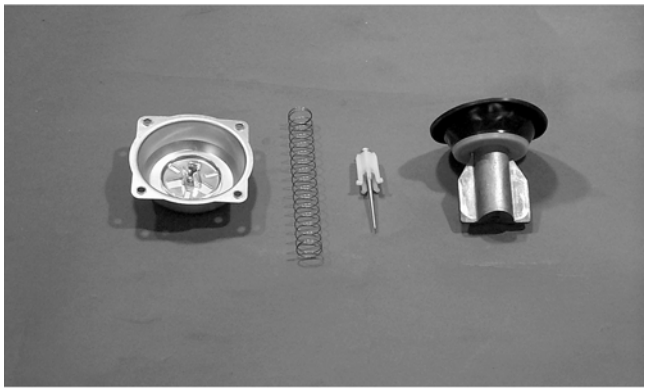
## DISASSEMBLING

1. Remove the four Phillips-head screws securing the top cover; then remove the cover.



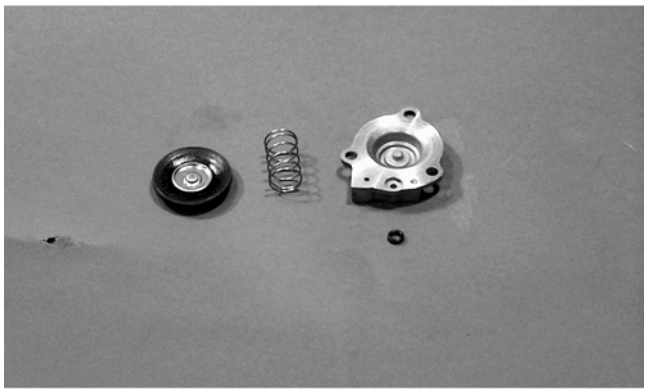
CH015D

2. Remove the vacuum piston assembly from the carburetor body. Account for a spring, spring seat, and the jet needle.



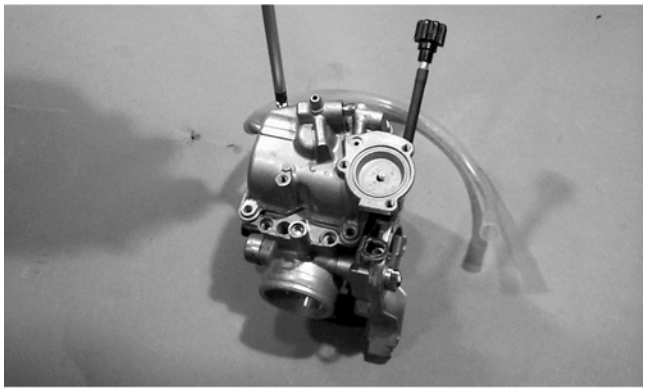
CC746

3. Remove the three screws securing the pump housing. Account for the diaphragm assembly, spring, and U-ring (in the housing).

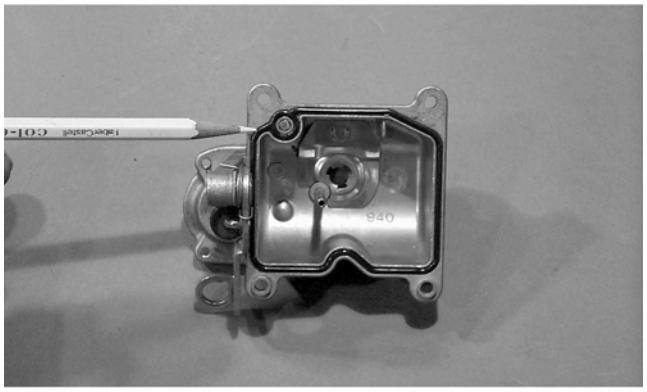


CC748

4. Remove the Phillips-head screws securing the float chamber; then remove the chamber. Account for the O-ring.

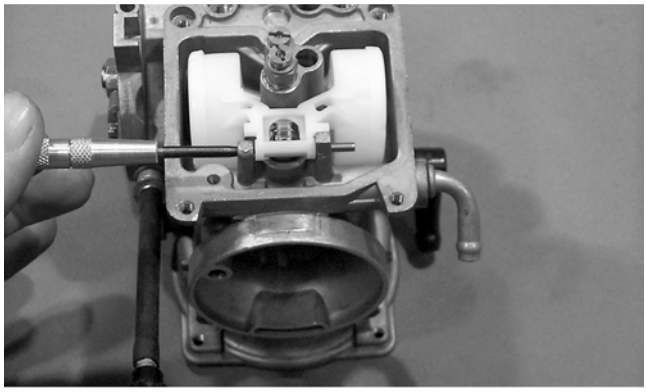


CC749



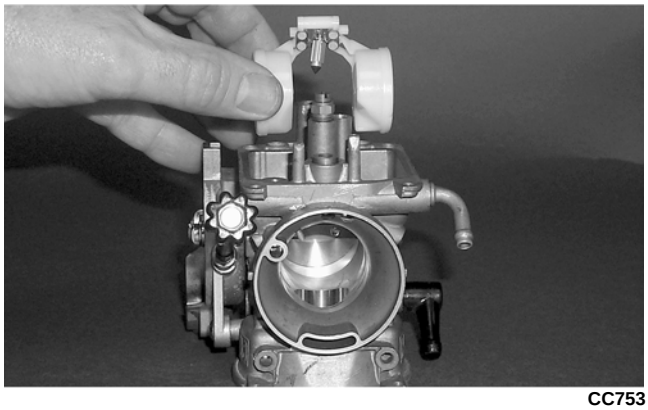
CC750

5. Remove the float pin.



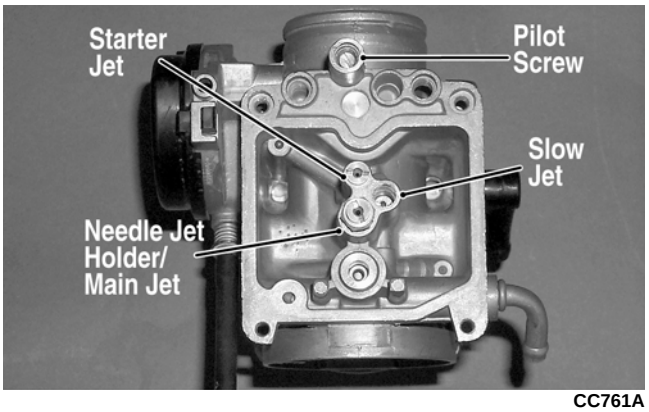
CC752

6. Lift the float assembly from the carburetor. Account for the float valve.



CC753

■ **NOTE: Note the locations of the jets, pilot screw, and holder for disassembling procedures.**

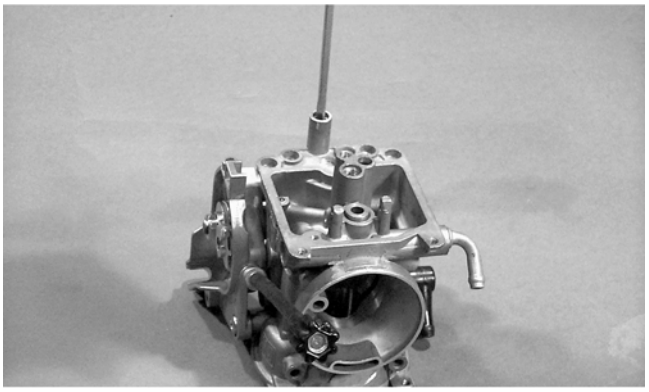



CC761A

7. Secure the needle jet holder with a wrench; then remove the main jet.

8. Remove the needle jet holder; then remove the needle jet, slow jet, and the starter jet.

9. Remove the pilot screw. Account for a spring, washer, and an O-ring.



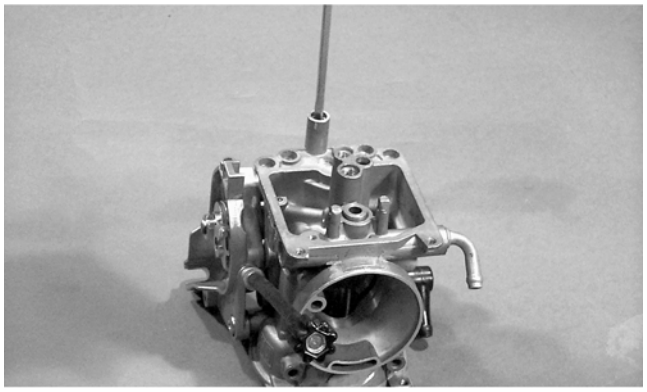
CC758

10. Unscrew and remove the idle adjust screw. Account for the spring and washer.

## ASSEMBLING

1. Screw the idle adjust screw into the carburetor making sure the washer and spring are properly positioned.

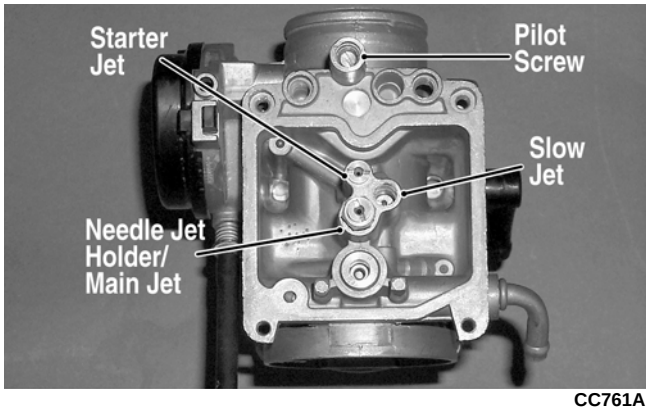
2. Install the pilot screw, spring, washer, and O-ring.



CC758

■ **NOTE: Turn the pilot screw clockwise until it is lightly seated; then turn it counterclockwise the recommended number of turns as an initial setting.**

■ **NOTE: Note the locations of the jets and holder during assembling procedures.**

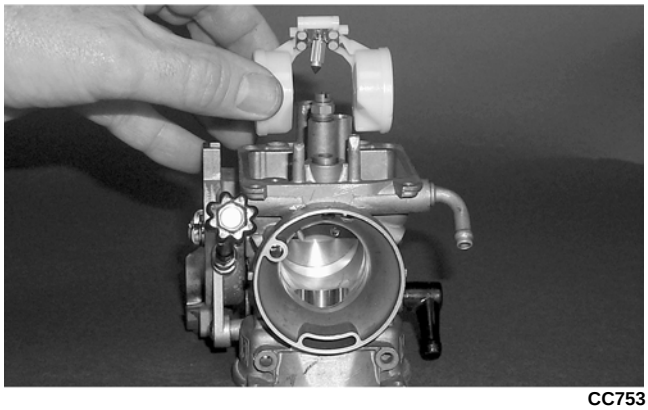



CC761A

3. Install the slow jet. Tighten securely.

4. Install the main jet into the needle jet holder and tighten securely; then install the needle jet and needle jet holder assembly into the carburetor and tighten securely.

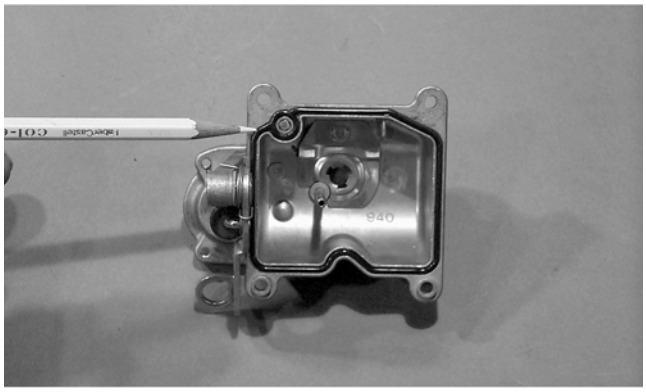
5. Place the float assembly (with float valve) into position and secure to the carburetor with the float pin.



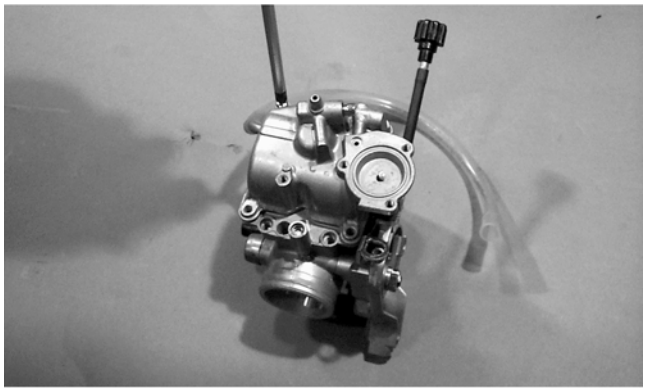
CC753

■ **NOTE: Check float arm height by placing the carburetor on its side w/float contacting the needle; then measure with a caliper the height when the float arm is in contact with the needle valve. Float arm height should be 17 mm (0.7 in.).**

6. Place the float chamber into position making sure the O-ring is properly positioned; then secure with the Phillips-head screws.

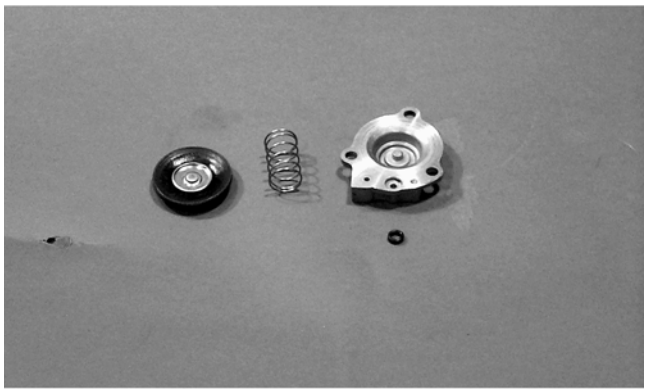


CC750



CC749

7. Place the U-ring into the pump housing. Position the spring and diaphragm assembly (lip toward the carburetor) onto the carburetor; then secure the assembly with the pump housing and three screws. Tighten securely.



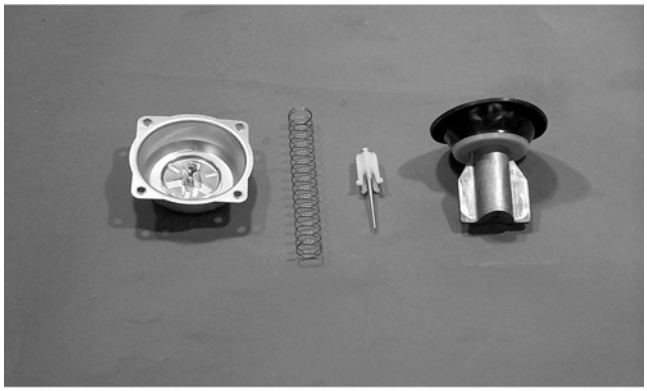
CC748

4

**⚠ CAUTION**

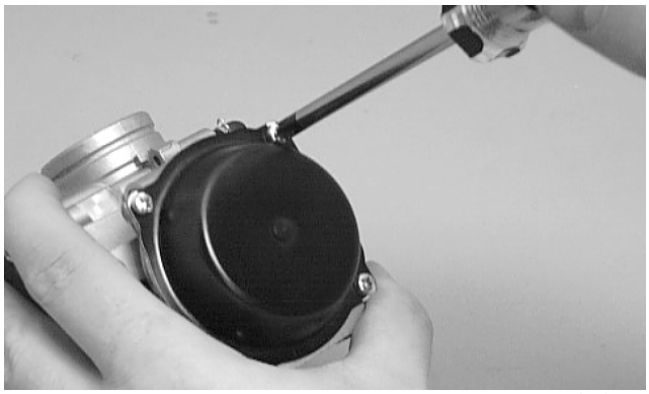
**It is important to press down on the pump housing until it contacts the carburetor to make sure the diaphragm lip is properly seated in the groove in the carburetor. If the diaphragm is not properly seated, leakage will occur.**

8. Place the jet needle, spring seat, and spring into the vacuum piston; then place the assembly down into the carburetor.



CC746

9. Place the top cover into position; then secure with the Phillips-head screws. Tighten securely.

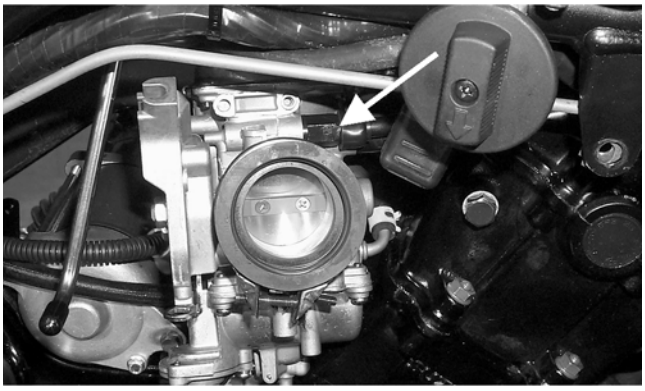


CH015D

## INSTALLING

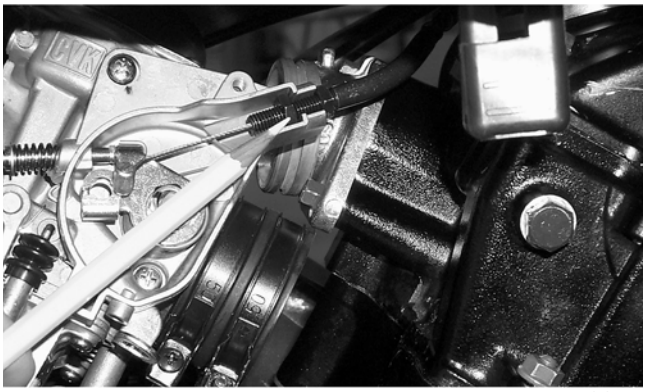
1. Connect the gas and vent hoses onto the carburetor.

2. Connect the electric choke lead to the wiring harness.



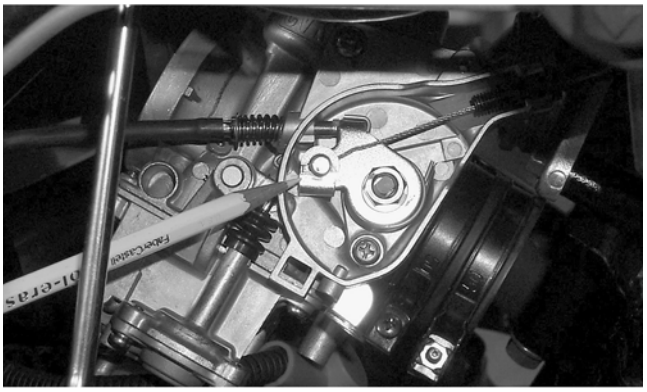
CC740A

3. Place the throttle cable into position and secure by tightening the outer jam nut.



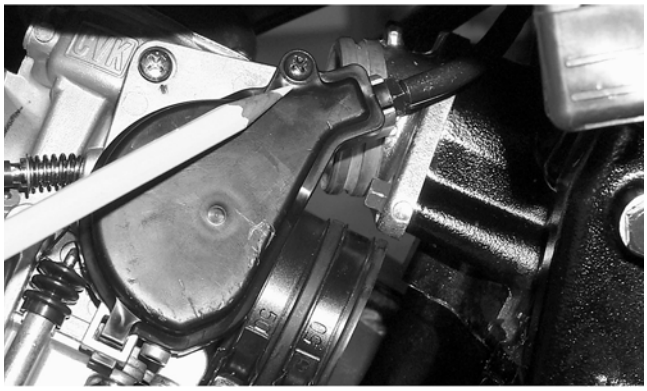
CC741

4. Connect the throttle cable to the actuator arm.



CC742

5. Place the throttle actuator cover into position on the carburetor; then secure with the screw.



CC743

6. Position the carburetor in the air cleaner boot and intake pipe assembly; then secure with the clamps.

7. Connect the hose from the carburetor to the gas tank.

8. As necessary, secure the air-intake snorkel, the air cleaner housing cover, or the air cleaner housing.

9. Install the seat.

# Electronic Fuel Injection
## (700 EFI)

**⚠ WARNING**

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

### TROUBLESHOOTING

1. Verify that the electric fuel pump is operating by listening for a “whirring” sound for several seconds after the ignition switch is turned to the ON position. If no sound can be heard, see Testing Electric Fuel Pump (700 EFI) in this section.

2. Check for a flashing EFI icon on the LCD display. If EFI is flashing, see ECU Error Codes (700 EFI) in Section 5.

3. Make sure there is sufficient, clean gas in the gas tank.

4. Verify that the battery is sufficiently charged to crank the engine over at normal speed.

5. Check the air filter housing and air filter for contamination. Clean or replace as necessary (see Section 2).

### REMOVING

1. Turn the ignition switch to the OFF position; then remove the ignition switch key.

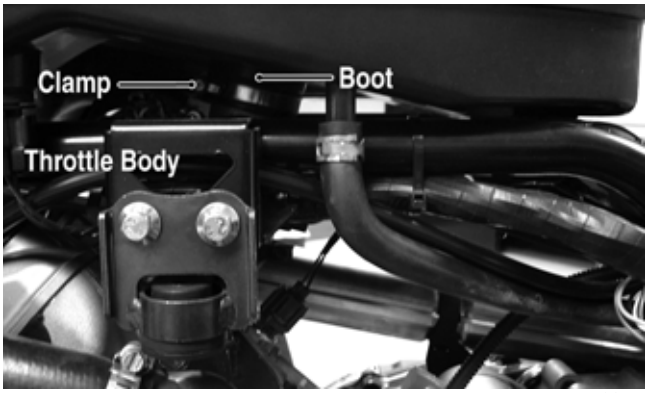
**⚠ WARNING**

**Do not turn the ignition switch to the ON position with the hoses removed. Gasoline will be pumped by the electric fuel pump causing a safety hazard.**

2. Disconnect the battery; then remove the seat.

3. Remove the storage compartment cover and air filter housing cover; then remove the air filter.

4. Loosen the clamp securing the air filter housing boot to the throttle body inlet; then remove the boot from the throttle body.

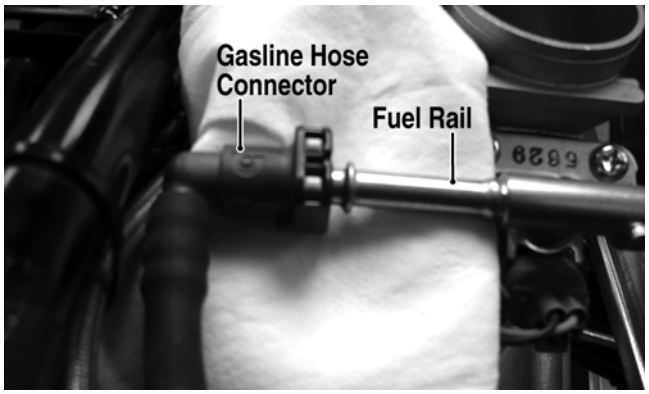



FI081B

5. Slowly disconnect the gasline hose connector from the fuel rail.

**⚠ WARNING**

**Gasoline may be under pressure. Place an absorbant towel under the connector to absorb any gasoline spray when disconnecting.**



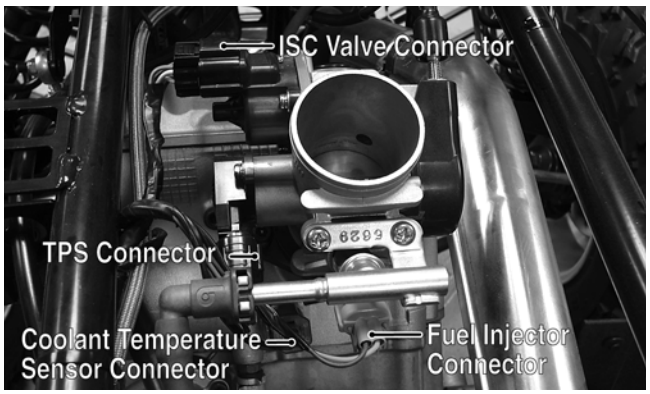

FI092A

6. Remove the screw securing the throttle actuator cover to the throttle body; then remove the cover.

7. Remove the throttle cable from the actuator arm.

8. Loosen the outer jam nut securing the throttle cable to the throttle body; then route the cable out of the way.

9. Remove the four electrical connectors from the throttle body components.




FI089A

10. Remove the cap screws securing the intake pipe to the cylinder head and remove the throttle body assembly; then remove the intake pipe from the throttle body. Account for an O-ring.


FI104A

11. Use tape to cover and seal the intake opening.

**⚠ CAUTION**

**Any objects or liquid entering the intake opening will fall into the engine causing severe damage if the engine is turned over or started.**

### INSTALLING

1. Install the throttle body into the intake pipe and secure with the clamp. Tighten securely.

2. Place a new O-ring in the intake pipe; then position the pipe onto the engine and secure with two cap screws.

3. Connect the throttle cable to the throttle body and adjust throttle free-play (see Section 2); then connect the gasline hose.

4. Connect the four electrical connectors to the throttle body components.

5. Install the air filter housing boot and secure with the clamp; then install the air filter, air filter cover, storage compartment, and storage compartment cover.

6. Install the seat making sure it locks securely in place.

## Cleaning and Inspecting Carburetor (400/500/650 H1)

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

**⚠ WARNING**

**When drying components with compressed air, always wear safety glasses.**

**⚠ CAUTION**

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

1. Place all metallic components in a wire basket and submerge in carburetor cleaner.

2. Soak for 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. Inspect the carburetor body for cracks, nicks, stripped threads, and any other imperfections in the casting.

6. Inspect the vacuum piston/diaphragm for cracks, imperfections in the casting, or cracks and tears in the rubber.

7. Inspect float for damage.

8. Inspect gasket and O-rings for distortion, tears, or noticeable damage.

9. Inspect tips of the jet needle, pilot screw, and the needle jet for wear, damage, or distortion.

10. Inspect the slow jet and main jet for obstructions or damage.

■ **NOTE: If the slow jet is obstructed, the mixture will be extremely lean at idle and part-throttle operation.**

11. Inspect the float valve for wear or damage.

12. Inspect the carburetor mounting flange for damage and tightness.

## Throttle Cable Free-Play

To adjust throttle cable free-play, see Section 2.

## Engine RPM (Idle)
### (Carbureted Models)

To adjust the idle RPM, see Section 2.

## Gas Tank

**⚠ WARNING**

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

### REMOVING

1. Remove the seat.
2. Remove the rear rack and fenders (see Section 8).
3. Disconnect the hose from the fuel pump to the carburetor/throttle body.
4. Remove the cap screws securing the gas tank to the frame.
5. Disconnect the fuel gauge connector; then remove the gas tank.

### CLEANING AND INSPECTING

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

1. Clean all gas tank components with parts-cleaning solvent.
2. Inspect all hoses for cracks or leaks.
3. Inspect tank cap and tank for leaks, holes, and damaged threads.

### INSTALLING

1. Place the gas tank into position in the frame; then install the cap screws. Tighten securely.
2. Connect the gas hose from the carburetor/throttle body; then connect the fuel gauge connector.
3. Install the vent hose; then fill the gas tank with gasoline.
4. Start the engine and inspect for leakage.
5. Install the rear fenders and rack (see Section 8); then install the seat making sure it latches securely.



## Gas/Vent Hoses

Replace the gas hose every two years. Damage from aging may not always be visible. Do not bend or obstruct the routing of the carburetor/throttle body vent hose. Make certain that the vent hose is securely connected to the carburetor/throttle body and the opposite end is always open.

## Electric Fuel Pump
### (700 EFI)

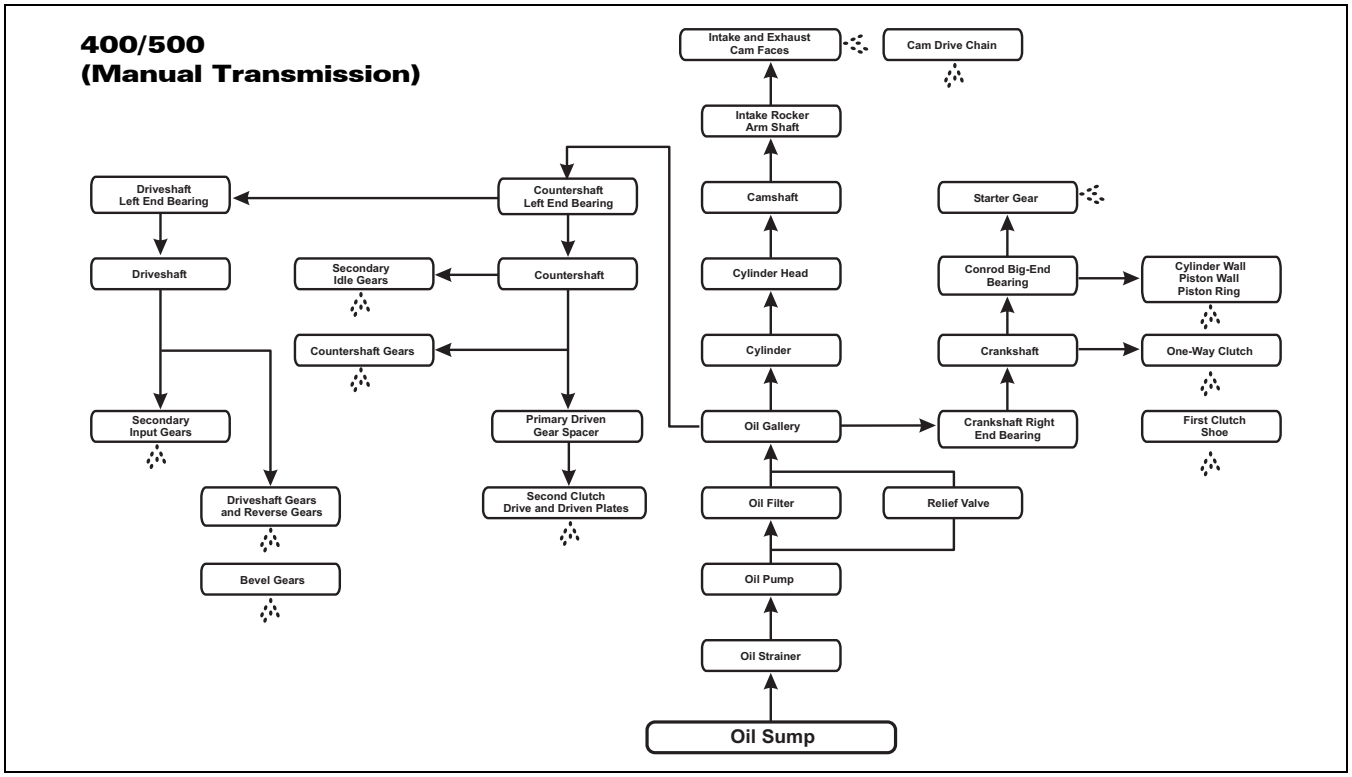
The electric fuel pump and fuel level sensor are not serviceable components. If either fails, the fuel pump assembly must be replaced.

■ **NOTE: To test the fuel pump, see Testing Electric Fuel Pump (700 EFI) in this section.**

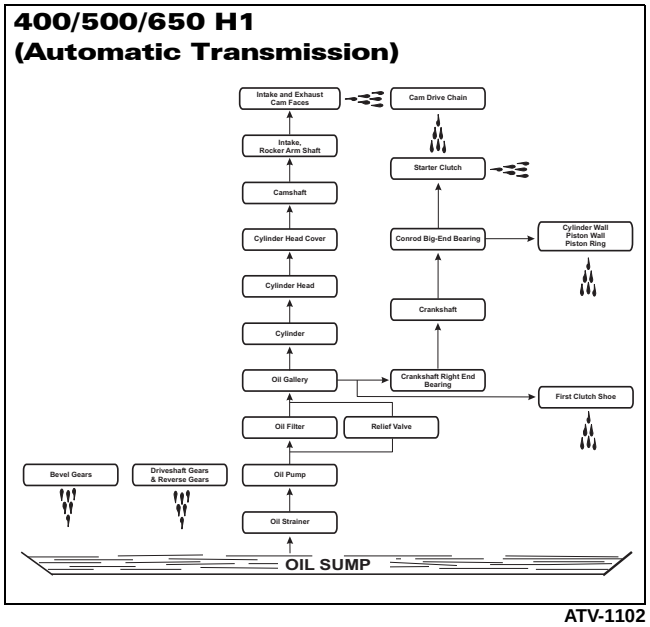
## Vacuum Pulse Fuel Pump
### (400/500/650 H1)

The vacuum pulse fuel pump is not a serviceable component. If the pump fails, it must be replaced.

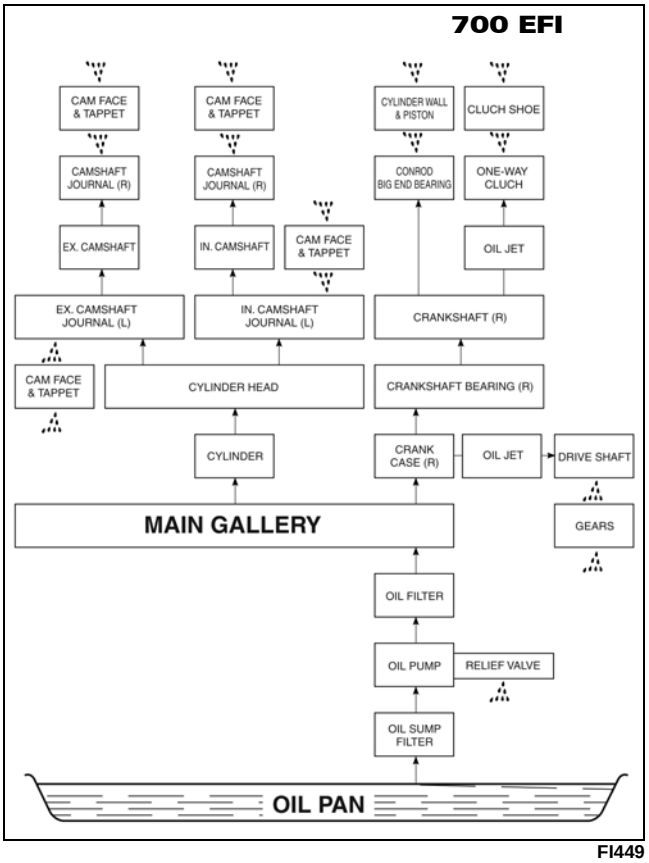
# Oil Flow Charts




ATV-0111




ATV-1102




FI449

# Oil Filter/Oil Pump

■ **NOTE: Whenever internal engine components wear excessively or break and whenever oil is contaminated, the oil pump should be replaced. The oil pump is not a serviceable component.**

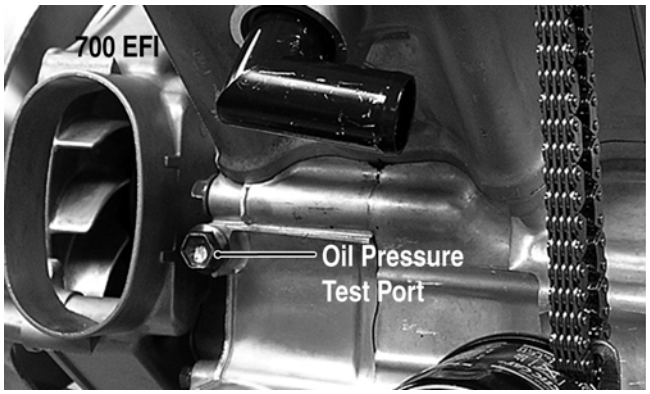
# Testing Oil Pump Pressure

■ **NOTE: The engine must be warmed up to the specified temperature for this test.**

1. Connect the Tachometer (p/n 0644-275) to the engine.
2. Connect the Oil Pressure Test Kit (p/n 0644-495) to the oil filter drain plug (400/500), in the oil pressure test port (700 EFI), or to the upper oil cooler hose at the engine (650 H1).


CD457B


PR265B




FI439A

■ **NOTE: Some oil seepage may occur when installing the oil pressure gauge. Wipe up oil residue with a cloth.**

3. Start the engine and run at 3000 RPM. The oil pressure gauge must read as specified.

| 400 (Manual Transmission) |
|---|
| OIL PRESSURE |
| 0.6-1.0 kg/cm² (9-14 psi) |
| Oil Temperature - 60°C (140°F) |

| 400 (Automatic Transmission) |
|---|
| OIL PRESSURE |
| 1.1-1.5 kg/cm² (16-21 psi) |
| Oil Temperature - 60°C (140°F) |

| 500 (Manual Transmission) |
|---|
| OIL PRESSURE |
| 1.2-1.6 kg/cm² (17-23 psi) |
| Oil Temperature - 60°C (140°F) |

| 500 (Automatic Transmission) |
|---|
| OIL PRESSURE |
| 1.3-1.7 kg/cm² (18-24 psi) |
| Oil Temperature - 60°C (140°F) |

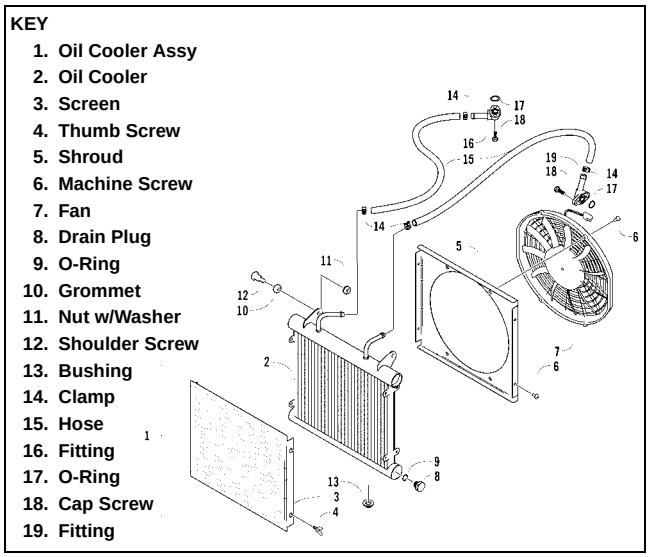
| 650 H1 |
|---|
| OIL PRESSURE (From Oil Cooler) |
| 1.40-2.46 kg/cm² (15-25 psi) |
| Oil Temperature - 60°C (140°F) |

| 700 EFI |
|---|
| OIL PRESSURE |
| 1.4-1.8 kg/cm² (20-26 psi) |
| Oil Temperature - 110°C (230°F) |

■ **NOTE: If the oil pressure is lower than specified, check for an oil leak, damaged oil seal, defective oil pump, or oil cooler.**

■ **NOTE: If the oil pressure is higher than specified, check for too heavy engine oil weight (see Section 2), clogged oil passage, clogged oil filter, or improper installation of the oil filter.**

# Oil Cooler
## (400)




0739-573

### REMOVING

■ **NOTE: It is not necessary to drain the engine oil for this procedure.**

1. Remove the input and output hoses from the fittings on the cooler.

**⚠ CAUTION**

**Elevate and secure the hoses to avoid oil spillage.**

2. Remove the cap screws securing the oil cooler to the frame. Account for grommets.

AL651D

3. Remove the oil cooler from the frame.

### INSTALLING

1. Place the cooler into position in the frame.

2. Secure the cooler to the frame with the cap screws and grommets.

AL651D

3. Install the hoses onto their respective fittings and secure with the clamps.

# Oil Cooler
## (650 H1)

### REMOVING

1. Disconnect the oil hoses from the oil cooler located on the back of the radiator.

2. Remove the radiator (see Radiator) in this section.

3. Remove the fan and fan shroud; then separate the oil cooler from the radiator.

### INSTALLING

1. Place the oil cooler into position on the radiator and secure with the retainer brackets; then install the fan shroud and fan.

2. Install the radiator (see Radiator) in this section.

3. Connect the oil hoses to the oil cooler and tighten the clamps securely.

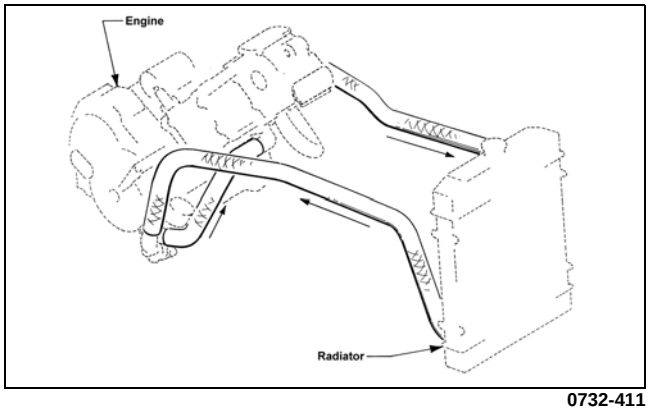
4. Warm up the engine and check for leaks; then shut off the engine and check for the proper oil level on the oil level stick. Add sufficient amount of oil to raise the level above the lower level mark.

# Liquid Cooling System
## (500/650 H1/700 EFI)

The cooling system should be inspected daily for leakage and damage. Also, the coolant level should be checked periodically.

To check the cooling system, see Section 2.

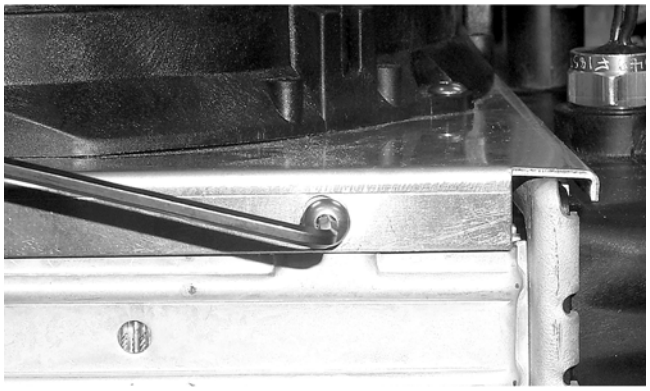
# Radiator



0732-411

### REMOVING

1. Drain the coolant at the engine.
2. Remove the front rack (see Section 8).
3. Remove the front bumper and front fender panel (see Section 8).
4. Remove the upper and lower coolant hoses.
5. Remove the cap screws and nuts securing the radiator to the frame.
6. Disconnect the fan wiring from the main wiring harness; then remove the radiator/fan assembly and account for the grommets and collars.
7. Remove the fan/fan shroud assembly from the radiator.


CC863

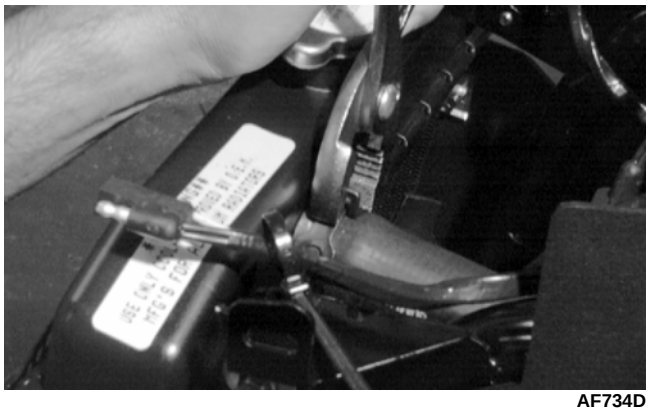
### CLEANING AND INSPECTING

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

1. Flush the radiator with water to remove any contaminants.
2. Inspect the radiator for leaks and damage.
3. Inspect all hoses for cracks and deterioration.
4. Inspect all fasteners and grommets for damage or wear.

### INSTALLING

1. Position the fan/fan shroud assembly on the radiator; then secure with existing hardware.
2. Place the radiator with grommets and collars into position on the frame; then install the cap screws and nuts. Tighten securely.
3. Install the upper and lower coolant hoses; then secure with hose clamps.


AF734D

4. Install the front bumper and front fender panel (see Section 8).
5. Install the front rack (see Section 8).

6. Fill the cooling system with the recommended amount of antifreeze. Check for leakage.

7. Connect the fan wiring to the main wiring harness.

## Hoses/Thermostat
### (500/650 H1/700 EFI)

### REMOVING

1. Drain approximately one qt of coolant from the cooling system.

2. Remove the two cap screws securing the thermostat housing to the cylinder head. Account for an O-ring and a thermostat.

### INSPECTING

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

1. Inspect the thermostat for corrosion, wear, or spring damage.

2. Using the following procedure, inspect the thermostat for proper operation.

   A. Suspend the thermostat in a container filled with water.

   B. Heat the water and monitor the temperature with a thermometer.

   C. The thermostat should start to open at 73.5-76.5° C (164-170° F) on the 500/650 H1 and 80.5-83.5° C (177-182° F) on the 700 EFI.

   D. If the thermostat does not open, it must be replaced.

3. Inspect all coolant hoses, connections, and clamps for deterioration, cracks, and wear.

**■ NOTE: All coolant hoses and clamps should be replaced every four years or 4000 miles.**

### INSTALLING

1. Place the thermostat and O-ring into the thermostat housing; then secure the thermostat housing to the cylinder head with the two cap screws.

2. Install the crossover coolant hose onto the water pump and engine water inlet. Secure with the two hose clamps.

3. Slide the upper hose onto the thermostat housing and radiator. Secure with the two hose clamps.

4. Install the lower coolant hose onto the water pump housing and radiator. Secure with the two hose clamps.

5. Fill the cooling system with the recommended amount of antifreeze. Check for leakage.

## Fan

### REMOVING

1. Remove the radiator (see Radiator in this section).

2. Remove the fan assembly from the radiator.

### INSTALLING

1. Position the fan assembly on the radiator; then secure with existing hardware.

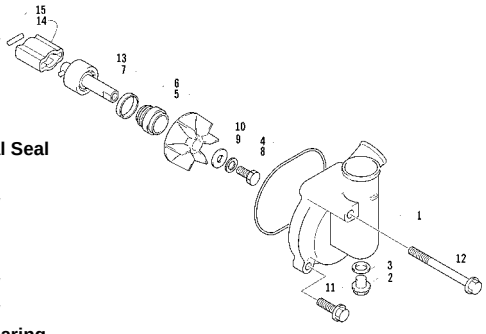
**■ NOTE: The fan wiring must be in the upper-right position.**

2. Install the radiator (see Radiator in this section).

## Servicing Water Pump
### (500 - Manual Transmission)

### REMOVING/DISASSEMBLING

KEY
1. Case
2. Cap Screw
3. Gasket
4. O-Ring
5. Impeller
6. Mechanical Seal
7. Seal
8. Cap Screw
9. Washer
10. Washer
11. Cap Screw
12. Cap Screw
13. Shaft w/Bearing
14. Joint
15. Pin



0738-290

1. Drain the coolant.

2. Remove the three cap screws securing the water pump case. Note the position of the long cap screw and account for the O-ring.

3. Remove the impeller cap screw, washer, and gasket.

4. Remove the mechanical seal using this procedure.

   A. Tap the tip of a small sheet metal screw into the inner-metal edge of the seal.

   B. Grip the screw with a pair of vise-grip pliers and pull the seal out. Account for the pump drive seal.

## CLEANING AND INSPECTING

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

1. Clean all pump components in solvent.

2. Inspect the mechanical seal and pump drive seal for damage.

■ **NOTE: If the mechanical seal and/or pump drive seal are damaged, they must be replaced as a set.**

3. Inspect the impeller for corrosion or damage.

## ASSEMBLING/INSTALLING

■ **NOTE: Treat seals and O-rings with clean antifreeze for initial lubrication.**

1. Press the mechanical seal with pump drive seal into the impeller by hand.

2. Install the mechanical seal assembly onto the water pump shaft and secure with the cap screw, washer, and gasket. Tighten the cap screw securely.

3. Place the water pump case into position and secure with the three cap screws. Note the position of the long cap screw from removal.

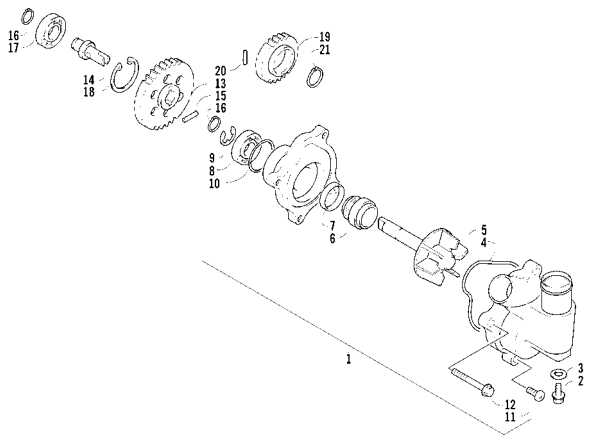
4. Fill the cooling system with the recommended amount of antifreeze.

■ **NOTE: While the cooling system is being filled, air pockets may develop; therefore, run the engine for five minutes after the initial fill, shut the engine off, and then fill the cooling system.**

5. Check the entire cooling system for leakage.

# Servicing Water Pump
## (500/650 H1/700 EFI - Automatic Transmission)

■ **NOTE: When servicing the water pump, it will be necessary to install a new oil seal and a new mechanical seal.**




KEY

1. Water Pump Assy
2. Cap Screw (Drain)
3. Gasket
4. O-Ring
5. Impeller/Shaft
6. Mechanical Seal
7. Oil Seal
8. Bearing
9. E-Ring
10. O-Ring
11. Screw
12. Cap Screw
13. Driven Gear
14. Shaft
15. Pin
16. Circlip
17. Shaft
18. Circlip
19. Drive Gear
20. Pin
21. Circlip

0737-766

## REMOVING

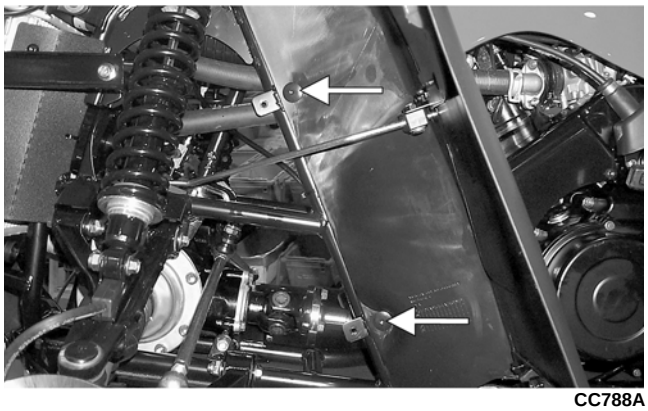
1. Remove the radiator cap; then remove the water pump drain and drain the coolant.

CC789

2. Drain the oil from the engine/transmission.

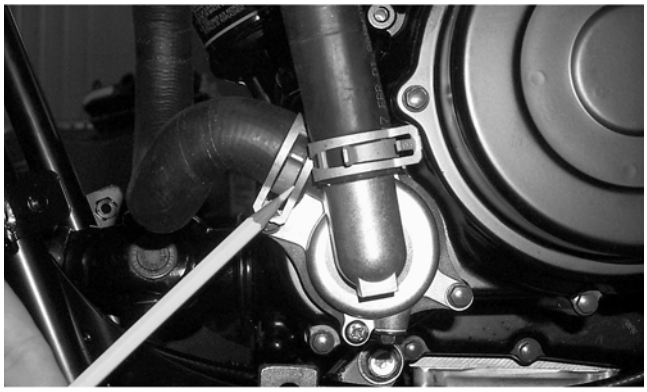
3. Remove the four torx-head cap screws securing the front and rear fenders to the footrest; then remove the four cap screws securing the footrest to the frame. Remove the footrest.

4. From inside the left-front wheel-well, remove the two torx-head cap screws securing the fender to the frame.



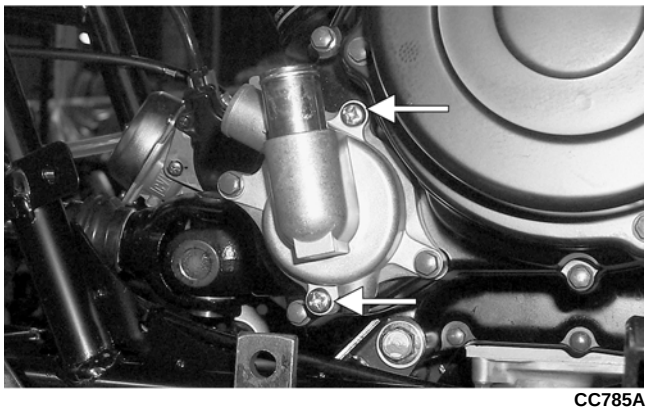
CC788A

5. Compress the tabs on the coolant hose clamps and slide the clamps away from the hose ends approximately 51 mm (2 in.); then remove both hoses from the water pump.



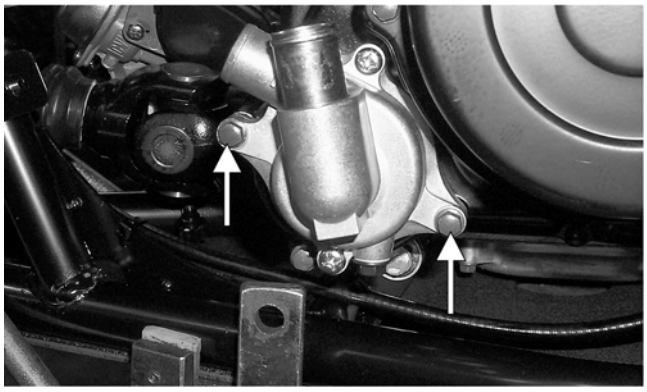
CC784

6. Using an impact driver, loosen but do not remove the two Phillips-head cover screws.



CC785A

7. Remove the two cap screws securing the water pump to the engine; then remove the water pump.



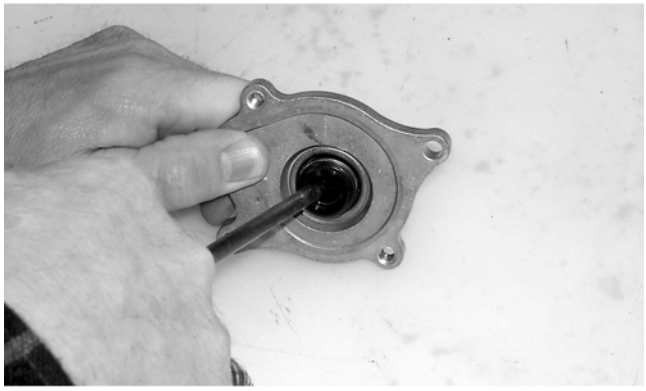
CC786A

## DISASSEMBLING

1. Finish removing the two Phillips-head cap screws securing the cover to the bearing housing; then remove the cover. Account for the O-ring.

2. Remove the E-ring securing the impeller/shaft to the bearing housing; then remove the impeller/shaft.

3. Using Seal Removal Tool (p/n 0644-072), remove the mechanical seal and the oil seal from the bearing housing.



CC772

## CLEANING AND INSPECTING

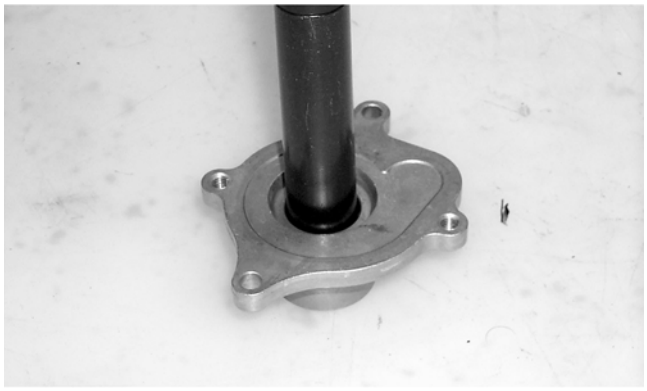
■ **NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.**

1. Clean all oil-pump components in cleaning solvent.

2. Inspect the impeller/shaft for corrosion or damage.

## ASSEMBLING

1. Place the new oil seal into the bearing housing; then using a seal driver, gently tap the seal down until it is fully seated.



CC778

2. Place the new mechanical seal into the bearing housing; then tap it down until it is fully seated.

**■ NOTE: A large deep-well socket can be used to drive the seal down evenly.**

3. Install the impeller/shaft assembly into the bearing housing; then secure with the E-ring.

**■ NOTE: Make sure the E-ring is fully seated and the impeller rotates freely.**

4. While holding the bearing housing assembly in position on the engine, slowly rotate the impeller until the impeller/shaft engages properly with its slot in the driven shaft.

**■ NOTE: The bearing housing will be flush with the engine when the two shafts are properly engaged.**

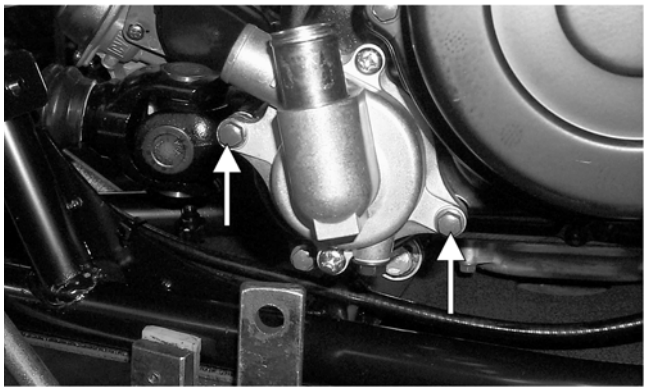
**⚠ CAUTION**

**Failure to properly engage the two shafts could cause serious engine damage.**

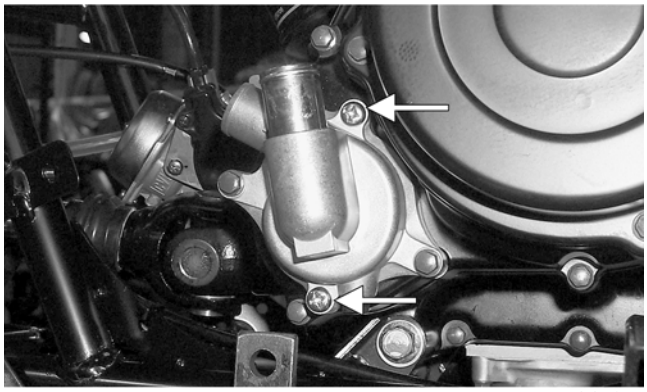
5. With the bearing housing assembly in position on the engine, place the cover (with O-ring installed) into position on the housing; then loosely secure with the two Phillips-head cap screws.

## INSTALLING

1. Secure the water pump to the engine with the two cap screws tightened securely; then tighten the two Phillips-head cap screws securely.



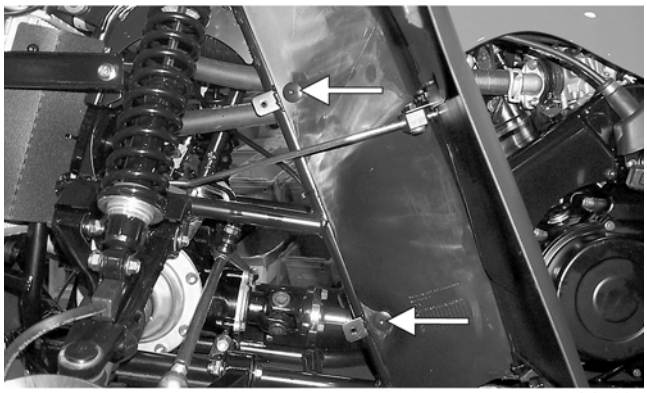
CC786A



CC785A

2. Connect the two coolant hoses to the water pump and secure with the clamps.

3. From inside the left-front wheel-well, secure the fender to the frame with the two torx-head cap screws. Tighten securely.



CC788A

4. Place the footrest into position on the frame and loosely secure with four cap screws; then secure the front and rear fenders to the footrest with the four torx-head cap screws. Tighten the four torx-head cap screws securely; then tighten the remaining cap screws to specifications.

5. Fill the engine/transmission with the proper amount of recommended oil.

6. Fill the cooling system with the proper amount of recommended coolant.

■ **NOTE: While the cooling system is being filled, air pockets may develop; therefore, run the engine for five minutes after the initial fill, shut the engine off, and then fill the cooling system.**

7. Check the entire cooling system for leakage.

**⚠ CAUTION**

**After operating the ATV for the initial 5-10 minutes, stop the engine, allow the engine to cool down, and check the coolant level. Add coolant as necessary.**

# Testing Electric Fuel Pump
## (700 EFI)

**⚠ WARNING**

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

**☞ AT THIS POINT**

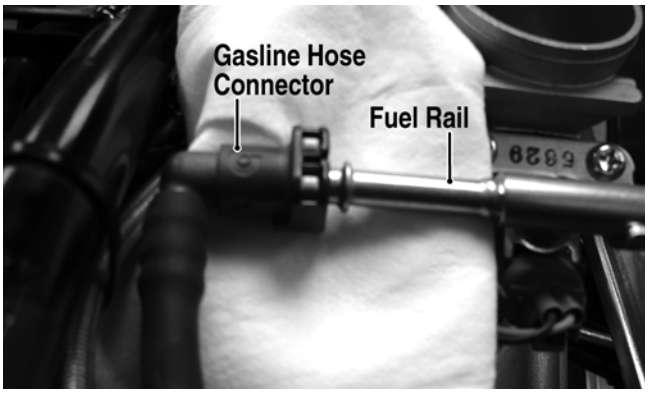
**Prior to removing the electric fuel pump, the following check should be performed to determine that removal is necessary.**

1. Turn the ignition switch ON and listen for a momentary "whirring" sound of the pump building pressure. If the sound is heard (10 seconds), no electrical checks are necessary. Turn the ignition switch OFF.

2. Disconnect the gasline hose from the throttle body; then install a suitable pressure gauge.

**⚠ WARNING**

**Gasoline may be under pressure. Place an absorbant towel under the connector to absorb any gasoline spray when disconnecting.**



FI092A

3. Turn the ignition switch to the ON position. The fuel pressure should build until the pump shuts off. Pressure should read 3.0 kg-cm$^2$ (43 psi).

4. If the pump is not running, disconnect the fuel pump/tank sensor connector by reaching under the rear rack from behind.

5. Connect a multimeter to the power supply leads with the red tester lead to the red wire and the black tester lead to the black wire; then turn the ignition switch to the ON position. The meter should read battery voltage. If battery voltage is indicated and the fuel pump does not run, replace the pump assembly. If no battery voltage is indicated, check the ECU and the vehicle tilt sensor.

### REMOVING

1. Remove the rear rack and fenders (see Section 8); then disconnect the power supply/ fuel gauge connector.

2. Remove the spring clamp; then remove the fuel hose.

3. Remove the screws securing the fuel pump to the gas tank; then make a reference mark on the fuel pump and tank.

4. Lift out the fuel pump assembly carefully tilting it forward to clear the voltage regulator; then guide the pump and float lever through the opening in the gas tank.

**⚠ CAUTION**

**Take care not to damage the float or float arm or replacement of the entire assembly will be necessary.**

5. Using duct tape or other suitable means, cover the fuel pump opening.

## INSPECTING

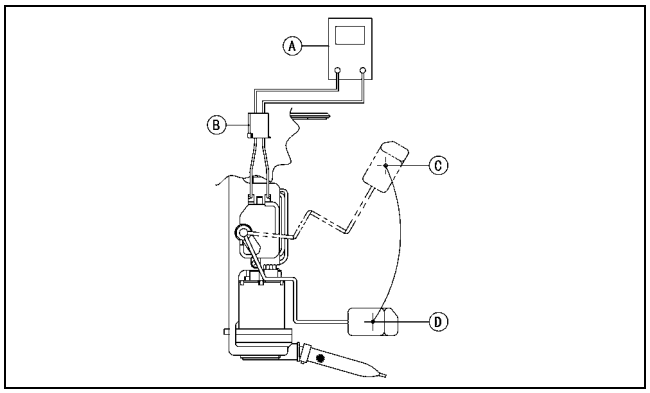
**☞AT THIS POINT**

**If the pump has failed earlier test and must be replaced, proceed to INSTALLING.**

1. Inspect the fuel screen and blow clean with low pressure compressed air.

2. Move the float lever and check for free movement. The float assembly should return to the lower position without force. If not, replace the fuel pump assembly.

3. Test the fuel gauge tank sensor by connecting a multimeter (A) to the fuel sensor leads (B); then select OHMS. The multimeter should show 5 ohms at full fuel position (C) and 95 ohms at empty fuel position (D).

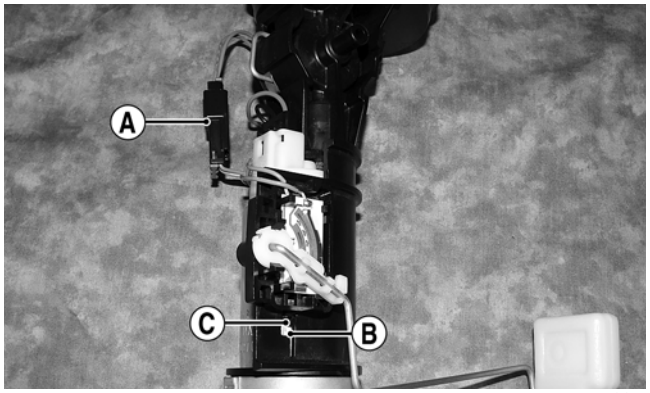



ATV2116

■ **NOTE: If readings are erratic, clean the resistor wiper and resistor with clean alcohol and retest. If still not correct, replace the fuel gauge tank sensor.**

4. To replace the fuel gauge tank sensor, use the following procedure.

   A. Disconnect the two-wire connector (A); then press the fuel gauge tank sensor toward the top of the fuel pump to release it from the mounting slot (B).



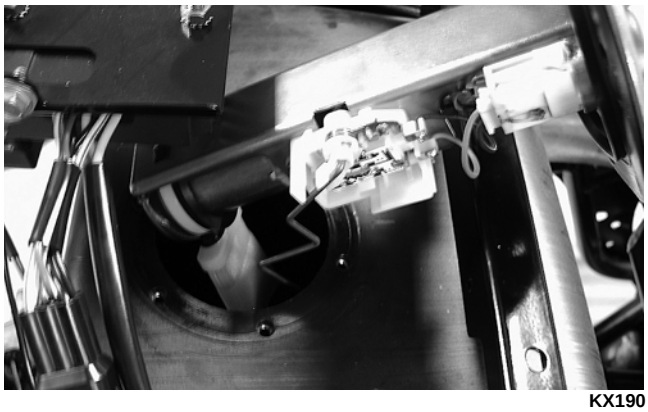

FI460A

   B. Engage the tabs (C) of the fuel gauge tank sensor into the mounting slot (B) and press toward the bottom of the fuel pump to latch in place; then connect the two-wire connector (A).

## INSTALLING

1. Mark the new fuel pump with a reference mark in the same location as the removed pump; then place the new gasket on the pump.

2. Remove the material covering the fuel pump opening; then carefully guide the fuel pump into position taking care not to damage the float or float lever.



KX190

3. Rotate the fuel pump until the match marks align; then install the mounting screws and tighten securely using a crisscross pattern.

■ **NOTE: It is important to install the fuel pump with the correct orientation to ensure adequate float lever clearance.**

4. Connect the wires, fuel hose, and spring clamp; then turn the ignition switch to the ON position. Note that the fuel pump runs momentarily and the fuel gauge indicates the proper fuel level.

5. With the transmission in neutral and brake lever lock engaged, start the engine and check for normal operation. Check for any fuel leaks.

6. Install any wire ties that were removed; then install the rear fenders, rack, and seat making sure the seat locks securely.

# Testing Vacuum Pulse Fuel Pump
## (400/500/650 H1)

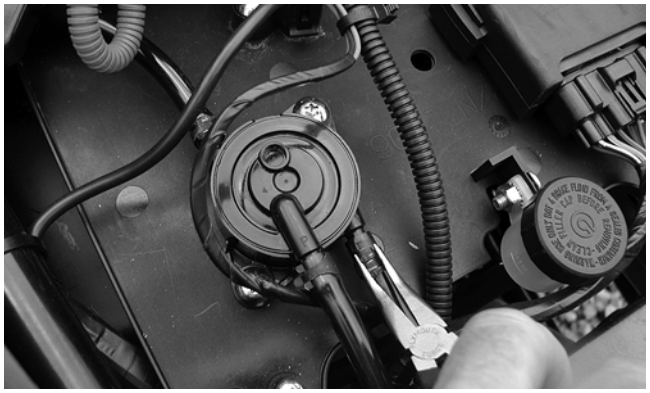
**⚠ WARNING**

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

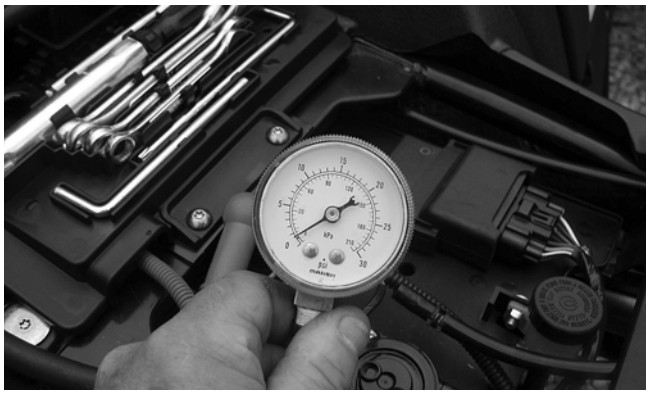
**☞ AT THIS POINT**

**Prior to removing the vacuum pulse fuel pump, the following check should be performed to determine that removal is necessary.**

1. Disconnect the fuel pump/carburetor hose at the fuel pump; then connect a hose and suitable pressure gauge to the fuel pump output fitting.



CD815

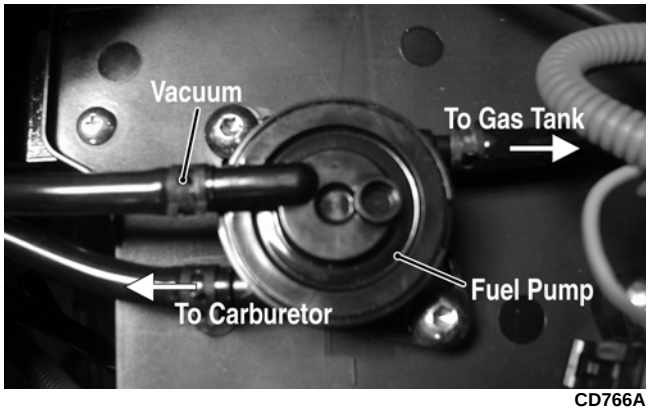


CD816

2. Start the engine. Fuel pump pressure should read 0.18-0.25 kg/cm² (2.5-3.5 psi).

### REMOVING

1. Remove the seat; then remove the three clamps securing the gas hoses and vacuum hose and disconnect the hoses.




CD766A

2. Remove the two machine screws and flange nuts securing the fuel pump to the electrical tray; then remove the pump.

### INSTALLING

1. Place the fuel pump into position on the electrical tray; then secure with the machine screws and flange nuts. Tighten securely.

2. Connect two gas hoses and one vacuum hose; then secure with the clamps.

# SECTION 5 - ELECTRICAL SYSTEM

## TABLE OF CONTENTS

# Specifications

| 400 | | |
|---|---|---|
| Ignition Timing | | 10° BTDC @ 1500 RPM |
| Spark Plug Type | | NGK CR7E |
| Spark Plug Gap | | 0.7-0.8 mm (0.028-0.032 in.) |
| Spark Plug Cap | | 8000-12,000 ohms |
| Ignition Coil Resistance | (primary)<br>(secondary) | Less than 1 ohm<br>(terminal to ground)<br>5200-7800 ohms<br>(high tension - plug cap removed - to ground) |
| Ignition Coil Peak Voltage | (primary/ CDI) | 250-375 DC volts<br>(terminal to ground) |
| **MAGNETO** | | |
| Magneto Coil Resistance | (trigger)<br>(source)<br>(charging) | 160-240 ohms (green to blue)<br>Less than 1 ohm<br>(yellow to white)<br>Less than 1 ohm (black to black) |
| Magneto Coil Peak Voltage | (trigger)<br>(source) | 5.04-7.56 volts (green to blue)<br>0.7-1.05 volts (yellow to white) |
| Stator Coil Output | (no load) | 60 AC volts @ 5000 RPM<br>(black to black) |

| 500/650 H1 | | |
|---|---|---|
| Ignition Timing | | 10° BTDC @ 1500 RPM |
| Spark Plug Type | | NGK CR6E |
| Spark Plug Gap | | 0.7-0.8 mm (0.028-0.032 in.) |
| Spark Plug Cap | | 8000-12,000 ohms (500)<br>4000 ohms (650 H1) |
| Ignition Coil Resistance | (primary)<br>(secondary) | Less than 1 ohm<br>(terminal to ground)<br>5200-7800 ohms<br>(high tension - plug cap removed - to ground) |
| Ignition Coil Peak Voltage | (primary/ CDI) | 140.0-215.0 DC volts - 500<br>142.4-213.6 DC volts - 650 H1<br>(terminal to ground) |
| **MAGNETO** | | |
| Magneto Coil Resistance | (trigger)<br>(source)<br>(charging) | 160-240 ohms (green to blue)<br>Less than 1 ohm<br>(yellow to white)<br>Less than 1 ohm (black to black) |
| Magneto Coil Peak Voltage | (trigger)<br>(source) | 4.2-6.3 volts<br>(green to blue)<br>0.40-0.62 volt<br>(yellow to white) |
| Stator Coil Out-put | (no load) | 60 AC volts @ 5000 RPM<br>(black to black) |

| 700 EFI | | |
|---|---|---|
| Ignition Timing | | N/A |
| Spark Plug Type | | NGK CR6E |
| Spark Plug Gap | | 0.7-0.8 mm<br>(0.028-0.032 in.) |
| Spark Plug Cap | | 8000-12,000 ohms |
| Ignition Coil Resistance | (primary)<br>(secondary) | Less than 1 ohm<br>(terminal (+) to terminal (-))<br>12k-19k ohms<br>(high tension - plug cap to terminal (+)) |
| Ignition Coil Peak Voltage | (ECU) | 80 volts or more<br>(wire (+) to ground) |
| **MAGNETO** | | |
| Stator Coil Resistance | (crankshaft position sensor)<br>(charging) | 150-250 ohms (blue to white)<br>Less than 1 ohm<br>(yellow to yellow) |
| Crankshaft Position Sensor Peak Voltage | | 5.0 volts or more (blue to white) |
| Stator Coil Output | (no load) | 75 AC volts @ 5000 RPM<br>(yellow to yellow) |

# Battery

For battery related information, see Section 2.

# RPM Limiter

■ **NOTE: The ATV is equipped with a CDI unit that retards ignition timing when maximum RPM is approached. When the RPM limiter is activated, it could be misinterpreted as a high-speed misfire.**

# Testing Electrical Components

All of the electrical tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) and when testing peak voltage, the Peak Voltage Reading Adapter (p/n 0644-307) must be used. If any other type of meter is used, readings may vary due to internal circuitry. When troubleshooting a specific component, always verify first that the fuse(s) are good, that the bulb(s) are good, that the connections are clean and tight, that the battery is fully charged, and that all appropriate switches are activated.

■ **NOTE: For absolute accuracy, all tests should be made at room temperature of 68° F.**

# Accessory Receptacle/Connector

■ **NOTE: This test procedure is for either the receptacle or the connector.**

### VOLTAGE

1. Turn the ignition switch to the ON position; then set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the red/white wire or the positive connector; then connect the black tester lead to ground.
3. The meter must show battery voltage.

■ **NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, receptacle, connector, or the main wiring harness.**

# Brakelight Switch (Auxiliary)

The switch connector is the two-prong connector on the brake switch lead above the transmission.

■ **NOTE: The ignition switch must be in the ON position.**

### VOLTAGE (Wiring Harness Side)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester to the orange wire; then connect the black tester lead to ground.

AR627D

3. The meter must show battery voltage.

■ **NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, switch, or the main wiring harness.**

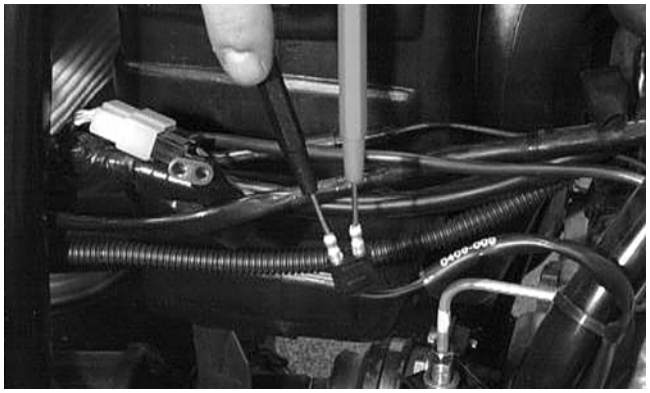
■ **NOTE: If the meter shows battery voltage, the main wiring harness is good; proceed to test the switch/component, the connector, and the switch wiring harness for resistance.**

### RESISTANCE (Switch Connector)

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one black wire; then connect the black tester lead to the other black wire.



AR626D

3. When the brake pedal is depressed, the meter must show less than 1 ohm.

■ **NOTE: If the meter shows more than 1 ohm of resistance, replace the switch.**

# Brakelight Switch (Handlebar Control)

To access the connector, remove the access panel.

■ **NOTE: The ignition switch must be in the ON position.**

### VOLTAGE (Wiring Harness Connector)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the orange wire; then connect the black tester lead to ground.

AR622D

3. The meter must show battery voltage.

■ **NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, switch, or the main wiring harness.**

■ **NOTE: If the meter shows battery voltage, the main wiring harness is good; proceed to test the switch/component, the connector, and the switch wiring harness for resistance.**

### RESISTANCE (Switch Connector)

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

■ **NOTE: The brake lever must be compressed for this test. Also, the ignition switch must be in the OFF position.**

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one black wire; then connect the black tester lead to the other black wire.

AR621D

3. When the lever is compressed, the meter must show less than 1 ohm.

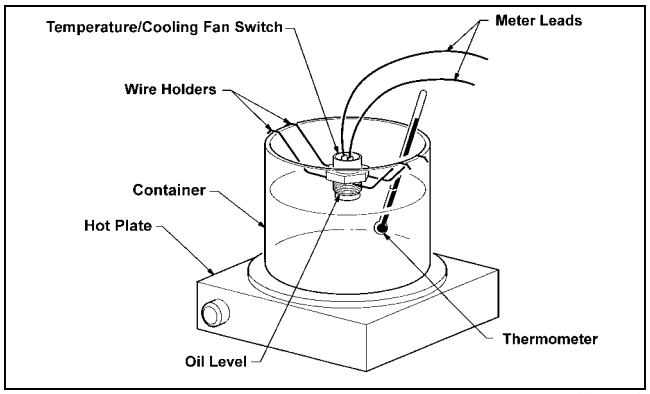
■ **NOTE: If the meter shows more than 1 ohm of resistance, replace the switch.**

## Oil Temperature and Cooling Fan Switches (400)

■ **NOTE: This model has an oil temperature switch and a cooling fan switch.**

1. Connect the meter leads (selector in the OHMS position) to the switch contacts.
2. Suspend the switch and a thermometer in a container of oil; then heat the oil.

■ **NOTE: Neither the switch nor the thermometer should be allowed to touch the bottom of the container or inaccurate readings will occur. Use wire holders to suspend switch and thermometer.**




733-554C

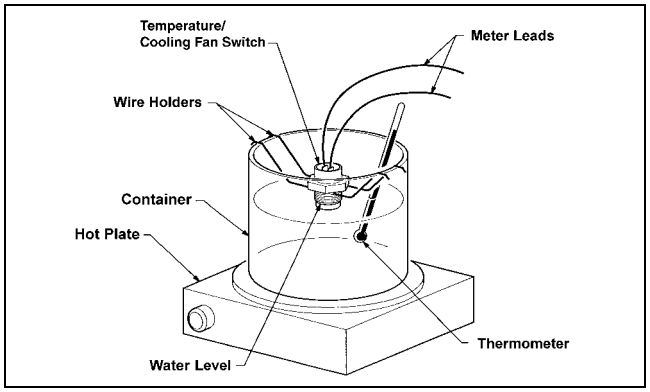
3. On the oil temperature switch when the oil temperature reaches 160° C (320° F), the meter should read a closed circuit.
4. On the oil temperature switch, allow the oil to cool, and when the temperature is at (or just before) a temperature of 140° C (284° F), the meter should read an open circuit.
5. On the cooling fan switch when the temperature reaches 120° C (248° F), the meter should read a closed circuit.
6. On the cooling fan switch, allow the oil to cool, and when the temperature is at (or just before) a temperature of 110° C (230° F), the meter should read an open circuit.
7. If the readings are not as indicated, the switch must be replaced.
8. Apply thread tape to the threads of the switch; then install the switch and tighten securely.
9. Connect the switch leads.

# Coolant Temperature and Cooling Fan Switches
## (500/650 H1)

1. Connect the meter leads (selector in the OHMS position) to the switch contacts.

2. Suspend the switch and a thermometer in a container of water; then heat the water.

■ **NOTE: Neither the switch nor the thermometer should be allowed to touch the bottom of the container or inaccurate readings will occur. Use wire holders to suspend switch and thermometer.**




733-554E

3. On the coolant temperature switch when the water temperature reaches 112-118° C (234-244° F), the meter should read a closed circuit.

4. On the coolant temperature switch, allow the water to cool, and when the temperature is within a temperature range of 108-111° C (226-232° F), the meter should read an open circuit.

5. On the cooling fan switch when the temperature reaches 66-68° C (150-155° F), the meter should read a closed circuit.

6. On the cooling fan switch, allow the water to cool, and when the temperature is within a temperature range of 62-65° C (145-149° F), the meter should read an open circuit.

7. If the readings are not as indicated, the switch must be replaced.

8. Install the switch and tighten securely.

9. Connect the switch leads.

# Cooling Fan Switch and Engine Coolant Temperature (ECT) Sensor
## (700 EFI)

1. Connect the meter leads (selector in OHMS position) to the switch/sensor terminals.

2. Suspend the switch/sensor and a thermometer in a container of water; then heat the water.

■ **NOTE: Neither the switch/sensor nor the thermometer should be allowed to touch the bottom of the container or inaccurate readings will occur. Use wire holders to suspend the switch/sensor and thermometer.**

3. On the cooling fan switch when the water temperature reaches approximately 93° C (199° F), the meter should read less than 1.0 ohm.

4. On the cooling fan switch, allow the water to cool and when the temperature reaches approximately 87° C (189° F), the meter should read an open circuit.

5. On the ECT sensor when the temperature reaches 20° C (68° F), the meter should read approximately 2.45k ohms.

6. On the ECT sensor when the temperautre reaches 50° C (122° F), the meter should read approximately 800 ohms.

7. On the ECT sensor when the temperautre reaches 80° C (176° F), the meter should read approximately 318 ohms.

8. On the ECT sensor when the temperautre reaches 110° C (230° F), the meter should read approximately 142 ohms.

9. If the readings are not as indicated, the switch/sensor must be replaced.

10. Install the switch/sensor and tighten securely.

11. Connect the leads.

# Fan Motor

The connector is the black two-prong one located behind the fan assembly.

■ **NOTE: The ignition switch must be in the ON position.**

### VOLTAGE (Main Harness Connector to Fan Motor)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the black/red wire (500/650 H1/700 EFI) or the black/orange wire (400); then connect the black tester lead to ground.
3. The meter must show battery voltage.

■ **NOTE: If the meter shows no battery voltage, troubleshoot the battery, fuse, motor, or the main wiring harness.**

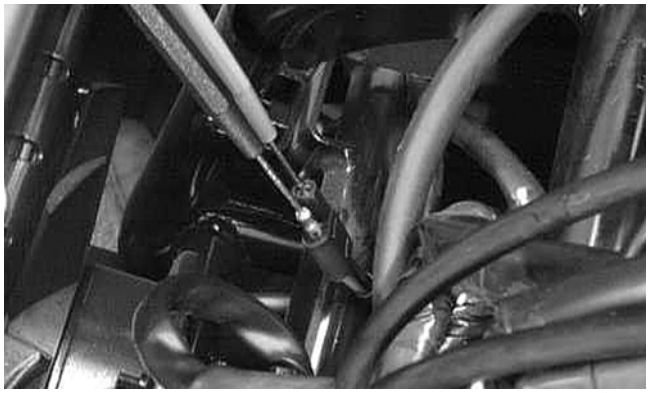
■ **NOTE: If the meter shows battery voltage, the main wiring harness is good. The connector should be checked for resistance.**

### RESISTANCE (Fan Motor Connector)

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the blue wire; then connect the black tester lead to the black wire.



AR645D

3. The meter must show less than 1 ohm.

■ **NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.**

■ **NOTE: To determine if the fan motor is good, connect the blue wire from the fan connector to a 12 volt DC power supply; then connect the black wire from the fan connector to ground. The fan should operate.**

**⚠ CAUTION**

**Care should be taken to keep clear of the fan blades.**

# Fuse Block/Power Distribution Module

The fuses are located in a power distribution module under the seat.

If there is any type of electrical system failure, always check the fuses first.

■ **NOTE: The ignition switch must be in the LIGHTS position.**

1. Remove all fuses from the distribution module.
2. Set the meter selector to the DC Voltage position.
3. Connect the black tester lead to ground.
4. Using the red tester lead, contact each end of the fuse holder connector terminals individually.
5. The meter must show battery voltage from one side of the connector terminal ends.

■ **NOTE: Battery voltage will be indicated from only one side of the fuse holder connector terminal; the other side will show no voltage.**

■ **NOTE: When testing the HI fuse holder, the headlight dimmer switch must be in the HI position; when testing the LIGHTS fuse holder, the headlight dimmer switch can be in either position.**

■ **NOTE: If the meter shows no battery voltage, troubleshoot the battery, switches, distribution module, or the main wiring harness.**

# Fuses

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one spade end of the fuse; then connect the black tester lead to the other spade end.
3. The meter must show less than 1 ohm resistance. If the meter reads open, replace the fuse.

**■ NOTE: Make sure the fuses are returned to their proper position according to amperage. Refer to the fuse block cover for fuse placement.**

# Ignition Coil

The ignition coil is on the frame above the engine. To access the coil, the side panel (see Section 2) must be removed.

## RESISTANCE

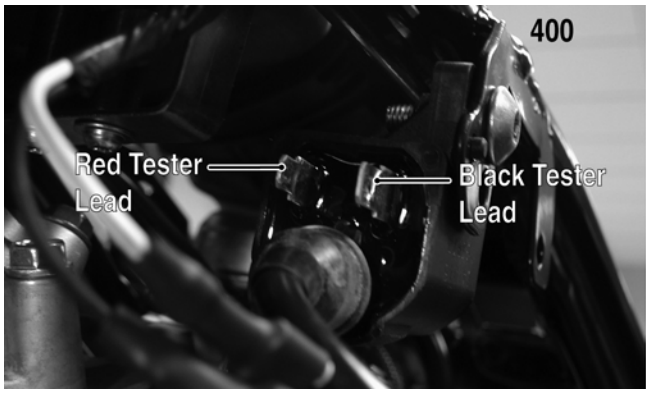
**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

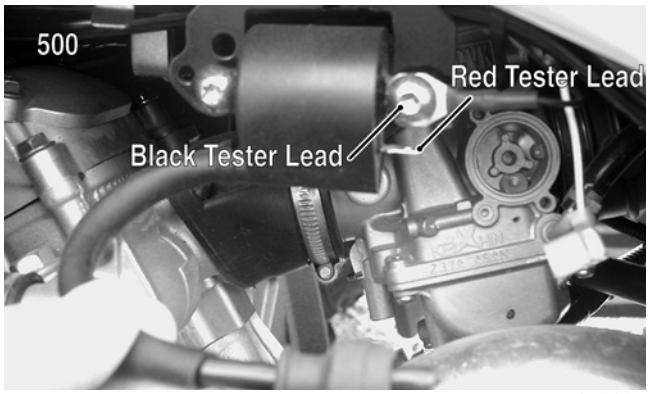
**■ NOTE: For these tests, the meter selector should be set to the OHMS position and the primary wire(s) should be disconnected.**

### Primary Winding

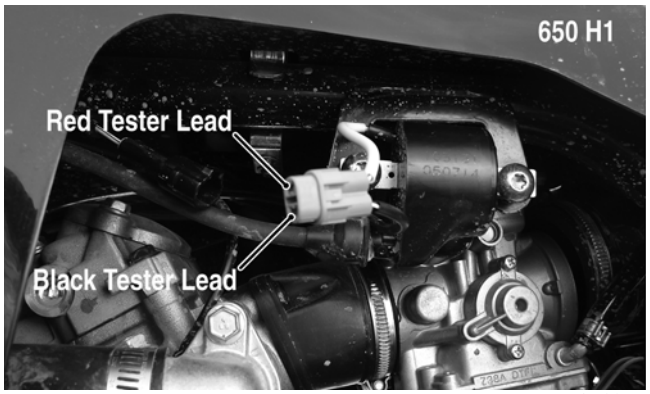
1. Connect the red tester lead to either terminal; then connect the black tester lead to the other terminal or on 500 models, to a suitable ground.



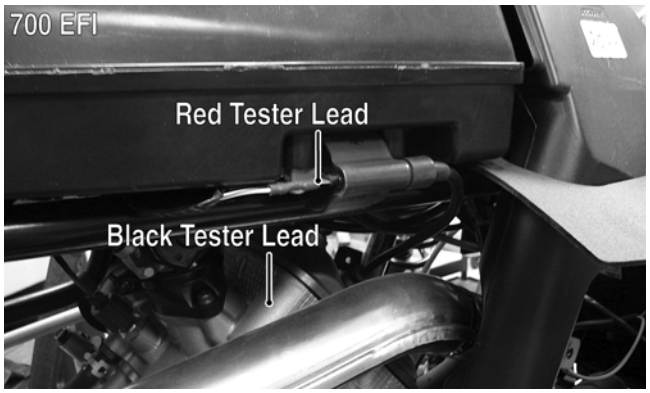
CF202A



CD882B



CF234A



FI066B

2. The meter reading must be within specification.

### Secondary Winding

1. Remove the plug cap from the high tension lead; then connect the red tester lead to the high tension lead.

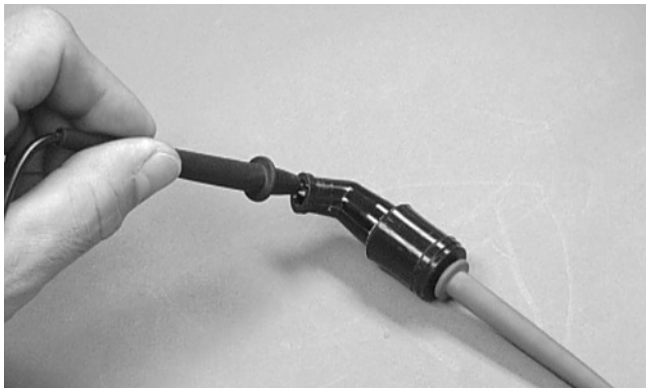
2. On the 400/650 H1, connect the black tester lead to either primary connector; on the 500/700 EFI, connect the black tester lead to the coil frame or to the primary connector.

3. The meter reading must be within specification.

■ **NOTE: If the meter does not show as specified, replace ignition coil.**

### Spark Plug Cap

1. Connect the red tester lead to one end of the cap; then connect the black tester lead to the other end of the cap.



AR603D

2. The meter reading must be within specification.

■ **NOTE: If the meter does not read as specified, replace the spark plug cap.**

### PEAK VOLTAGE (400)

■ **NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). If any other type of tester is used, readings may vary due to internal circuitry.**

■ **NOTE: The battery must be at full charge for these tests.**

### Primary/CDI

■ **NOTE: The CDI is located beneath the seat and fender panel near the battery.**

1. Set the meter selector to the DC Voltage position; then disconnect the blue/white primary wire from the coil.

2. Connect the red tester lead to the primary wire; then connect the black tester lead to ground.

3. Crank the engine over using the electric starter.

4. The meter reading must be within specification.

### PEAK VOLTAGE (500/650 H1/700 EFI)

■ **NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). If any other type of tester is used, readings may vary due to internal circuitry.**

■ **NOTE: The battery must be at full charge for these tests.**

### Primary/CDI (500/650 H1)/ ECU (700 EFI)

■ **NOTE: The CDI/ECU is located beneath the seat near the battery.**

1. Set the meter selector to the DC Voltage position; then disconnect the blue/white primary wire from the coil.

2. Connect the red tester lead to the primary wire; then connect the black tester lead to ground.

3. Crank the engine over using the electric starter.

4. The meter reading must be within specification.

## EFI Sensors/ Components (700 EFI)

### CRANKSHAFT POSITION (CKP) SENSOR

To test the CKP sensor, see Stator Coil/Crankshaft Position (CKP) Sensor (700 EFI) in this section.

### AIR PRESSURE SENSOR (APS)

1. Disconnect the APS connector from the pressure sensor located on the right front-side of the air filter housing.

2. Select DC Voltage on the tester and turn the ignition switch to the ON position.

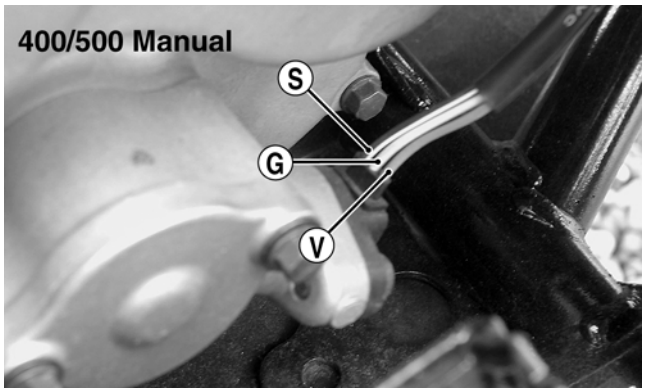
3. Connect the black tester lead to the black/green wire and the red tester lead to the brown wire. The meter should read 4.5-5.5 DC volts. If the meter does not read as specified, check the ECU connector or wiring.

4. Connect the APS to the harness; then using MaxiClips (p/n 0744-041), connect the red tester lead to the brown/white wire and the black tester lead to the black/green wire. With the engine running at idle speed, the meter should read approximately 2.6 DC volts.

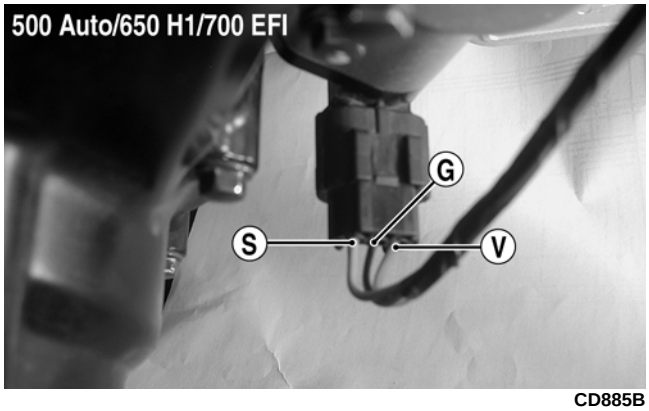
■ **NOTE: If the meter does not read as specified, check the hose connecting the APS to the intake pipe or replace the sensor.**

## Electronic Speedometer Speed Sensor

■ **NOTE: Prior to testing the speed sensor, inspect the three-wire connector on the sensor harness (400/500 manual models) or on the speed sensor (500 auto/650 H1/700 EFI models) for contamination, broken pins, and/or corrosion.**




CD884A




CD885B

1. Set the meter selector to the DC Voltage position.

2. With appropriate needle adapters on the meter leads, connect the red tester lead to the voltage lead (V); then connect the black tester lead to the ground lead (G).

3. Turn the ignition switch to the ON position.

4. The meter must show 6 DC volts (500 auto/650 H1/700 EFI) or 12 DC volts (400/500 manual).

5. Leave the black tester lead connected; then connect the red tester lead to the signal lead (S) pin.

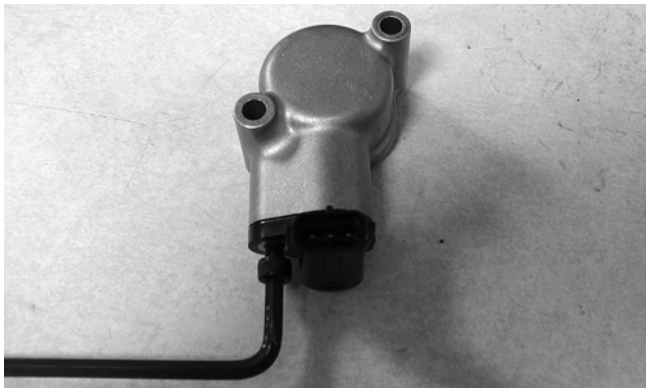
6. Slowly move the ATV forward or backward; the meter must show 0 and 6 DC volts alternately (500 auto/650 H1/700 EFI) or 0 and 12 DC volts alternately (400/500 manual).

■ **NOTE: If the sensor tests are within specifications, the speedometer must be replaced. See Section 9.**

To replace a speed sensor, use the following procedure.

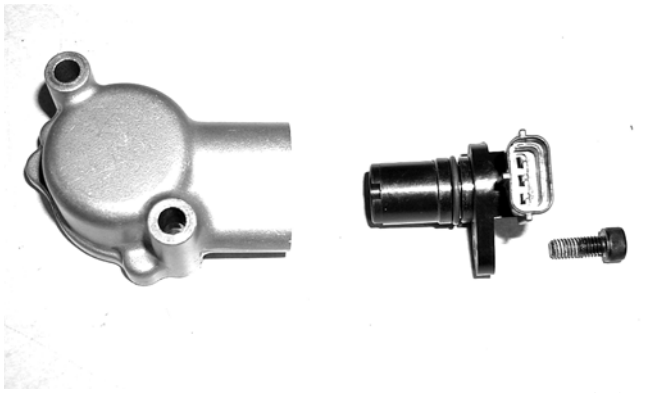
1. Disconnect the three-wire connector from the speed sensor harness or from the speed sensor; then remove the Allen-head cap screw securing the sensor to the sensor housing.

2. Remove the sensor from the sensor housing accounting for an O-ring.



CD070

3. Install the new speed sensor into the housing with new O-ring lightly coated with multi-purpose grease; then secure the sensor with the Allen-head cap screw (threads coated with blue Loctite #242). Tighten securely.



CD071

# Ignition Switch

On the 400/500, the connector is the black three-wire one beneath the steering post cover. On the 650 H1/700 EFI, the connector is a four-wire one. To access the connector, the cover must be removed.

### VOLTAGE

■ **NOTE: Perform this test on the lower side of the connector.**

1. Set the meter selector to the DC Voltage position.
2. Connect the red meter lead to the red wire; then connect the black meter lead to ground.
3. Meter must show battery voltage.

■ **NOTE: If the meter shows no battery voltage, troubleshoot the battery or the main wiring harness.**

### RESISTANCE

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

■ **NOTE: Perform this test on the upper side of the connector.**

1. Turn the ignition switch to the ON position.
2. Set the meter selector to the OHMS position.
3. Connect the red tester lead to the red wire; then connect the black tester lead to the orange wire (400/500) or to the red/black wire (650 H1/700 EFI).
4. The meter must show less than 1 ohm.
5. Turn the ignition switch to the LIGHTS position.
6. Connect the red tester lead to the red wire; then connect the black tester lead to the orange wire (400/500) or to the red/black wire (650 H1/700 EFI).
7. The meter must show less than 1 ohm.
8. Connect the red tester lead to the red wire; then connect the black tester lead to the gray wire.
9. The meter must show less than 1 ohm.
10. With the switch in the OFF position, connect the red tester lead to the red wire and the black tester lead to each of the remaining wires. The meter must show an open circuit on all wires.
11. On the 650 H1/700 EFI, connect the red tester lead to the red wire and the black tester lead to the brown wire. With the switch in the ON position, the meter must show 980-1020 ohms.

■ **NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.**

# Handlebar Control Switches

The connector is the yellow one next to the steering post. To access the connector, the steering post cover and the right-side fender splash shield must be removed (see Section 8).

■ **NOTE: These tests should be made on the top side of the connector.**

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

### RESISTANCE (HI Beam)

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the yellow wire; then connect the black tester lead to the gray wire.
3. With the dimmer switch in the HI position, the meter must show less than 1 ohm.

■ **NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.**

### RESISTANCE (LO Beam)

1. Connect the red tester lead to the white wire; then connect the black tester lead to the gray wire.
2. With the dimmer switch in the LO position, the meter must show an open circuit.

■ **NOTE: If the meter reads resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.**

### DIODE (Starter Button)

■ **NOTE: If voltage is not as specified, check the condition of the battery in the meter prior to replacing the switch. A low battery will result in a low voltage reading during a diode test.**

1. Set the meter selector to the Diode position.
2. Connect the red tester lead to the orange/white wire; then connect the black tester lead to the yellow/green wire.
3. With the starter button depressed, the meter must show 0.5-0.7 DC volts.
4. With the starter button released, the meter must show 0 DC volts.
5. Connect the red tester lead to the yellow/green wire; then connect the black tester lead to the orange/white wire.
6. With the starter button depressed, the meter must show 0 DC volts.

■ **NOTE: If the meter does not show as specified, replace the switch/component, connector, or switch harness.**

### RESISTANCE (Emergency Stop)

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the orange wire; then connect the black tester lead to the orange/white wire.
3. With the switch in the OFF position, the meter must show an open circuit.
4. With the switch in the RUN position, the meter must show less than 1 ohm.

■ **NOTE: If the meter shows more than 1 ohm of resistance, troubleshoot or replace the switch/component, the connector, or the switch wiring harness.**

### RESISTANCE (Reverse Override)

The connector is the four-prong white one next to the steering post. To access the connector, the front rack and front fenders must be removed (see Section 8).

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to one red/yellow wire; then connect the black tester wire to the other red/yellow wire. The meter must show less than 1 ohm.
3. Depress and hold the reverse override button. The meter must show an open circuit.
4. Connect the red tester lead to the blue wire; then connect the black meter lead to the black wire. The meter must show an open circuit.
5. Depress and hold the reverse override button. The meter must show less than 1 ohm.

■ **NOTE: If the meter does not show as specified, replace the switch/component, connector, or switch harness.**

## Front Drive Selector Switch

The connector is the two-wire black snap-lock one in front of the steering post. To access the connector, the cover must be removed.

■ **NOTE: Resistance tests should be made with the connector disconnected and on the selector-side of the connector.**



### RESISTANCE

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the red wire; then connect the black tester lead to the white wire.
3. With the selector switch in the 2WD position, the meter must show a closed circuit.
4. With the selector switch in the 4WD position, the meter must show an open circuit.

■ **NOTE: If the meter does not show as specified, replace the front drive selector switch.**

### VOLTAGE

■ **NOTE: The battery must be connected when performing voltage tests.**

1. Set the meter selector to the DC Voltage position.

2. Connect the black tester lead to the negative battery terminal.

3. Connect the red tester lead to the red wire on the harness side of the connector.

4. Turn the ignition switch to the RUN position.

5. The meter must show 12 DC volts.

■ **NOTE: If the meter shows other than specified, check the harness, connector, 30 amp fuse, and battery connections.**

## Front Drive Selector Actuator

■ **NOTE: With the engine stopped and the ignition switch in the ON position, a momentary "whirring" sound must be noticeable each time the selector switch is moved to 2WD and 4WD. Test the switch, 30 amp fuse, and wiring connections prior to testing the actuator.**

■ **NOTE: The differential must be in the unlocked position for this procedure.**

### VOLTAGE

1. Select the 2WD position on the front drive selector switch; then disconnect the connector on the actuator wiring harness.

2. With the ignition switch in the OFF position, connect the black tester lead to the black wire in the supply harness; then connect the red tester lead to the orange wire in the supply harness.

3. Turn the ignition switch to the ON position. The meter must show 12 DC volts.

4. Connect the red tester lead to the white/red wire in the supply harness. The meter must show 12 DC volts.

5. Select the 4WD position on the front drive selector switch; then connect the red tester lead to the white/red wire in the supply harness. The meter must show 0 DC volts.

■ **NOTE: The 4WD icon on the LCD should illuminate.**

6. Connect the red tester lead to the orange wire in the supply harness. The meter must show 12 DC volts.

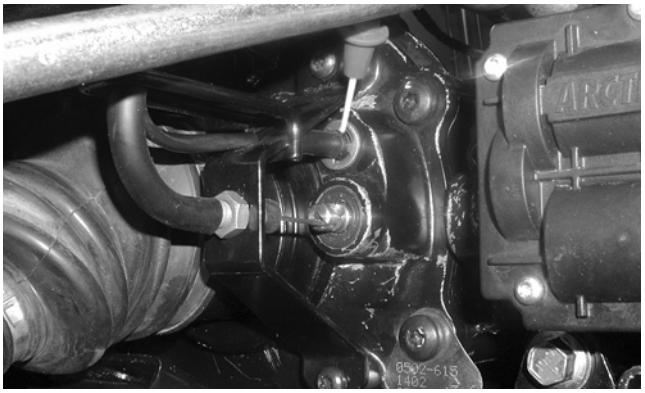
■ **NOTE: If the voltage readings are as specified and the actuator does not function correctly, replace the actuator (see Section 6).**

## Differential Lock Switch

■ **NOTE: The following procedure does not include the 400 TRV model.**

### VOLTAGE

1. Select DC Voltage on the multimeter; then connect the red tester lead to the switch terminal (leaving the wire connected) and the black tester lead to ground.



CD575

2. Turn the ignition switch to the ON position. The meter must show 12 DC volts.

■ **NOTE: If no voltage is indicated, check the wiring harness, fuse, or battery connections.**

3. Select the lock position on the differential. The meter should drop to 0 volts, and the front drive selector actuator switch should operate to engage 4-wheel drive.

■ **NOTE: It may be necessary to rock the ATV slightly to engage the differential lock fully.**

■ **NOTE: The 4WD and the LOCK icons on the LCD should illuminate.**


CD576


CF094C

4. If the differential lock engages (front wheels locked) and the voltage does not drop to 0, the switch is faulty and must be cleaned or replaced.

# Magneto Coils
## (400/500/650 H1)

### VOLTAGE
### (Stator Coil - Regulated Output)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the positive battery post; then connect the black tester lead to the negative battery post.
3. With the engine running at a constant 5000 RPM (with the headlights on), the meter must show 14-15.5 DC volts.

**⚠ CAUTION**

**Do not run the engine at high RPM for more than 10 seconds.**

**■ NOTE: If voltage is lower than specified, test stator coil - no load.**

### VOLTAGE
### (Stator Coil - No Load)

The connector is the black three-pin one on the right side of the engine just above the starter motor.

**■ NOTE: Test the connector that comes from the engine.**

1. Set the meter selector to the AC Voltage position.
2. Test between the three black wires for a total of three tests.
3. With the engine running at the specified RPM, all wire tests must show 60 AC volts.

**⚠ CAUTION**

**Do not run the engine at high RPM for more than 10 seconds.**

**■ NOTE: If both stator coil tests failed, check all connections, etc., and test again. If no voltage is present, replace the stator assembly.**

### RESISTANCE
### (Charging Coil)

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Set the meter selector to OHMS position.
2. Test between the three black wires for a total of three tests.
3. The meter reading must be within specification.

### RESISTANCE
### (Trigger Coil)

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Disconnect the gray four-pin connector on the right side of the engine just above the starter motor.
2. Set the meter selector to the OHMS position.
3. Connect the red tester lead to the green wire; then connect the black tester lead to the blue wire. The meter reading must be within specification.

### RESISTANCE (Source Coil)

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the yellow wire; then connect the black tester lead to the white wire.
3. The meter reading must be within specification.

■ **NOTE: If the meter shows other than specified in any resistance test, replace the stator assembly.**

### PEAK VOLTAGE (400)

■ **NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). If any other type of tester is used, readings may vary due to internal circuitry.**

■ **NOTE: The battery must be at full charge for these tests.**

### Magneto Coil (Trigger)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the green wire; then connect the black tester lead to the blue wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

### Magneto Coil (Source)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the yellow wire; then connect the black tester lead to the white wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

### PEAK VOLTAGE (500/650 H1)

■ **NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). If any other type of tester is used, readings may vary due to internal circuitry.**

■ **NOTE: The battery must be at full charge for these tests.**

### Magneto Coil (Trigger)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the green wire; then connect the black tester lead to the blue wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

### Magneto Coil (Source)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the yellow wire; then connect the black tester lead to the white wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

## Stator Coil/Crankshaft Position (CKP) Sensor (700 EFI)

### VOLTAGE (Regulator/Rectifier - Output)

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the positive battery post; then connect the black tester lead to the negative battery post.
3. With the engine running at a constant 5000 RPM (with the headlights on), the meter must show 14-15.5 DC volts.

**⚠ CAUTION**

**Do not run the engine at high RPM for more than 10 seconds.**

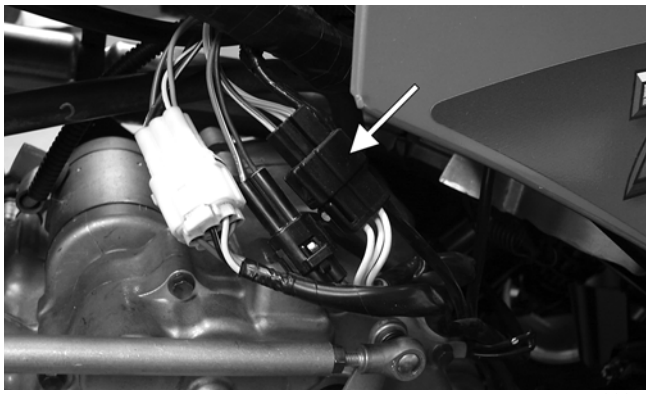
■ **NOTE: If voltage is lower than specified, test stator coil - no load.**

### VOLTAGE (Stator Coil - No Load)

The connector is the black three-pin one on the left side above the shift lever.

■ **NOTE: Test the connector that comes from the engine.**

1. Set the meter selector to the AC Voltage position.
2. Test between the three yellow wires for a total of three tests.



FI083B

3. With the engine running at a constant 5000 RPM, all wire tests must be within specifications.

**⚠ CAUTION**

**Do not run the engine at high RPM for more than 10 seconds.**

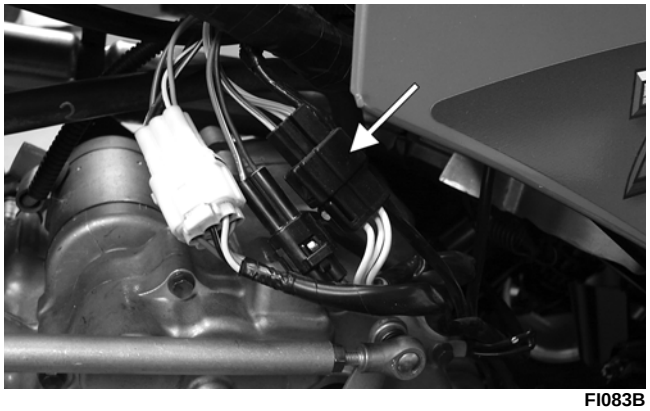
■ **NOTE: If both stator coil tests failed, check all connections, etc., and test again. If no voltage is present, replace the stator assembly.**

### RESISTANCE (Charging Coil)

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Set the meter selector to OHMS position.
2. Test between the three yellow wires for a total of three tests.



FI083B

3. The meter reading must be within specification.

### RESISTANCE (Crankshaft Position Sensor)

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

1. Set the meter selector to the OHMS position.
2. Connect the red tester lead to the blue wire; then connect the black tester lead to the white wire. The meter reading must be within specification.

### PEAK VOLTAGE

■ **NOTE: All of the peak voltage tests should be made using the Fluke Model 73 Multimeter (p/n 0644-191) with Peak Voltage Reading Adapter (p/n 0644-307). If any other type of tester is used, readings may vary due to internal circuitry.**

■ **NOTE: The battery must be at full charge for these tests.**

### Crankshaft Position Sensor

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the blue wire; then connect the black tester lead to the white wire.
3. Crank the engine over using the electric starter.
4. The meter reading must be within specification.

## Starter Motor

### REMOVING/DISASSEMBLING

1. Disconnect the battery.

**⚠ CAUTION**

**Always disconnect the negative battery cable from the battery first; then disconnect the positive cable.**

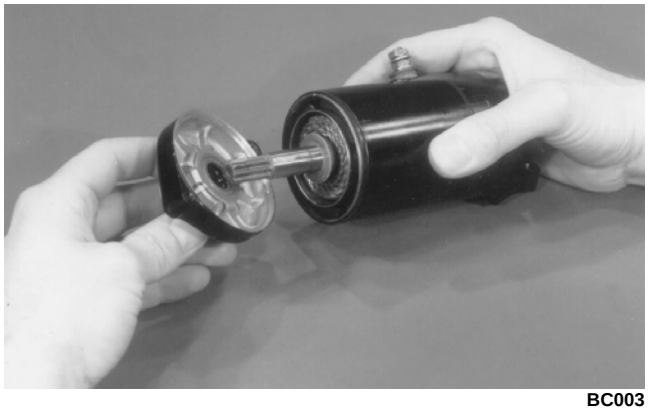
2. Remove the nut securing the positive cable to the starter; then remove the cable from the starter.
3. Remove the two cap screws securing the starter to the crankcase; then remove the starter. Account for the wiring forms and an O-ring.

4. For assembly purposes, scribe a line across the outside of the starter assembly.

AR652D

5. Remove the two long starter cap screws securing the starter components.

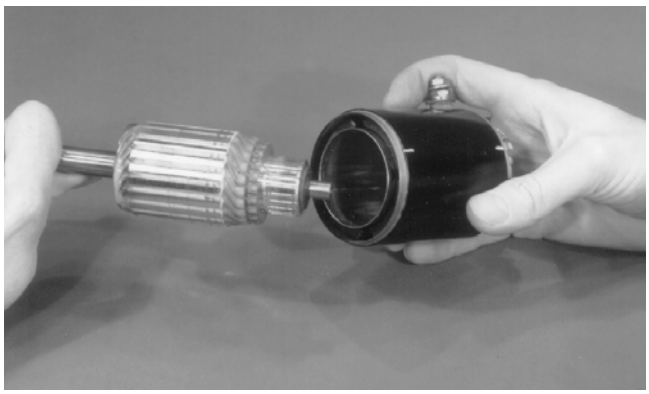
6. Remove the front cover from the starter housing and armature shaft. Account for a seal protector and three washers.



BC003

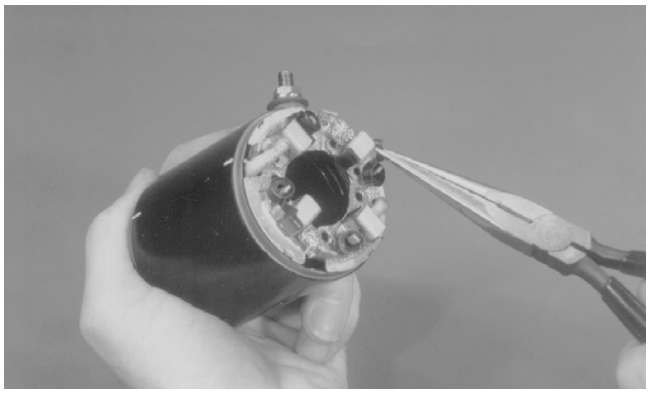
7. Remove the rear cover.

8. Slide the armature free of the starter housing.

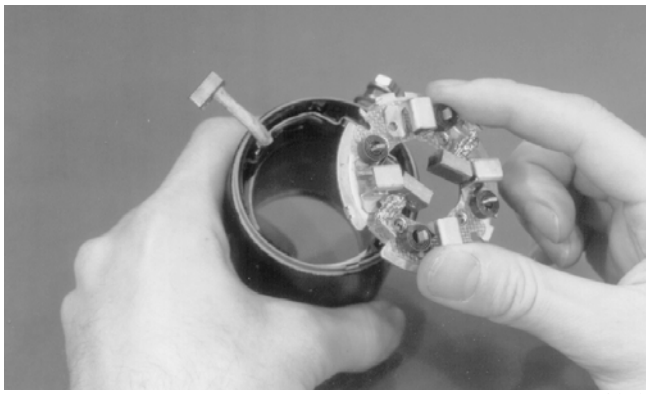


BC006

9. Bend the two positive brushes outward; then remove the brush holder.

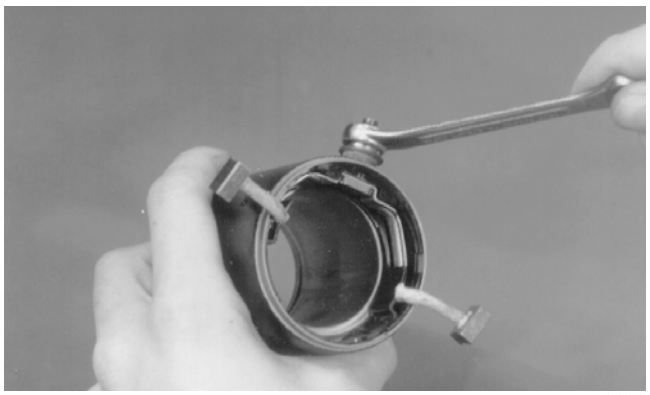


BC007



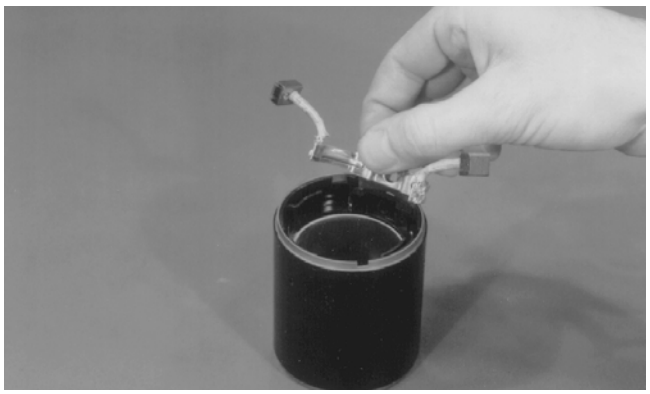
BC010

10. Remove the nut from the positive post. Account for the lock washer, flat washer, a fiber washer, and an O-ring.



BC008

11. Remove the positive brush assembly from the starter housing.



BC009

## CLEANING AND INSPECTING

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

1. Thoroughly clean all components except the armature and brushes in parts-cleaning solvent; then dry with compressed air.

**⚠ CAUTION**

**Do not wash the armature and brushes in any kind of solvent. Use only compressed air and a clean dry, lint-free cloth.**

2. Inspect all threaded areas for damage or stripped threads.

3. Inspect the brush holder assembly and brushes for damage or wear. Using a caliper, measure the length of the brushes. If brush measurement is less than 10.1 mm (0.40 in.), replace with new brushes and brush springs as a set.

4. Inspect the brush leads for cracks, wear, or fraying. If any of these conditions exist, replace with new brushes and brush springs as a set.

5. Inspect the rear cover bushing for wear.

6. Inspect the front cover bearing for wear.

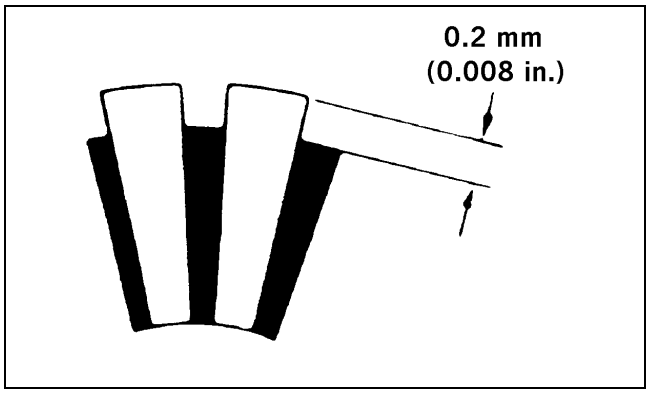
7. Inspect the brass commutator end of the armature for any discolored spots or damage. If the commutator is lightly discolored or damaged, the armature must be replaced. This is a molded commutator and turning it down in a lathe should not be attempted.

**⚠ CAUTION**

**Do not use emery cloth to clean the commutator as emery particles will become imbedded in the brass commutator resulting in a short circuit. Use only #200 grit sandpaper.**

8. Inspect the commutator end of the armature for buildup in the grooves. Carefully remove any buildup by undercutting using a thinly ground hacksaw blade. Do not undercut any deeper than the original groove which can be seen by looking at the end of the commutator.

9. Using a caliper, measure the undercut. Maximum undercut groove must be 0.2 mm (0.008 in.).




ATV-1054

**⚠ CAUTION**

**Buildup in the grooves must be removed to prevent any chance of an electrical arc between individual sections of the commutator.**

10. Inspect the commutator for shorting using a multimeter and the following procedure.

    A. Set the selector to the OHMS position.

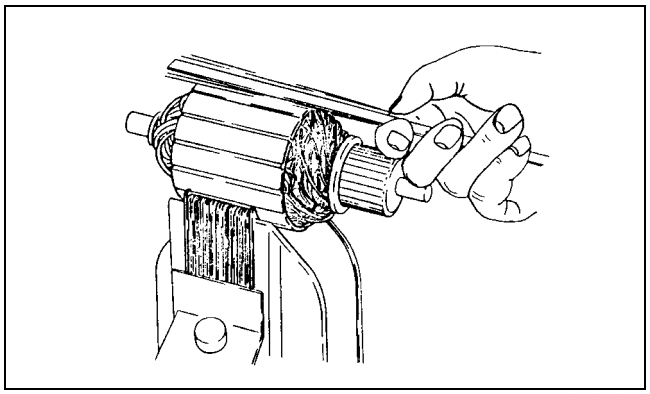
    B. Touch the black lead to the armature shaft.

    C. Using the red tester lead, probe the commutator end of the armature. The meter indicator should not change. If the indicator shows resistance, the armature is shorted and must be replaced.

11. Inspect the armature for shorting using a "growler" and the following procedure.

    A. Place the armature in the "growler."

    B. While holding a metal strip on the armature, rotate the armature an entire revolution. If the metal strip vibrates at any point on the armature, the armature is shorted and must be replaced.



0725-653

12. Inspect the ground brushes to make sure they are properly grounded. Use a multimeter and the following procedure.

    A. Set the selector to the OHMS position.

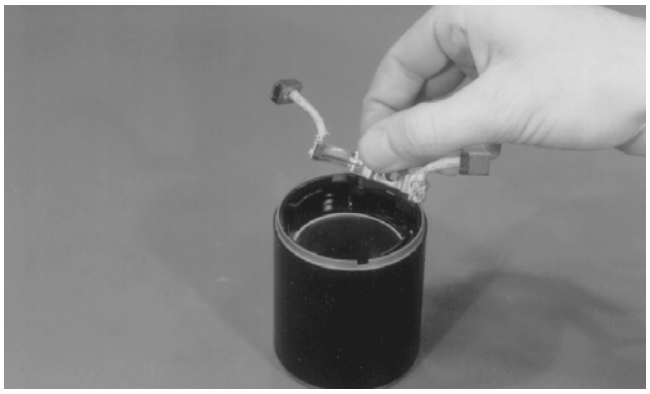
B. Touch the black tester lead to a ground brush.

C. Touch the red tester lead to the brush holder assembly.

■ **NOTE: If no resistance is indicated, check the ground connection for tightness and for cleanliness. If there is still no meter indication, replace the brush assembly.**

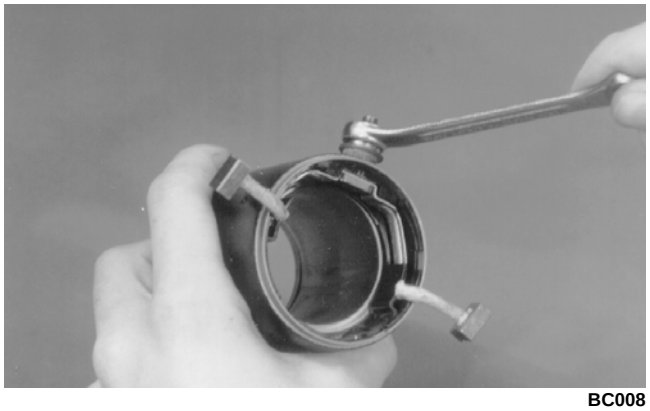
## ASSEMBLING/INSTALLING

1. Install the positive post on the positive brush assembly; then install on the starter housing.



BC009

2. On the positive post, install an O-ring washer, a fiber washer, a flat washer, and a lock washer. Secure with the nut.

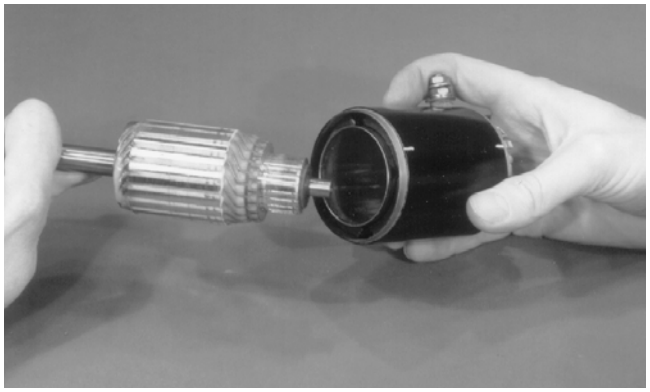


BC008

3. Align the tab on the brush holder with the notch in the starter housing; then install.

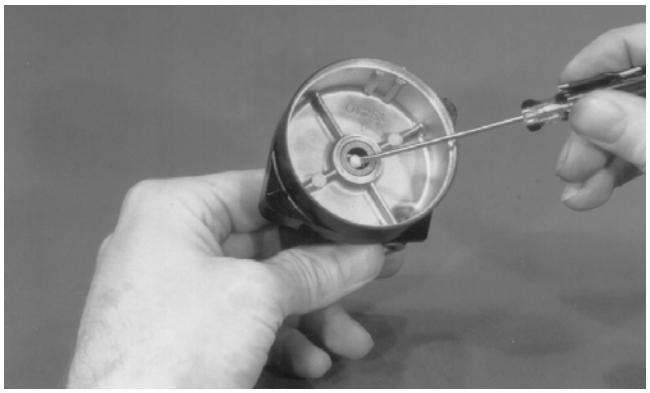
BC010

4. Install the armature into the starter housing; then while holding the brushes out, slide the commutator into the brush holder.



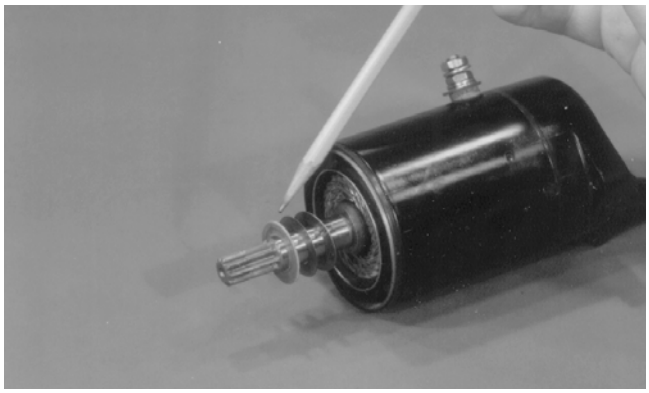
BC006

5. Apply a small amount of grease to the rear cover bushing; then install the cover on the starter housing making sure the reference marks align.



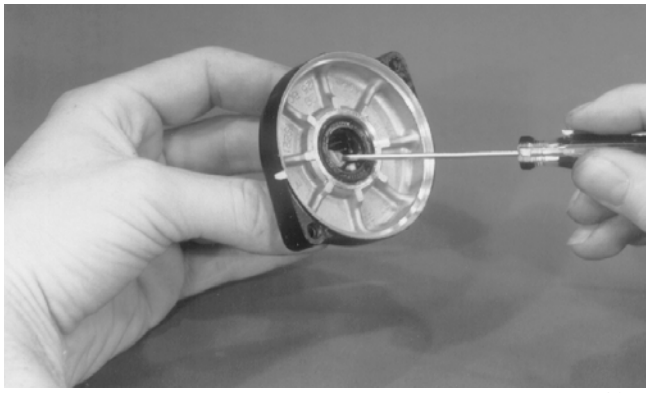
BC013

6. In order, install the thick metal washer, thin metal washer, and the fiber washer on the armature shaft; then install the housing O-ring on the starter housing.

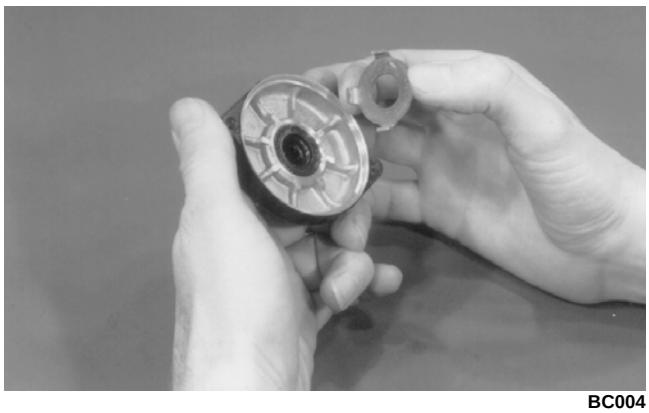


BC014

7. Apply a small amount of grease to the front cover bearing and seal; then install the seal protector.



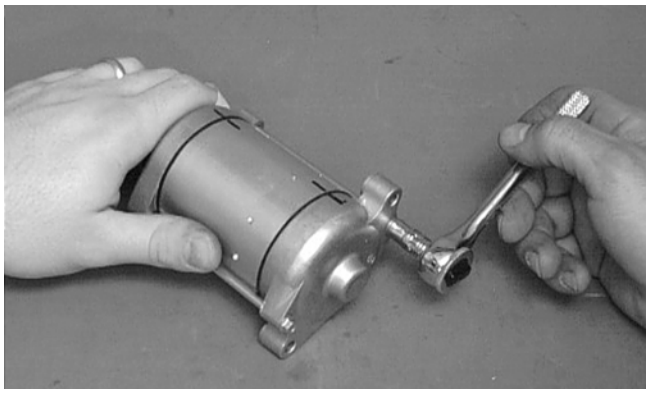
BC015



BC004

8. Place the front cover onto the starter housing making sure it seats properly.

9. Apply red Loctite #271 to the threads of the two long cap screws and install. Tighten to 0.8-1.2 kg-m (6-9 ft-lb).



AR653D

10. Apply a small amount of grease to the O-ring seal on the starter; then install the starter into the crankcase. Secure with two cap screws and wiring forms.

11. Secure the positive cable to the starter with the nut.

12. Connect the battery.

## TESTING VOLTAGE

Perform this test on the starter motor positive terminal. To access the terminal, slide the boot away.

■ **NOTE: The ignition switch must be in the ON position, the emergency stop switch in the RUN position, the reverse lever (on manual transmission models) in the FORWARD position, and the shift lever (on automatic transmission models) in the NEUTRAL position.**

1. Set the meter selector to the DC Voltage position.

2. Connect the red tester lead to the starter terminal; then connect the black tester lead to ground.

3. With the starter button depressed, the meter must show battery voltage and the starter motor should operate.

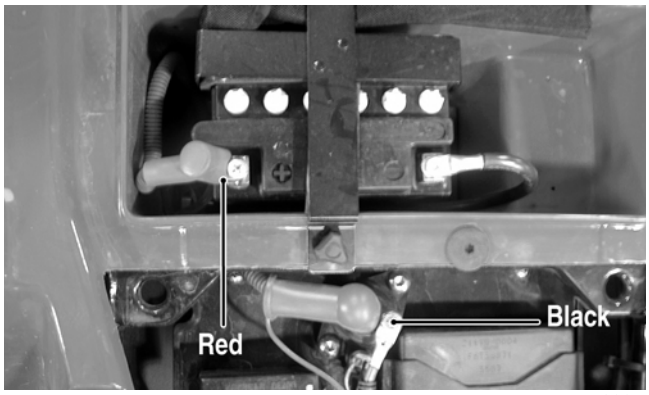
AR607D

■ **NOTE: If the meter showed battery voltage but the starter did not operate or operated slowly, inspect battery voltage (at the battery), starter motor condition, and/or ground connections.**

■ **NOTE: If the meter showed no battery voltage, inspect the main fuse, ground connections, starter motor lead, battery voltage (at the battery), starter relay, or the neutral start relay.**

## Starter Relay

1. Remove the seat; then using the multimeter set to the DC Voltage position, check the relay as follows.
2. Connect the red tester lead to the positive battery terminal; then connect the black tester lead to the starter cable connection on the starter relay. The meter must show battery voltage.



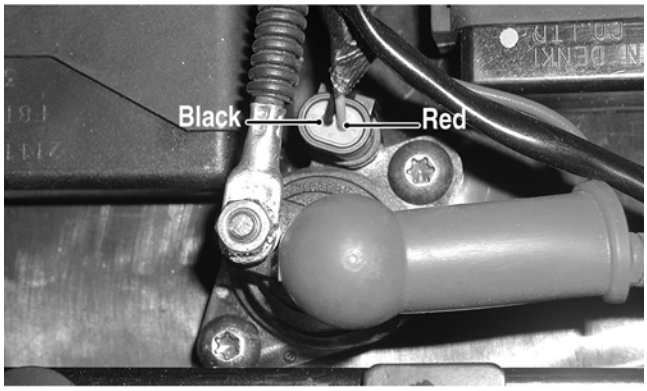
KX206A

■ **NOTE: Make sure that the ignition switch is in the ON position, transmission in neutral, brake lock released, and the emergency stop switch in the RUN position.**

3. Depress the starter button while observing the multimeter. The multimeter should drop to 0 volts and a "click" should be heard from the relay.

■ **NOTE: If a "click" is heard and any voltage is indicated by the multimeter, replace the starter relay. If no "click" is heard and the multimeter continues to indicate battery voltage, proceed to step 4.**

4. Disconnect the two-wire plug from the starter relay; then connect the red tester lead to the green wire and the black tester lead to the black wire.



KX059A

5. Depress the starter button and observe the multimeter.

■ **NOTE: If battery voltage is indicated, replace the starter relay. If no voltage is indicated, proceed to Neutral Start Relay check.**

## CDI Unit
### (400/TBX/500/650 H1)

The CDI is located beneath the seat near the battery.

■ **NOTE: The CDI unit is not a serviceable component. If the unit is defective, it must be replaced.**

The CDI is rarely the cause for electrical problems; however, if the CDI is suspected, substitute another CDI unit to verify the suspected one is defective.

■ **NOTE: Prior to replacing the CDI unit to assure the CDI unit is defective, it is advisable to perform a CDI peak voltage test (see Ignition Coils in this section) and/or perform a continuity test of the wiring harness from the CDI connector to the CDI unit.**

## Electronic Control Unit (ECU)
### (700 EFI)

The electronic control unit (ECU) is located beneath the seat near the battery.

■ **NOTE: The ECU is not a serviceable component. If the unit is defective, it must be replaced.**

The ECU is rarely the cause for electrical problems; however, if the ECU is suspected, substitute another ECU to verify the suspected one is defective.

Error codes can be cleared by following the procedures located in the ECU Error Codes (700 EFI) sub-section in this section.

## Regulator/Rectifier

The regulator/rectifier is located under the rear rack and rear fenders.

### TESTING

1. Start engine and warm up to normal operating temperatures; then connect a multimeter to the battery as follows.
2. Select the DC Voltage position; then connect the red tester lead to the positive battery post and the black tester lead to the negative battery post.
3. Start the engine and slowly increase RPM. The voltage should increase with the engine RPM to a maximum of 15.5 DC volts.

■ **NOTE: If voltage rises above 15.5 DC volts, the regulator is faulty or a battery connection is loose or corroded. Clean and tighten battery connections or replace the regulator/rectifier. If voltage does not rise, check Voltage (Charging Coil - No Load) in this section. If charging coil voltage is normal, replace the regulator/rectifier.**

## Neutral Start/Front Drive Actuator/Start-in-Gear/ Differential Lock/2WD Relays

The relays are identical plug-in type located on the power distribution module. Relay function can be checked by switching relay positions. The relays are interchangeable.

■ **NOTE: The module and wiring harness are not a serviceable component and must be replaced as an assembly.**

## Headlights

The connectors are the four 2-prong ones secured to the front bumper supports (two on each side) with cable ties.

### BULB VERIFICATION (Low and High Beam)

■ **NOTE: Perform this test on each headlight bulb. Also, a 12-volt external power supply w/jumpers will be needed.**

1. Disconnect the wiring harness from the bulb to be tested.
2. Connect the power supply (positive) to one bulb contact; then connect the power supply (negative) to the remaining bulb contact.
3. The bulb should illuminate.
4. If the bulb fails to illuminate, it must be replaced.

### VOLTAGE

■ **NOTE: Perform this test in turn on the main harness side of all four connectors. Also, the ignition switch must be in the LIGHTS position.**

■ **NOTE: The LO beam is the outside bulb, and the HI beam is the inside bulb.**

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to one wire; then connect the black tester lead to the other wire.
3. With the dimmer switch in the LO position, test the two outside connectors (LO beam). The meter must show battery voltage.
4. With the dimmer switch in the HI position, test the two inside connectors (HI beam). The meter must show battery voltage.

■ **NOTE: If battery voltage is not shown in any test, inspect the fuses, battery, main wiring harness, connectors, or the left handlebar switch.**

## Taillight - Brakelight

The connector is the 3-prong one located under the rear fender assembly.

### BULB VERIFICATION

■ **NOTE: Perform this test on the taillight-brakelight side of the connector. Also, a 12-volt external power supply (jumper) will be needed.**

1. Connect the power supply (positive) to the middle terminal; then connect the power supply (negative) to the bottom terminal.
2. The taillight should illuminate.
3. With the negative power supply still connected, connect the positive supply wire to the top terminal.
4. The brakelight should illuminate.

■ **NOTE: If either the taillight or brakelight fails to illuminate, inspect the bulb, the connectors, or the component wiring harness.**

### VOLTAGE (Taillight)

■ **NOTE: Perform this test on the main harness side of the connector. Also, the ignition switch should be in the LIGHTS position.**

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the white wire; then connect the black tester lead to the black wire.
3. With the ignition key in the LIGHTS position, the meter must show battery voltage.

■ **NOTE: If the meter shows no voltage, inspect fuses, wiring harness, connectors, and switches.**

### VOLTAGE (Brakelight)

■ **NOTE: Perform this test on the main harness side of the connector. Also, the ignition switch should be in the ON position and the brake (either foot pedal or hand lever) must be applied.**

■ **NOTE: Make sure the brake lever (hand) and brake pedal (auxiliary) are properly adjusted for this procedure.**

1. Set the meter selector to the DC Voltage position.
2. Connect the red tester lead to the red/blue wire; then connect the black tester lead to the black wire.
3. With either brake applied, the meter must show battery voltage.

■ **NOTE: If the meter shows no voltage, inspect bulb, fuses, wiring harness, connectors, and switches.**

## Ignition Timing

The ignition timing cannot be adjusted; however, verifying ignition timing can aid in troubleshooting other components. To verify engine timing, see Section 2.

## ECU Error Codes
### (700 EFI)

If a sensor fails or an out-of-tolerance signal is sensed by the ECU, an error code will be generated by the ECU. This will result in the analog needle swinging full scale (LE model) or the LCD gauge going blank (standard model). The EFI icon will flash.

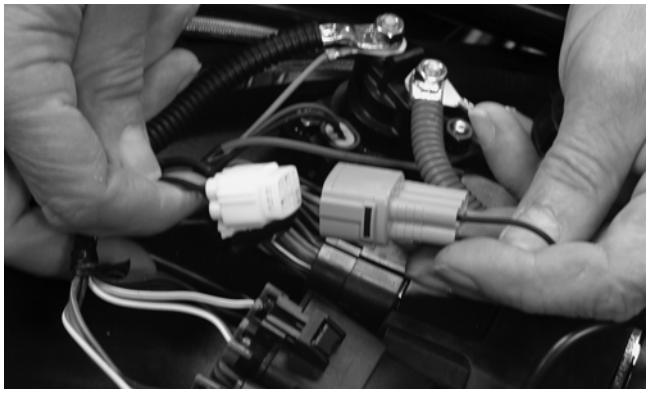
To read the error code, use the following procedure.

1. Make sure the ignition switch is in the OFF position; then remove the seat.

**⚠ CAUTION**

**Always make sure the ignition switch is in the OFF position before disconnecting the ECU.**

2. Locate the diagnostic plug in front of the ECU; then remove the black rubber cap.
3. Connect the Diagnostic Harness (p/n 0486-219) to the diagnostic plug.



ATV-112

4. Turn the ignition switch to the ON position and read the error code on the LCD. Refer to the following ECU Error Code List to identify the specific problem area.

## ECU Error Code List

- EC00 = No Fault Detected
- EC12 = CKP (Crankshaft Position) Sensor
- EC13 = APS (Air Pressure Sensor)
- EC14 = TPS (Throttle Position Sensor)
- EC15 = Water Temperature Sensor
- EC20 = Differential Lock Relay
- EC21 = Air Temperature Sensor
- EC23 = Tilt Sensor
- EC24 = Ignition Coil #1
- EC32 = Fuel Injector #1
- EC40 = ISC Valve
- EC41 = Fuel Pump Relay
- EC99 = Start Not Possible

■ **NOTE: EC99 indicates that the engine will not start and that the spark plug and fuel pump are disabled. EC99 will be displayed following EC23 (Tilt Sensor), EC24 (Ignition Coil), etc.**

To clear an error code after repairs or adjustments are made, install the Diagnostic Harness (p/n 0486-219) by connecting it to the diagnostic plug; then turn the ignition switch to the ON position. After three seconds, turn the ignition switch to the OFF position and disconnect the diagnostic harness. When the ignition switch is turned on, the error code should not be displayed.

# Tilt Sensor
### (700 EFI)

**⚠ WARNING**

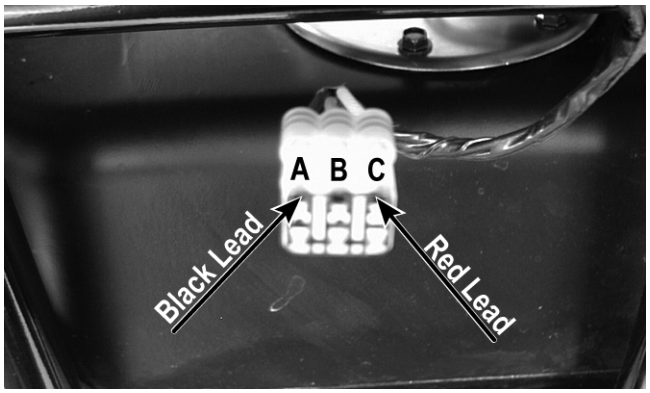
**Incorrect installation of the tilt sensor could cause sudden loss of engine power which could result in loss of vehicle control resulting in injury or death.**

**⚠ CAUTION**

**Do not drop the tilt sensor as shock can damage the internal mechanism.**

## SUPPLY VOLTAGE

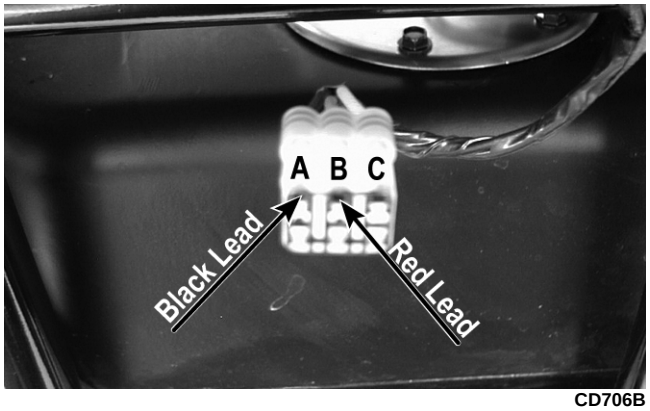
1. Disconnect the three-wire connector from the sensor; then select DC Voltage on the multimeter and connect the red tester lead to the orange wire (C) and the black tester lead to the black wire (A).



CD706A

2. Turn the ignition switch to the ON position. The multimeter should read battery voltage. If battery voltage is not indicated, check the 30-amp fuse, wiring harness, or the ignition switch.

3. Remove the red tester lead and connect to the blue/brown wire (B). The multimeter should read 0 DC volts. If the specified voltage is not indicated, check wire connections at the CDI or substitute another CDI to verify the test.

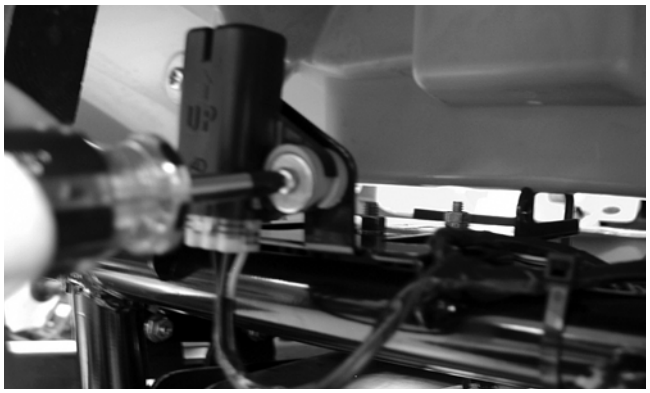


CD706B

## OUTPUT VOLTAGE

■ **NOTE: Needle adapters will be required on the multimeter leads as the following tests are made with the sensor connected.**

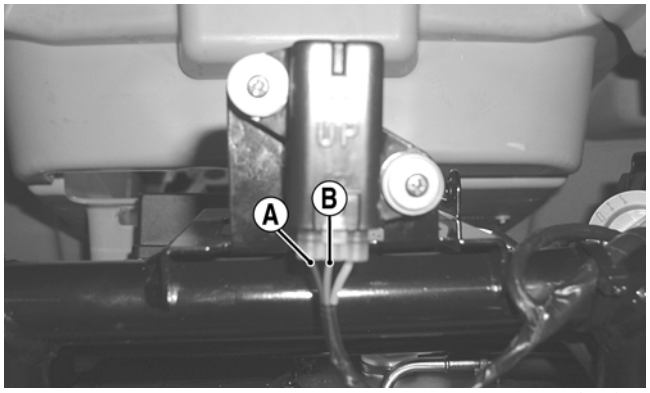
1. Connect the three-wire plug to the sensor; then remove the right-side mounting screw securing the sensor to the rear frame.



CD707

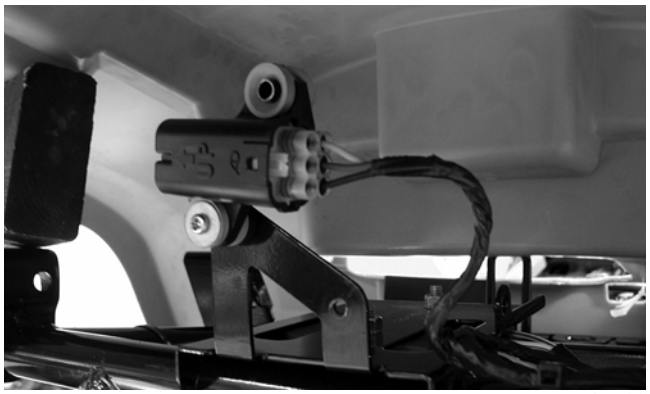
2. Install the needle adapters to the multimeter leads; then select DC Voltage on the multimeter.

3. Connect the red tester lead to the blue/brown wire (B) and the black tester lead to the black/yellow wire (A); then turn the ignition switch ON and observe the meter. The meter should read 0.8-3.0 DC volts.



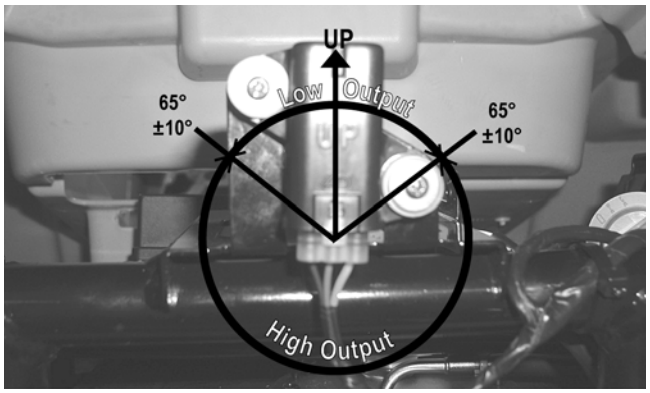

CD705B

4. Tilt the sensor 60° or more to the left and right observing the meter. The meter should read 4.0-8.0 DC volts after approximately one second in the tilted position. If the meter readings are not as specified, the tilt sensor is defective.



CD709

■ **NOTE: When replacing the sensor after testing, make sure the arrow marking is directed up.**




CD705A

# Throttle Position Sensor (TPS)
## (700 EFI)

## INSPECTING

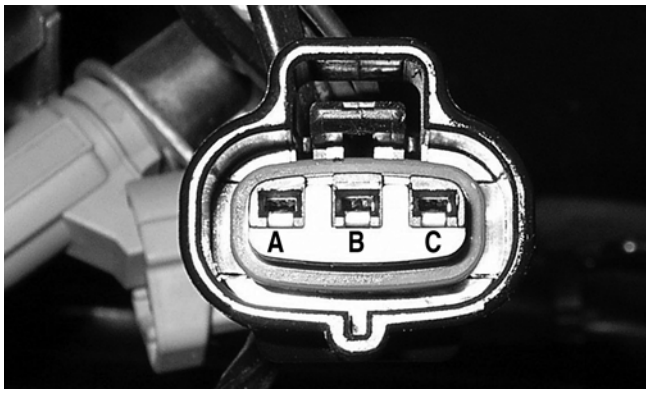
1. Remove the left-side engine cover; then disconnect the three-wire TPS connector plug.

FI450A

■ **NOTE: Prior to testing the TPS, inspect the three-wire plug connector on the main harness and the three-pin plug on the TPS for contamination, broken pins, and/or corrosion.**

2. Make sure the ignition switch is in the OFF position; then select the DC Voltage position on the meter.

3. Connect the black tester lead to spade terminal C and the red tester lead to spade terminal A. Turn the ignition switch to the ON position. The meter should read 4.5-5.5 DC volts.



FI456A

4. Remove the red tester lead from spade terminal A and connect it to spade terminal B. The meter should read 4.5-5.5 DC volts.

■ **NOTE: If the meter does not read as specified, check for poor connections at the ECU or open/broken wires in the wiring harness.**

**⚠ CAUTION**

**Always make sure the ignition switch is in the OFF position before disconnecting the ECU.**

5. Turn the ignition switch to the OFF position; then disconnect the battery (negative cable first).

**⚠ CAUTION**

**Always disconnect the battery when performing resistance tests to avoid damaging the multimeter.**

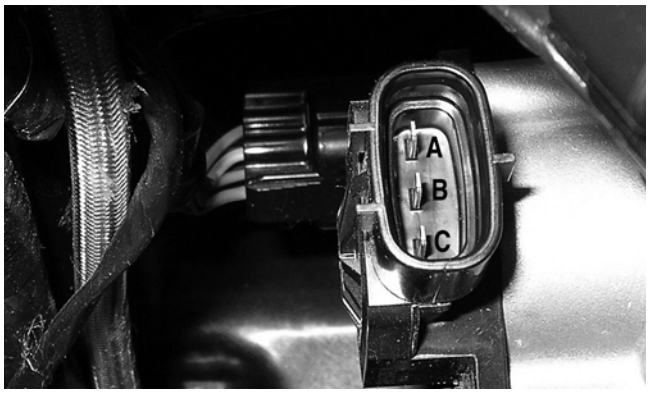
6. Select the OHMS position on the meter; then perform the following resistance tests on the TPS.

   A. Pin (B) to ground - infinity (open circuit).

   B. Pin (A) to pin (B) - approximately 1.22k ohms (throttle closed).

   C. Pin (A) to pin (B) - approximately 4.36k ohms (throttle full-open).

   D. Pin (A) to pin (C) - approximately 4.05k ohms.

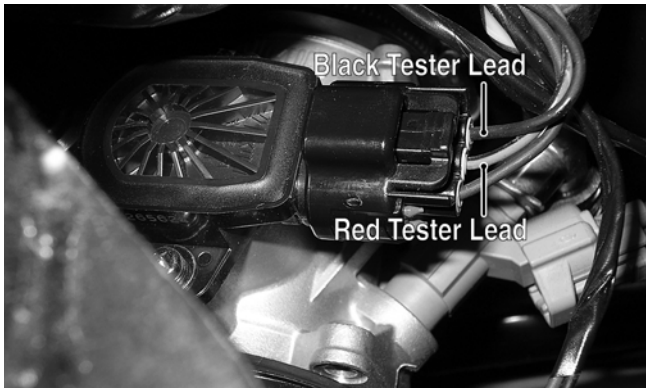


FI455A

■ **NOTE: If any meter reading is not as specified, replace or adjust the TPS (see INSTALLING/ADJUSTING in this sub-section).**

7. Connect the positive lead to the battery; then connect the negative lead.

8. Connect the main harness TPS connector to the TPS; then using MaxiClips (p/n 0744-041), connect the black tester lead to the green/black wire.



FI451A

9. Select the DC Voltage position on the meter and turn the ignition switch to the ON position. The meter should read approximately 1.12 DC volts with the throttle closed and approximately 4.32 DC volts with the throttle in the full-open position.

■ **NOTE: If the meter readings are as specified, check the main harness connector at the ECU main harness wiring. If the meter readings are not as specified, replace the TPS and adjust to specifications (see INSTALLING/ADJUSTING in this sub-section.**

**⚠ CAUTION**

**Always make sure the ignition switch is in the OFF position before disconnecting the ECU.**

10. Clear all ECU error codes after servicing is complete (see ECU Error Codes (700 EFI) in this section).

## REMOVING

1. Remove the left-side engine cover; then disconnect the three-wire TPS connector plug.

FI450A

2. Remove the two screws securing the TPS to the throttle body and remove the TPS.

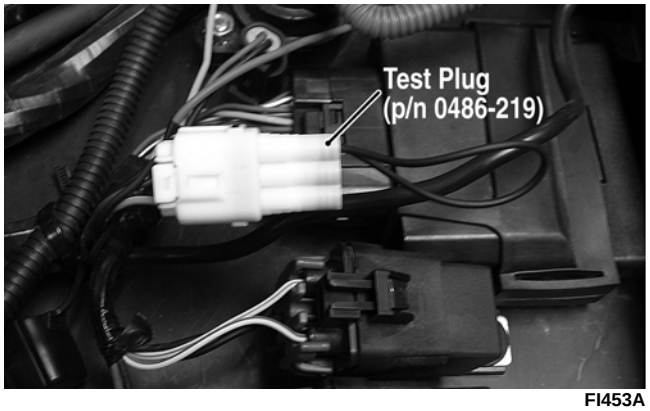
## INSTALLING/ADJUSTING

1. Place the TPS into position on the throttle body and secure with the two screws. Do not tighten at this time.

2. Connect the main harness to the TPS.

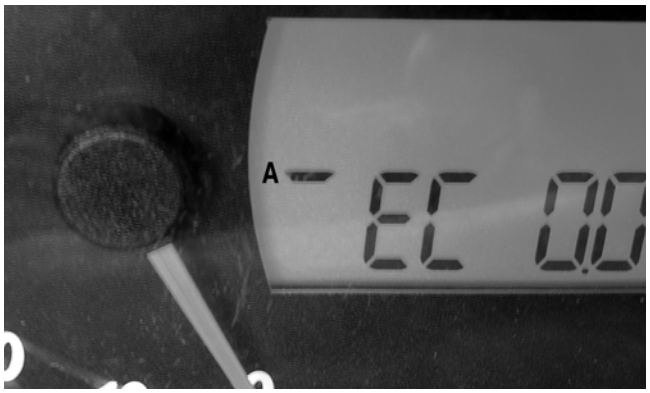
3. Locate the diagnostic connector under the seat; then install the test plug from Test Plug/Error Code List Kit (p/n 0444-216) onto the connector.


FI452A

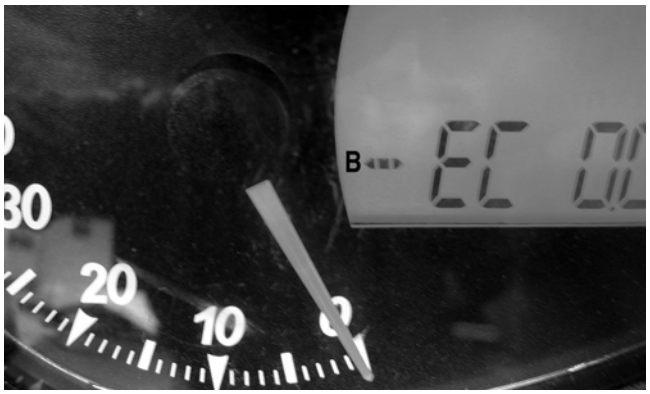



FI453A

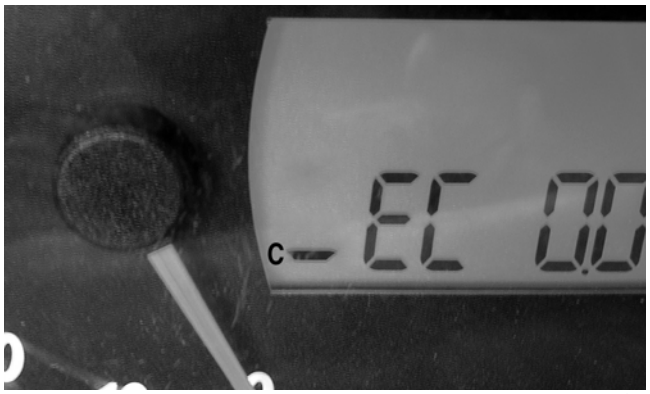
4. Turn the ignition switch to the ON position and note the position of the TPS indicator icon (A, B, or C); then adjust the TPS until the TPS icon appears in the center position (B).




FI459A




FI454A




FI459B

5. Tighten the mounting screws securely; then verify the TPS icon appears in the center position.

6. Remove the test plug; then install the left-side engine cover.

# SECTION 6 - DRIVE SYSTEM

6

## TABLE OF CONTENTS

# Drive System

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

■ **NOTE: Critical torque specifications are located in Section 10.**

# General Information

All gear cases are tagged beneath a cover bolt. This tag is marked with a production date code, sequence code, and a ratio code.

A. A “6” or “3.6” on the lower-right corner indicates a 3.6:1 gear set ratio (10:36 teeth).

B. A “1” or “3.1” on the lower-right corner indicates a 3.1:1 gear set ratio (11:34 teeth).

C. A “4.0” on the lower-right corner indicates a 4.0:1 gear set ratio (9:36 teeth).

The die-cast aluminum housings have been assembled with thread-rolling screws (trilobular). When assembling with these screws, start the screws carefully into the housing; then use the following torque values.

| Size | New Housing | Reassembled Housing |
|---|---|---|
| M6 (Torx T-30 Recess) | 1.1-1.3 kg-m (8-9.5 ft-lb) | 0.9-1.2 kg-m (6.5-9 ft-lb) |
| M8 (Torx T-40 Recess) | 3.5-4.3 kg-m (25-31 ft-lb) | 2.9-3.5 kg-m (21-25 ft-lb) |
| M10 (Torx T-50 Recess) | 5.1-6.3 kg-m (37-45.5 ft-lb) | 4.3-5.3 kg-m (31-38 ft-lb) |

## SPECIFICATIONS

Specific specifications regarding the gear cases (capacities, lubricant type, etc.) can be found in Section 1 of this manual.

| | |
|---|---|
| Ring Gear Backlash | 0.28-0.38 mm (0.011-0.015 in.) |
| Ring Gear End Play | 0.1-0.2 mm (0.004-0.008 in.) |

## SPECIAL TOOLS

A number of special tools must be available to the technician when servicing the gear case.

| Description | p/n |
|---|---|
| CV Boot Clamp Tool | 0444-120 |
| Pinion Gear/Shaft Removal Tool | 0444-127 |
| Slide Hammer Kit | 0444-225 |
| Internal Hex Socket (48 mm) | 0444-104 |

■ **NOTE: Special tools are available from the Arctic Cat Service Parts Department.**

## TROUBLESHOOTING

If a noise is heard from the gear case area, it can be difficult to locate and/or diagnose. If the noise is related to wheel speed, but not to engine RPM, the problem is probably in the final drive or engine/transmission bevel gear set. When a problem is localized, a number of inspections must be made to pinpoint that problem. The most obvious of the inspections include CV boots, wheel and hub nut tightness, wheel bearing damage, gear case lubricant contamination, low lubricant level, seal leakage, CV joints, or selector arm.

■ **NOTE: Small metallic particles will collect on the magnetic drain plug as a normal part of break-in and will also give a metallic cast to drained lubricant. Contamination would include large particles or water which gives a “milky” look to the lubricant.**

■ **NOTE: Lubricant on a new pinion housing assembly could be grease. If the front of the gear case is leaking at the rear drive boot, wipe excess lubricant from the bottom of the pinion housing; then operate the ATV for a period of time. Inspect the pinion housing area for any signs of leakage. If lubricant is again on the bottom of the pinion housing, the seal must be replaced.**

Additional troubleshooting could include the following.

- Binding/abrupt motion: CV boot torn (grease loss, foreign object damage, broken cage); gear lubricant loss or not filled (bearing seizure, broken gear teeth, seal leakage, bladder or hose leakage, missing filler/drain plug).
- Noise from drive system: wheel or gear case bearing damage, improper gear backlash, improper assembly, low or no gear case lubricant.
- Lockup: gear case lubricant loss or not filled, water contamination causing bearing seizure.

# Front Drive Actuator

■ **NOTE: The actuator is not a serviceable component. If it is defective, it must be replaced.**

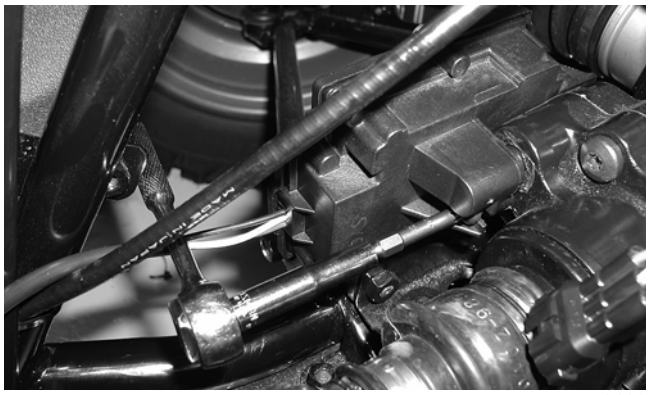
■ **NOTE: The actuator will operate only when the ignition switch is in the ON position.**

The front drive actuator is located on the left side of the front drive input housing. With the engine stopped and the ignition switch in the ON position, a momentary "whirring" sound can be heard each time the front drive selector switch is shifted. If no sound is heard, see Section 5. If the actuator runs constantly or makes squealing or grinding sounds, the actuator must be replaced.

## REMOVING

1. Remove the left-front inner fender panel; then disconnect the connector on the actuator harness.

2. Using a T-30 torx wrench, remove the mounting cap screw from the driveshaft side of the actuator.

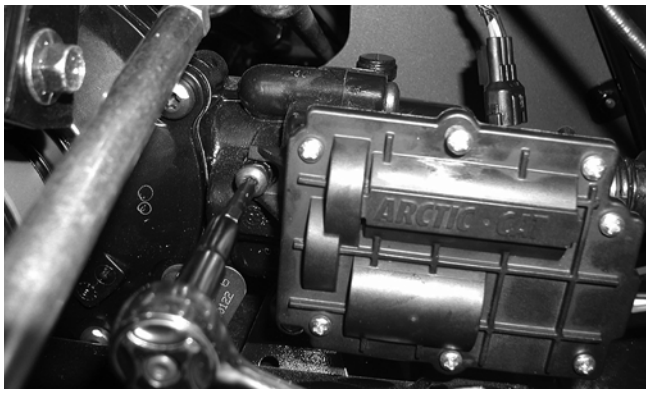


AG926

3. Remove the mounting cap screw from below the actuator on the suspension side.

AG927

4. Loosen but do not remove the mounting cap screw at the front of the actuator; then slide the actuator to the rear enough to clear the slotted mounting tab and the selector shaft.

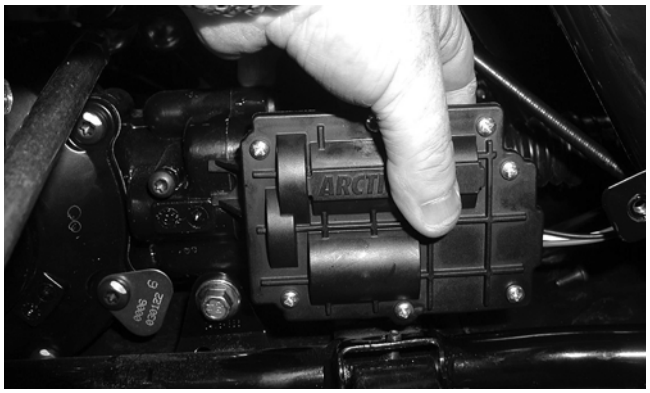


AG928

## INSTALLING

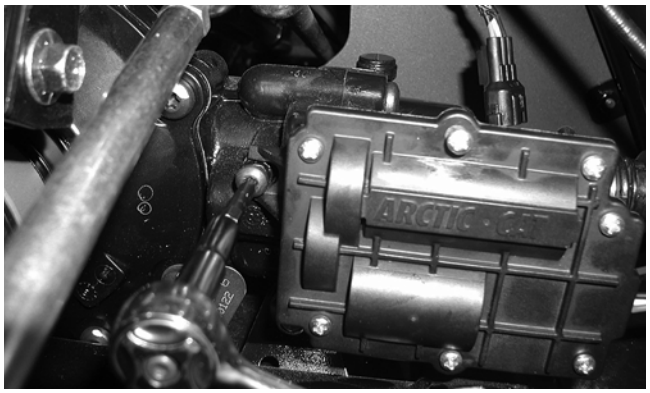
1. Lubricate the O-ring on the actuator; then ensure that all mounting surfaces are clean and free of debris.

2. Align the actuator with the selector shaft and slide it forward onto the shaft taking care to engage the cap screw in the slot of the front mounting tab.



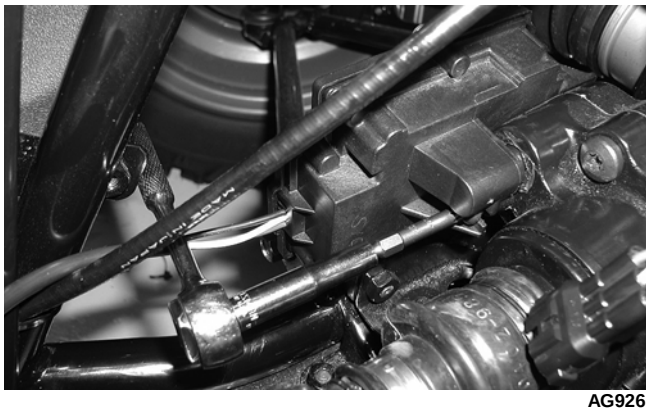
AG925

3. While holding the actuator firmly forward, tighten the front cap screw to hold the actuator in place; then install but do not tighten the two remaining cap screws.




AG928

4. Loosen the front cap screw; then tighten the cap screw on the driveshaft side.



AG926

■ **NOTE: It is important to tighten this cap screw while the others are loose to ensure proper seating of the actuator.**

5. Tighten the remaining cap screws; then connect the electrical plug to the main harness.

6. Turn the ignition switch to the ON position and check the operation by shifting the selector switch several times.

7. Secure the wiring harness to the frame with a nylon cable tie; then install the inner fender panel.

# Front Differential

■ **NOTE: To remove the rear gear case, see Rear Gear Case in this section.**

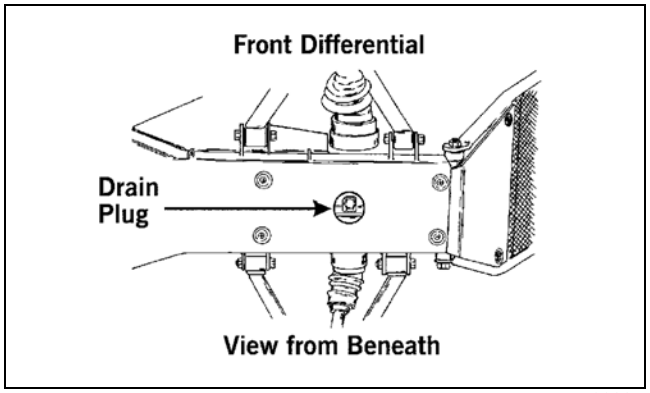
## REMOVING DIFFERENTIAL

1. Secure the ATV on a support stand to elevate the wheels.

**⚠ WARNING**

**Make sure the ATV is solidly supported on the support stand to avoid injury.**

2. Remove the drain plug and drain the gear lubricant into a drain pan; then reinstall the plug.

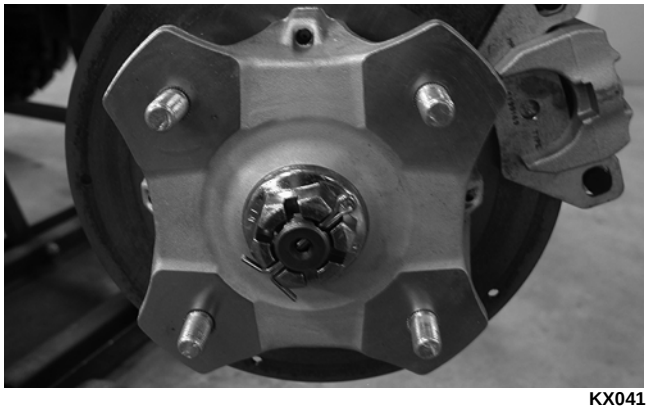



ATV0082A

3. Remove the front wheels.

4. Pump up the hand brake; then engage the brake lever lock.

5. Remove the cotter pin securing the hex nut; then remove the hex nut and washer.



KX041

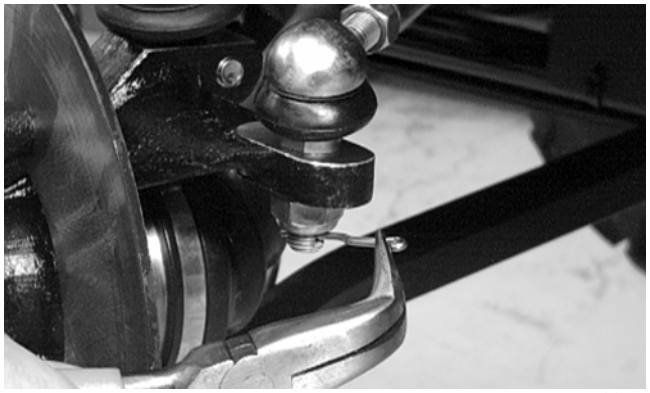
6. Release the brake lever lock.

■ **NOTE: It is not necessary to remove the brake hoses from the calipers for this procedure.**

7. Remove the two brake calipers. Account for the four cap screws and four 0.76 mm (0.030 in.) spacer washers.

AF894D

8. Remove the tie rod cotter pins and discard the pins.

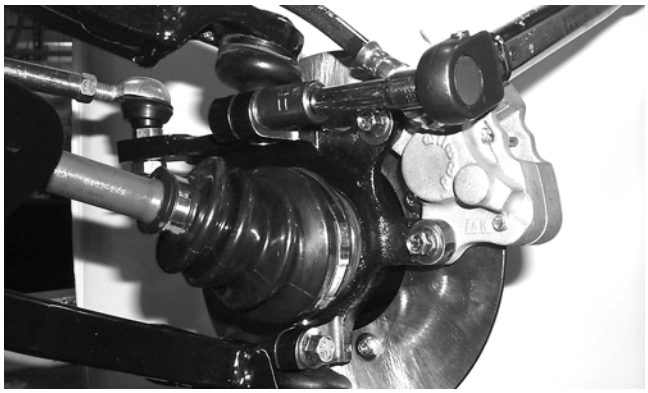


AF895D

9. Remove the tie rod lock nuts.

AF896D

10. Remove the upper ball joint cap screws taking care not to strip the threads on the ball joint shaft; then using a rubber mallet, tap the end of the axle and free it from the knuckle assembly.



AF628D

11. Pull the steering knuckle away from the axle taking care not to damage the seals with the axle end.

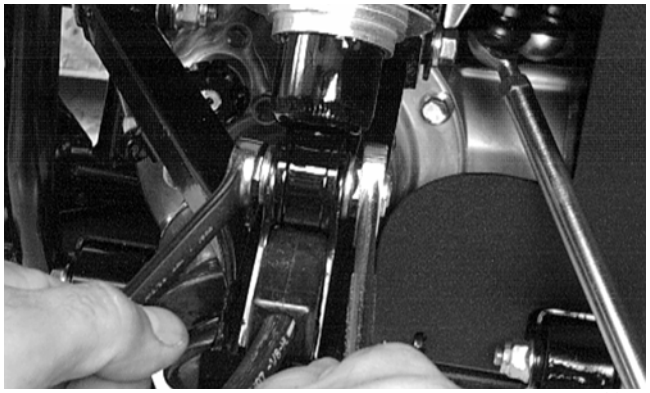
KX151

12. Support the axle to not allow it to drop or hang.

**⚠ CAUTION**

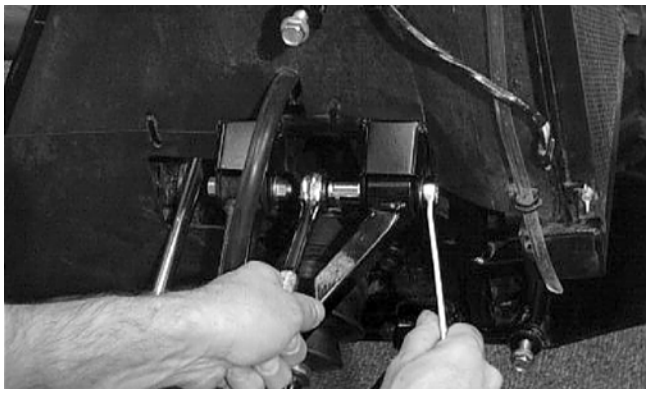
**The axle must be supported. If the axle is allowed to drop or hang, damage to the inner CV joint may occur.**

13. Remove the lower shock bolts. Account for the lock nuts; then move the shocks aside and secure them with a strap.



AF897D

14. Remove the upper A-arm lock nuts and cap screws; then remove the A-arms.



AF610D

15. Using a slide hammer, remove the front axles.

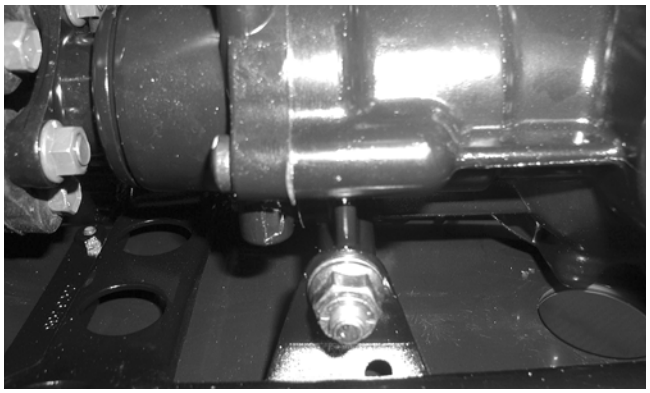
AF899D

16. Remove the inner fender panels.

17. Using a T-30 torx wrench, remove the three screws securing the front drive actuator to the gear case; then remove the actuator.

AG925

18. Remove the lower differential mounting cap screw. Account for a lock nut and washers.



CD026

19. Remove the upper differential mounting cap screws.


CD016

20. Free the differential assembly from the frame mountings; then shift the differential assembly forward enough to disengage the front drive-shaft from the output yoke.

KX161

21. Place the differential on its right side; then remove it from the frame.

KX159

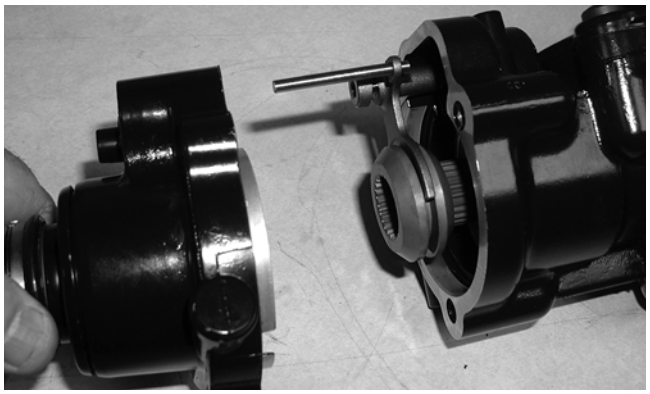
## Disassembling Input Shaft

■ **NOTE: This procedure can be performed on a rear gear case; however, some components may vary from model to model. The technician should use discretion and sound judgment.**

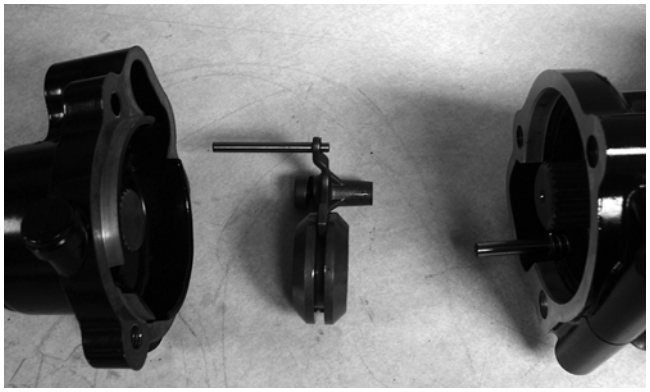
1. Using a T-40 torx wrench, remove the cap screws securing the pinion housing.

CD102

2. Using a rubber mallet, remove the housing. Account for a gasket. Remove the fork, collar, and spring. Note the location of all the components for assembling purposes.

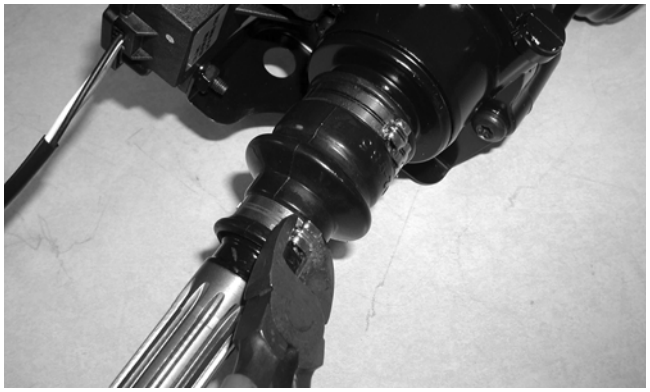


CD103



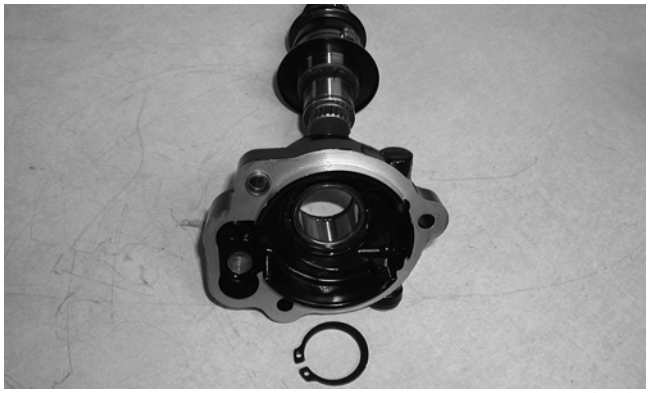
CD106

3. Using a side-cutter (or suitable substitute), remove the boot clamps; then remove the boots and splined drive from the input shaft.



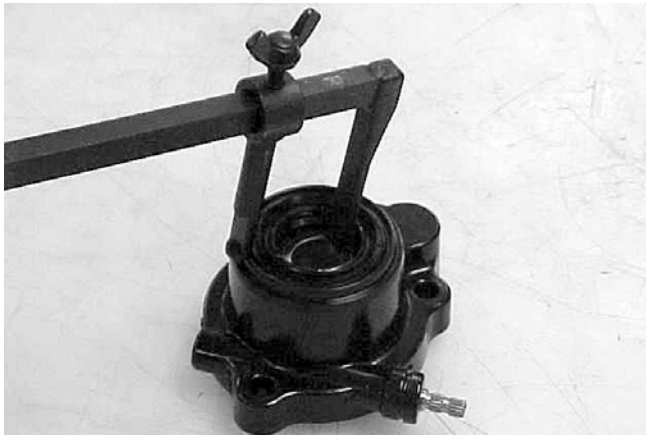
CD114

4. Remove the input shaft from the pinion housing.



CD107

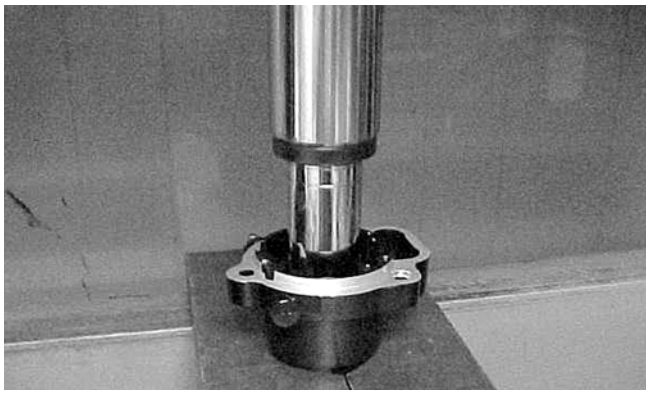
5. Using a seal removal tool, remove the input shaft seal. Account for a spacer.



AF982

6. Remove the snap ring securing the input shaft bearing; then place the pinion housing in a press and remove the bearing.

AF983

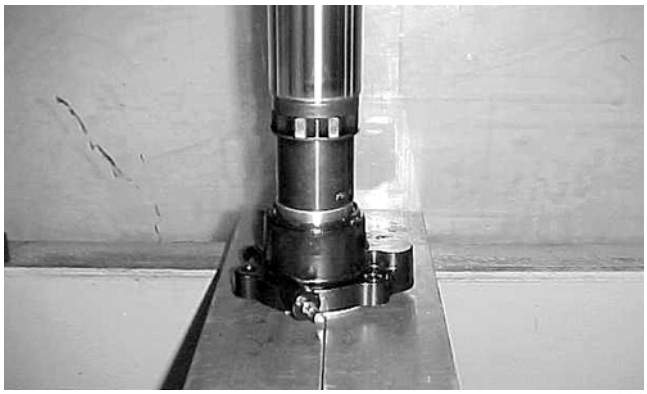


AF984

KX219

## Assembling Input Shaft

1. Place the pinion housing in a press and install the input shaft bearing. Secure the bearing with the existing snap ring making sure the sharp edge of the snap ring faces to the outside.



AF993

AF994

2. Install the input shaft seal making sure it is flush with the edge of the housing.

3. Lubricate the input shaft splines with High-Performance Grease (p/n 0436-905).

■ **NOTE: Any time drive splines are separated, clean all splines with parts-cleaning solvent and dry with compressed air; then lubricate with recommended grease.**

KX221

KX222

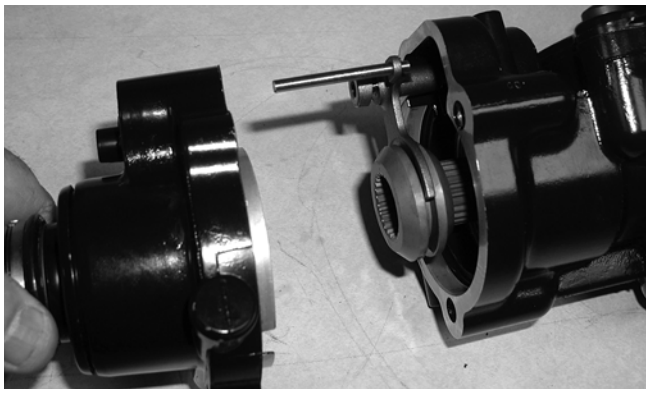
4. On the 400/500/650 H1, install the input shaft into the housing; then install the front boot and secure with Boot Clamp (p/n 0423-393) and the rear boot with Boot Clamp (p/n 0423-411).

CD112

CD099

5. Place the pinion housing with new gasket onto the gear case housing; then secure with the existing cap screws. Tighten to specifications.

■ **NOTE: If a new gear case housing is being installed, tighten the cap screws to 3.5-4.3 kg-m (25-31 ft-lb).**



CD103

## Disassembling Pinion Gear

■ **NOTE: This procedure can be performed on a rear gear case.**

1. Using a T-40 torx wrench, remove the cap screws securing the pinion housing. Account for the coupler, fork, and spring.

KX209

2. Using a T-40 torx wrench, remove the cap screws securing the gear case cover. Account for and make note of the ID tag location for assembling purposes.

KX173

3. Using a plastic mallet, tap lightly to remove the differential cover. Account for an O-ring.

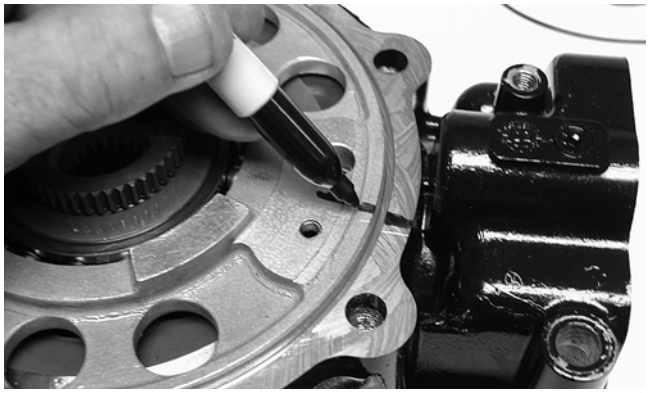
KX174

■ **NOTE: If the cover is difficult to remove, pry on the cover in more than one recessed location.**

4. Remove the splined coupler, shifter fork, pin, and spring of the differential lock assembly and set aside. Note position of parts for assembling purposes.

KX175

5. Make match marks on the left bearing housing and differential housing; then remove the plate and account for a shim. Mark the shim as left-side.



KX176

KX177

KX178

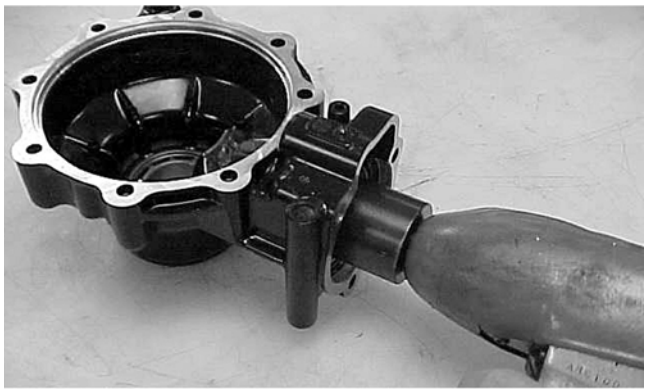
6. Place the differential with the open side down; then lift the housing off the spider assembly. Account for shim(s) and mark as right-side.

KX179

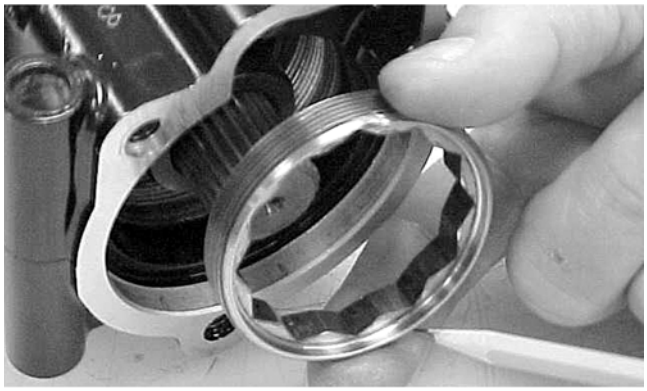
KX181

7. Using the 48 mm Internal Hex Socket (p/n 0444-104), remove the lock collar securing the pinion gear assembly.

■ **NOTE: On a front differential, the lock collar has right-hand threads. On a rear gear case, the lock collar has left-hand threads.**

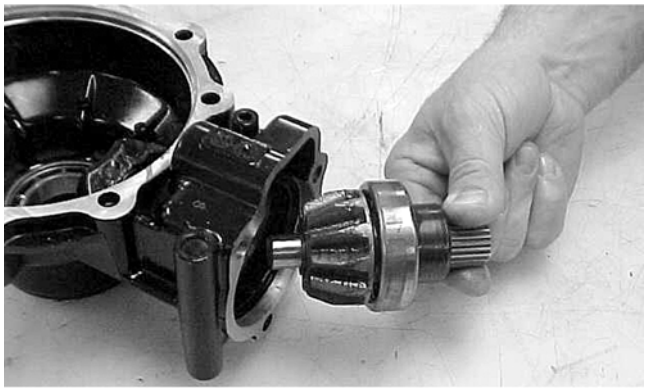


CC875



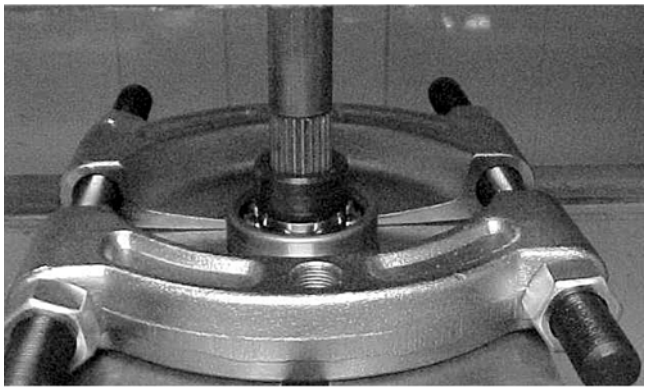
CC876

8. Using the Pinion Gear/Shaft Removal Tool (p/n 0444-127) and a hammer, remove the pinion gear from the gear case housing.



CC878

9. Secure the pinion gear in a bearing puller; then remove the pinion bearing using a press. Account for a collar and a bearing.



CC879

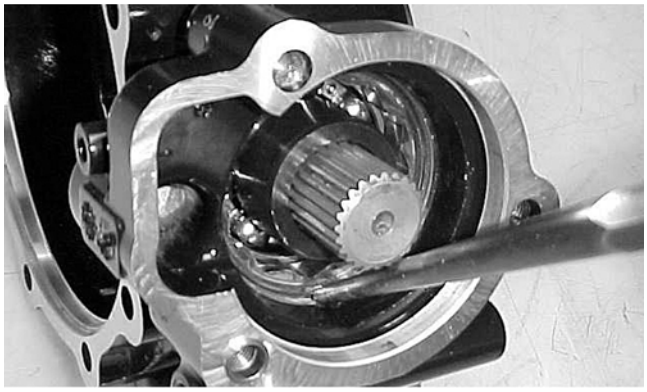
■ **NOTE: If gears are being replaced, use the existing shims. The numbers are scribed onto the gears: the ring gear has the number on the opposite side of the gears, and the pinion gear has the number on the end of the pinion gear shaft by the splines. If no number is present, it should be considered as being in the 0 category.**

■ **NOTE: If the gear case housing is being replaced, proceed to the following Shimming Procedure/Shim Selection sub-section.**

## Shimming Procedure/Shim Selection

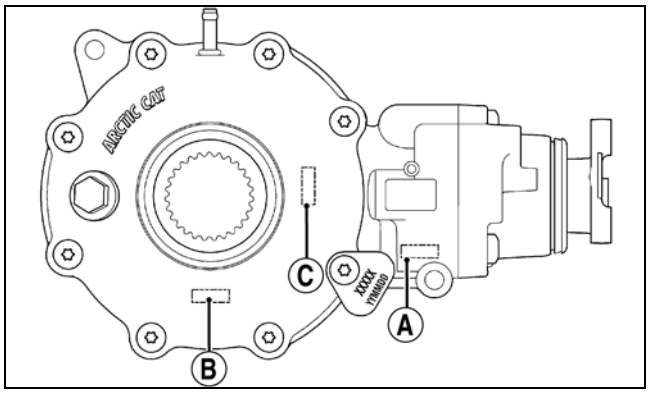
1. Press bearings into bores by outer ring to hard contact with seat.

2. Install the lock collar and tighten to specifications; then on final assembling, stake the lock collar edge approximately 1.5 mm (0.060 in.) into the lower oil channel.



CC891

3. Note the following shim selections (shims are nominally 1.5 mm/0.060 in. thick):




738-268B

A. Cover Side - add value A on the gear case housing to value B (all models except 400 TRV) or value C (400 TRV) on the gear case cover; then add 1.5 mm (0.060 in.). This will give you the proper shim thickness.

■ **NOTE: When shimming a rear gear case, add value A to value B on all models.**

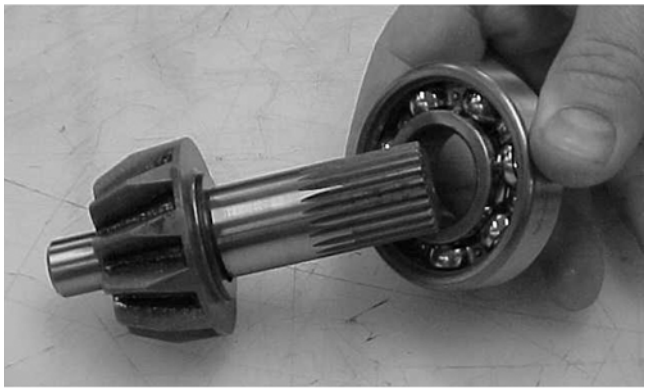
B. Gear Case Side - install a 1.3-1.4 mm (0.050-0.055 in.) shim and tighten the bolts to 3.5-4.3 kg-m (25-31 ft-lb). Verify backlash to be within a range of 0.28-0.38 mm (0.011-0.015 in.) and end-play to be within a range of 0.10-0.20 mm (0.004-0.008 in.). If not within specification range, reselect shim until backlash specification range can be verified.

4. Prior to final assembling, apply molybdenum disulfide grease to all oil seal lips.

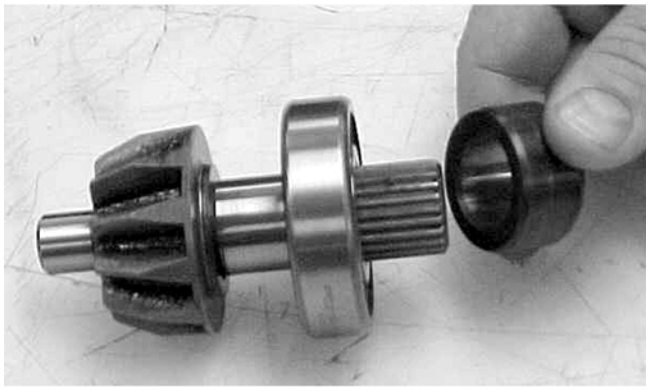
5. Prior to final assembling, prelubricate journal on pinion assembly with SAE 80W-90 hypoid gear lubricant prior to pressing assembly into gear case housing.

## Assembling Pinion Gear

1. Install the bearing onto the pinion shaft. Install the pinion shaft collar.

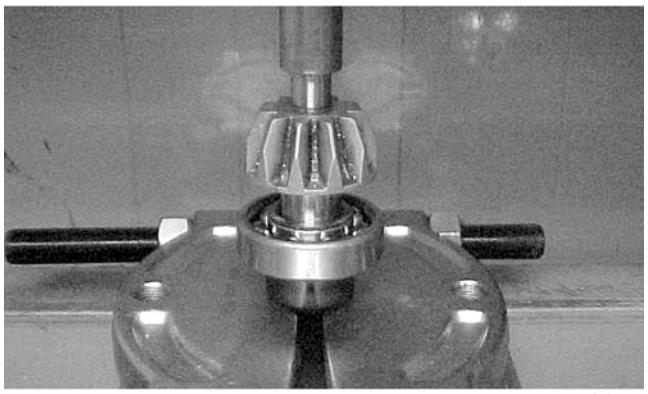


CC882



CC883

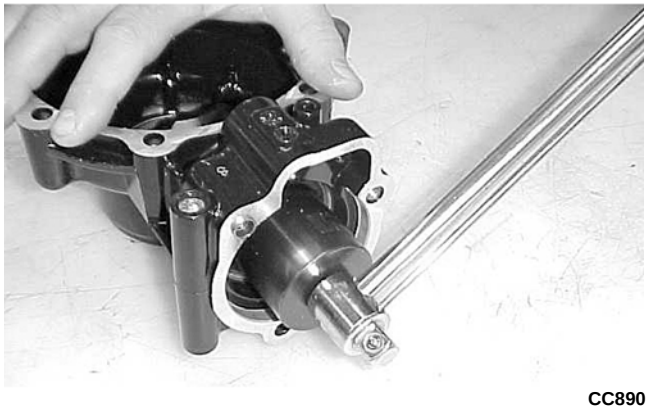
2. Place the pinion assembly in a bearing puller; then install the bearing using a press.



CC884

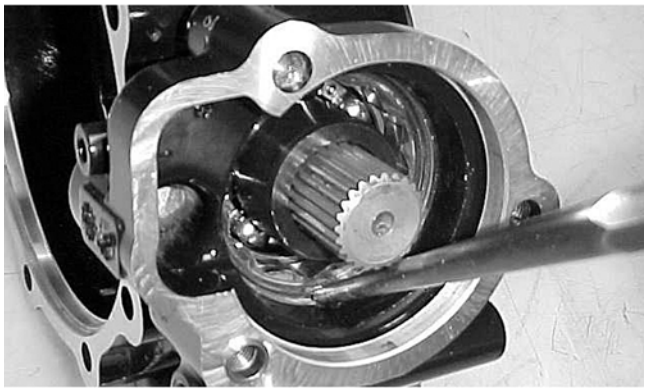
3. Install the pinion gear assembly into the housing. Using the 48 mm Internal Hex Socket (p/n 0444-104), secure the pinion gear assembly with the existing lock collar. Tighten to specifications.

■ **NOTE: On a front differential, the lock collar has right-hand threads. On a rear gear case, the lock collar has left-hand threads.**



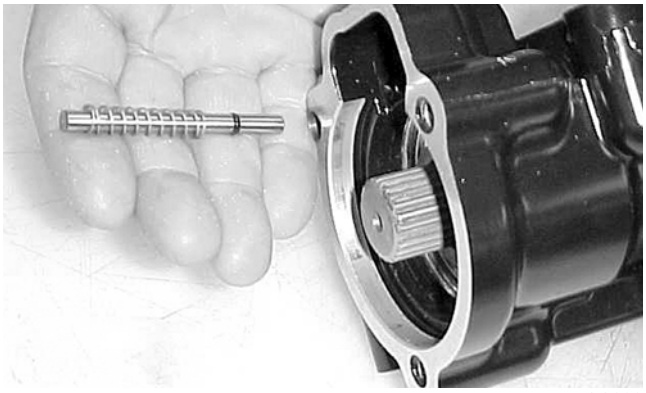
CC890

4. Place a punch on the edge of the lock collar in the oil gallery area; then using a hammer, stake the lock collar to ensure that the collar will remain securely tightened.



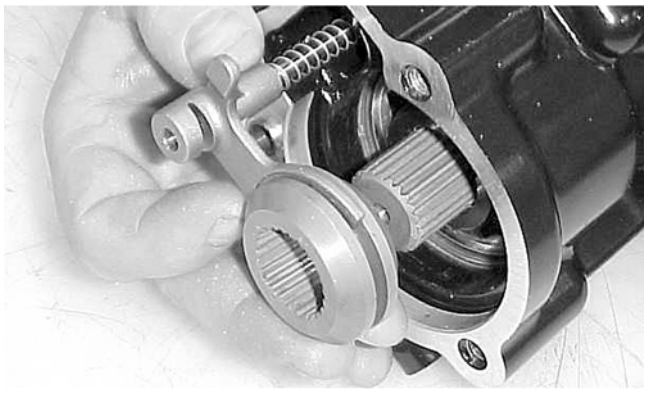
CC891

5. Install the shift fork shaft w/spring into the gear housing making sure the shaft O-ring is positioned to the inside.



CC892

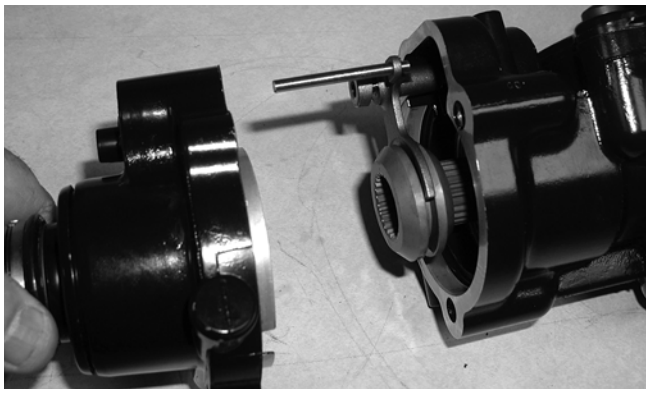
6. Install the shift fork assembly making sure the fork leg is facing upward. Apply a small amount of oil to the gasket; then install the gasket.



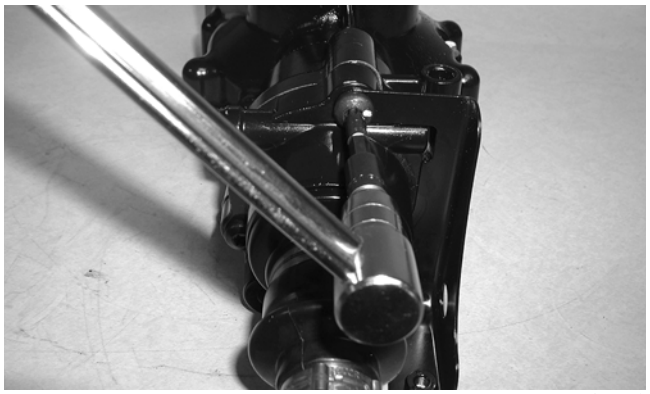
CC893

7. Place the input shaft assembly onto the gear housing; then secure with the existing cap screws. Tighten to specifications.

■ **NOTE: If a new gear housing is being installed, tighten the cap screws to 3.5-4.3 kg-m (25-31 ft-lb).**



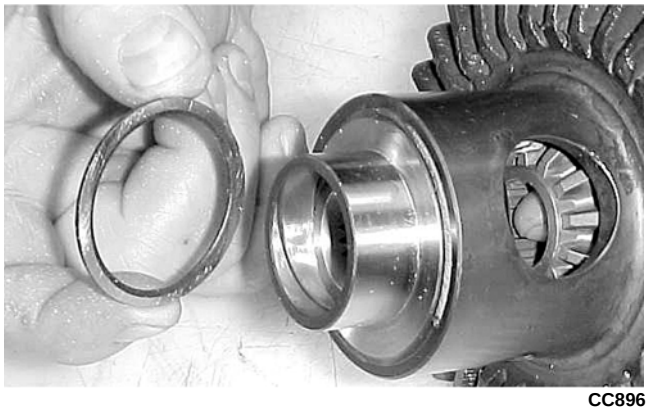
CD103



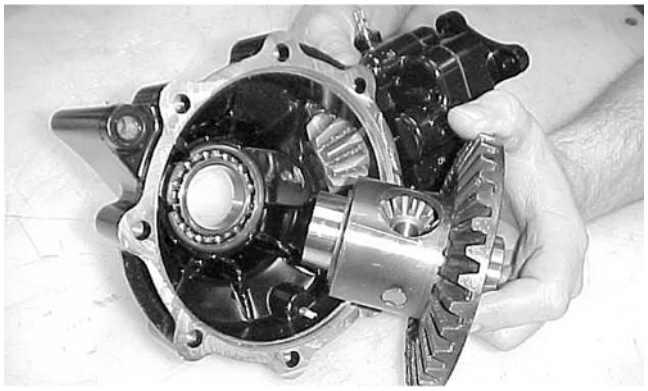
CD110

8. Install the proper shim onto the ring gear spider assembly making sure the chamfer side of the shim is facing toward the ring gear. Install the ring gear in the housing; then install the outside shim with the chamfer side of the shim toward the ring gear.

■ **NOTE: The spider and ring gear assembly must be replaced as a complete unit.**



CC896



CC897

KX178

9. Install the left bearing housing aligning the match mark to the mark on the differential housing.

KX177

10. Install the differential lock assembly into the bearing housing; then place the O-ring on the gear case housing.

KX175

KX174

11. Making sure the O-ring is properly positioned on the gear case housing, install the housing with existing hardware. Account for the ID tag. Tighten the cap screws to specifications.

■ **NOTE: Grease can be applied to the O-ring for ease of assembling.**

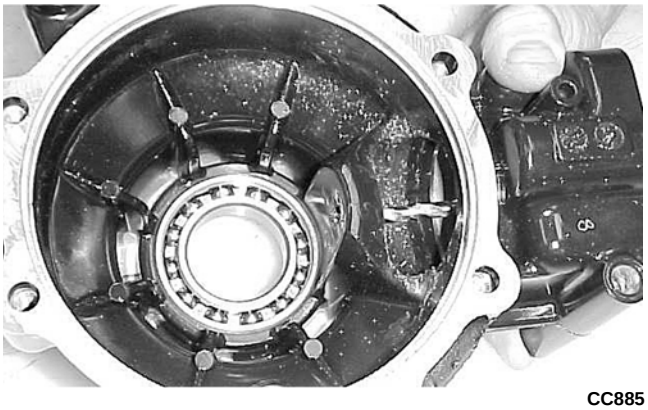
■ **NOTE: If a new gear case housing is being installed, tighten the cap screws to 3.5-4.3 kg-m (25-31 ft-lb).**

## Removing Needle Bearing

■ **NOTE: Removing the needle bearing is rarely necessary. Avoid removing the needle bearing unless the bearing is clearly damaged.**

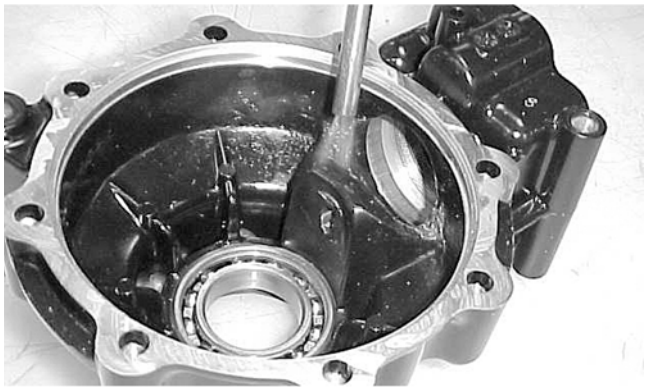
■ **NOTE: This procedure can be performed on a rear gear case.**

1. Place a 6.35 mm (1/4 in.) drill bit on the inside surface of the needle bearing (against the bottom side); then drill through the pinion shaft needle bearing housing.



CC885

2. Using a propane torch, heat the area surrounding the needle bearing to soften the Loctite.



CC886

3. Using a flat-nosed punch, drive the bearing out of the housing.

CC887

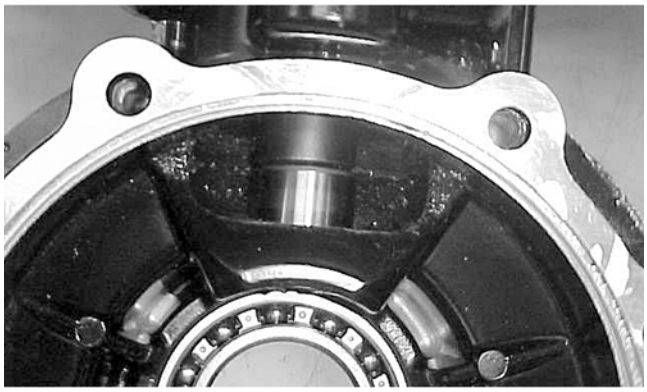
## Installing Needle Bearing

1. Apply red Loctite #271 to the outside of a new bearing; then place the new bearing into the housing.

CC888

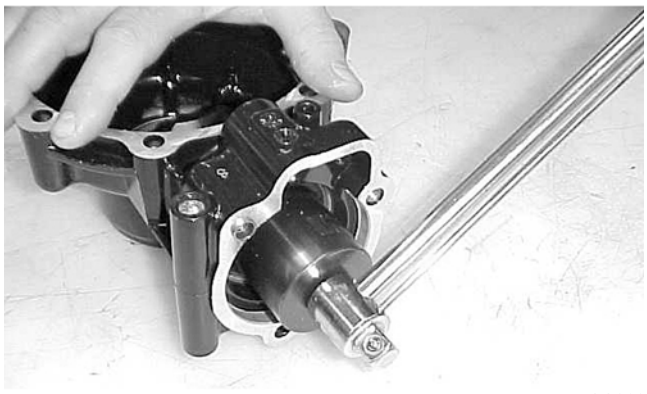
2. Using a suitable driver, install the needle bearing into the gear case housing making sure the bearing is seated.

■ **NOTE: Do not push the bearing too far into the housing.**



CC889

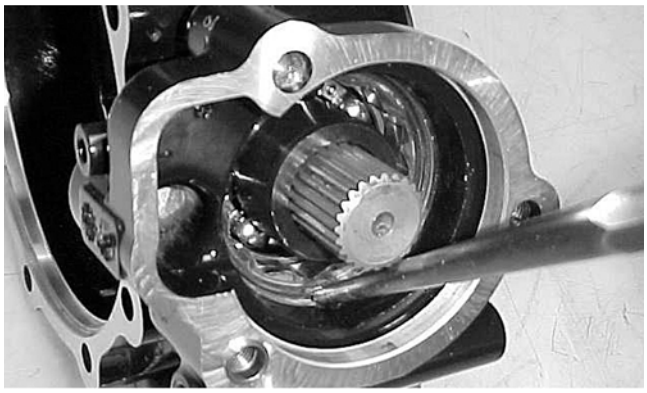
3. Install the pinion shaft and secure with the existing 48 mm lock collar. Tighten to specifications.



CC890

4. Place a punch on the edge of the lock collar in the oil gallery area; then using a hammer, stake the lock collar to ensure that the collar will remain securely tightened.





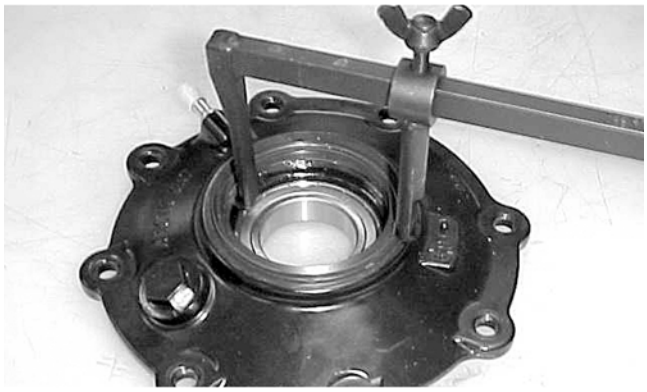
CC891

5. Install the pinion housing.

## Removing/Installing Axle Seal

■ **NOTE: This procedure can be performed on a rear gear case.**

1. Remove the seal using a seal removal tool.

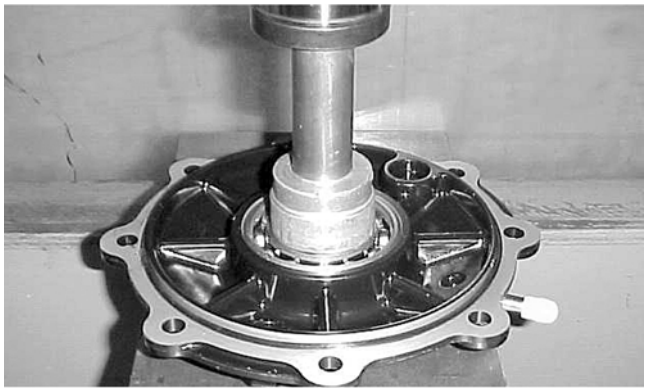


CC899

2. Using a press, remove the bearing.

CC900

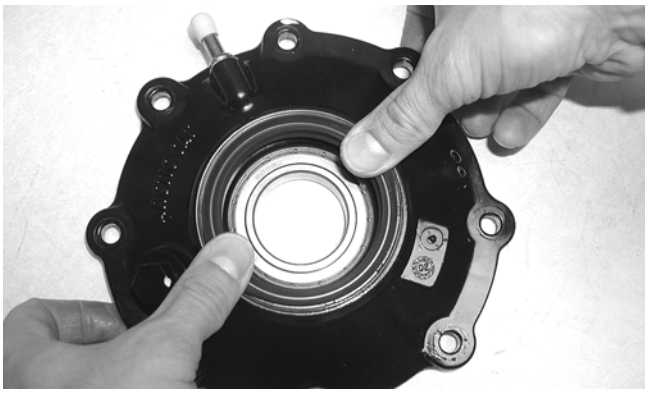
3. Using a press, install the new bearing into the housing.



CC901

■ **NOTE: Prior to installing the seal, apply grease to the seal outside diameter.**

4. Install the seal into the housing pressing evenly on the outside edge until the seal is seated.



CD018

5. Repeat steps 1-4 for the opposite side.

## INSTALLING DIFFERENTIAL

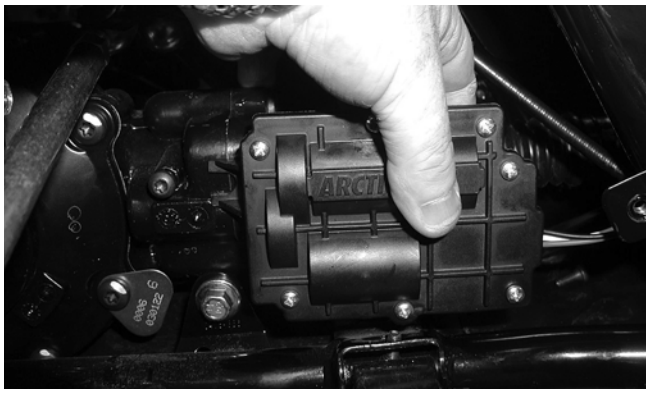
1. Align the splined input yoke with the front output splines; then place the differential into position on the frame and install the cap screws, washers, and flex-lock nuts. Tighten to specifications. Make sure the rubber boot is properly seated on the input yoke.

CD857

CD859

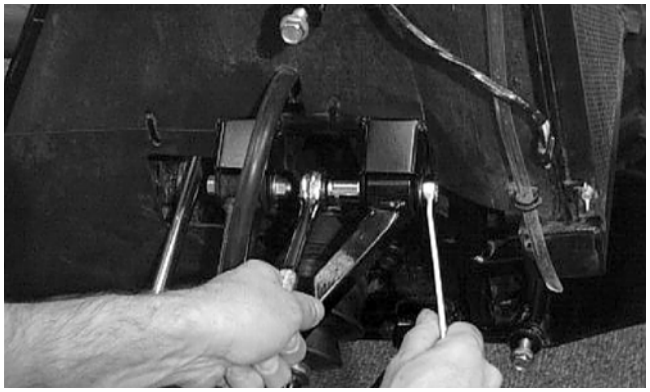
2. Pour 275 ml (9.3 fl oz) of SAE 80W-90 hypoid lubricant into the differential and install the filler plug. Tighten to specifications.

3. Install the front drive actuator with the three torx-head cap screws; then connect the wire connector to the main wiring harness.



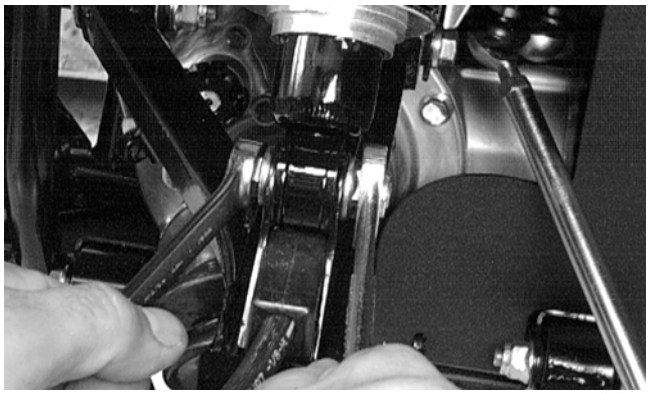
AG925

4. Install the inner fender panels.
5. Install the front axles (see Drive Axles in this section).
6. Secure the upper A-arms with cap screws and lock nuts. Tighten to specifications.



AF610D

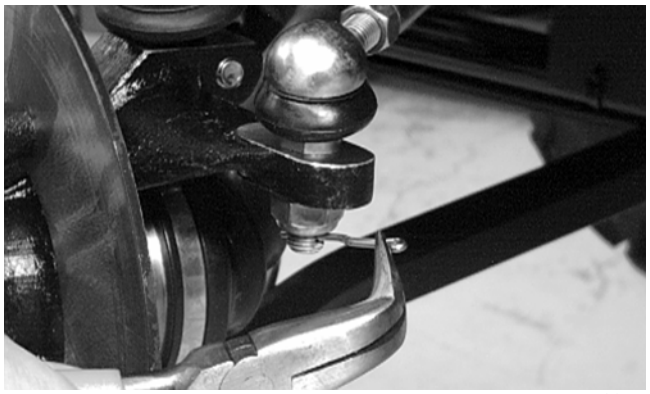
7. Secure the lower shock eyelets with cap screws and lock nuts. Tighten to specifications.



AF897D

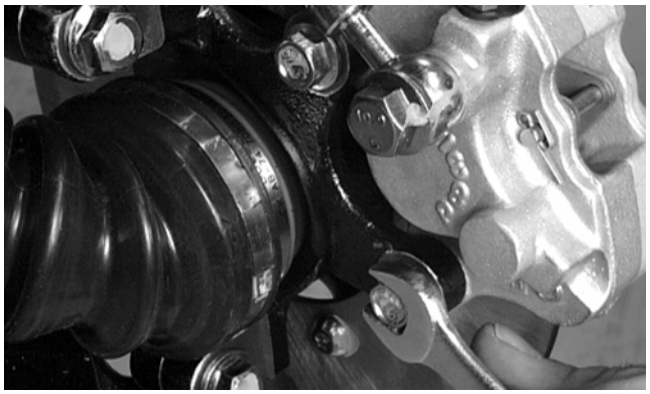
8. Secure the tie rods with the lock nuts. Tighten to specifications; then install and spread the cotter pins.

AF896D



AF895D

9. Making sure that each caliper has the 0.76 mm (0.030 in.) spacer washers between the caliper and the knuckle, install the brake calipers. Secure with the cap screws tightened to specifications.



AF894D

10. Install the wheels and tighten to specifications.
11. Remove the ATV from the support stand.

# Drive Axles

## REMOVING REAR DRIVE AXLE

1. Secure the ATV on a support stand to elevate the wheels.

**⚠ WARNING**

**Make sure the ATV is solidly supported on the support stand to avoid injury.**

2. Pump up the hand brake; then engage the brake lever lock.
3. Remove the wheel.
4. Remove the cotter pin securing the hex nut; then remove the hex nut. Release the brake lever lock.

KX041

5. Remove the two brake calipers (right side only).

**■ NOTE: Do not allow the brake calipers to hang from their cable/hose.**

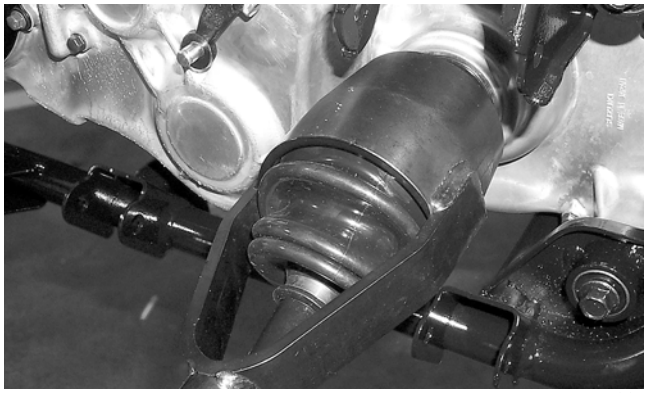
**⚠ CAUTION**

**The calipers should be supported. If the calipers are allowed to hang from the cable/hose, damage may occur.**

6. Slide the hub out of the knuckle and set aside.
7. Remove the cap screw and lock nut securing the knuckle to the upper A-arm. Discard the lock nut.

**■ NOTE: Never reuse a lock nut. Once a lock nut has been removed, it must be replaced with a new lock nut.**

8. While holding the drive axle stationary, pull the top of the knuckle out and down until it is free of the drive axle.
9. Place a drain pan under the ATV to contain any oil leakage; then using a slide hammer, remove the drive axle.



AF935

## REMOVING FRONT DRIVE AXLE

**■ NOTE: For removing a front drive axle, see Front Differential in this section.**

## CLEANING AND INSPECTING

**■ NOTE: Always clean and inspect the drive axle components to determine if any service or replacement is necessary.**

1. Using a clean towel, wipe away any oil or grease from the axle components.

CD019

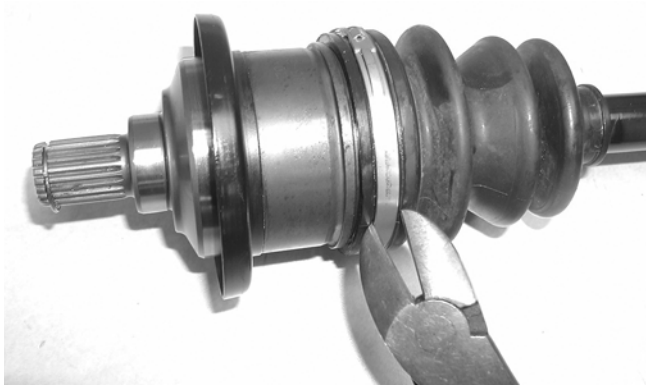
2. Inspect boots for any tears, cracks, or deterioration.

**■ NOTE: If a boot is damaged in any way, it must be replaced with a boot kit.**

3. Inspect the gear case seals for nicks or damage.

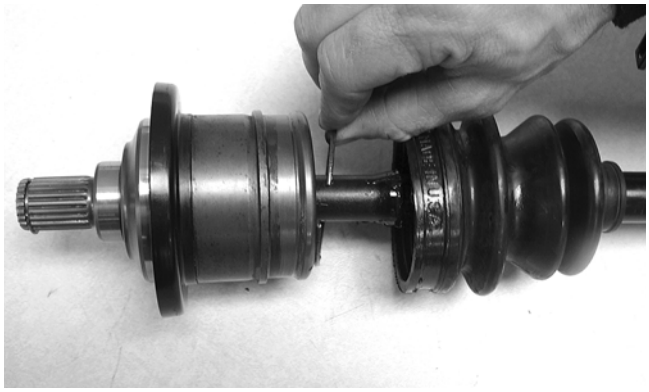
## DISASSEMBLING AXLES

1. Using a side-cutters (or suitable substitute), remove the large clamp from the boot.



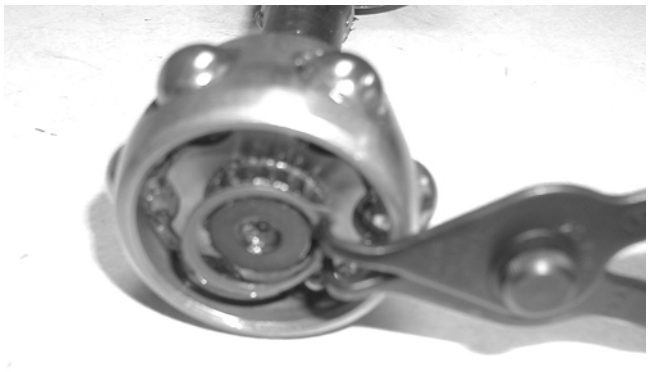
CD020

2. Wipe away excess grease to access the retaining ring. Using an awl or circlip pliers, remove the circlip.



CD021

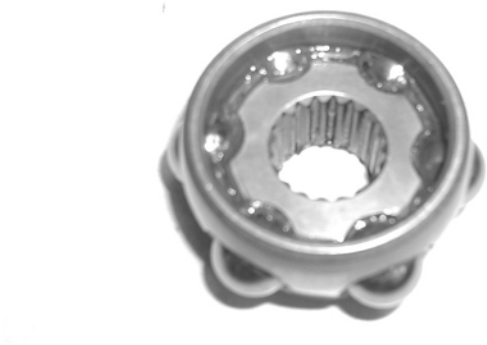
3. Using a snap ring pliers, remove the circlip securing the bearing ring to the shaft. Note the direction of the bearing for assembling purposes.



CD023

4. Note the difference inside each bearing ring end for assembling purposes; then remove the bearing ring.

■ **NOTE: The recess of the bearing must face toward the housing.**



CD022

5. Inspect the splines of the shaft, the bearing ring, and the housing for damage.

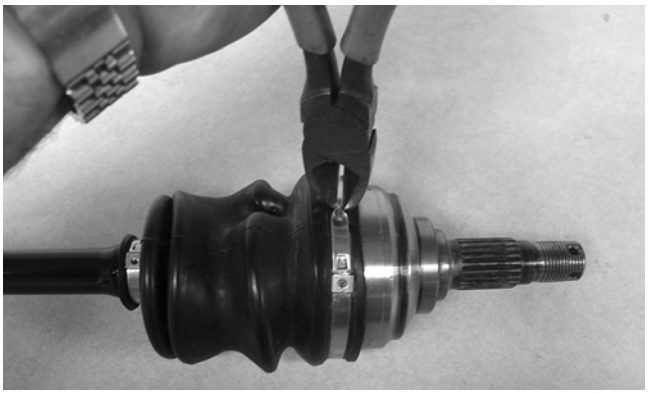
■ **NOTE: If any damage is apparent to the splines, the bearing ring, and/or the housing, the drive axle must be replaced as an assembly.**

6. Using a side-cutters (or suitable substitute), remove the small clamp from the shaft.

CD752

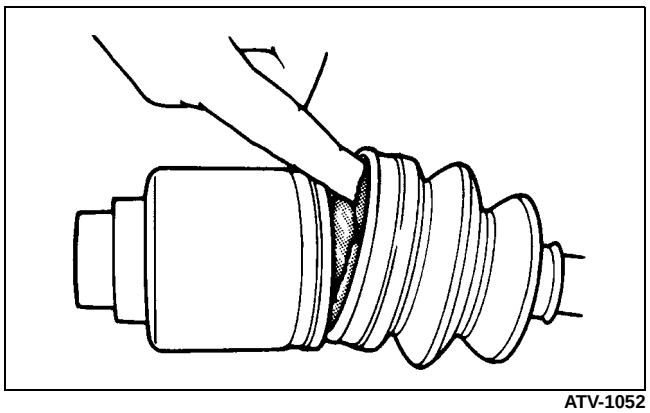
■ **NOTE: At this point if the outside boot is damaged, continue with step 7.**

7. Using a side-cutters (or suitable substitute), remove both outside boot clamps from the shaft. Note the position of the different-sized clamps for assembling purposes.



CD751

8. Apply 40 grams (1/3 of contents) of grease from the Grease Pack (p/n 0441-173) into the knuckles and the new outside boot.



ATV-1052

■ **NOTE: Grease Pack (p/n 0441-173) contains 120 grams of grease. The inside joint (double-offset) requires approximately 70-90 grams of grease and the outside (bell-type) requires approximately 35-55 grams. When replacing boots, use 2/3 of the pack for inside boots and 1/3 of the pack for outside boots.**

**⚠ CAUTION**

**Do no over-fill the joint as boot damage may occur resulting in joint failure.**

9. Slide the new outside boot onto the shaft with the new clamps positioned as shown. Note the different-sized clamps from removal.

■ **NOTE: The boot is positioned correctly when the small end of the boot seats down into the recessed groove.**

CD754

10. Using a CV Boot Clamp Tool (p/n 0444-120), secure both outside boot clamps.

**⚠ CAUTION**

**It is important that the clamps are positioned correctly or they may loosen when in motion.**

CD024

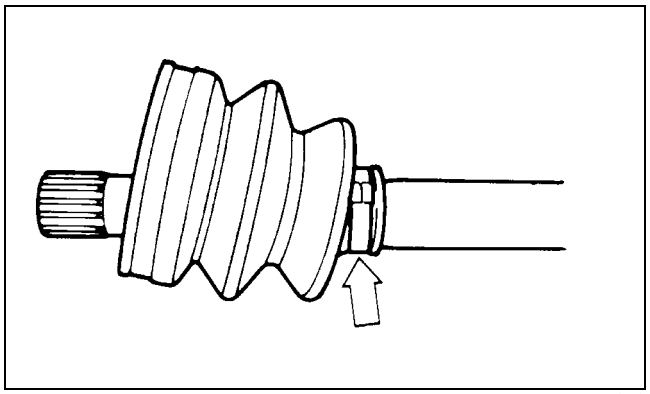
## ASSEMBLING AXLES

1. Install the inner boot with the small clamp making sure the ends of the clamp are positioned correctly.

■ **NOTE: The boot is positioned correctly when the small end of the boot seats down into the recessed groove.**

CD754

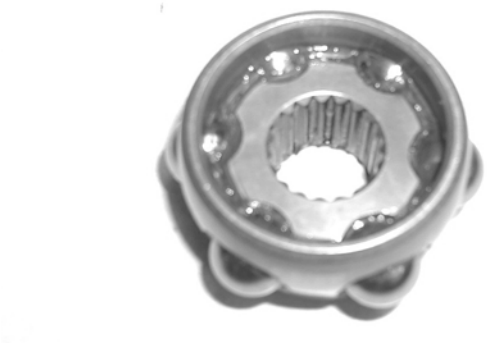
2. Using the boot clamp pliers, secure the small clamp of the inner boot.



ATV-1048

3. Apply 80 grams (2/3 of contents) of grease from the pack into the bearing housing.

4. Install the bearing onto the shaft making sure the recess of the bearing is facing the housing.

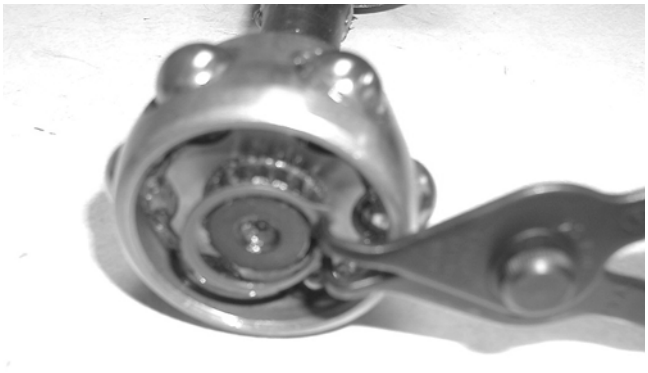


CD022

**⚠ CAUTION**

**The bearing ring must go onto the shaft with the side without splines facing toward the small clamp of the inner boot or severe damage will result.**

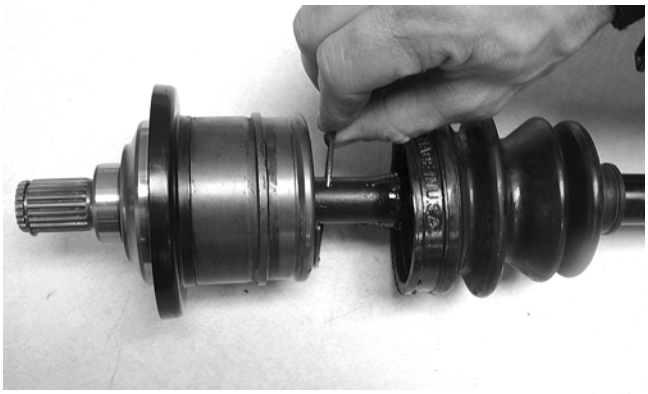
5. Secure the bearing ring with the circlip making sure the sharp side of the circlip faces away from the boot.



CD023

6. Making sure the marks made during disassembling align, slide the housing over the bearing ring; then completely seat the bearing ring into the housing and install the circlip.

■ **NOTE: Pull the bearing ring out of the housing until it contacts the circlip; then slide the ring in half way. This will purge air from the housing and ensure the bearing is packed properly.**



CD021

7. Slide the boot over the housing; then using the boot clamp pliers, secure the boot with the clamp.

CD024

8. Inspect the axle components for correct positioning of the four clamps. Also, inspect the boots for being correctly positioned on the shaft.

## INSTALLING REAR DRIVE AXLE

1. Slide the drive axle into place in the gear case.

■ **NOTE: To assure proper seating of the axle, give it a light pull; the axle should remain "clipped" in place.**

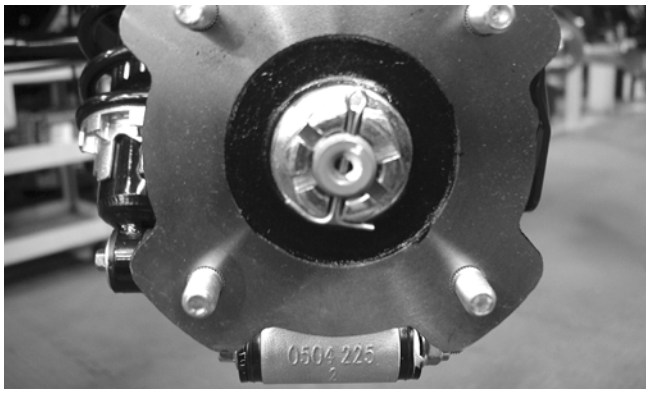
2. Swing the knuckle up and onto the drive axle; then place the knuckle into place in the upper A-arm. Secure the knuckle to the A-arm with a cap screw and a new lock nut. Tighten to specifications.

3. Place the hub into position on the axle followed by a hex nut. Tighten the hex nut finger-tight at this time.

4. If the brake calipers were removed, position them on the knuckle and secure with existing cap screws. Tighten the auxiliary brake caliper cap screws to specifications. Tighten the hydraulic brake caliper cap screws to specifications.

5. Pump up the hand brake lever; then engage the brake lever lock.

6. Tighten the hub hex nut (from step 3) to specifications; then install and spread a new cotter pin making sure each side of the pin is flush to the hub nut.



CD027

7. Install the wheel. Tighten to specifications.

8. Remove the ATV from the support stand and release the brake lever lock.

### INSTALLING FRONT DRIVE AXLE

1. Position the drive axle in the gear case and steering knuckle; then insert the upper A-arm ball joint into the steering knuckle. Secure with a cap screw tightened to specifications.

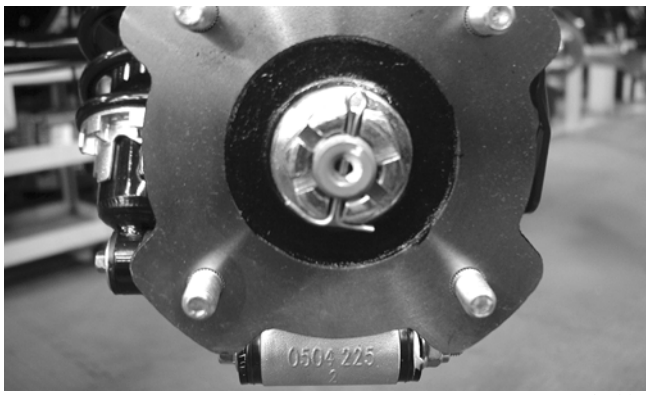
2. Place the brake hose into position on the upper A-arm; then secure the lower shock eyelet to the A-arm with a cap screw and a new lock nut. Tighten to specifications.

3. Secure the tie rod to the steering knuckle with a new lock nut. Tighten securely; then install and spread a new cotter pin.

4. Slide the hub w/brake disc into position in the steering knuckle followed by a washer and hex nut. Tighten finger-tight at this time.

5. Install the brake caliper on the steering knuckle. Tighten to specifications; then pump up the hand brake lever and engage the brake lever lock.

6. Tighten the hub hex nut (from step 4) to specifications; then install and spread a new cotter pin making sure each side of the pin is flush to the hub nut.

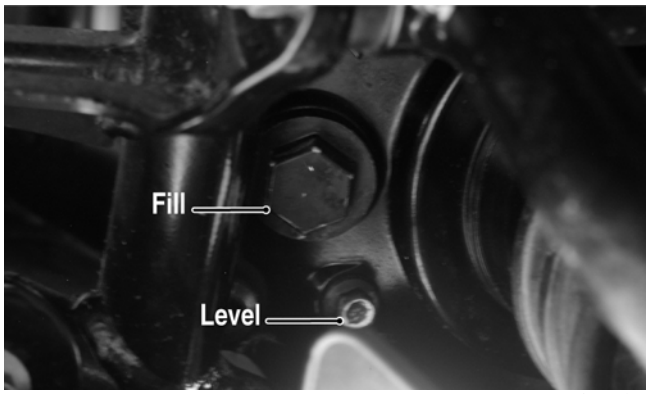


CD027

7. Install the wheel and tighten to specifications.

8. Remove the ATV from the support stand and release the brake lever lock.

9. Check the front differential oil level and add oil as necessary.



CF113A

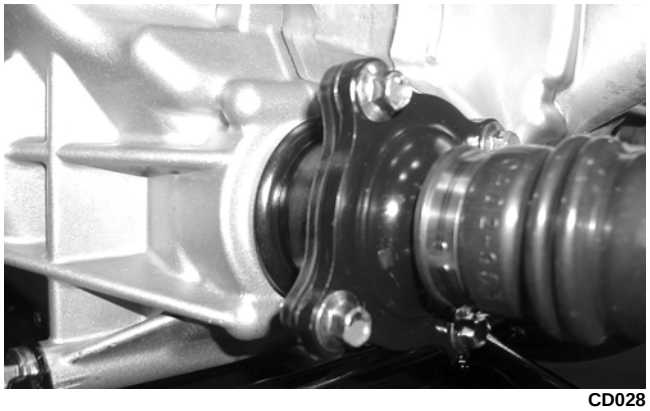
## Rear Gear Case

### REMOVING

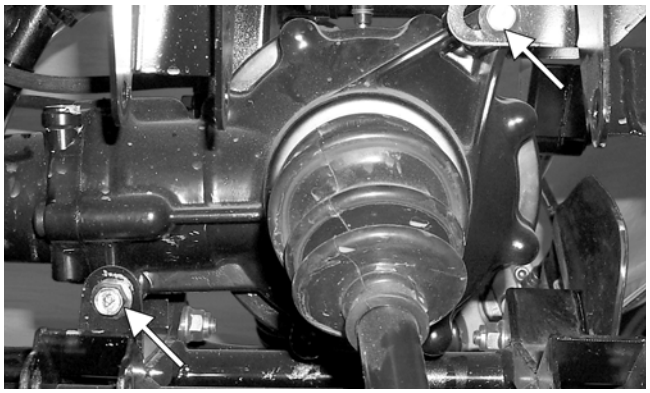
1. Remove the left-side rear A-arms (see Rear A-Arms in Section 7).

2. Remove both of the rear drive axles (see Drive Axles in this section).

3. Remove the four cap screws securing the engine output shaft to the rear gear case input flange.


CD028

4. Remove the two cap screws and lock nuts securing the rear gear case to the frame; then remove the gear case through the left side.



AF960A

**☞ AT THIS POINT**

**For servicing the input shaft, pinion gear, needle bearing, and axle seal, see Front Differential in this section.**

### INSTALLING

1. Slide the gear case into position through the left side of the frame; then secure it to the frame with cap screws and lock nuts. Tighten to specifications.

**■ NOTE: If a new gear case is being installed, tighten the cap screws to 5.1-6.3 kg-m (37-45.5 ft-lb).**

2. Secure the engine output shaft to the rear gear case input flange with three cap screws (coated with red Loctite #271) and lock nuts. Tighten to specifications.
3. Install the rear drive axles (see Drive Axles in this section).
4. Install the left-side rear A-arms (see Rear A-Arms in Section 7).

## Hub

### REMOVING

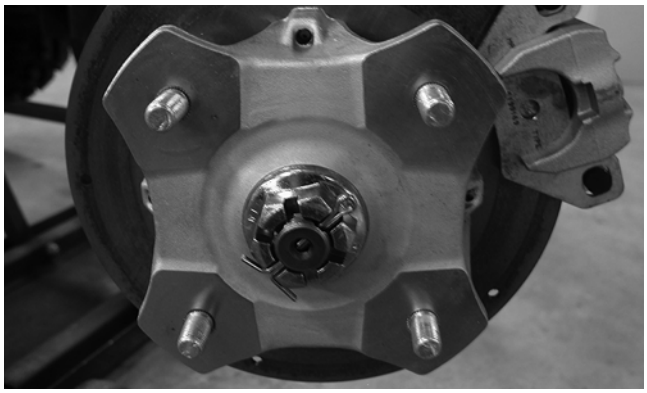
1. Secure the ATV on a support stand to elevate the wheel; then remove the wheel.

**⚠ WARNING**

**Make sure the ATV is solidly supported on the support stand to avoid injury.**

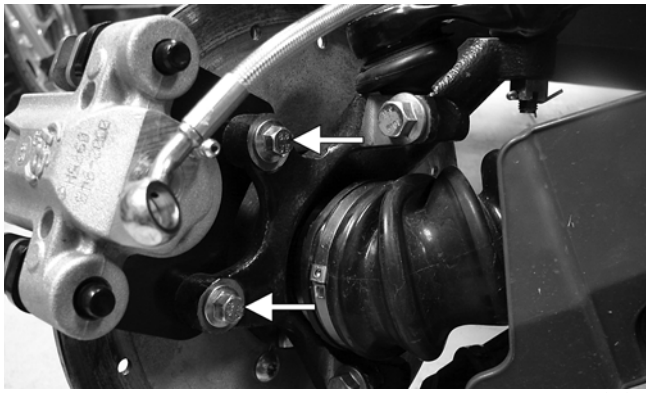
2. Remove the cotter pin from the nut.

**■ NOTE: During assembly, new cotter pins should be installed.**



KX041

3. Remove the flange nut securing the hub.
4. Remove the brake caliper.



PR243A

5. Remove the hub assembly.
6. Remove the four cap screws securing the brake disc.

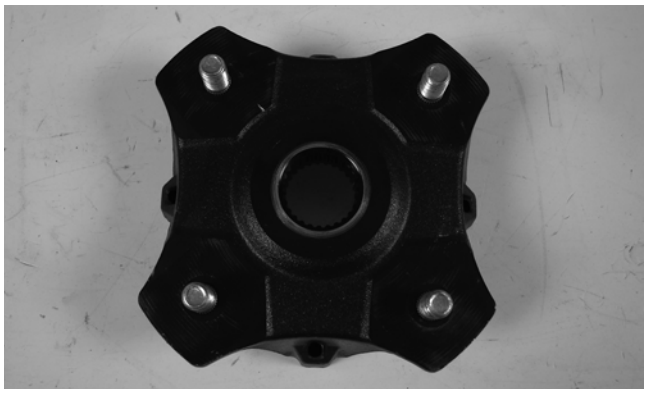
### CLEANING AND INSPECTING

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

1. Clean all hub components.
2. Inspect all threads for stripping or damage.
3. Inspect the brake disc for cracks or warping.
4. Inspect the hub for pits, cracks, loose studs, or spline wear.

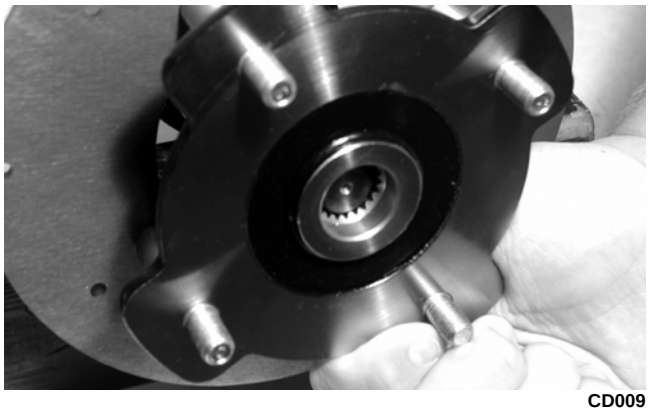
### INSTALLING

1. Secure the brake disc to the hub with the four cap screws coated with blue Loctite #243. Tighten to specifications.
2. Apply grease to the splines in the hub.



PR291

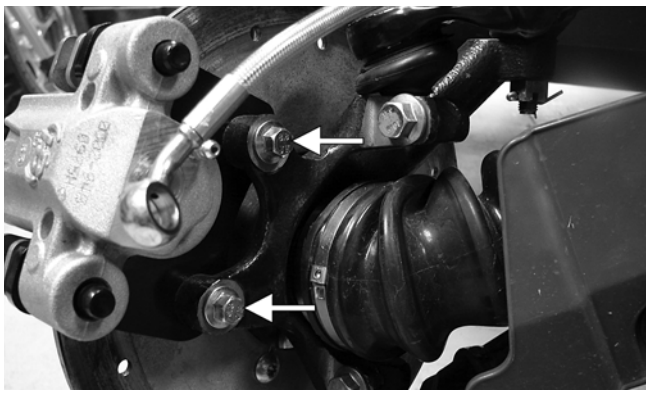
3. Install the hub assembly onto the shaft.



CD009

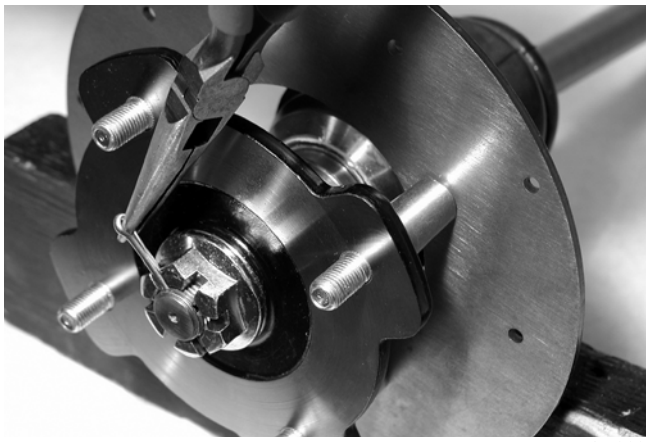
4. Secure the hub assembly with the nut. Tighten only until snug.

5. Secure the brake caliper to the knuckle with the two cap screws. Tighten the auxiliary caliper to specifications. Tighten the hydraulic caliper to specifications.



PR243A

6. Tighten the hub nut (from step 4) to specifications; then install and spread a new cotter pin making sure each side of the pin is flush to the hub nut.



CD008

7. Install the wheel and tighten to specifications.

CD006

8. Remove the ATV from the support stand.

## Hydraulic Brake Caliper

■ **NOTE: The brake caliper is a non-serviceable component; it must be replaced as an assembly (see Section 2).**

# SECTION 7 - SUSPENSION

7

## TABLE OF CONTENTS



Back to TOC

# Suspension

■ **NOTE: Critical torque specifications are located in Section 10.**

# Shock Absorbers

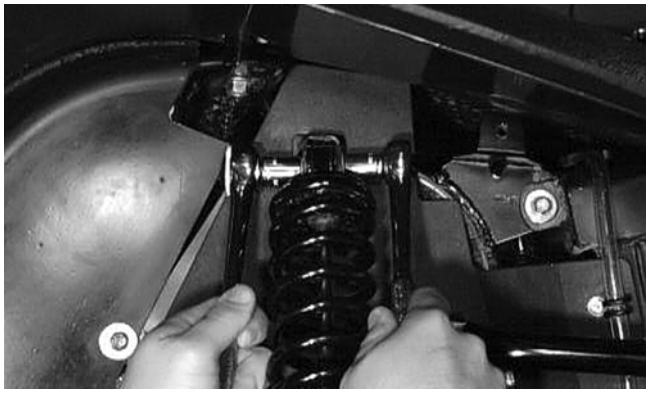
## REMOVING

1. Secure the ATV on a support stand to elevate the wheels and to release load on the suspension.

**⚠ WARNING**

**Make sure the ATV is solidly supported on the support stand to avoid injury.**

2. Remove the two cap screws and nuts securing each front shock absorber to the frame and the upper A-arm. Account for bushings and sleeves from each.

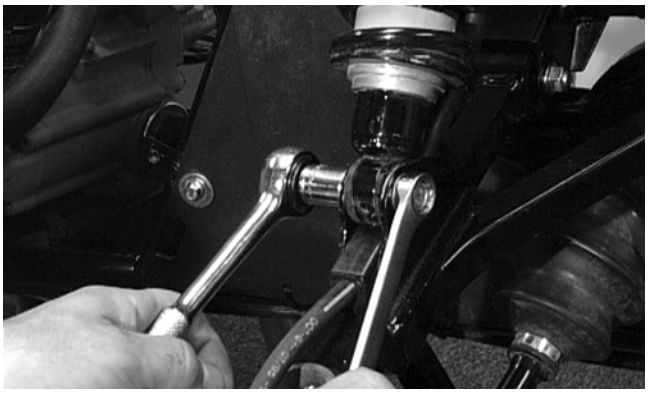


AF605D

**⚠ CAUTION**

**Additional support stands are necessary to support the rear axle when the shock absorbers are removed or damage may occur.**

3. Remove the two cap screws and nut securing each rear shock absorber to the frame and lower A-arm. Account for bushings and sleeves from each.



AF626D

4. Compress the shock absorber spring, remove the retainer, and remove the spring.

AF730D

## CLEANING AND INSPECTING

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

1. Clean all shock absorber components in parts-cleaning solvent.
2. Inspect each shock rod for nicks, pits, rust, bends, and oily residue.
3. Inspect all springs, spring retainers, shock rods, sleeves, bushings, shock bodies, and eyelets for cracks, leaks, and bends.

## INSTALLING

1. Place the shock absorber spring over the shock absorber, compress the spring, and install the retainer.

2. Place bushings and sleeves (where appropriate) into shock eyelet; then install shock with two cap screws and nuts. Tighten all nuts to specifications.

**⚠ CAUTION**

**Do not tighten the nuts beyond the 4.8 kg-m (35 ft-lb) specification or the shock eyelet or mount WILL be damaged.**

**■ NOTE: The rear shock absorber-to-lower A-arm torque factor is 2.8 kg-m (20 ft-lb).**

3. Remove the ATV from the support stand.

# Front A-Arms

## REMOVING

1. Secure the ATV on a support stand to elevate the front wheels; then remove the wheels.

**⚠ WARNING**

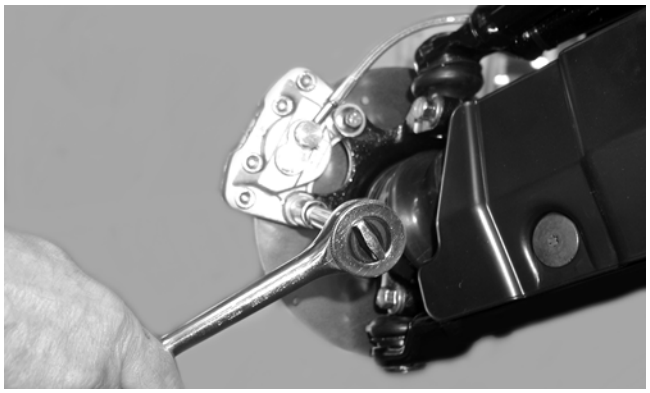
**Make sure the ATV is solidly supported on the support stand to avoid injury.**

2. Remove the cotter pin from the nut. Discard the cotter pin.

CD008

3. Remove the nut securing the hub.

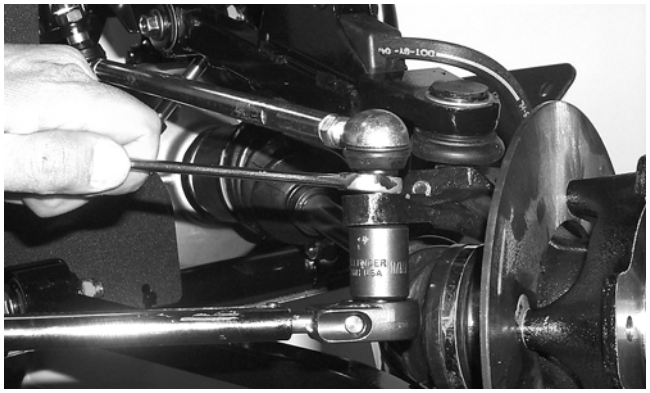
4. Remove the brake caliper. Account for two cap screws and two 0.76 mm (0.030 in.) spacer washers.



CD007

5. Remove the hub assembly.

6. Remove the cotter pin and slotted nut securing the tie rod end to the knuckle; then remove the tie rod end from the knuckle.

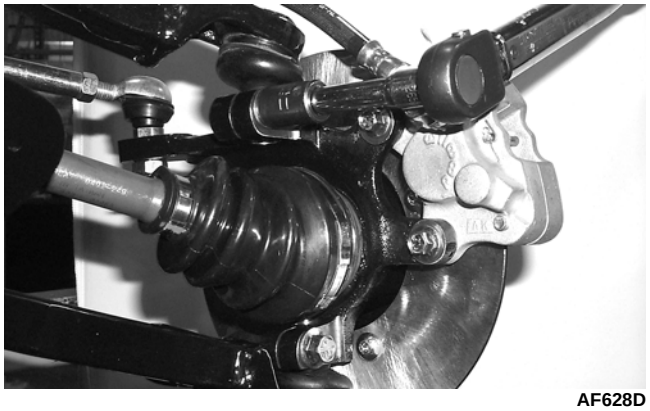


AF618D

7. Remove the cap screws securing the ball joints to the knuckle.

**⚠ CAUTION**

**Support the knuckle when removing the cap screws or damage to the threads will occur.**

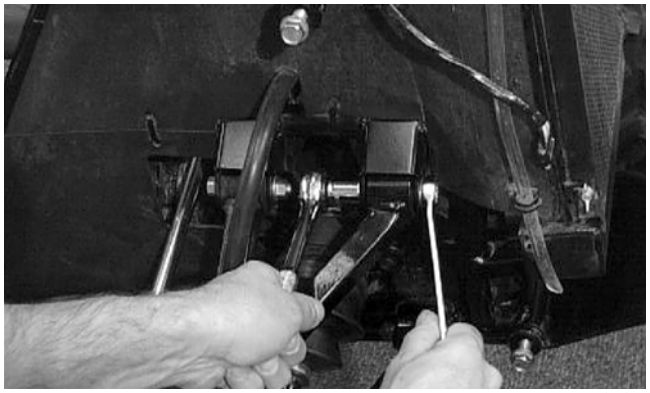


AF628D

8. Tap the ball joints out of the knuckle; then remove the knuckle.

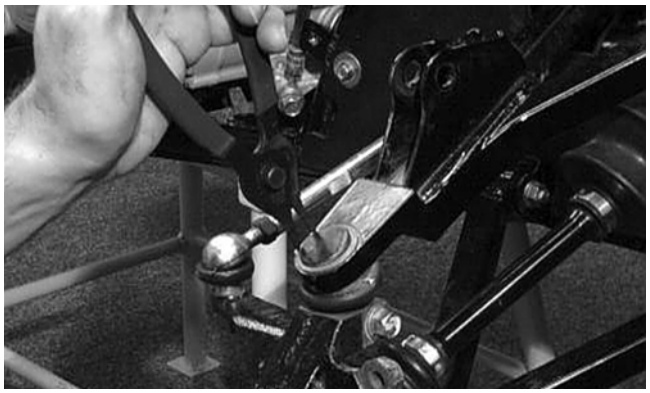
9. Remove the lower shock absorber eyelet from the upper A-arm.

10. Remove the cap screws securing the A-arms to the frame.



AF610D

11. Remove the circlip from the ball joint; then remove the ball joint from the A-arm.



AF616D

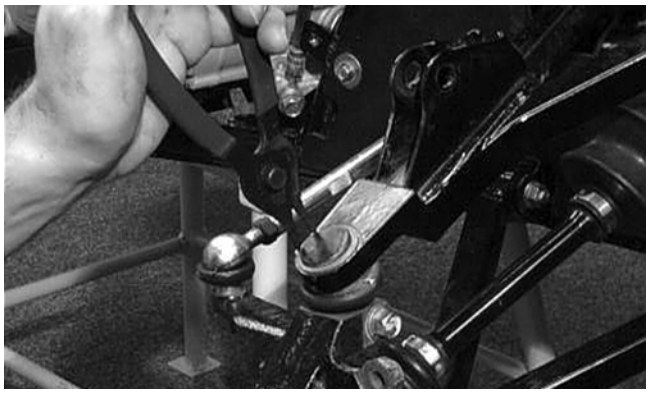
## CLEANING AND INSPECTING

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

1. Clean all A-arm components in parts-cleaning solvent.
2. Clean the ball joint mounting hole of all residual Loctite, grease, oil, or dirt for installing purposes.
3. Inspect the A-arm for bends, cracks, and worn bushings.
4. Inspect the ball joint mounting holes for cracks or damage.
5. Inspect the frame mounts for signs of damage, wear, or weldment damage.

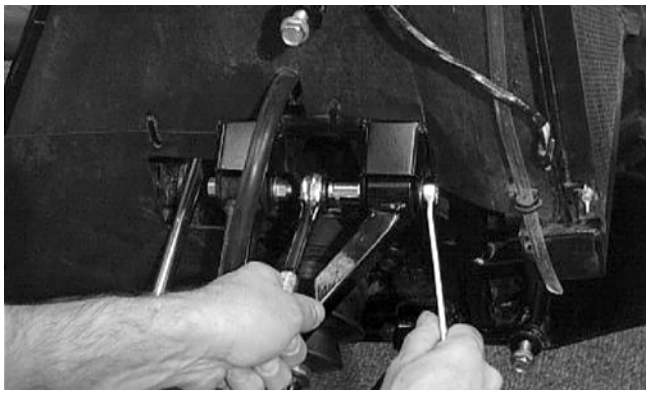
## INSTALLING

1. Apply green Loctite #609 to the entire outside diameter of the ball joint; then install the ball joint into the A-arm and secure with the circlip.



AF616D

2. Install the A-arm assemblies into the frame mounts and secure with the cap screws. Only finger-tighten at this time.



AF610D

3. Route the brake hose through the upper A-arm shock absorber mount; then secure the hose to the A-arm with a cable tie and grommet.

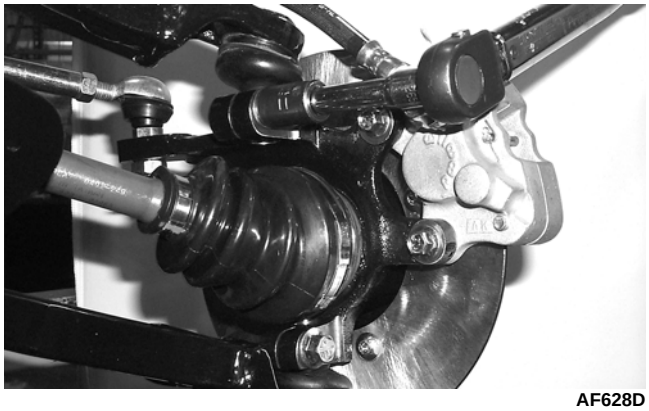

DE054A

4. Secure the lower eyelet of the shock absorber to the upper A-arm. Tighten nut to specifications.
5. Secure the A-arm assemblies to the frame mounts (from step 2). Tighten the cap screws to specifications.

**⚠ CAUTION**

**Do not tighten the nut beyond the 4.8 kg-m (35 ft-lb) specification or the shock eyelet or mount WILL be damaged.**

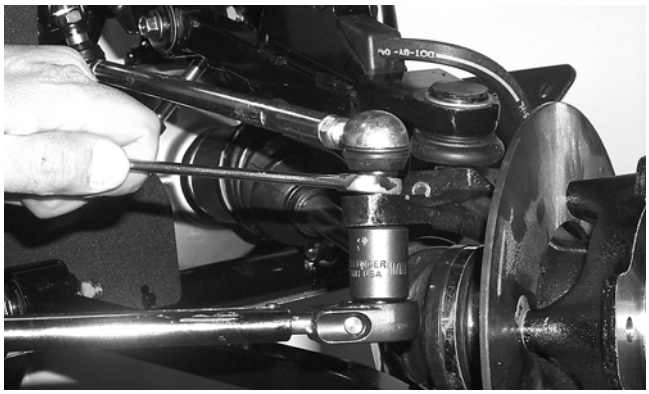
6. Install the knuckle assembly onto the ball joints and secure with cap screws. Tighten to specifications.



AF628D

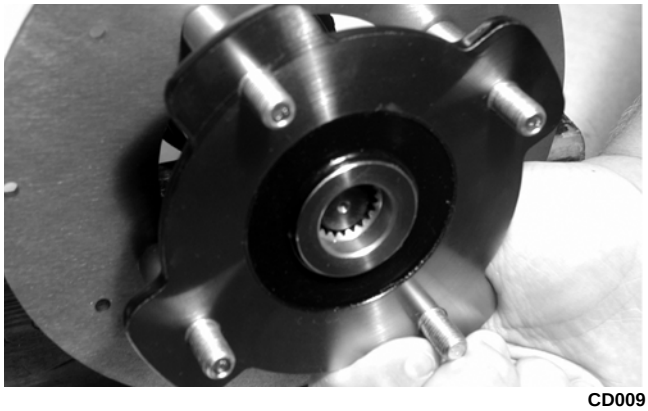
7. Install the tie rod end and secure with the nut. Tighten to specifications; then install a new cotter pin and spread the pin to secure the nut.

■ **NOTE: During assembly, new cotter pins should be installed.**



AF618D

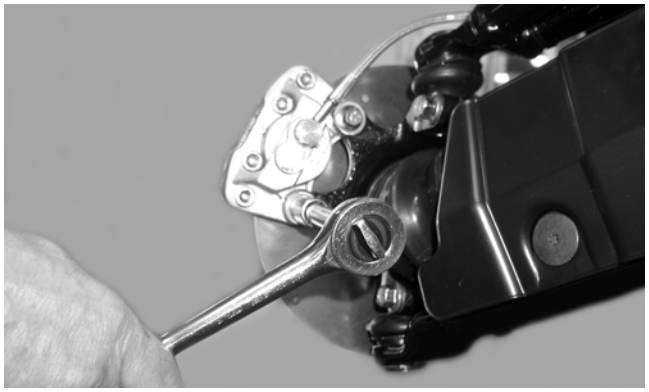
8. Apply grease to the hub and drive axle splines; then install the hub assembly onto the drive axle.



CD009

9. Secure the hub assembly with the nut. Tighten only until snug.

10. Secure the brake caliper to the knuckle with the two cap screws making sure the two 0.76 mm (0.030 in.) spacer washers are positioned between the caliper and the knuckle. Tighten to specifications.



CD007

11. Secure the hub nut (from step 9) to the shaft/axle. Tighten to specifications.

12. Install a new cotter pin and spread the pin to secure the nut.

CD008

13. Install the wheel and tighten to specifications.

14. Remove the ATV from the support stand.

## Rear A-Arms

### REMOVING

1. Secure the ATV on a support stand to elevate the wheels.

**⚠ WARNING**

**Make sure the ATV is solidly supported on the support stand to avoid injury.**

2. Pump up the hand brake; then engage the brake lever lock.

3. Remove the wheel.

4. Remove the cotter pin securing the hex nut; then remove the hex nut. Release the brake lever lock.

5. Remove the caliper (right side only).

■ **NOTE: Do not allow the brake calipers to hang from their cable/hose.**

6. Remove the cap screws and lock nut securing the shock absorber to the frame and lower A-arm; then remove the shock absorber.

7. Remove the cap screws securing the boot guard to the lower A-arm.

AF934

8. Slide the hub out of the knuckle and set aside.

9. Remove the cap screws and lock nuts securing the knuckle to the A-arms. Discard the lock nuts.

■ **NOTE: Never reuse a lock nut. Once a lock nut has been removed, it must be replaced with a new lock nut.**

10. Remove the cap screws and lock nuts securing the A-arms to the frame; then remove the A-arms.

■ **NOTE: If removing the upper right A-arm, it will be necessary to disconnect the brake hose from the A-arm.**

## CLEANING AND INSPECTING

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

1. Clean all A-arm components in parts-cleaning solvent.

2. Inspect the A-arm for bends, cracks, and worn bushings.

3. Inspect the frame mounts for signs of damage, wear, or weldment damage.

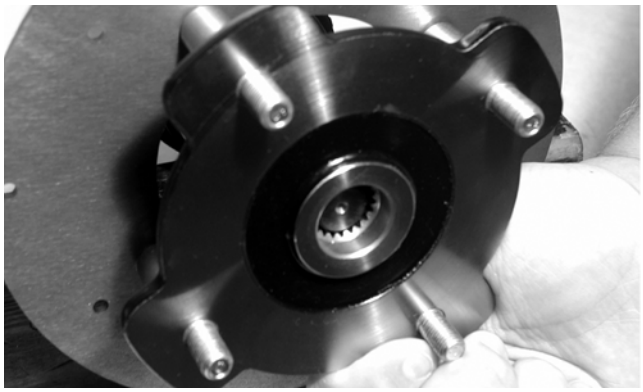
## INSTALLING

1. Install the A-arm assemblies into the frame mounts and secure with the cap screws and new lock nuts. Only finger-tighten at this time.

2. Slide the knuckle onto the drive axle and into position on the A-arms; then secure the knuckle to the A-arms with cap screws and new lock nuts. Tighten to specifications.

3. Tighten the hardware securing the A-arms to the frame mounts (from step 1) to specifications.

4. Apply grease on the drive axle splines; then install the hub assembly onto the drive axle.

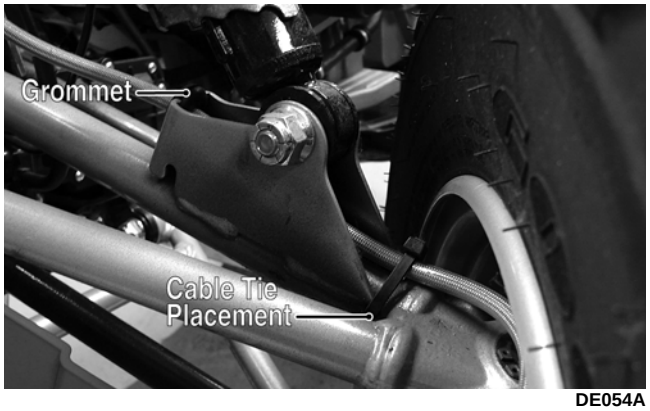


CD009

5. Secure the hub assembly with the nut. Tighten only until snug.

6. Secure the brake caliper to the knuckle with the two cap screws (right side only). Tighten the caliper to specifications.

■ **NOTE: Ensure that the brake hose is properly routed and secured to the upper A-arm.**




DE054A

7. Compress the hand brake lever and engage the brake lever lock; then secure the hub nut (from step 5) to the drive axle. Tighten to specifications.

8. Install a new cotter pin and spread the pin to secure the nut.

CD008

9. Secure the shock absorber to the frame with a cap screw and new lock nut. Tighten to specifications.

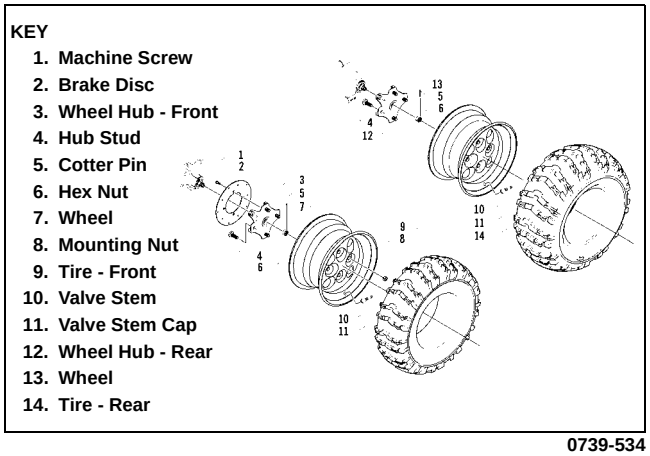
10. Secure the shock absorber to the lower A-arm with a cap screw and new lock nut. Tighten to specifications.

11. Secure the boot guard to the lower A-arm with the two cap screws. Tighten securely.

12. Install the wheel and tighten to specifications.

13. Remove the ATV from the support stand.

# Wheels and Tires




0739-534

## TIRE SIZE

**⚠ WARNING**

**Use only Arctic Cat approved tires when replacing tires. Failure to do so could result in unstable ATV operation.**

The ATV is equipped with low-pressure tubeless tires of the size and type listed in the General Specifications (see Section 1). Do not under any circumstances substitute tires of a different type or size.

**⚠ WARNING**

**Do not mix tire tread patterns. Use the same pattern type on front and rear. Failure to heed warning could cause poor handling qualities of the ATV and could cause excessive drive train damage not covered by warranty.**

## TIRE INFLATION PRESSURE

Front and rear tire inflation pressure should be 0.35 kg/cm² (5.0 psi).

## REMOVING

1. Secure the ATV on a support stand to elevate the wheels.

**⚠ WARNING**

**Make sure the ATV is solidly supported on the support stand to avoid injury.**

2. Remove the wheels.

**■ NOTE: Keep left-side and right-side wheels separated for installing them on their proper sides.**

## CLEANING AND INSPECTING

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

1. Clean the wheels and hubs with parts-cleaning solvent.

2. Clean the tires with soap and water.

3. Inspect each wheel for cracks, dents, or bends.

4. Inspect each tire for cuts, wear, missing lugs, and leaks.

## INSTALLING

1. Install each wheel on its hub.

CD006

■ **NOTE: Make sure each wheel is installed on its proper hub as noted in removing (the "rotation arrow" (if applicable) must indicate forward direction of rotation).**

AF612D

2. Tighten to specifications.

## CHECKING/INFLATING

1. Using an air pressure gauge, measure the air pressure in each tire. Adjust the air pressure as necessary to meet the recommended inflation pressure.

CD005

2. Inspect the tires for damage, wear, or punctures.

**⚠ WARNING**

**Do not operate the ATV if tire damage exists.**

■ **NOTE: If repair is needed, follow the instructions found on the tire repair kit or remove the wheel and have it repaired professionally.**

■ **NOTE: Be sure all tires are the specified size and have identical tread pattern.**

3. Check the front wheel toe-in and toe-out and adjust as necessary (see Section 8).

4. Test drive the ATV on a dry, level surface and note any pulling to the left or right during acceleration, deceleration, and braking.

■ **NOTE: If pulling is noted, measure the circumference of the front and rear tires on the pulling side. Compare the measurements with the tires on the opposite side. If pulling is noted during braking only, check and adjust the brakes as necessary and recheck operation (see Section 2).**

5. Increase the air pressure in the tires with the smallest circumference measurement until all tires are equal in circumference.

6. Repeat steps 4-5 as necessary to ensure proper handling.

# SECTION 8 - STEERING/FRAME

## TABLE OF CONTENTS





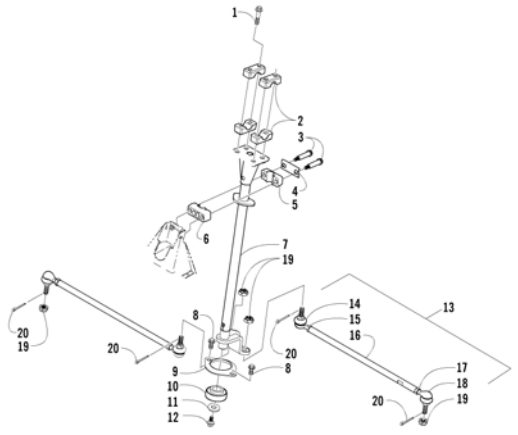
Back to TOC

# Steering/Frame

■ **NOTE: Critical torque specifications are located in Section 10.**

# Steering Post/ Tie Rods

■ **NOTE: Some components may vary from model to model. The technician should use discretion and sound judgment.**



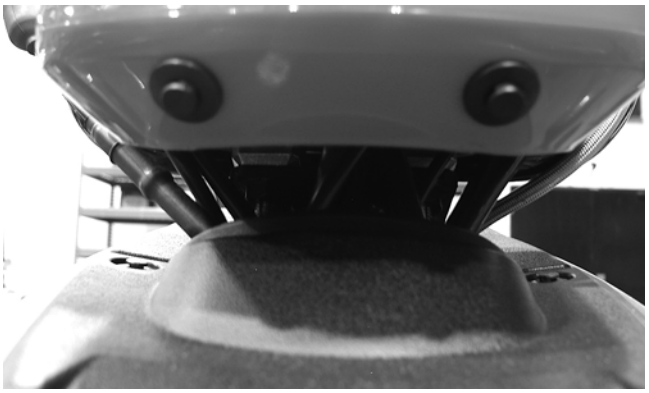
**KEY**

1. Cap Screw
2. Cap
3. Shoulder Screw
4. Housing Cap
5. Housing (Lower)
6. Housing (Upper)
7. Steering Post
8. Cap Screw
9. Bearing Flange
10. Bearing w/Oil Seal
11. Washer
12. Cap Screw
13. Tie Rod Assy
14. Ball Joint (Left)
15. Nut (Left)
16. Tie Rod
17. Nut (Right)
18. Ball Joint (Right)
19. Lock Nut
20. Cotter Pin

0739-774

## REMOVING

1. Remove the ignition switch retaining ring; then remove the reinstallable rivets securing the instrument pod to the mounting bracket and remove the pod.



CD759

2. Remove the reinstallable rivets securing the radiator access cover and remove the cover.

CD666

3. Remove four reinstallable rivets securing the steering post cover and remove the cover.


CD667

4. Unlatch the storage compartment lid; then slide the storage compartment cover assembly forward and lift off.


CD669

5. Remove the storage compartment.


CD671

6. Remove the four cap screws securing the handlebar caps and speedometer bracket to the steering post; then move the handlebar and speedometer out of the way. Account for four handlebar caps.

CD762

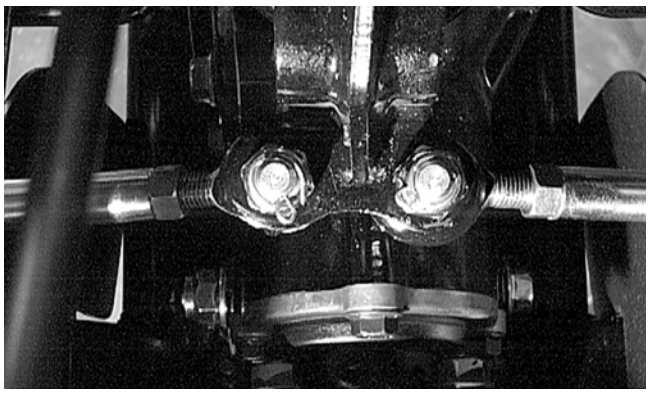
7. Remove two cap screws securing the upper steering post bearing to the frame. Account for two bearings and two housings.

CD760

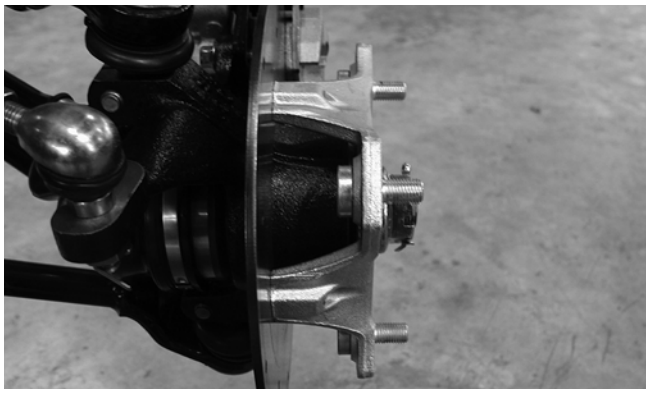
8. Using a suitable lift stand, raise the ATV enough to remove the front wheels; then remove the left-side and right-side splash panels.

CD685

9. Remove the cotter pins and slotted nuts from the inner and outer tie rod ends; then remove the tie rods from the steering post arm and the left-side and right-side steering knuckles.

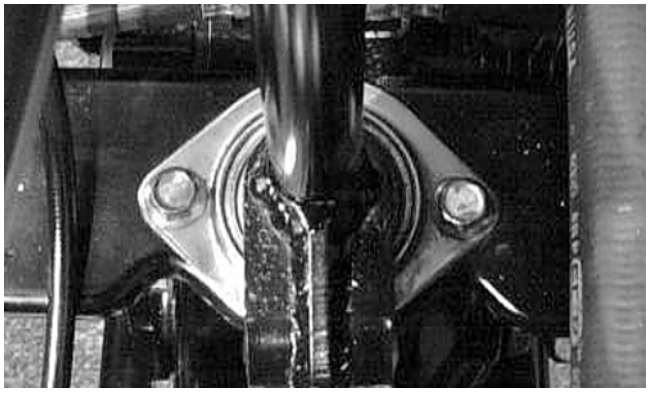


AF778D



KX039

10. Remove two cap screws securing the lower steering post bearing flange to the frame; then remove the steering post.



AL600D

## CLEANING AND INSPECTING

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

1. Wash the tie rod ends in parts-cleaning solvent. Dry with compressed air. Inspect the pivot area for wear. Apply a low-temperature grease to the ends.

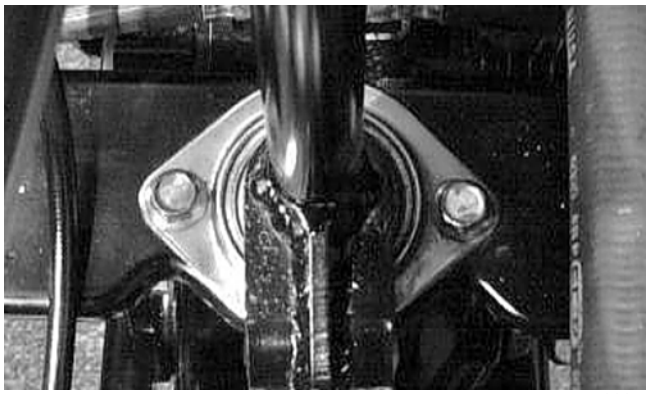
**⚠ WARNING**

**Always wear safety glasses when using compressed air.**

2. Inspect the tie rods for damaged threads or wear.
3. Inspect the tie rods for cracks or unusual bends.
4. Inspect all welded areas for cracks or deterioration.
5. Inspect the steering post and steering-post brackets for cracks, bends, or wear.
6. Inspect the bearing halves, bearing caps, and bearing housings for cracks or wear.
7. Inspect the handlebar tube for cracks, wear, or unusual bends.
8. Inspect the handlebar grips for damage or wear.

## INSTALLING

1. Place the steering post into position; then secure the lower bearing flange to the frame with two cap screws. Tighten to specifications.



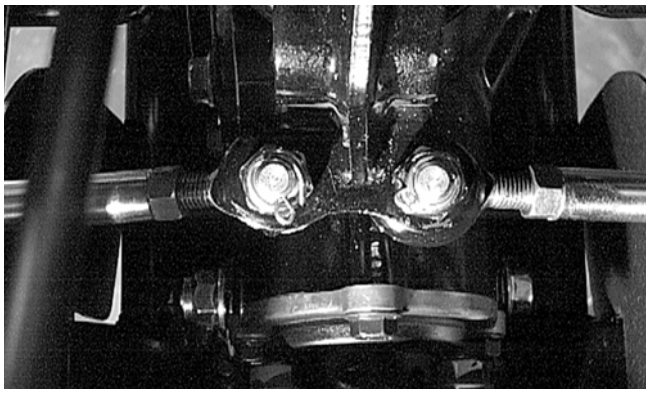
AL600D

2. Place the upper steering post bearings into the housings; then position on the steering post and secure the housings to the frame with two cap screws. Tighten to specifications.

CD760

3. Install the tie rods and secure with the slotted nuts. Tighten to specifications; then install new cotter pins.

■ **NOTE: If the slots do not align with the holes in the tie rod ends, tighten the nuts just enough to allow installation of the cotter pins.**



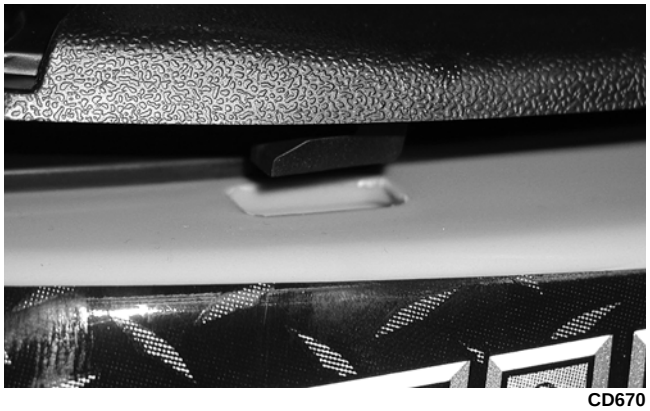
AF778D

4. Install the splash panels; then install the front wheels and tighten to specifications using a crisscross pattern.

5. Lower the ATV and place the handlebar and caps into position on the steering post; then position the speedometer on top of the caps and secure with the four cap screws. Tighten to specifications.

6. Install the storage compartment box; then attach the storage compartment cover assembly by engaging the lugs into the slots and sliding rearward. Lock the storage compartment lid to hold the assembly in place.


CD671



CD670

7. Place the instrument pod into position over the speedometer; then secure with two reinstallable rivets and the ignition switch locking ring.

CD677


CD676

8. Install the steering post access cover and secure with four reinstallable rivets; then install and secure the radiator access cover.

## Handlebar Grip

### REMOVING

1. Remove the plug from the head of the rivet.

2. Using a 1/8-in. drill bit, drill out the rivet.

3. Using compressed air between the grip and the handlebar, twist the grip back and forth until it slides free of the handlebar.

### INSPECTING

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

1. Inspect the grip for wear, cuts, or cracks.

2. Inspect the grip for deterioration.

### INSTALLING

■ **NOTE: Before installing a grip, use contact spray or alcohol to clean the inside of the grip and the handlebar of glue residue, oil, or any other contaminant.**

1. Apply a liberal amount of Handlebar Grip Adhesive to the inside of the grip.
2. Align the rivet hole in the grip with the rivet hole in the handlebar; then align the notch (inside the grip) with the slot in the handlebar and slide the grip onto the handlebar until it is fully seated.
3. Wipe off any excess glue; then secure the grip with a new rivet.
4. Install the plug on the head of the rivet.

## Steering Knuckles

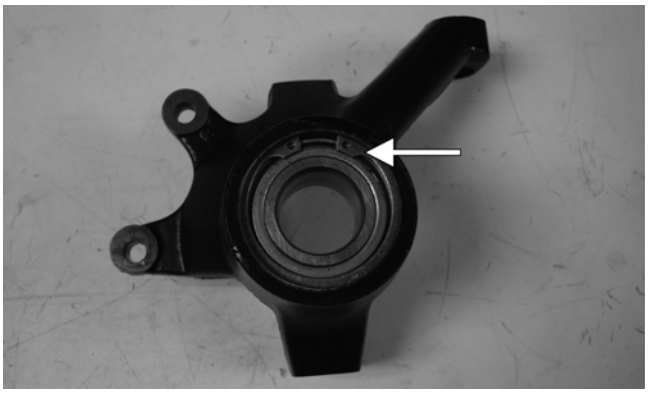
### REMOVING AND DISASSEMBLING

1. Secure the ATV on a support stand to elevate the wheel; then remove the wheel.

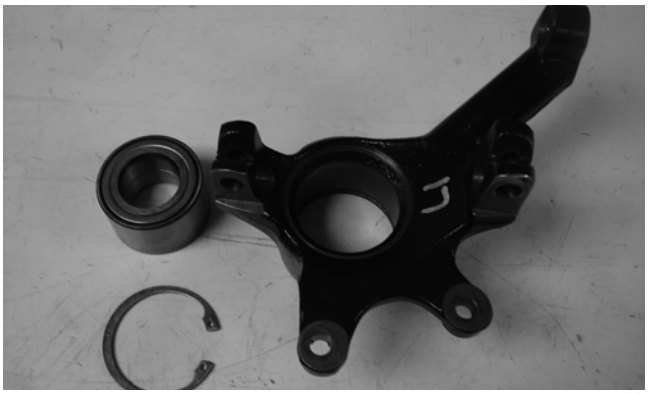
**⚠ WARNING**

**Make sure the ATV is solidly supported on the support stand to avoid injury.**

2. Remove the wheel cap from the hub; then remove the cotter pin from the nut.
3. Remove the nut securing the hub.
4. Remove the brake caliper.
5. Remove the hub assembly.
6. Remove the cotter pin from the tie rod end and remove the tie rod end from the knuckle.
7. Remove the two cap screws securing the ball joints in the knuckle.
8. Tap the ball joint end out of the knuckle; then remove the knuckle.
9. Remove the snap ring from the knuckle; then remove the bearing.



PR287A



PR288

**⚠ CAUTION**

**Use extreme care when removing the bearing. If the bearing is allowed to fall, it will be damaged and will have to be replaced.**

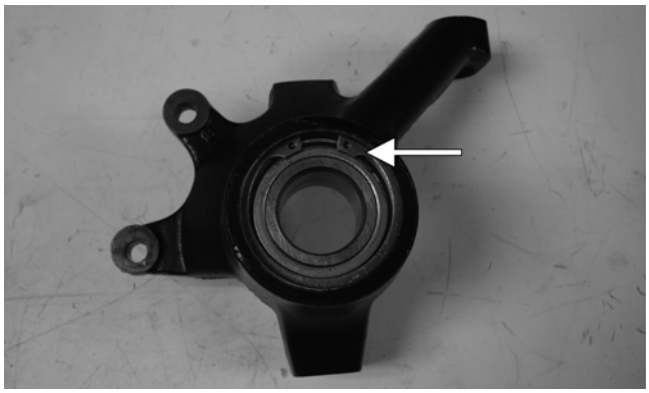
### CLEANING AND INSPECTING

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

1. Clean all knuckle components.
2. Inspect the bearing for pits, gouges, rusting, or premature wear.
3. Inspect the knuckle for cracks, breaks, or porosity.
4. Inspect threads for stripping or damage.

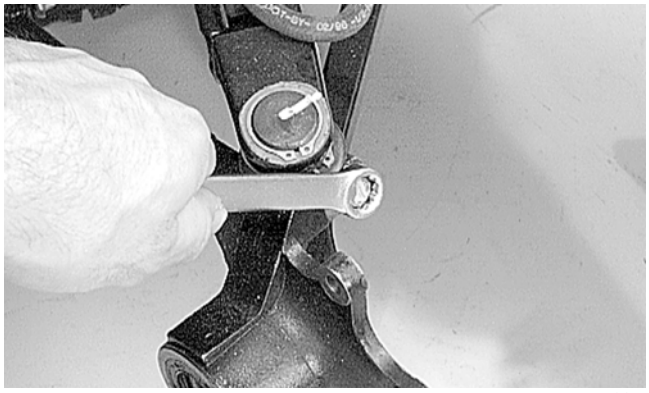
## ASSEMBLING AND INSTALLING

1. Install the bearing; then install the snap ring making sure it seats into the knuckle.



PR287A

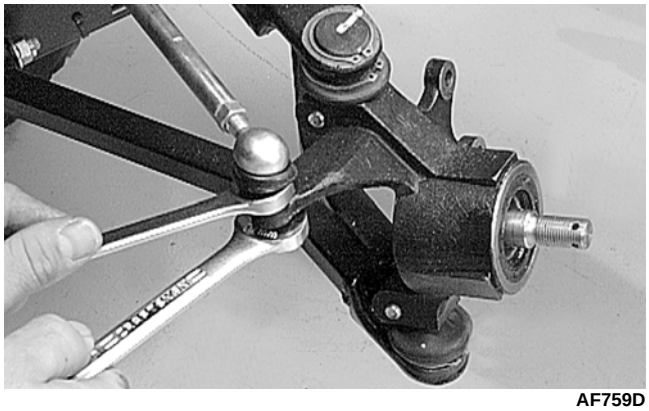
2. Install the knuckle to the upper and lower ball joints and secure with the two cap screws. Tighten to specifications.



AF760D

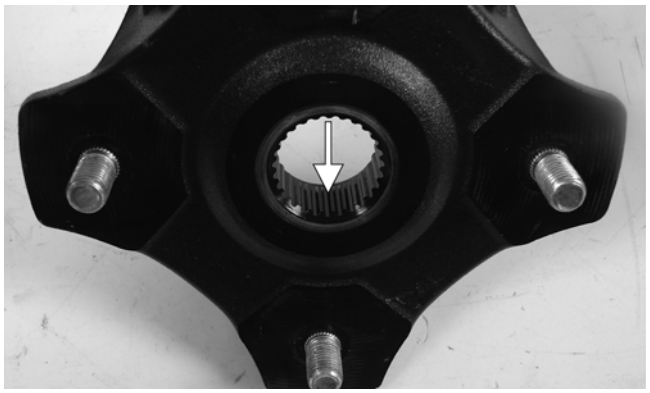
3. Install the tie rod end and secure with the nut. Tighten to specifications; then install a new cotter pin and spread the pin.

■ **NOTE: During assembling, new cotter pins should be installed.**



AF759D

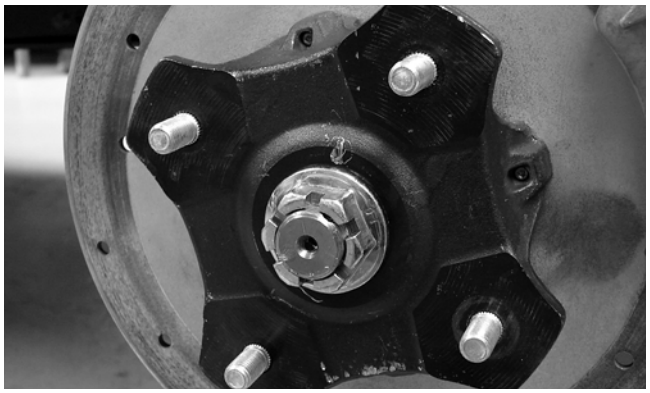
4. Apply a small amount of grease to the hub splines.



PR290A

5. Install the hub assembly onto the splines of the shaft.

6. Secure the hub assembly with the nut. Tighten only until snug.



PR257

7. Secure the brake caliper to the knuckle with the two cap screws. Tighten to specifications.

PR264A

8. Pump the hand brake lever; then engage the brake lever lock.

9. Secure the hub nut (from step 6) to the shaft. Tighten to specifications.

10. Install a new cotter pin and spread the pin to secure the nut.

11. Install the wheel; then using a crisscross pattern, tighten to specifications.


CD006

12. Remove the ATV from the support stand.

## Measuring/Adjusting Toe-In

1. Thoroughly wash the ATV to remove excess weight (mud, etc.).
2. Refer to the specifications and ensure the tires are properly inflated to the recommended pressure.

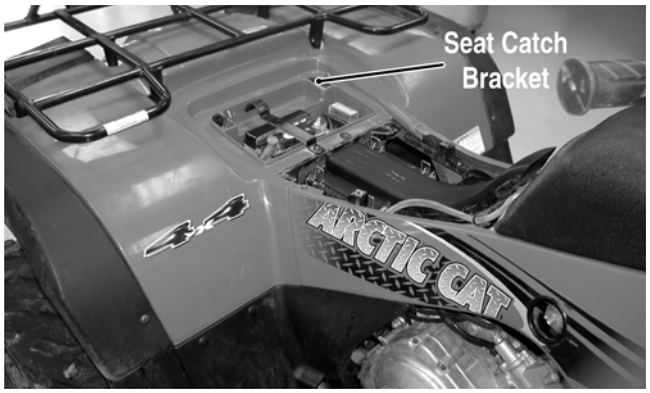
■ **NOTE: Ensure the inflation pressure is correct in the tires or inaccurate measurements can occur.**

CD005

3. Place the ATV in a level position taking care not to push down or lift up on the front end; then turn the handlebar to the straight ahead position.

■ **NOTE: When measuring and adjusting, there should be a normal operating load on the ATV (without an operator but with Arctic Cat approved accessories).**

4. Measure the distance from the outside edge of each handlebar grip to the seat catch brackets.



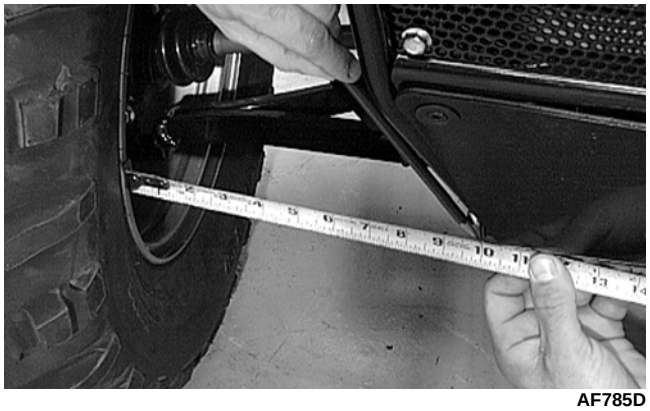

CD012A

5. Adjust the handlebar direction until the two measurements are equal; then secure the handlebar to the rear rack using tie-down straps.

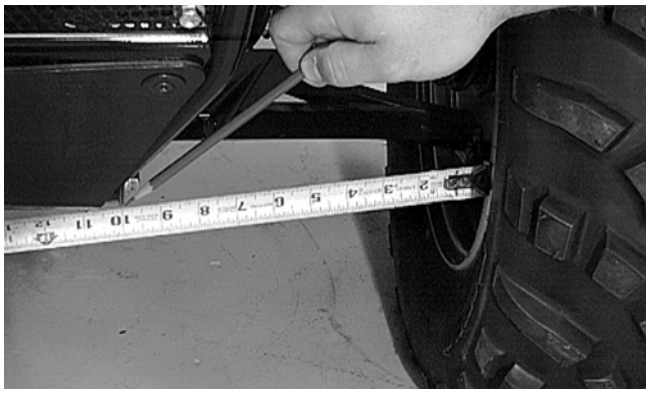
■ **NOTE: Care must be taken not to allow the handlebar to turn while securing it.**


CD014

6. Measure the distance from the inside of each front rim to the lower frame tube.



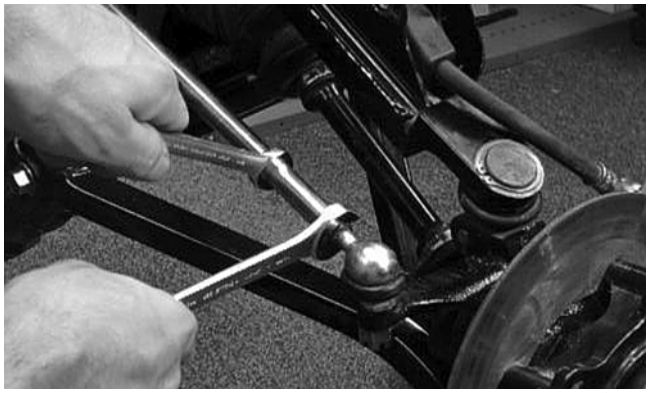
AF785D



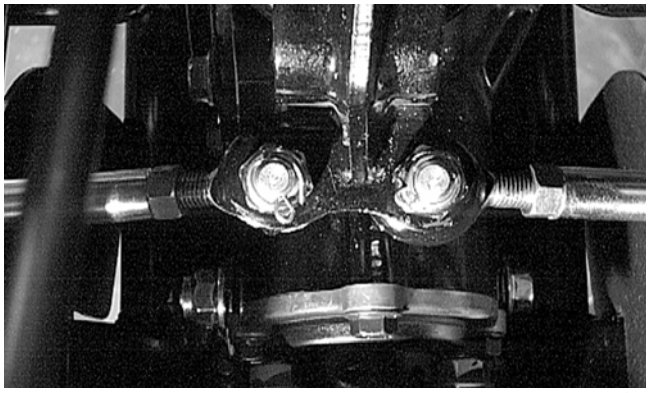
AF786D

■ **NOTE: The distances from the inside rims to the frame tubes should be equal. If the measurements are equal, proceed to step 8; if the measurements are not equal, proceed to step 7.**

7. To make the measurements equal, loosen the appropriate tie rod jam nuts and adjust accordingly; then proceed to step 8.



AF617D



AF778D

■ **NOTE: The front wheels do not have to be removed to adjust the tie rod. Also, care should be taken not to disturb the handlebar position.**

8. Using a permanent marker of some type, mark the center of each front tire (at a height parallel to the belly panel).

AF789D

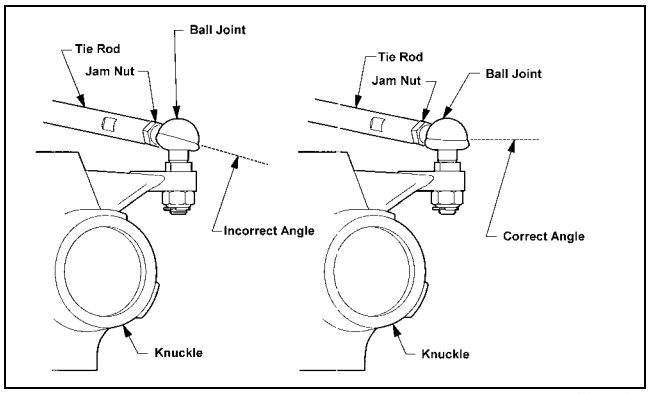
9. Measure the distance between the marks (at a height parallel to the belly panel) at the front side; then record the measurement.

10. Push the ATV forward until the marks are parallel to the belly panel on the back side; then measure the distance between the marks.

11. The difference in the measurements must show 3.2-6.4 mm (1/8-1/4 in.) toe-in (the front measurement 3.2-6.4 mm (1/8-1/4 in.) less than the rear measurement).

12. If the difference in the measurements is not within specifications, adjust both tie rods equally until within specifications.

■ **NOTE: Prior to locking the jam nuts, make sure the ball joints are at the center of their normal range of motion and at the correct angle.**




733-559A

# Front Rack

## REMOVING

1. Remove the two cap screws and lock nuts securing the front fender panel.

2. Remove the cap screws and lock nuts securing the rack to the frame.

3. Remove the front rack from the ATV.

### CLEANING AND INSPECTING

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

1. Clean all rack components with parts-cleaning solvent.
2. Inspect all welds for cracking or bending.
3. Inspect threaded areas of all mounting bosses for stripping.
4. Inspect for missing decals and/or reflectors.

### INSTALLING

1. Place the rack into position on the frame and front fender panel. Install the cap screws and lock nuts and finger-tighten only.
2. Install the two cap screws and lock nuts securing the rack to the fenders. Tighten all hardware securely.

## Front Bumper Assembly

### REMOVING

1. Remove the two flange bolts and lock nuts securing the upper bumper supports to the bumper.
2. Remove the through-bolt and lock nut securing the bumper to the frame; then remove the bumper.

### CLEANING AND INSPECTING

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

1. Clean all bumper components with parts-cleaning solvent.
2. Inspect all welds for cracking or bending.

### INSTALLING

1. Place the front bumper assembly into position and install the through-bolt. Start the lock nut and finger-tighten only.
2. Install the two flange bolts and lock nuts on the upper supports. Tighten all hardware securely.

## Front/Rear Body Panel

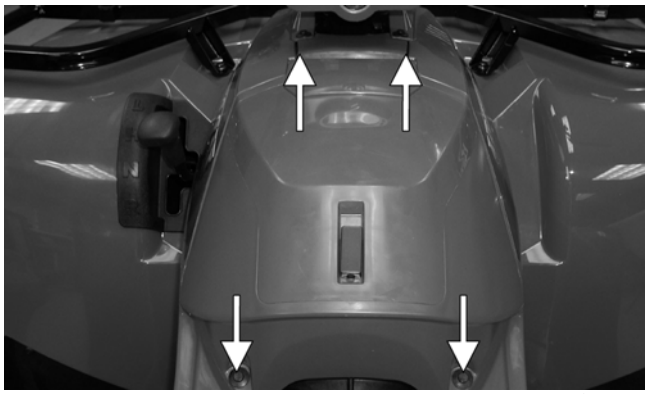
### REMOVING

1. Remove the seat; then remove the battery cover/tool tray.
2. Remove the negative battery cable from the battery; then remove the positive cable. Remove the vent hose; then remove the battery.

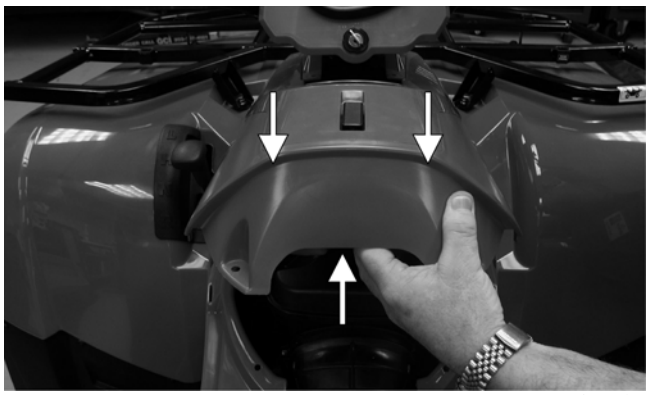
**⚠ CAUTION**

**Battery acid is harmful if it contacts eyes, skin, or clothing. Care must be taken whenever handling a battery.**

3. Remove four reinstallable rivets securing the storage compartment to the body; then remove the storage compartment and the steering post cover.

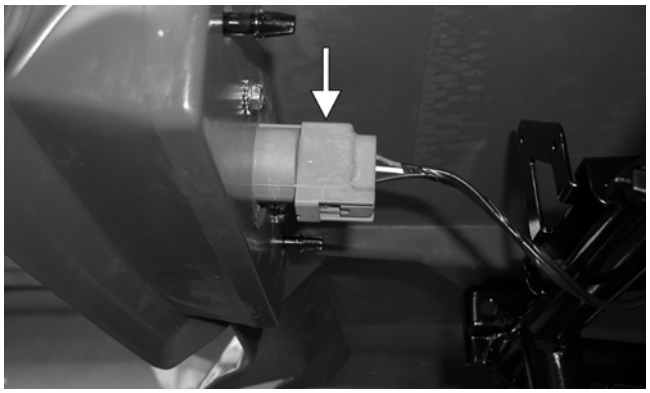


CF145A



CF143A

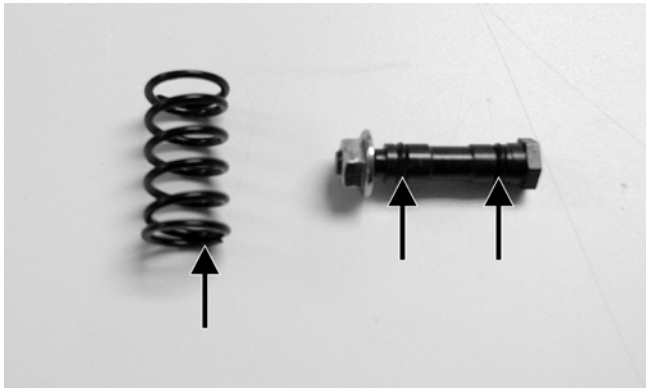
4. Remove the left-side and right-side fender splash panels; then remove one press-in fastener and one reinstallable rivet from the left side and right side of the air-intake splash shroud. Do not remove the shroud.
5. Disconnect the four headlight connectors and the taillight/brakelight connector from the sockets.



CF135A

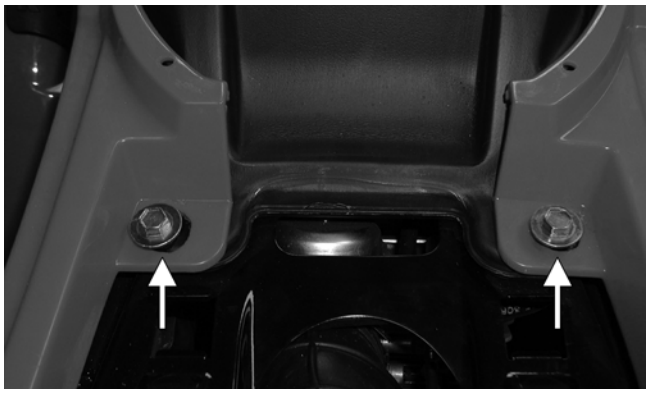
6. Remove the shift knob; then remove the nut and axle pivot bolt securing the lever to the shift lever axle. Remove the shift lever. Account for the two O-rings on the axle bolt and one spring.

CD779



CD780A

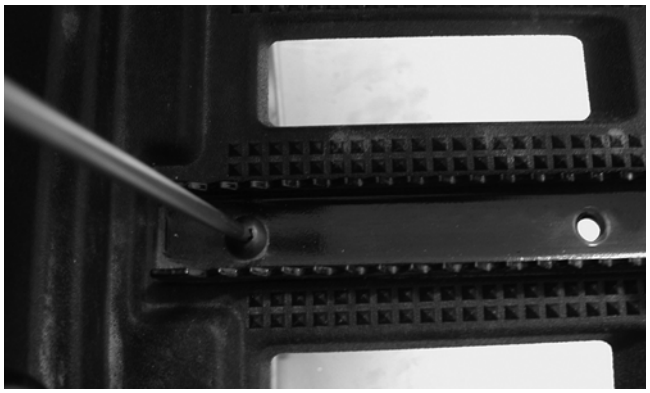
7. Remove the front and rear racks; then remove the two body bolts adjacent to the air filter housing and two push nuts located behind the grille.



CF201A


CF160A

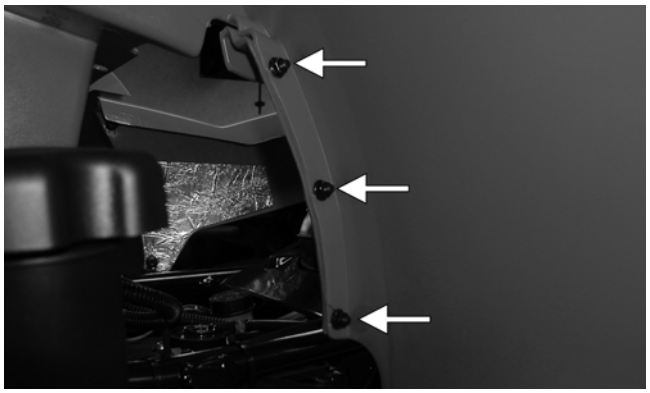
8. Remove the two cap screws and lock nuts securing the left foot peg and remove the foot peg.



CD782

9. Remove eight cap screws and lock nuts and one reinstallable rivet securing the right-side footwell to the fenders.

10. Lift and support the rear of the body to allow access to the torx-head cap screws securing the front and rear body sections together; then remove six self-locking nuts (three from each side). Remove the rear body panel; then remove the front one.



CF213A

■ **NOTE: To aid in removing the body without separating the front and rear panels, it is advisable to have an assistant help with lifting and guiding the body clear of the handlebar.**

## CLEANING AND INSPECTING

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

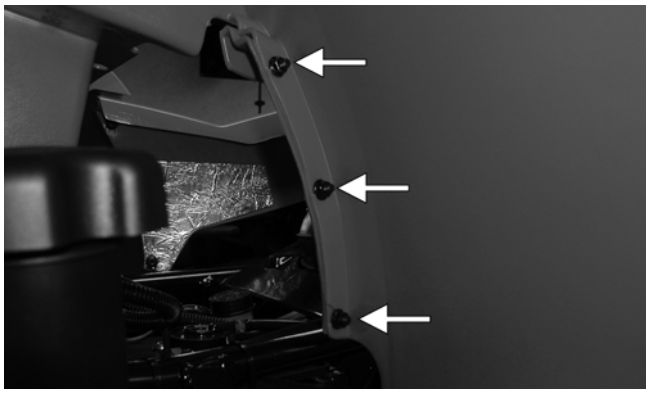
1. Clean all fender components with part-cleaning solvent and soap and water.
2. Inspect fenders for cracks and/or loose rivets.
3. Inspect for any missing decals.

## INSTALLING

1. Place the body assembly into position on the ATV.

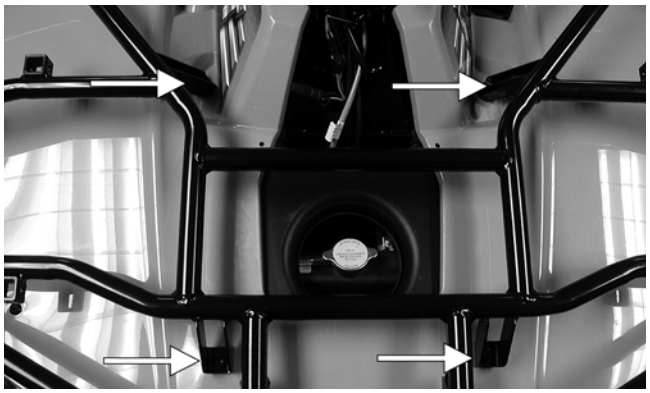
■ **NOTE: If the front and rear body panels have been separated, proceed to step 2; if the panels have not been separated, proceed to step 3.**

2. Install the torx-head cap screws and lock nuts securing the front and rear body panels together. Tighten securely.



CF213A

3. Making sure the body mounting grommets are in place, position the front and rear racks; then install the eight flanged cap screws and lock nuts. Do not tighten at this time.

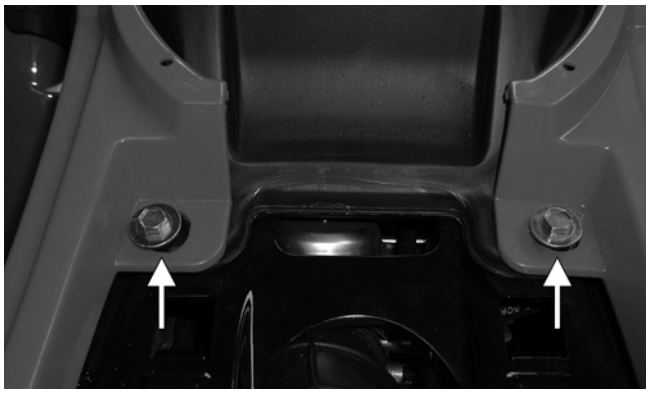


CD679A


CD690A

4. Install four rack-to-body machine screws and lock nuts on the front and rear racks, two push nuts behind the grille, and two body bolts adjacent the air filter housing; then tighten all fasteners (from step 3 and 4) securely.

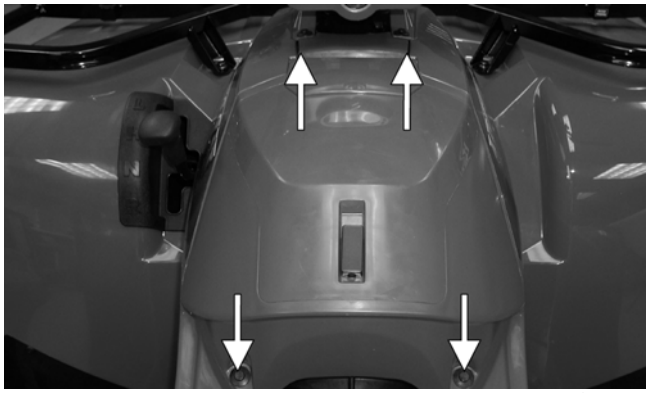

CF160A



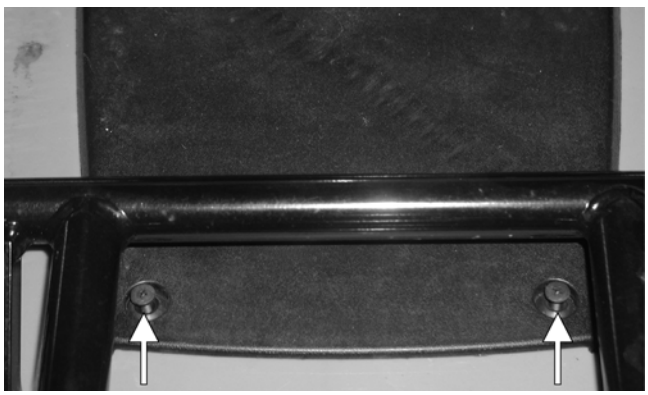
CF201A

5. Install eight cap screws and lock nuts securing the right-side footwell to the front and rear fenders; then place the left-side foot peg into position and secure with two cap screws and lock nuts. Tighten securely.

6. Place the storage compartment into position; then install the steering post cover. Secure with the reinstallable rivets.



CF145A



CF134A

7. Place the shift lever into position making sure the spring is installed; then secure with the axle pivot bolt and lock nut.

8. Install the shift knob and the left-side and right-side splash panels; then reconnect the headlights. Tighten all fasteners securely.

9. Place the battery into position in the battery box; then connect the vent hose.

10. Connect the positive battery cable; then connect the negative battery cable. Tighten the battery terminal cap screws securely.

11. Install the battery cover/tool tray; then install the seat. Make sure the seat locks securely.

# Front Body Panel/ Side Panels
## (TBX/TRV/500/650 H1/700 EFI)

### REMOVING

1. Remove the reinstallable rivets securing the radiator access cover and remove the cover; then remove four reinstallable rivets securing the steering post cover and remove the cover.

CD666


CD667

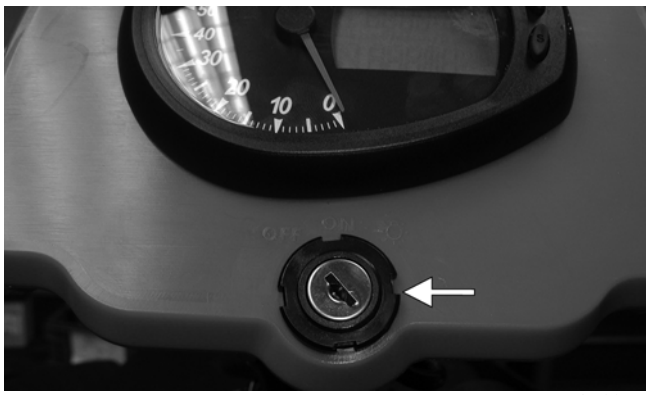
2. Unlock the storage compartment lid; then slide the storage compartment cover assembly forward and lift off the storage compartment.


CD669

3. Remove the storage compartment box; then remove the seat.

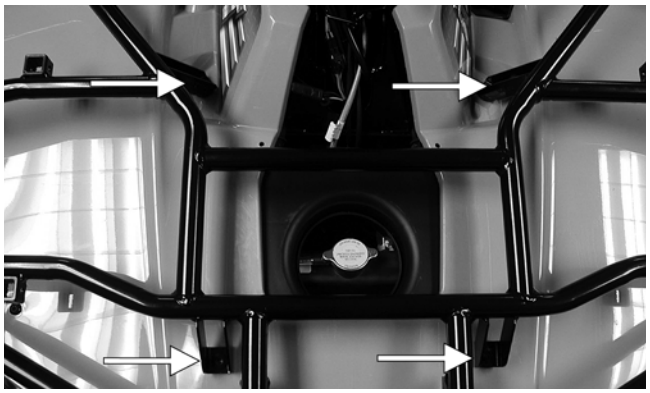

CD671

4. Remove the ignition switch lock collar and two reinstallable rivets securing the instrument pod; then remove the instrument pod.

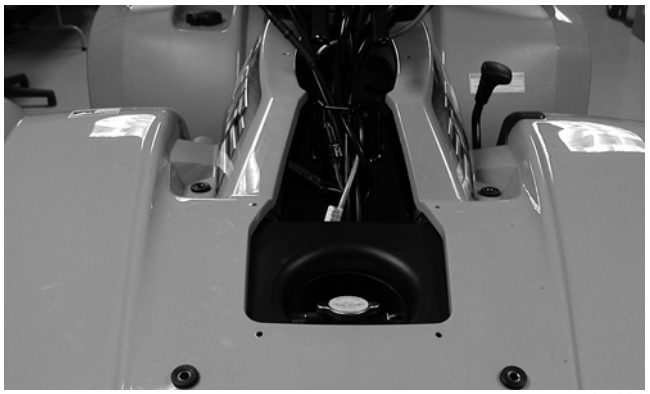



CF207A

5. Remove four machine screws and lock nuts securing the front rack to the frame; then remove the front rack. Account for four grommets and four bushings.

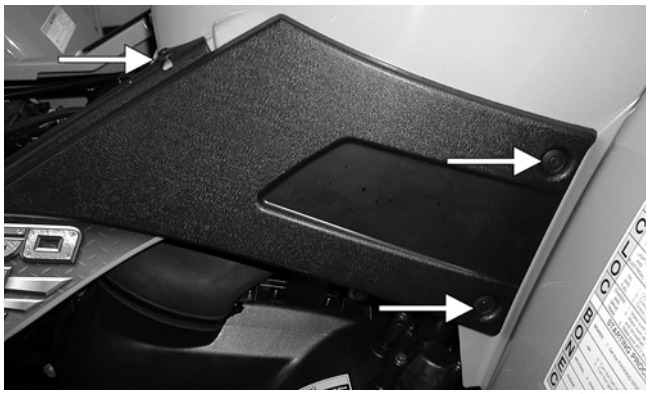


CD679A

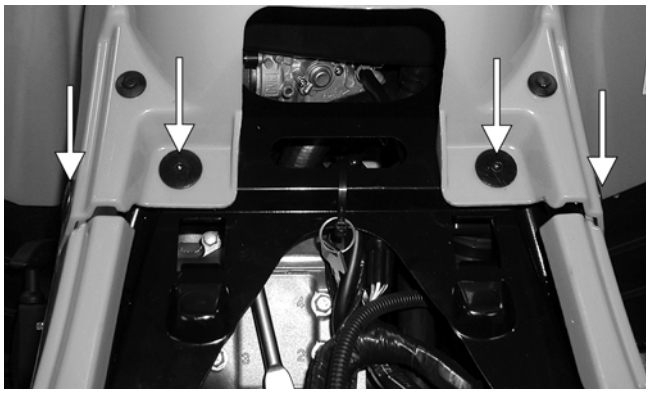


CD680

6. Remove three reinstallable rivets securing the right side panel; then remove two torx-head cap screws securing the rear of the front panel to the frame.



CD683A



CD684A

7. Remove the torx-head cap screws and nylon ties securing the left-side and right-side splash panels; then remove the panels.

CD685

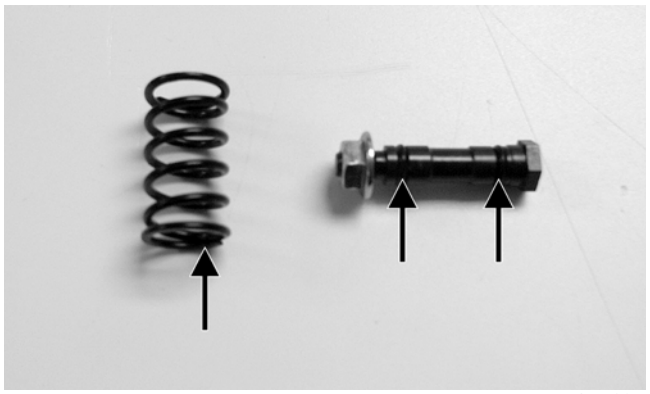
8. Remove one shoulder screw and four plastic rivets on each side to separate the front panel lower fenders from the left-side and right-side footwells.

CD691

CD682

9. Remove the shift knob retaining pin and remove the shift knob; then remove the shift lever pivot axle nut and remove the axle and shift lever. Account for a spring and two O-rings.

CD779



CD780A

10. Disconnect four headlight connectors and secure the wires out of the way; then disconnect the wires to the front accessory plug.

CD681

11. Rotate the handlebar to the full-left position; then lift and slide the panel to the rear and lift the rear up to clear the handlebar.


CD765A

■ **NOTE: It may be necessary to rotate the body panel to the right to align the opening with the handlebar.**

## CLEANING AND INSPECTING

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

1. Clean all fender components with part-cleaning solvent and soap and water.
2. Inspect fenders for cracks and/or loose rivets.
3. Inspect for any missing decals.

## INSTALLING

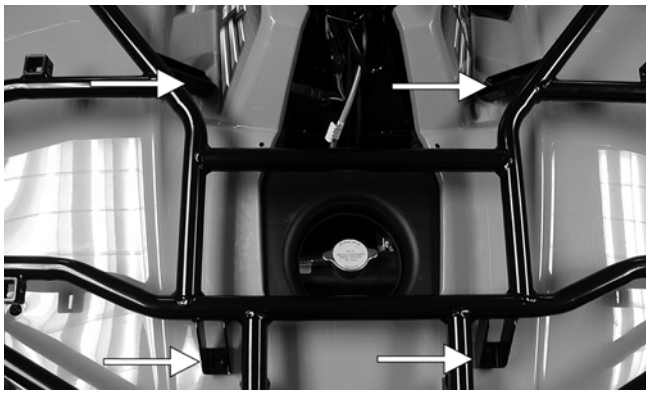
1. Rotate the handlebar to the full-left position; then place the front body panel over the handlebar and rotate and lower into position.


CD765

2. Connect the headlight connectors to the appropriate headlights and the front accessory plug wires to the accessory plug.

CD681

3. Make sure the four rubber grommets and bushings are in place; then place the front rack into position and secure with four machine screws and flange nuts. Tighten securely.

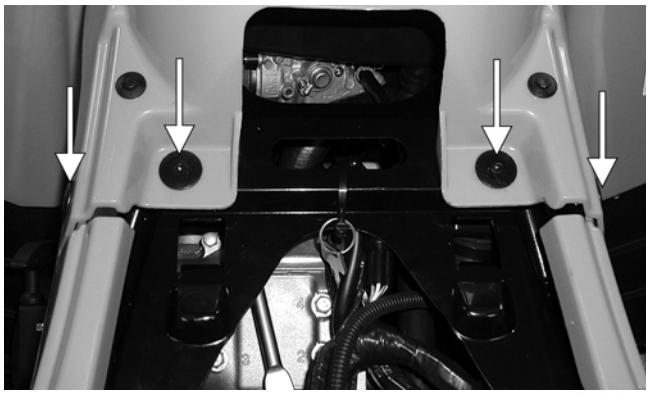


CD679A

4. Install one machine screw and flange nut and four plastic rivets on each side to secure the front fenders to the footwells. Tighten the flange nuts securely.

■ **NOTE: If the footwells have been removed, see Footrests in this section.**

5. Install four cap screws securing the front body panel to the frame and rear panel.



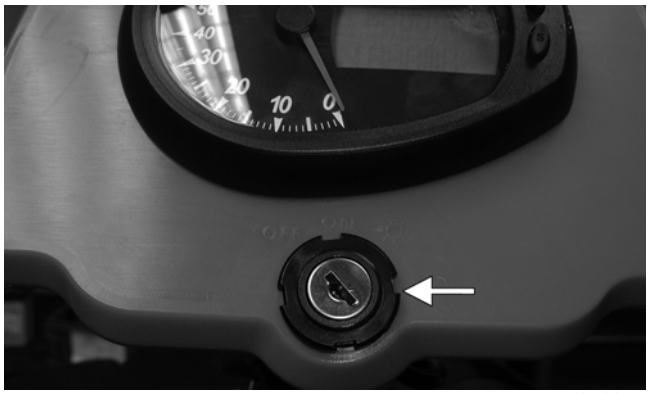
CD684A

6. Install the shift lever spring, shift lever, and pivot axle; then tighten the axle nut securely.

CD779

7. Install the left-side and right-side splash panels and tighten the cap screws securely. Install new nylon ties in the appropriate locations.

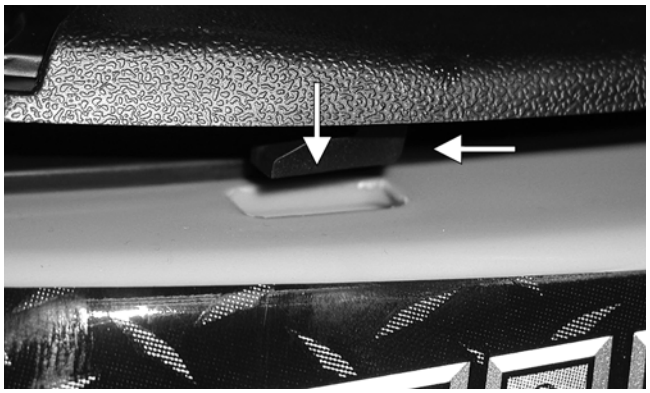
8. Install the instrument pod and ignition switch; then secure with two reinstallable rivets and the ignition switch lock collar.



CF207A

9. Set the storage compartment box into position; then install the storage compartment cover making sure the mounting lugs engage the slots. Slide rearward to secure and lock by engaging the lid lock.

CD671



CD670A

10. Install the steering post cover and secure with the reinstallable rivets; then install and secure the radiator access panel.

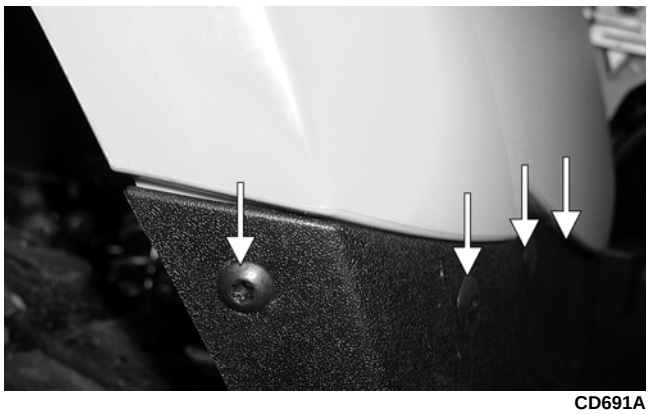
11. Install the left and right side panels and secure with reinstallable rivets.

CD683A

## Footrests

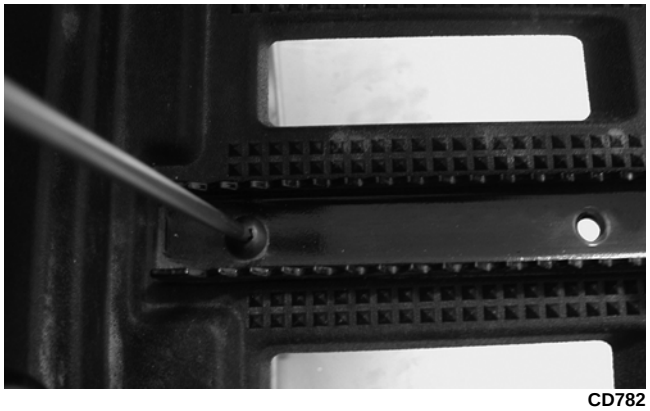
### REMOVING

1. Remove the machine screws and flange nuts securing the front and rear fenders to the footwells.



CD691A

2. Remove the cap screws securing the foot pegs to the footrests; then remove the foot pegs and footwells.



CD782

3. Remove the cap screws and flange nuts securing the footrests to the frame; then remove the footrests.

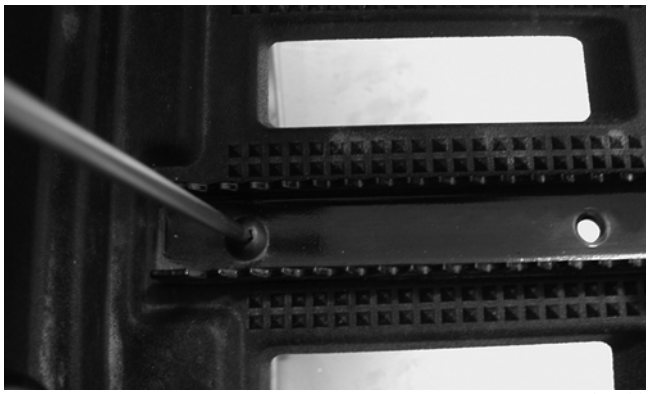
### CLEANING AND INSPECTING

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

1. Clean the footrest in parts-cleaning solvent.
2. Inspect the footrest weldments for cracks or unusual bends.
3. Inspect all tubing for cracks or unusual bends.

### INSTALLING

1. Secure the footrests to the frame with four cap screws and two flange nuts; then tighten securely.
2. Place the footwells onto the footrests; then put the foot pegs in position and secure with two cap screws.



CD782

3. Install the machine screws and flange nuts securing the front and rear fenders to the footwells.

## Belly Panel

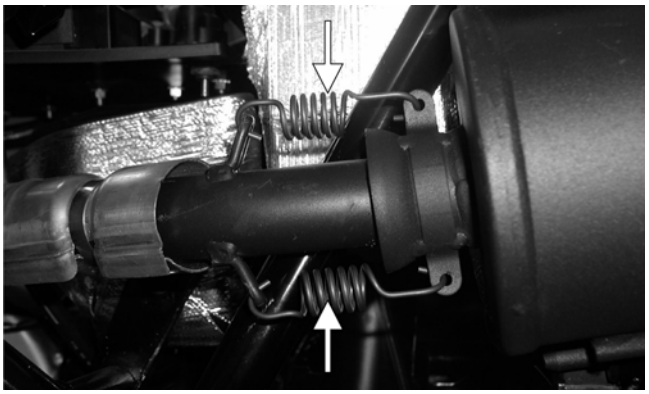
### REMOVING/INSTALLING

1. Remove the machine screws and shoulder washers securing the belly panel to the underside of the frame; then remove the belly panel.
2. Place the belly panel into position on the underside of the frame; then install the machine screws and shoulder washers. Tighten securely.

## Exhaust System

### REMOVING MUFFLER

1. Remove the two exhaust springs at the muffler/exhaust pipe juncture.



CF138A

2. Slide the muffler rearward to clear the mounting lugs and remove the muffler.

### INSPECTING MUFFLER

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

1. Inspect muffler externally for cracks, holes, and dents.
2. Inspect the muffler internally by shaking the muffler back and forth and listening for rattles or loose debris inside the muffler.

■ **NOTE: For additional details on cleaning the muffler/spark arrester, see Section 2.**

### INSTALLING MUFFLER

1. Place the muffler into position engaging the mounting lugs into the grommets; then slide the muffler forward.

2. Install the two exhaust springs.

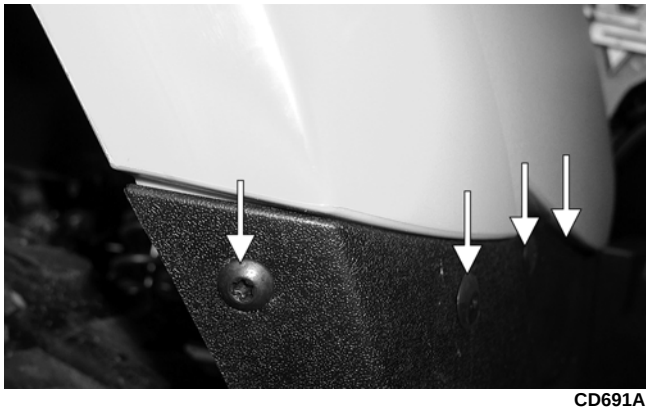
## Rear Body Panel/Rack

### REMOVING

1. Remove four machine screws and flanged nuts securing the rear rack; then remove the rear rack. Account for four bushings.

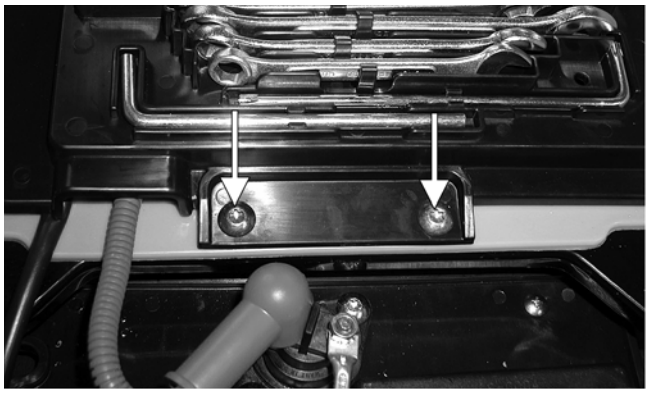

CD690A

2. Remove one shoulder screw and lock nut and three plastic rivets (on each side) securing the rear body panel to the footwells.



CD691A

3. Remove two machine screws securing the battery cover and remove the cover.



CD687A

4. Disconnect the battery (negative cable first); then remove the battery.

CD688

5. Disconnect the taillight/brakelight; then remove the gas tank cap and lift off the rear body panel. Install the gas tank cap.

**■ NOTE: If the front body panel has not been removed, the left-side and right-side panels and the two machine screws must be removed (see Front Body Panel/Side Panels in this section).**

### CLEANING AND INSPECTING

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

1. Clean all rear body panel components with parts-cleaning solvent and soap and water.

2. Inspect side panels and rear body panel for cracks and loose rivets.

3. Inspect threaded areas of all mounting bosses for stripping.

4. Inspect for missing decals.

## INSTALLING

1. Remove the gas tank cap and set the rear body panel in position; then install the cap and connect the taillight/brakelight connector.

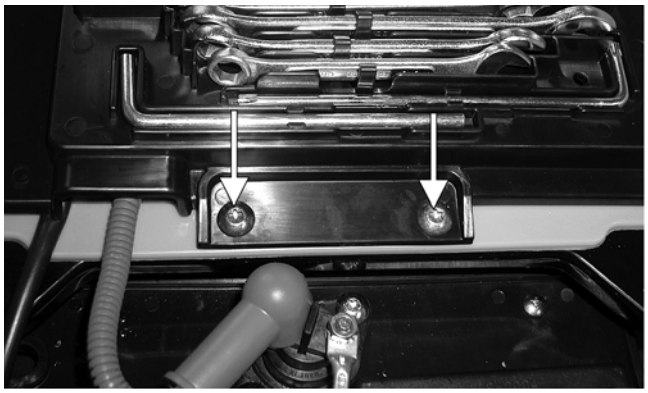
2. Place the rear rack in position with four bushings and secure with four machine screws and flanged nuts. Tighten securely.


CD690A

3. Install one shoulder screw and three plastic rivets (on each side) to secure the front of the rear body panel to the footwells.

CD691

4. Place the battery into the battery box; then connect the battery (positive cable first) and secure with the battery cover.



CD687A

5. Secure the front and rear panels with two machine screws; then install the left and right side panels.

■ **NOTE: If the front body panel has not been installed, see Front Body Panel/Side Panels in this section.**

6. Place the seat into position making sure it locks securely.

# Side Storage Box
## (TBX Models)

## REMOVING

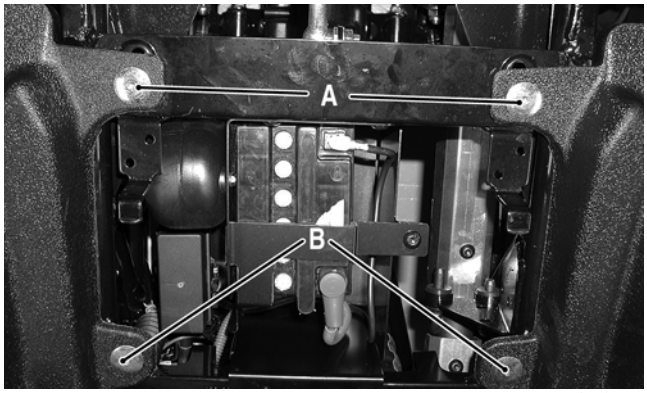
1. Rotate the cargo box latch handle (located on the left and right sides between the cargo box and the rear tire) and fully raise the cargo box.

2. Pull the seat lock lever forward (located below the right side of the seat), raise the front end of the seat, and slide it forward and off the ATV.

3. Remove the two cap screws (located inside the side storage box) securing the box to the footrest.

4. Remove the screw securing the box to the side panel.

5. Remove cap screws (A and B) securing the box to the frame.




CD045A

## CLEANING AND INSPECTING

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

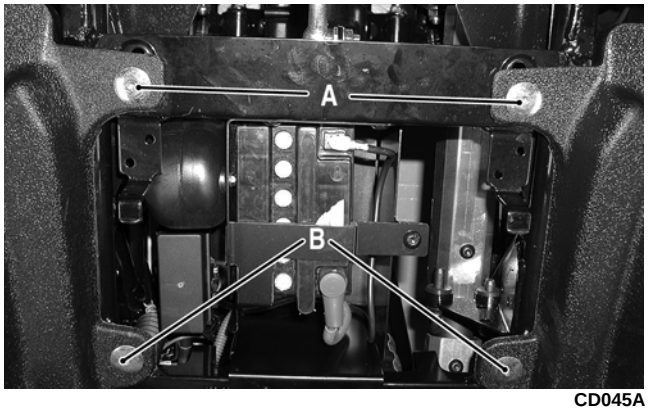
1. Clean all side storage box components with soap and water.

2. Inspect the box for cracks, tears, and loose mounting hardware.

3. Inspect the box hatch O-ring seals for cuts or tears.

### INSTALLING

1. Place the side storage box into position on the frame; then secure with the two cap screws (A and B). Tighten cap screws to specifications.



CD045A

2. Secure the box to the side panel with the existing screw.
3. Secure the box to the footrest with existing hardware. Tighten securely.
4. Install the seat.
5. Lower the cargo box and press down firmly on the front of the box. The cargo box will automatically lock into position.

## Cargo Box
### (TBX Models)

### REMOVING

1. Rotate the cargo box latch handle (located on the left and right sides between the cargo box and the rear tire) and fully raise the cargo box.


CD771

2. Remove the nut from the lower end of the box lift support.
3. Remove the two cap screws and lock nuts securing the cargo box to the frame; then remove the cargo box and discard the lock nuts.


CD122

■ **NOTE: Never reuse a lock nut. Once a lock nut has been removed, it must be replaced with a new lock nut.**

### CLEANING AND INSPECTING

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

1. Clean all cargo box components with soap and water.
2. Inspect the cargo box for cracks, tears, and loose mounting hardware.
3. Inspect the welds of the cargo box frame for cracking or bending.
4. Inspect the cargo box gate latches for smooth operation.

### INSTALLING

1. Place the cargo box into position on the frame. Secure with cap screws and new lock nuts. Tighten to specifications.


CD122

2. While an assistant holds the cargo box in the raised position, secure the lower end of the box lift support to the frame with the cap screw and nut.

3. Lower the cargo box and press down firmly on the front of the box. It will automatically lock into position.

## Adjusting Headlight

The headlights can be adjusted vertically and horizontally. The geometric center of the HIGH beam light zone is to be used for vertical and horizontal aiming.

To check/adjust headlight beam, see Section 2.

**⚠ WARNING**

**Do not operate the ATV unless the headlight beam is adjusted properly. An incorrectly adjusted beam will not provide the operator the optimum amount of light.**

## Taillight Assembly

### REMOVING

1. Unplug the three-prong connector and free the taillight wiring harness from the frame.

2. Remove the torx-head cap screws securing the taillight assembly to the frame. Account for any washers.

3. Remove the taillight assembly.

### INSPECTING

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

1. Inspect wiring harness, three-prong connector, lens, base, cap screws, and socket for damage.

2. Inspect all wires for corroding, pinching, and cracking.

3. Inspect the bulb for wattage, voltage, and proper operation.

### INSTALLING

1. Place the assembly into position on the frame and secure with torx-head cap screws and any washers.

2. Tighten the cap screws securely.

3. Route the wiring harness over the rear frame; then connect the three-prong connector.

## Seat

**■ NOTE: Some components may vary from model to model. The technician should use discretion and sound judgment.**

### REMOVING/INSTALLING

1. To remove the seat, lift up on the latch release (located at the rear of the seat). Raise the rear of the seat and slide it rearward.

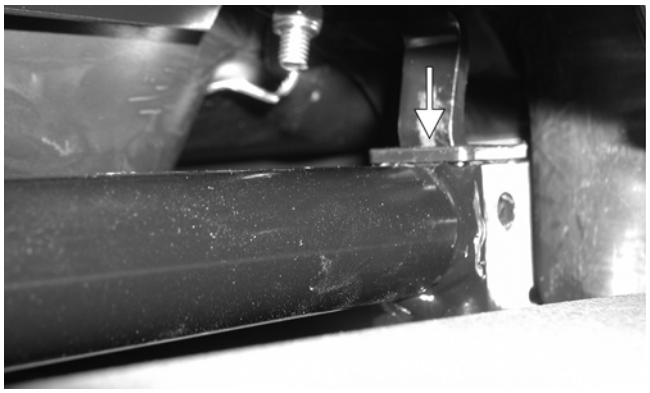
2. To lock the seat into position, slide the front of the seat into the seat retainers and push down firmly on the rear of seat. The seat should automatically lock into position.

### REMOVING/INSTALLING (TRV)

1. To remove the rear seat, pull the two latch handles to the rear and rotate them to the vertical position.

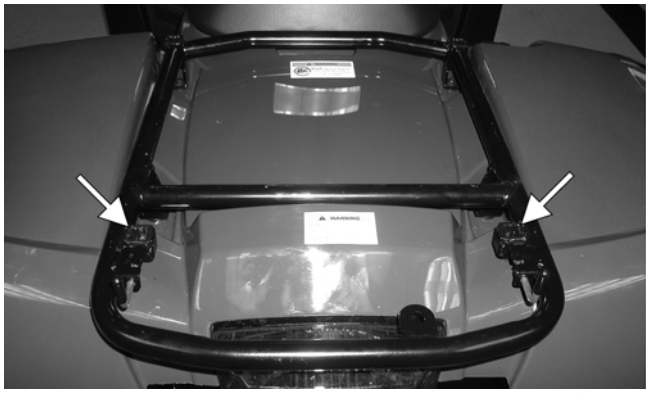
CF226

2. Lift the rear of the seat up; then pull slightly to the rear and lift the seat off the mountings.



CF227A

3. To lock the seat into position, engage the two front mounting lugs into the mounting rack; then holding down firmly on the front of the seat, push the seat forward until the rear tabs engage the rear mounting latches.



CF229A

4. Lock the seat into position by pulling the two latch handles to the rear and rotating them to the horizontal position.

CF226A

■ **NOTE: The rear seat must be removed prior to removing the front seat.**

5. To remove the front seat, pull the seat lock lever up (located at the rear of the seat). Raise the rear end of the seat and slide it rearward.

6. To lock the seat into position, slide the front of the seat into the seat retainers and push down firmly on rear of seat. The seat should automatically lock into position.

# SECTION 9 - CONTROLS/INDICATORS

9

## TABLE OF CONTENTS



Back to TOC

# Hand Brake Lever/ Master Cylinder Assembly

■ **NOTE: The master cylinder is a non-serviceable component; it must be replaced as an assembly.**

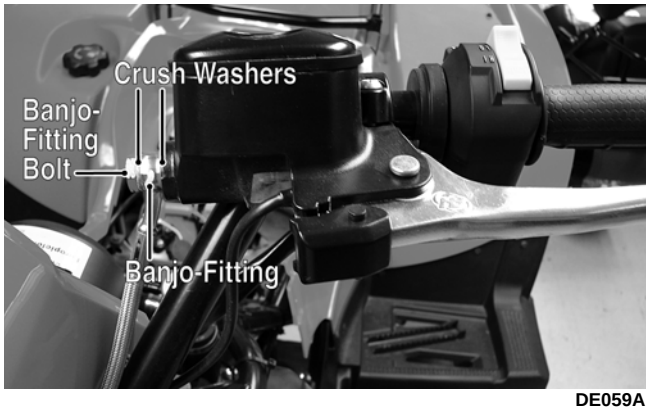
## REMOVING

1. Slide a piece of flexible tubing over one of the wheel bleeder valves and direct the other end into a container. Remove the reservoir cover; then open the bleeder valve. Allow the brake fluid to drain completely.

■ **NOTE: Compressing the brake lever several times will quicken the draining process.**

AF637D

2. Place an absorbent towel around the connection to absorb brake fluid. Remove the banjo-fitting from the master cylinder. Account for two crush washers and a banjo-fitting bolt.




DE059A

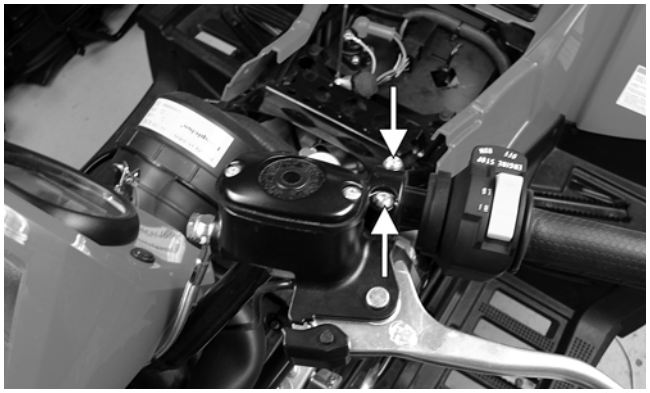
**⚠ CAUTION**

**Brake fluid is highly corrosive. Do not spill brake fluid on any surface of the ATV.**

3. Remove the circlip and pivot pin securing the brake lever to the master cylinder housing; then remove the brake lever and set aside.
4. Dislodge the brakelight switch from the master cylinder housing by gently pressing it toward the pivot pin hole in the housing; then lay it aside leaving the switch and wiring harness connected.

BC205

5. Remove the clamp screws securing the brake housing to the handlebar; then remove the assembly from the handlebar.



DE058A

## INSPECTING

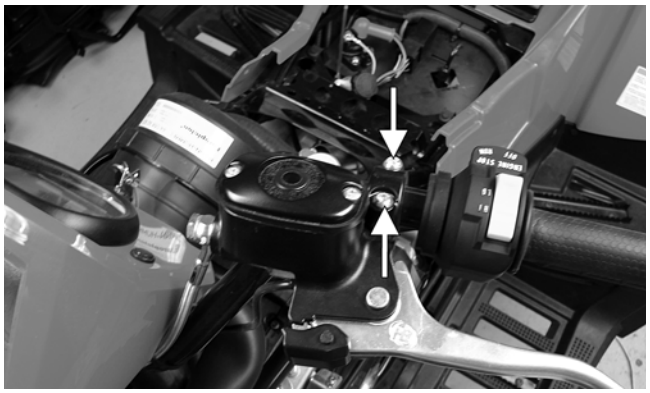
■ **NOTE: Whenever a part is worn excessively, cracked, or damaged in any way, replacement is necessary.**

1. Inspect the pin securing the brake lever for wear.
2. Inspect the brake lever for elongation of the pivot hole.
3. Inspect the reservoir for cracks and leakage.
4. Inspect the banjo-fitting for cracks and deterioration and the condition of the fittings (threaded and compression).
5. Inspect the brakelight switch for corrosion, cracks, missing or broken mounting tabs, or broken and frayed wiring.

■ **NOTE: If the brakelight switch is determined to be not serviceable, see Section 5.**

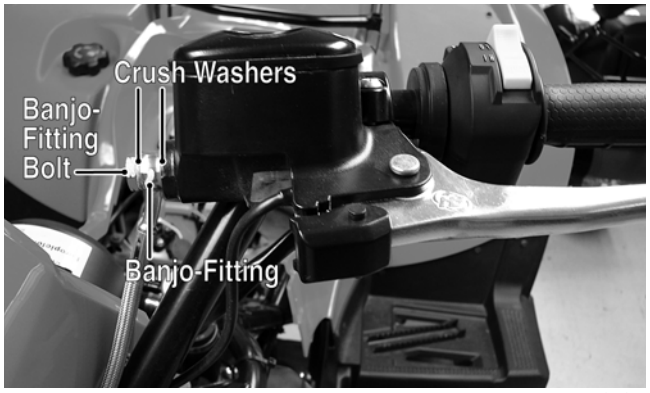
## INSTALLING

1. Position the brake housing on the handlebar. Secure with clamp screws; then tighten securely.



DE058A

2. Using two new crush washers, connect the banjo-fitting to the master cylinder; then secure with the banjo-fitting bolt.




DE059A

3. Gently press the brakelight switch into the housing (left to right) until the mounting tabs snap into the four locating holes; then install the brake lever, pivot pin, and circlip.

BC206

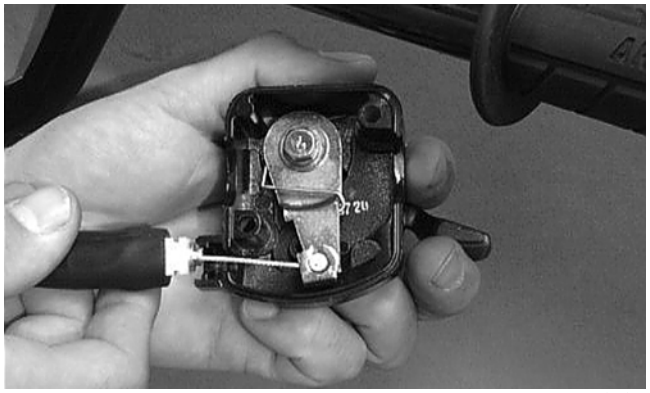
4. Bleed the brake system (see Section 2).

# Throttle Control

## REMOVING

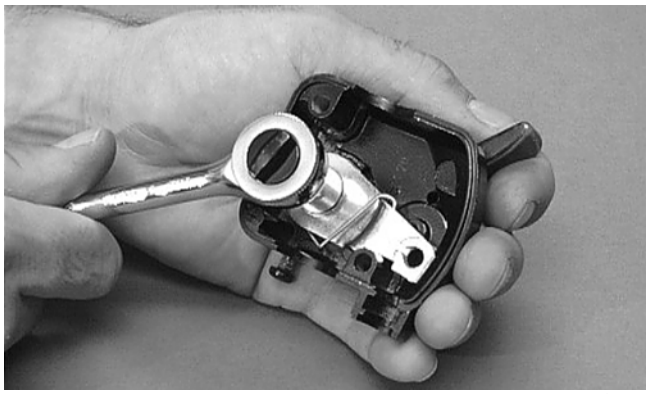
1. Remove the two machine screws securing the throttle control to the handlebar.

2. Slide the grommet out of the lower half of the throttle control; then remove the cable from the actuator arm.



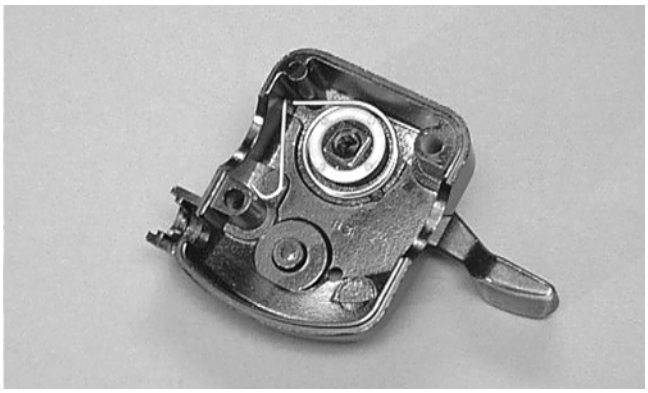
AF676D

3. Remove the cap screw, lock washer, and washer securing the actuator arm to the throttle control lever.



AF677D

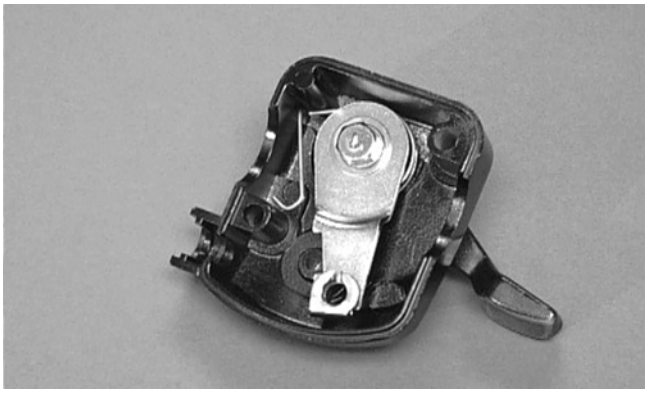
4. Remove the actuator arm and account for a bushing. Note the position of the return spring for installing purposes.



AF678D

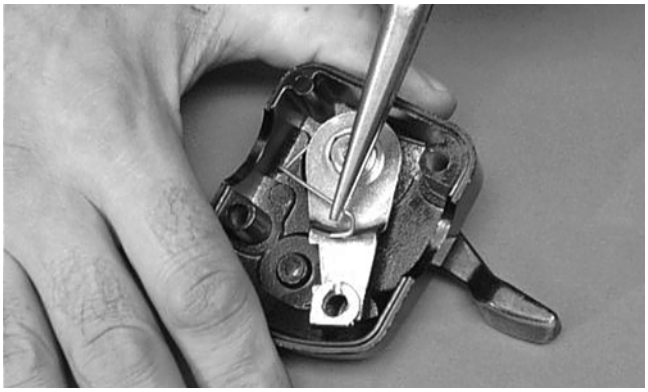
## INSTALLING

1. Place the return spring into the throttle control; then place the bushing and actuator arm into position. Secure with the cap screw, lock washer, and washer.



AF679D

2. Using a pair of needle-nose pliers, place the spring into position on the actuator arm.

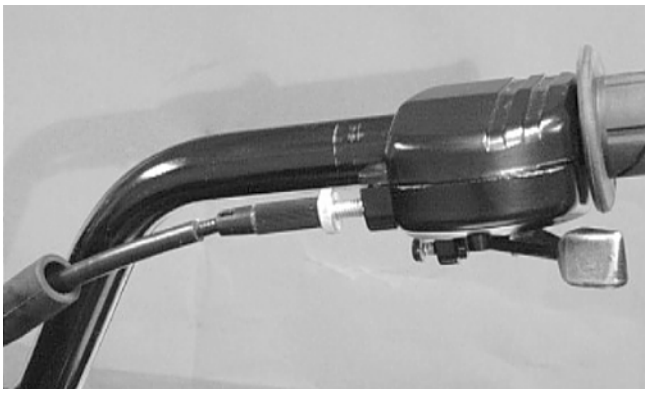


AF680D

3. Place the two halves of the throttle control onto the handlebars and secure with the two machine screws.

## ADJUSTING

1. Slide the boot back to reveal the jam nut; then loosen the jam nut.

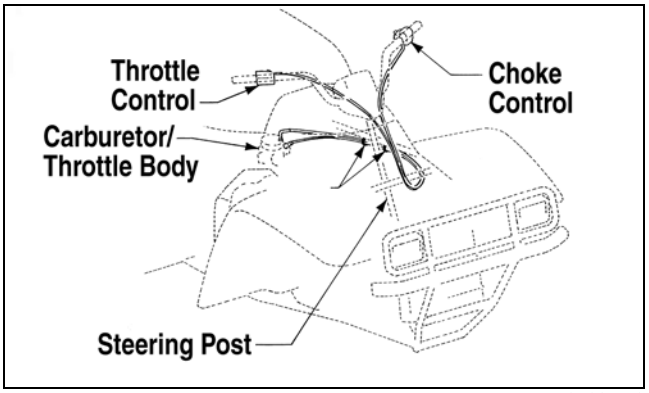


AF682D

2. Rotate the adjuster sleeve until 0.5-1.0 mm (0.02-0.04 in.) is attained.


AL611D

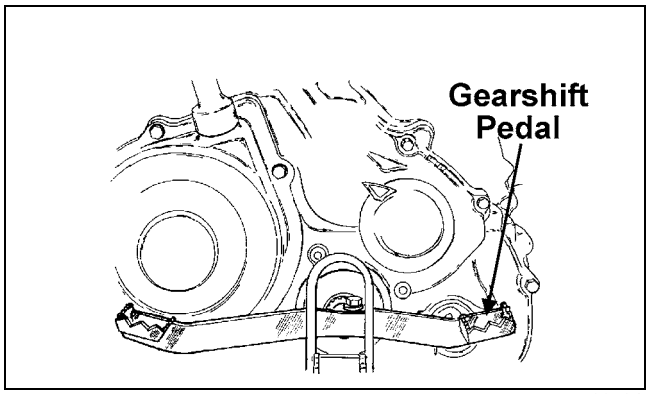
3. Secure the adjustment by tightening the jam nut; then slide the boot over the jam nut.




0732-412

## Gearshift Pedal
### (Manual Transmission)

The gearshift pedal is attached to a ratchet mechanism in the transmission. Each time a gear is selected, the gearshift pedal will return to its normal position ready to select the next gear. To return to neutral, press down repeatedly (once for each gear) on the front of the pedal. Shift into gears by pressing down on the back of the pedal once for each gear. The ratchet mechanism makes it impossible to upshift or downshift more than one gear at a time.

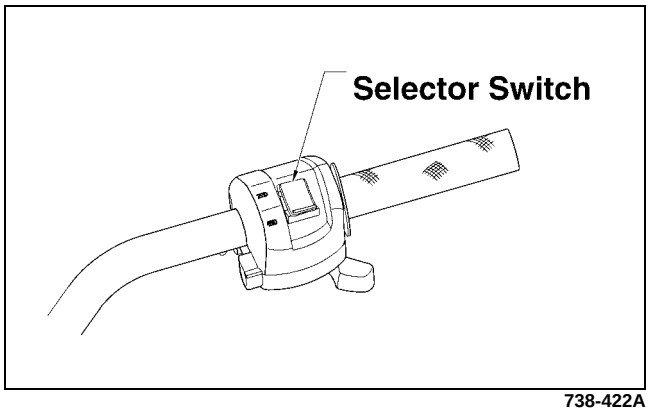



ATV0078C

## Drive Selector

The automatic drive selector allows the operator to operate in either 2-wheel drive (rear wheels) or 4-wheel drive (all wheels). For normal riding on flat, dry, hard surfaces, 2-wheel drive should be sufficient. In situations of aggressive trail conditions, 4-wheel drive would be the desired choice.

To either engage or disengage the front wheels, move the switch to the 4WD position or to the 2WD position.




738-422A

**⚠ CAUTION**

**Do not attempt to either engage or disengage the front differential while the ATV is moving.**

## Front Differential Lock

Certain ATV models are equipped with a front differential lock. The front differential lock allows the operator to mechanically lock the differential to apply equal power to both front wheels. To engage the front differential lock, rotate the handle fully clockwise to LOCK; to disengage the front differential lock, rotate the handle fully counterclockwise to UNLOCK.


KX016A

To adjust the differential lock cable, see Section 2.

## Shift Lever

### REMOVING

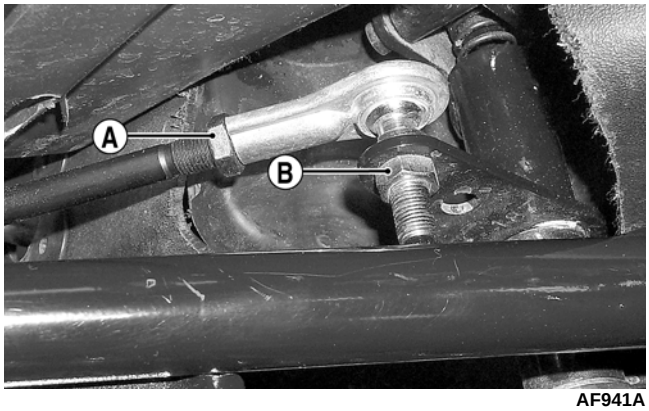
1. Remove the E-clip securing the shift rod to the engine shift arm.
2. Remove two cap screws, two self-tapping screws, and three nylon ties securing the left-side splash panel and remove the panel.
3. Remove the axle and nut securing the shift lever to the upper shift arm; then remove the shift lever. Account for a spring and two O-rings.
4. Using two open-end wrenches, remove the lock nut securing the shift rod to the upper shift arm. Remove the shift rod and discard the lock nut.

■ **NOTE: Never reuse a lock nut. Once a lock nut has been removed, it must be replaced with a new lock nut.**

## INSTALLING

1. Place the shift rod into position on the engine shift arm and secure with the existing E-clip.

2. Using a new lock nut (B), secure the shift rod to the upper shift arm; then using two open-end wrenches, tighten securely.




AF941A

3. Place the spring into position between the upper shift arm and shift lever; then making sure the O-rings are in place on the axle, secure the shift lever to the arm with the existing axle and nut.

4. Check shift lever adjustment (see Section 2); then tighten jam nut (A) securely.

5. Install the left-side splash panel.

# Speedometer/ Tachometer/LCD

## REPLACING

To replace the speedometer, use the following procedure.

1. Remove the two reinstallable rivets securing the instrument pod; then remove the ignition switch retaining ring.

2. Remove the two nuts securing the mounting studs; then remove the speedometer and disconnect the multi-pin connector.

3. Mount the speedometer and secure with the two nuts; then connect the multi-pin connector.

4. Install the instrument pod and secure with the reinstallable rivets.

5. Secure the ignition switch with the retaining ring.

# SECTION 10 - AIDS FOR MAINTENANCE

## TABLE OF CONTENTS

# Torque Specifications
## (400/500 - Manual Transmission)

| DRIVE TRAIN COMPONENTS | | | |
|---|---|---|---|
| Part | Part Bolted To | Torque | |
| | | kg-m | ft-lb |
| Engine (Lower Rear/Front) | Frame | 5.5 | 40.0 |
| Front Differential* | Frame/Differential Bracket | 6.2 | 45.0 |
| Pinion Housing | Differential Housing | 2.9-3.5 | 21.0-25.0 |
| Differential Housing Cover*** | Differential Housing | 2.9-3.5 | 21.0-25.0 |
| Drive Bevel Gear Nut*** | Shaft | 10.0 | 72.0 |
| Differential Gear Case*** | Hub | 2.3-3.0 | 16.5-22.0 |
| Lock Collar | Differential Housing | 17.3 | 125.0 |
| Hub Nut | Shaft/Axle (max) | 27.6 | 200.0 |
| Oil Drain Plug | Front Differential/ Rear Drive | 0.5 | 3.5 |
| Oil Fill Plug | Front Differential/ Rear Drive | 2.2 | 16.0 |
| Oil Drain Plug | Engine | 2.2 | 16.0 |
| Inspection Plug | Front Differential/ Rear Drive | 0.5 | 3.5 |
| Wheel | Hub | 5.5 | 40.0 |
| Oil Fitting (400) | Engine | 0.8 | 6.0 |
| **EXHAUST COMPONENTS** | | | |
| Exhaust Pipe | Engine | 2.8 | 20.0 |
| **ELECTRICAL COMPONENTS** | | | |
| Coil* | Frame | 1.7 | 12.0 |
| Ground Wire | Engine | 1.1 | 8.0 |
| **STEERING COMPONENTS** | | | |
| Handlebar Block | Steering Post | 2.8 | 20.0 |
| Steering Post Bearing Housing | Frame | 2.8 | 20.0 |
| Steering Post Bearing Flange | Frame | 2.8 | 20.0 |
| Lower Steering Bearing Washer Cap Screw*** | Steering Post | 5.5 | 40.0 |
| Tie Rod End | Knuckle/Steering Post | 4.2 | 30.0 |

| BRAKE COMPONENTS | | | |
|---|---|---|---|
| Part | Part Bolted To | Torque | |
| | | kg-m | ft-lb |
| Brake Disc* | Hub | 2.1 | 15.0 |
| Brake Hose | Caliper | 2.8 | 20.0 |
| Brake Hose | Master Cylinder | 2.8 | 20.0 |
| Brake Hose | Auxiliary Brake Cylinder | 2.8 | 20.0 |
| Master Cylinder (Rear) | Frame | 3.5 | 25.0 |
| Master Cylinder Cover | Master Cylinder | 0.1 | 1.0 |
| Auxiliary Brake Pedal | Lever Axle | 3.5 | 25.0 |
| Hydraulic Caliper | Knuckle/Axle Retainer Assembly | 2.8 | 20.0 |
| Auxiliary Caliper | Knuckle/Axle Retainer Assembly | 2.8 | 20.0 |
| **CHASSIS COMPONENTS** | | | |
| Footrest | Frame (8 mm) | 2.8 | 20.0 |
| Footrest | Frame (10 mm) | 5.5 | 40.0 |
| Shift Lever* | Shift Axle | 1.1 | 8.0 |
| **SUSPENSION COMPONENTS (Front)** | | | |
| A-Arm | Frame | 4.8 | 35.0 |
| Ball Joint Cap Screw | Knuckle | 4.8 | 35.0 |
| Shock Absorber | Frame | 4.8 | 35.0 |
| Shock Absorber | Upper A-Arm | 4.8 | 35.0 |
| Knuckle | A-Arm | 4.8 | 35.0 |
| **SUSPENSION COMPONENTS (Rear)** | | | |
| Axle Retainer Assembly | Axle Housing | 5.5 | 40.0 |
| Shock Absorber (Upper) | Frame | 4.8 | 35.0 |
| Shock Absorber (Lower) | Lower A-Arm | 2.8 | 20.0 |
| A-Arm | Frame | 4.8 | 35.0 |
| Swing Arm | Axle Housing/Case | 4.8 | 35.0 |
| Knuckle | A-Arm | 4.8 | 35.0 |

# Torque Specifications
## (400/500 - Automatic Transmission/650 H1)

| ENGINE/TRANSMISSION | | | |
|---|---|---|---|
| Part | Part Bolted To | Torque | |
| | | kg-m | ft-lb |
| Clutch Shoe | Crankshaft | 13.0 | 94.0 |
| Clutch Sleeve Hub | Countershaft | 10.0 | 72.0 |
| Crankcase Half (6 mm) | Crankcase Half | 0.9-1.3 | 6.5-9.5 |
| Crankcase Half (8 mm) | Crankcase Half | 2-2.4 | 14.5-17.0 |
| Cylinder Head (Cap Screw) | Cylinder | 3.8 | 27.5 |
| Cylinder Head (6 mm Nut) | Cylinder | 1.1 | 8.0 |
| Cylinder Head (8 mm Nut) | Cylinder | 2.5 | 18.0 |
| Cylinder Head Cover | Cylinder Head | 1.0 | 7.0 |
| Left-Side Cover | Crankcase Half | 0.9-1.3 | 6.5-9.5 |
| Mechanical Water Pump Impeller | Pump Shaft | 1.05 | 7.5 |
| Oil Pump Drive Gear | Crank Balancer Shaft | 8.0 | 58.0 |
| Oil Pump* | Crankcase | 1.0 | 7.0 |
| Output Shaft Gear | Output Shaft | 10.0 | 72.0 |
| Rear Output Shaft | Output Joint | 2.8 | 20.0 |
| Recoil Starter | Left-Side Cover | 0.8 | 6.0 |
| Reverse Cam Stopper Housing | Crankcase | 2.3 | 16.5 |
| Right-Side Cover | Crankcase | 0.9-1.3 | 6.5-9.5 |
| Rotor/Flywheel Nut | Crankshaft | 16.0 | 116.0 |
| Shift Stop Housing | Crankcase | 2.3 | 16.5 |
| Cam Sprocket** | Camshaft | 1.5 | 11.0 |
| Starter Cup | Crankshaft | 3.5 | 25.0 |
| Spark Plug | Engine | 1.7 | 12.0 |

* w/Blue Loctite #243

** w/Red Loctite #271

*** w/Green Loctite #609

| DRIVE TRAIN COMPONENTS | | | |
|---|---|---|---|
| Part | Part Bolted To | Torque | |
| | | kg-m | ft-lb |
| Engine Mounting Through-Bolt (400/500) | Frame | 5.5 | 40.0 |
| Engine (650 H1) | Engine Cradle | 5.5 | 40.0 |
| Engine Cradle (650 H1/TRV)** | Rubber Mount | 3.5 | 25.0 |
| Rubber Mount (650 H1/TRV) | Frame Bracket | 4.8 | 35.0 |
| Front Differential* | Frame/Differential Bracket | 6.2 | 45.0 |
| Rear Output Joint Assembly | Engine | 2.8 | 20.0 |
| Input Housing | Differential Housing | 2.9-3.5 | 21.0-25.0 |
| Differential Housing Cover*** | Differential Housing | 2.9-3.5 | 21.0-25.0 |
| Drive Bevel Gear Nut*** | Shaft | 10.0 | 72.0 |
| Differential Gear Case*** | Hub | 2.3-3 | 16.5-22 |
| Lock Collar | Differential Housing | 17.3 | 125.0 |
| Hub Nut | Shaft/Axle (max) | 27.6 | 200.0 |
| Oil Drain Plug | Front Differential/ Rear Drive | 0.5 | 3.5 |
| Oil Fill Plug | Front Differential/ Rear Drive | 2.2 | 16.0 |
| Oil Drain Plug | Engine | 2.2 | 16.0 |
| Inspection Plug | Rear Drive | 0.5 | 3.5 |
| Wheel | Hub | 5.5 | 40.0 |
| **EXHAUST COMPONENTS** | | | |
| Exhaust Pipe (400/500) | Engine | 2.8 | 20.0 |
| Exhaust Pipe (650 H1) | Engine | 2.8 | 20.0 |
| **ELECTRICAL COMPONENTS** | | | |
| Coil* | Frame | 1.7 | 12.0 |
| Ground Wire | Engine | 1.1 | 8.0 |

| STEERING COMPONENTS | | | |
|---|---|---|---|
| Part | Part Bolted To | Torque | |
| | | kg-m | ft-lb |
| Handlebar Block | Steering Post | 2.8 | 20.0 |
| Steering Post Bearing Housing | Frame | 2.8 | 20.0 |
| Steering Post Bearing Flange | Frame | 2.8 | 20.0 |
| Lower Steering Bearing Washer Cap Screw*** | Steering Post | 5.5 | 40.0 |
| Tie Rod End | Knuckle/Steering Post | 4.2 | 30.0 |
| **BRAKE COMPONENTS** | | | |
| Brake Disc* | Hub | 2.1 | 15.0 |
| Brake Hose | Caliper | 2.8 | 20.0 |
| Brake Hose | Master Cylinder | 2.8 | 20.0 |
| Brake Hose | Auxiliary Brake Caliper | 2.8 | 20.0 |
| Master Cylinder Cover | Master Cylinder | 0.1 | 1.0 |
| Auxiliary Brake Pedal | Lever Axle | 3.5 | 25.0 |
| Hydraulic Caliper | Knuckle | 2.8 | 20.0 |
| Auxiliary Caliper | Knuckle | 2.8 | 20.0 |
| **CHASSIS COMPONENTS** | | | |
| Footrest | Frame (8 mm) | 2.8 | 20.0 |
| Footrest | Frame (10 mm) | 5.5 | 40.0 |
| Shift Lever* | Shift Axle | 1.1 | 8.0 |
| **SUSPENSION COMPONENTS (Front)** | | | |
| A-Arm | Frame | 4.8 | 35.0 |
| Ball Joint Cap Screw | Knuckle | 4.8 | 35.0 |
| Shock Absorber | Frame | 4.8 | 35.0 |
| Shock Absorber | Upper A-Arm | 4.8 | 35.0 |
| Knuckle | A-Arm | 4.8 | 35.0 |
| **SUSPENSION COMPONENTS (Rear)** | | | |
| A-Arm | Frame | 4.8 | 35.0 |
| Shock Absorber (Upper) | Frame | 4.8 | 35.0 |
| Shock Absorber (Lower) | Lower A-Arm | 2.8 | 20.0 |
| Knuckle | A-Arm | 4.8 | 35.0 |
| **SUSPENSION COMPONENTS (Rear) TBX Model** | | | |
| Shock Absorber | Frame | 4.8 | 35.0 |
| Shock Absorber | A-Arm | 2.8 | 20.0 |
| Tilt Box Frame | ATV Frame | 3.3 | 24.0 |
| Cargo Box (Plastic) | Tilt Box Frame | 1.7 | 12.0 |
| Side Box | Frame | 2.8 | 20.0 |
| Side Box | Footwell | 1.1 | 8.0 |
| Rear CV Joint** | Engine | 2.8 | 20.0 |

| ENGINE/TRANSMISSION (400/500 - Automatic Transmission) | | | |
|---|---|---|---|
| Part | Part Bolted To | Torque | |
| | | kg-m | ft-lb |
| Clutch Shoe | Crankshaft | 13.0 | 94.0 |
| Clutch Cover/Housing Assembly | Crankcase | 1.1 | 8.0 |
| Crankcase Half (6 mm) | Crankcase Half | 0.9-1.3 | 6.5-9.5 |
| Crankcase Half (8 mm) | Crankcase Half | 2-2.4 | 14.5-17 |
| Cylinder Head (Cap Screw) | Crankcase | 3.8 | 27.5 |
| Cylinder Head (6 mm) | Cylinder | 1.1 | 8.0 |
| Cylinder Head (8 mm) | Cylinder | 2.5 | 18.0 |
| Cylinder Head Cover | Cylinder Head | 1.0 | 7.0 |
| Driven Pulley Nut** | Fixed Face | 10.4-11.8 | 75.0-85.0 |
| Fixed Driven | Clutch Shaft | 10.4-11.8 | 75.0-85.0 |
| Ground Wire | Engine | 1.1 | 8.0 |
| Magneto Cover | Crankcase | 1.1 | 8.0 |
| Mechanical Water Pump Impeller | Pump Shaft | 1.05 | 7.5 |
| Movable Drive Face** | Driveshaft | 10.4-11.8 | 75.0-85.0 |
| Oil Pump Drive Gear | Crank Balancer Shaft | 5.0 | 36.0 |
| Output Shaft Gear | Output Shaft | 10.0 | 72.0 |
| Recoil Starter | Left-Side Cover | 0.8 | 6.0 |
| Rotor/Flywheel Nut | Crankshaft | 16.0 | 116.0 |
| Cam Sprocket** | Camshaft | 1.5 | 11.0 |
| Starter Cup | Crankshaft | 3.5 | 25.0 |
| V-Belt Cover | Crankcase | 1.1 | 8.0 |
| Spark Plug | Engine | 1.7 | 12.0 |

* w/Blue Loctite #243

** w/Red Loctite #271

*** w/Green Loctite #609

| ENGINE/TRANSMISSION (650 H1) | | | |
|---|---|---|---|
| Part | Part Bolted To | Torque | |
| | | kg-m | ft-lb |
| Clutch Shoe | Crankshaft | 31.8 | 230.0 |
| Clutch Cover/Housing Assembly | Crankcase | 1.1 | 8.0 |
| Crankcase Half (6 mm) | Crankcase Half | 0.9-1.3 | 6.5-9.5 |
| Crankcase Half (8 mm) | Crankcase Half | 2.8 | 20.0 |
| Cylinder Head (Cap Screw) | Crankcase | 5.5 | 40.0 |
| Cylinder Head (6 mm) | Cylinder | 1.1 | 8.0 |
| Cylinder Head (8 mm) | Cylinder | 2.5 | 18.0 |
| Cylinder Head Cover | Cylinder Head | 1.1-1.2 | 8.0-9.0 |
| Driven Pulley Nut | Fixed Face | 13.5 | 97.5 |
| Fixed Driven** | Clutch Shaft | 13.5 | 97.5 |
| Ground Wire | Engine | 1.1 | 8.0 |
| Magneto Cover | Crankcase | 1.1 | 8.0 |
| Mechanical Water Pump Impeller | Pump Shaft | 1.05 | 7.5 |
| Movable Drive Face** | Driveshaft | 10.4-11.8 | 75-85 |
| Oil Pump Drive Gear | Crank Balancer Shaft | 8.5 | 61.5 |
| Output Shaft Gear | Output Shaft | 8.5 | 61.5 |
| Outer Magneto Cover | Left-Side Cover | 0.8 | 6.0 |
| Recoil Starter (Certain 650 H1 Models) | Left-Side Cover | 0.8 | 6.0 |
| Rotor/Flywheel Nut | Crankshaft | 14.5 | 105.0 |
| Cam Sprocket** | Camshaft | 1.35 | 9.8 |
| Starter Cup/Spacer | Crankshaft | 3.8 | 27.5 |
| V-Belt Cover | Crankcase | 1.1 | 8.0 |
| Spark Plug | Engine | 1.7 | 12.0 |

* w/Blue Loctite #243

** w/Red Loctite #271

*** w/Green Loctite #609

# Torque Specifications
## (700 EFI)

| DRIVE TRAIN COMPONENTS | | | |
|---|---|---|---|
| Part | Part Bolted To | Torque | |
| | | kg-m | ft-lb |
| Engine Mounting Through-Bolt | Frame | 5.5 | 40.0 |
| Engine Mount (Rear) | Frame | 5.5 | 40.0 |
| Front Differential**** | Frame/Differential Bracket | 6.2 | 45.0 |
| Rear Drive Gear Case | Frame | 6.2 | 45.0 |
| Pinion Housing | Differential Housing | 2.9-3.5 | 21.0-25.0 |
| Differential Housing Cover*** | Differential Housing | 2.9-3.5 | 21.0-25.0 |
| Drive Bevel Gear Nut*** | Shaft | 11.0-13.0 | 79.5-94.0 |
| Lock Collar | Differential Housing | 17.3 | 125.0 |
| Hub Nut | Shaft/Axle (max) | 27.6 | 200.0 |
| Oil Drain Plug | Front Differential/ Rear Drive | 0.5 | 3.5 |
| Oil Fill Plug | Front Differential/ Rear Drive | 2.2 | 16.0 |
| Oil Drain Plug | Engine | 2.2 | 16.0 |
| Inspection Plug | Front Differential | 0.5 | 3.5 |
| Wheel | Hub | 5.5 | 40.0 |
| **EXHAUST COMPONENTS** | | | |
| Muffler | Frame | 2.8 | 20.0 |
| Exhaust Pipe | Cylinder Head | 1.9 | 14.0 |
| **ELECTRICAL COMPONENTS** | | | |
| Coil**** | Frame | 1.7 | 12.0 |
| Ground Wire | Engine | 1.1 | 8.0 |
| **STEERING COMPONENTS** | | | |
| Handlebar Block | Steering Post | 2.8 | 20.0 |
| Steering Post Bearing Housing | Frame | 2.8 | 20.0 |
| Steering Post Bearing Flange | Frame | 2.8 | 20.0 |
| Lower Steering Bearing Washer Cap Screw*** | Steering Post | 5.5 | 40.0 |
| Tie Rod End | Knuckle/Steering Post | 4.2 | 30.0 |

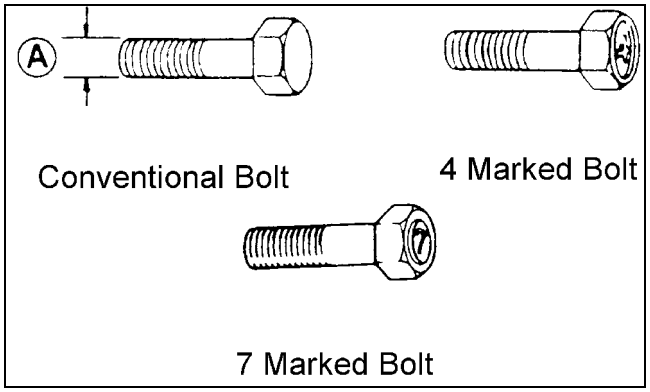
| BRAKE COMPONENTS | | | |
|---|---|---|---|
| Part | Part Bolted To | Torque | |
| | | kg-m | ft-lb |
| Brake Disc**** | Hub | 2.1 | 15.0 |
| Brake Hose | Caliper | 2.8 | 20.0 |
| Brake Hose | Master Cylinder | 2.8 | 20.0 |
| Brake Hose | Auxiliary Brake Cylinder | 2.8 | 20.0 |
| Master Cylinder Cover | Master Cylinder | 0.1 | 1.0 |
| Auxiliary Brake Pedal | Lever Axle | 3.5 | 25.0 |
| Hydraulic Caliper | Suspension Knuckle | 2.8 | 20.0 |
| **CHASSIS COMPONENTS** | | | |
| Footrest | Frame (8 mm) | 2.8 | 20.0 |
| Footrest | Frame (10 mm) | 5.5 | 40.0 |
| Shift Lever**** | Shift Axle | 1.1 | 8.0 |
| **SUSPENSION COMPONENTS (Front)** | | | |
| A-Arm | Frame | 4.8 | 35.0 |
| Ball Joint Cap Screw | Knuckle | 4.8 | 35.0 |
| Shock Absorber | Frame | 4.8 | 35.0 |
| Shock Absorber | Upper A-Arm | 4.8 | 35.0 |
| Knuckle | A-Arm | 4.8 | 35.0 |
| **SUSPENSION COMPONENTS (Rear)** | | | |
| A-Arm | Frame | 5.5 | 40.0 |
| Shock Absorber (Upper) | Frame | 4.8 | 35.0 |
| Shock Absorber (Lower) | Lower A-Arm | 2.8 | 20.0 |
| Knuckle | A-Arm | 4.8 | 35.0 |

| ENGINE/TRANSMISSION | | | |
|---|---|---|---|
| Clutch Shoe | Crankshaft | 15.0 | 108.0 |
| Clutch Cover/Housing Assembly | Crankcase | 0.9 | 6.5 |
| Crankcase Half (6 mm) | Crankcase Half | 1.0 | 7.0 |
| Crankcase Half (8mm) | Crankcase Half | 2.6 | 19.0 |
| Cylinder Head (Cap Screw) | Crankcase (Step 1)<br>(Step 2) | 2.5<br>3.7 | 18.0<br>27.0 |
| Cylinder Head (6 mm) | Cylinder | 1.0 | 7.0 |
| Cylinder Head Cover | Cylinder (Step 1)<br>Head (Step 2) | 1.0<br>1.4 | 7.0<br>10.0 |
| Driven Pulley Nut | Fixed Face | 10.9 | 79.0 |
| Fixed Driven** | Clutch Shaft | 10.9 | 79.0 |
| Ground Wire | Engine | 1.1 | 8.0 |
| Magneto Cover | Crankcase | 1.1 | 8.0 |
| Movable Drive Face** | Driveshaft | 10.9 | 79.0 |
| Oil Pump Drive Gear | Crank Balancer Shaft | 15.0 | 108.0 |
| Output Shaft Gear | Output Shaft | 10.0 | 72.0 |
| Recoil Starter | Left-Side Cover | 0.8 | 6.0 |
| Rotor/Flywheel Nut | Crankshaft | 16.0 | 116.0 |
| Cam Idler Shaft | Cylinder Head | 4.1 | 29.5 |
| Starter Cup | Crankshaft | 3.8 | 27.5 |
| V-Belt Cover | Crankcase | 0.9 | 6.5 |
| Spark Plug | Engine | 1.1 | 8.0 |

* w/Blue Loctite #242
** w/Red Loctite #271
*** w/Green Loctite #609
****w/Blue Loctite #243

# Tightening Torque
## (General Bolts)

| Type of Bolt | Thread Diameter A (mm) | Tightening Torque | |
|---|---|---|---|
| | | kg-m | ft-lb |
| (Conventional or 4 Marked Bolt) | 5 | 0.2-0.4 | 1.5-3.0 |
| | 6 | 0.4-0.7 | 3.0-5.0 |
| | 8 | 1.0-1.6 | 7.0-11.5 |
| | 10 | 2.2-3.5 | 16.0-25.5 |
| (7 Marked Bolt) | 5 | 0.3-0.6 | 2.0-4.5 |
| | 6 | 0.8-1.2 | 6.0-8.5 |
| | 8 | 1.8-2.8 | 13.0-20.0 |
| | 10 | 4.0-6.0 | 29.0-43.5 |




# Torque Conversions

| ft-lb | kg-m | ft-lb | kg-m | ft-lb | kg-m | ft-lb | kg-m | ft-lb | kg-m |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.1 | 21 | 2.9 | 41 | 5.7 | 61 | 8.4 | 81 | 11.2 |
| 2 | 0.3 | 22 | 3.0 | 42 | 5.8 | 62 | 8.6 | 82 | 11.3 |
| 3 | 0.4 | 23 | 3.2 | 43 | 5.8 | 63 | 8.7 | 83 | 11.5 |
| 4 | 0.6 | 24 | 3.3 | 44 | 6.1 | 64 | 8.9 | 84 | 11.6 |
| 5 | 0.7 | 25 | 3.5 | 45 | 6.2 | 65 | 9.0 | 85 | 11.8 |
| 6 | 0.8 | 26 | 3.6 | 46 | 6.4 | 66 | 9.1 | 86 | 11.9 |
| 7 | 1.0 | 27 | 3.7 | 47 | 6.5 | 67 | 9.3 | 87 | 12.0 |
| 8 | 1.1 | 28 | 3.9 | 48 | 6.6 | 68 | 9.4 | 88 | 12.2 |
| 9 | 1.2 | 29 | 4.0 | 49 | 6.8 | 69 | 9.5 | 89 | 12.3 |
| 10 | 1.4 | 30 | 4.2 | 50 | 6.9 | 70 | 9.7 | 90 | 12.5 |
| 11 | 1.5 | 31 | 4.3 | 51 | 7.1 | 71 | 9.8 | 91 | 12.6 |
| 12 | 1.7 | 32 | 4.4 | 52 | 7.2 | 72 | 10.0 | 92 | 12.8 |
| 13 | 1.8 | 33 | 4.6 | 53 | 7.3 | 73 | 10.1 | 93 | 12.9 |
| 14 | 1.9 | 34 | 4.7 | 54 | 7.5 | 74 | 10.2 | 94 | 13.0 |
| 15 | 2.1 | 35 | 4.8 | 55 | 7.6 | 75 | 10.4 | 95 | 13.1 |
| 16 | 2.2 | 36 | 5.0 | 56 | 7.7 | 76 | 10.5 | 96 | 13.3 |
| 17 | 2.4 | 37 | 5.1 | 57 | 7.9 | 77 | 10.7 | 97 | 13.4 |
| 18 | 2.5 | 38 | 5.3 | 58 | 8.0 | 78 | 10.8 | 98 | 13.6 |
| 19 | 2.6 | 39 | 5.4 | 59 | 8.2 | 79 | 10.9 | 99 | 13.7 |
| 20 | 2.8 | 40 | 5.5 | 60 | 8.3 | 80 | 11.1 | 100 | 13.8 |

# SECTION 11 - TROUBLESHOOTING

## TABLE OF CONTENTS

# Engine

■ **NOTE: A Condition/Remedy marked with an asterisk (*) is for manual transmission models only.**

| **Problem: Engine will not start or is hard to start (Compression too low)** | |
|---|---|
| **Condition** | **Remedy** |
| 1. **Valve clearance** out of adjustment | 1. Adjust clearance |
| 2. **Valve guides** worn - seated poorly | 2. Repair - replace guides |
| 3. **Valves** mistimed | 3. Adjust valve timing |
| 4. **Piston rings** worn excessively | 4. Replace rings |
| 5. **Cylinder bore** worn | 5. Replace - rebore cylinder |
| 6. **Spark plug** seating poorly | 6. Tighten plug |
| 7. **Starter motor** cranks too slowly - does not turn | 7. See Electrical in this section |
| **Problem: Engine will not start or is hard to start (No spark)** | |
| **Condition** | **Remedy** |
| 1. **Spark plug** fouled | 1. Clean - replace plug |
| 2. **Spark plug** wet | 2. Clean - dry plug |
| 3. **Magneto** defective | 3. Replace magneto |
| 4. **CDI unit/ECU** defective | 4. Replace CDI unit/ECU |
| 5. **Ignition coil** defective | 5. Replace ignition coil |
| 6. **High-tension lead** open - shorted | 6. Replace high tension lead |
| **Problem: Engine will not start or is hard to start (No fuel reaching the carburetor/fuel injector)** | |
| **Condition** | **Remedy** |
| 1. **Gas tank vent hose** obstructed | 1. Clean vent hose |
| 2. **Carburetor float valve** defective | 2. Replace valve |
| 3. **Fuel hose** obstructed | 3. Clean - replace hose |
| 4. **Fuel screens** obstructed | 4. Clean - replace inlet screen - valve screen |
| 5. **Fuel pump** defective | 5. Replace fuel pump |
| **Problem: Engine stalls easily** | |
| **Condition** | **Remedy** |
| 1. **Spark plug** fouled | 1. Clean plug |
| 2. **Magneto** defective | 2. Replace magneto |
| 3. **CDI unit/ECU** defective | 3. Replace CDI unit/ECU |
| 4. **Carburetor jets/fuel injector** obstructed | 4. Clean jets/replace fuel injector |
| 5. **Valve clearance** out of adjustment | 5. Adjust clearance |
| **Problem: Engine noisy (Excessive valve chatter)** | |
| **Condition** | **Remedy** |
| 1. **Valve clearance** too large | 1. Adjust clearance |
| 2. **Valve spring(s)** weak - broken | 2. Replace spring(s) |
| 3. **Rocker arm** - **rocker arm shaft** worn | 3. Replace arm - shaft |
| 4. **Camshaft** worn | 4. Replace camshaft |
| 5. **Valve tappets** worn | 5. Replace tappets |
| **Problem: Engine noisy (Noise seems to come from piston)** | |
| **Condition** | **Remedy** |
| 1. **Piston - cylinder** worn | 1. Replace - service piston - cylinder |
| 2. **Combustion chamber carbon** buildup | 2. Clean chamber |
| 3. **Piston pin - piston pin bore** worn | 3. Replace - service pin - bore |
| 4. **Piston rings - ring groove(s)** worn | 4. Replace rings - piston |
| **Problem: Engine noisy (Noise seems to come from timing chain)** | |
| **Condition** | **Remedy** |
| 1. **Chain** stretched | 1. Replace chain |
| 2. **Sprockets** worn | 2. Replace sprockets |
| 3. **Tension adjuster** malfunctioning | 3. Repair - replace adjuster |

| Problem: Engine noisy (Noise seems to come from clutch) | |
|---|---|
| **Condition *** | **Remedy *** |
| 1. **Crankshaft splines - bearings** worn | 1. Replace crankshaft - bearings |
| 2. **Countershaft - hub splines** worn | 2. Replace countershaft - hub |
| 3. **Clutch plate teeth** worn | 3. Replace clutch plate(s) |
| 4. **Driven - drive clutch plates** distorted - broken | 4. Replace clutch plate(s) |
| 5. **Clutch dampers** weak | 5. Replace dampers |
| **Problem: Engine noisy (Noise seems to come from crankshaft)** | |
| **Condition** | **Remedy** |
| 1. **Bearing** worn - burned | 1. Replace bearing |
| 2. **Lower rod-end bearing** worn - burned | 2. Replace bearing |
| 3. **Connecting rod side clearance** too large | 3. Replace thrust washer(s) |
| **Problem: Engine noisy (Noise seems to come from transmission)** | |
| **Condition** | **Remedy** |
| 1. **Gears** worn - rubbing | 1. Replace gears |
| 2. **Splines** worn | 2. Replace shaft(s) |
| 3. **Primary gears** worn - rubbing | 3. Replace gears |
| 4. **Bearings** worn | 4. Replace bearings |
| 5. **Bushing** worn | 5. Replace bushing |
| **Problem: Engine noisy (Noise seems to come from secondary-transmission/left-side cover)** | |
| **Condition *** | **Remedy *** |
| 1. **Gears - shaft(s)** worn | 1. Replace gears - shafts |
| 2. **Bearing(s)/bushing(s)** damaged | 2. Replace bearing(s)/bushing(s) |
| **Problem: Engine noisy (Noise seems to come from secondary bevel gear and final driven shaft)** | |
| **Condition** | **Remedy** |
| 1. **Drive - driven bevel gears** damaged - worn | 1. Replace gears |
| 2. **Backlash** excessive | 2. Adjust backlash |
| 3. **Tooth contact** improper | 3. Adjust contact |
| 4. **Bearing** damaged | 4. Replace bearing |
| 5. **Gears** worn - rubbing | 5. Replace gears |
| 6. **Splines** worn | 6. Replace shaft(s) |
| 7. **Final driven shaft thrust clearance** too large | 7. Replace thrust washer(s) |
| **Problem: Clutch slipping** | |
| **Condition *** | **Remedy *** |
| 1. **Release roller** out of adjustment - loss of free-play | 1. Adjust clutch bolts 1 & 2 |
| 2. **Clutch springs** weak | 2. Replace springs |
| 3. **Clutch shoes** worn | 3. Replace shoes |
| 4. **Pressure disc** worn - distorted | 4. Replace disc |
| 5. **Clutch plates (driven - drive)** distorted | 5. Replace plates |
| **Problem: Clutch dragging** | |
| **Condition *** | **Remedy *** |
| 1. **Clutch release roller** out of adjustment - too much free-play | 1. Adjust clutch bolts 1 & 2 |
| 2. **Clutch springs** weak | 2. Replace springs |
| 3. **Pressure disc - clutch plates** distorted | 3. Replace disc - plates |
| 4. **Clutch release mechanism** worn - damaged | 4. Adjust - replace mechanism |
| **Problem: Transmission will not shift** | |
| **Condition *** | **Remedy *** |
| 1. **Gearshift cam** broken | 1. Replace cam |
| 2. **Gearshift forks** distorted | 2. Replace forks |
| 3. **Gearshift shaft** worn | 3. Replace shaft |
| 4. **Clutch release mechanism** worn - damaged | 4. Adjust - replace mechanism |
| 5. **Gearshift linkage** adjusted improperly | 5. Adjust linkage |

| Problem: Transmission will not shift back | |
|---|---|
| **Condition *** | **Remedy *** |
| 1. **Reverse shift cam** broken | 1. Replace cam |
| 2. **Shift shafts** rubbing - sticking | 2. Replace shafts |
| 3. **Gearshift forks** distorted - worn | 3. Replace forks |
| 4. **Gearshift lever return spring** broken - damaged | 4. Replace spring |
| **Problem: Transmission jumps out of gear** | |
| **Condition *** | **Remedy *** |
| 1. **Shifting gears (driveshaft - countershaft)** worn | 1. Replace gears |
| 2. **Gearshift forks** distorted - worn | 2. Replace forks |
| 3. **Cam stopper spring (gearshift cam)** weak | 3. Replace spring |
| 4. **Gearshift lever stopper pin** worn | 4. Replace pin |
| **Problem: Secondary-transmission will not shift or shift back** | |
| **Condition *** | **Remedy *** |
| 1. **Sliding dog** broken - worn | 1. Replace dog |
| 2. **Gearshift fork** broken - worn | 2. Replace fork |
| 3. **Shift lever** out of adjustment | 3. Adjust lever |
| 4. **Gearshift cam** worn | 4. Replace cam |
| 5. **Cam stopper spring** weak | 5. Replace spring |
| 6. **Gearshift fork shaft** worn | 6. Replace shaft |
| **Problem: Engine idles poorly** | |
| **Condition** | **Remedy** |
| 1. **Valve clearance** out of adjustment | 1. Adjust clearance |
| 2. **Valve seating** poor | 2. Replace - service seats - valves |
| 3. **Valve guides** defective | 3. Replace guides |
| 4. **Rocker arms - arm shaft** worn | 4. Replace arms - shafts |
| 5. **Magneto** defective | 5. Replace magneto |
| 6. **CDI unit/ECU** defective | 6. Replace CDI unit/ECU |
| 7. **Spark plug** fouled - **gap** too wide | 7. Adjust gap - replace plug |
| 8. **Ignition coil** defective | 8. Replace ignition coil |
| 9. **Float** out of adjustment | 9. Adjust float height |
| 10. **Jets** obstructed | 10. Clean jets |
| 11. **Pilot screw setting** improper | 11. Adjust pilot screw |
| 12. **Fuel injector** obstructed | 12. Replace fuel injector |
| **Problem: Engine runs poorly at high speed** | |
| **Condition** | **Remedy** |
| 1. **High RPM "cut out"** against RPM limiter | 1. Shift into higher gear - decrease speed |
| 2. **Valve springs** weak | 2. Replace springs |
| 3. **Valve timing** out of adjustment | 3. Adjust timing |
| 4. **Cams - rocker arms - tappets** worn | 4. Replace cams - arms - tappets |
| 5. **Spark plug gap** too narrow | 5. Adjust gap |
| 6. **Ignition coil** defective | 6. Replace ignition oil |
| 7. **Float level** too low | 7. Adjust float height |
| 8. **Air cleaner element** obstructed | 8. Clean element |
| 9. **Fuel hose** obstructed | 9. Clean or replace hose |
| 10. **Fuel pump** defective | 10. Replace fuel pump |
| **Problem: Exhaust smoke dirty or heavy** | |
| **Condition** | **Remedy** |
| 1. **Oil (in the engine)** overfilled - contaminated | 1. Drain excess oil - replace oil |
| 2. **Piston rings - cylinder** worn | 2. Replace - service rings - cylinder |
| 3. **Valve guides** worn | 3. Replace guides |
| 4. **Cylinder wall** scored - scuffed | 4. Replace - service cylinder |
| 5. **Valve stems** worn | 5. Replace valves |
| 6. **Stem seals** defective | 6. Replace seals |

| Problem: Engine lacks power | |
|---|---|
| **Condition** | **Remedy** |
| 1. **Valve clearance** incorrect | 1. Adjust clearance |
| 2. **Valve springs** weak | 2. Replace springs |
| 3. **Valve timing** incorrect | 3. Re-time valve gear |
| 4. **Piston ring(s) - cylinder** worn | 4. Replace - service rings - cylinder |
| 5. **Valve seating** poor | 5. Repair seats |
| 6. **Spark plug** fouled | 6. Clean - replace plug |
| 7. **Rocker arms - shafts** worn | 7. Replace arms - shafts |
| 8. **Spark plug gap** incorrect | 8. Adjust gap - replace plug |
| 9. **Carburetor jets/fuel injector** obstructed | 9. Clean jets - replace injector |
| 10. **Float level** out of adjustment | 10. Adjust float height |
| 11. **Air cleaner element** obstructed | 11. Clean element |
| 12. **Oil (in the engine)** overfilled - contaminated | 12. Drain excess oil - change oil |
| 13. **Intake manifold** leaking air | 13. Tighten - replace manifold |
| 14. **Cam chain** worn | 14. Replace cam chain |
| **Problem: Engine overheats** | |
| **Condition** | **Remedy** |
| 1. **Carbon deposit (piston crown)** excessive | 1. Clean piston |
| 2. **Oil** low | 2. Add oil |
| 3. **Octane** low - **gasoline** poor | 3. Drain - replace gasoline |
| 4. **Oil pump** defective | 4. Replace pump |
| 5. **Oil circuit** obstructed | 5. Clean circuit |
| 6. **Gasoline level (in float chamber)** too low | 6. Adjust float height |
| 7. **Intake manifold** leaking air | 7. Tighten - replace manifold |
| 8. **Coolant level** low | 8. Fill - examine system for leaks |
| 9. **Fan** malfunctioning | 9. Check fan fuse - replace fan |
| 10. **Fan switch** malfunctioning | 10. Replace fan switch |
| 11. **Thermostat** stuck - closed | 11. Replace thermostat |
| 12. **Radiator hoses - cap** damaged - obstructed | 12. Clear obstruction - replace hoses |

# Drive

| Problem: Power not transmitted from engine to wheels | |
|---|---|
| **Condition** | **Remedy** |
| 1. **Rear axle shaft serration** worn - broken | 1. Replace shaft |
| **Problem: Power not transmitted from engine to either front wheel** | |
| **Condition** | **Remedy** |
| 1. **Secondary drive - driven gear teeth** broken | 1. Replace gear(s) |
| 2. **Propeller shaft serration** worn - broken | 2. Replace shaft |
| 3. **Coupling** damaged | 3. Replace coupling |
| 4. **Coupling joint serration** worn - damaged | 4. Replace joint |
| 5. **Front drive - driven bevel gears** broken - damaged | 5. Replace gear(s) |
| 6. **Front differential gears/pinions** broken - damaged | 6. Replace gears - pinions |
| 7. **Sliding dog/shaft/fork** worn - damaged | 7. Replace gear(s) |
| 8. **Front drive axle** worn - damaged | 8. Replace axle |
| 9. **Front drive axle serration** worn - damaged | 9. Replace axle |

# Fuel System
## (400/500/650 H1)

| Problem: Starting impaired | |
|---|---|
| **Condition** | **Remedy** |
| 1. **Starter jet** obstructed | 1. Clean jet |
| 2. **Starter jet passage** obstructed | 2. Clean passage |
| 3. **Carburetor** leaking air | 3. Replace gasket |
| 4. **Gas** contaminated | 4. Drain gas tank and fill with clean gas |
| **Problem: Idling or low speed impaired** | |
| **Condition** | **Remedy** |
| 1. **Slow jet** obstructed - loose | 1. Clean - tighten jet |
| 2. **Slow jet outlet** obstructed | 2. Clean outlet |
| 3. **Low speed fuel screw setting** incorrect | 3. Adjust screw |
| 4. **Float height** incorrect | 4. Adjust float height |
| 5. **TPS** out of adjustment | 5. Adjust TPS |
| **Problem: Medium or high speed impaired** | |
| **Condition** | **Remedy** |
| 1. **High RPM "cut out"** against RPM limiter | 1. Shift into higher gear - decrease RPM speed |
| 2. **Main jet** obstructed | 2. Clean main jet |
| 3. **Needle jet** obstructed | 3. Clean needle jet |
| 4. **Vacuum piston** not operating properly | 4. Check piston operation |
| 5. **Filter** obstructed | 5. Clean filter |
| 6. **Float height** incorrect | 6. Adjust float height |
| **Problem: Overflow and fuel level fluctuations** | |
| **Condition** | **Remedy** |
| 1. **Float valve** worn - damaged | 1. Replace valve |
| 2. **Float valve spring** broken | 2. Replace spring |
| 3. **Float** not working properly | 3. Adjust float height - replace float |
| 4. **Float valve** dirty | 4. Clean valve |
| 5. **Float height** too high - too low | 5. Adjust float height |

# Fuel System
## (700 EFI)

| Problem: Starting impaired | |
|---|---|
| **Condition** | **Remedy** |
| 1. **Gas** contaminated | 1. Drain gas tank and fill with clean gas |
| **Problem: Idling or low speed impaired** | |
| **Condition** | **Remedy** |
| 1. **TPS** out of adjustment | 1. Adjust TPS |
| **Problem: Medium or high speed impaired** | |
| **Condition** | **Remedy** |
| 1. **High RPM "cut out"** against RPM limiter | 1. Decrease RPM speed |

| Problem: Spark absent or weak | |
|---|---|
| **Condition** | **Remedy** |
| 1. **Ignition coil** defective | 1. Replace ignition coil |
| 2. **Spark plug** defective | 2. Replace plug |
| 3. **Magneto** defective | 3. Replace magneto |
| 4. **CDI unit/ECU** defective | 4. Replace CDI unit/ECU |
| 5. **Pick-up coil** defective | 5. Replace pick-up coil |
| **Problem: Spark plug fouled with carbon** | |
| **Condition** | **Remedy** |
| 1. **Mixture** too rich | 1. Adjust carburetor |
| 2. **Idling RPM** too high | 2. Adjust carburetor |
| 3. **Gasoline** incorrect | 3. Change to correct gasoline |
| 4. **Air cleaner element** dirty | 4. Clean element |
| 5. **Spark plug** incorrect (too cold) | 5. Replace plug |
| 6. **Valve seals** cracked - missing | 6. Replace seals |
| 7. **Oil rings** worn - broken | 7. Replace rings |
| **Problem: Spark plug electrodes overheat or burn** | |
| **Condition** | **Remedy** |
| 1. **Spark plug** incorrect (too hot) | 1. Replace plug |
| 2. **Engine** overheats | 2. Service cooling system |
| 3. **Spark plug** loose | 3. Tighten plug |
| 4. **Mixture** too lean | 4. Adjust carburetor |
| **Problem: Magneto does not charge** | |
| **Condition** | **Remedy** |
| 1. **Lead wires/connections** shorted - loose - open | 1. Repair - replace - tighten lead wires |
| 2. **Magneto coils** shorted - grounded - open | 2. Replace magneto coils |
| 3. **Regulator/rectifier** defective | 3. Replace regulator/rectifier |
| **Problem: Magneto charges, but charging rate is below the specification** | |
| **Condition** | **Remedy** |
| 1. **Lead wires** shorted - open - loose (at terminals) | 1. Repair - tighten lead wires |
| 2. **Stator coils (magneto)** grounded - open | 2. Replace stator coils |
| 3. **Regulator/rectifier** defective | 3. Replace regulator/rectifier |
| 4. **Electrolyte** low | 4. Add distilled water |
| 5. **Cell plates (battery)** defective | 5. Replace battery |
| **Problem: Magneto overcharges** | |
| **Condition** | **Remedy** |
| 1. **Internal battery** short circuited | 1. Replace battery |
| 2. **Regulator/rectifier resistor** damaged - defective | 2. Replace resistor |
| 3. **Regulator/rectifier** poorly grounded | 3. Clean - tighten ground connection |
| **Problem: Charging unstable** | |
| **Condition** | **Remedy** |
| 1. **Lead wire** intermittently shorting | 1. Replace lead wire |
| 2. **Magneto** internally shorted | 2. Replace magneto |
| 3. **Regulator/rectifier** defective | 3. Replace regulator/rectifier |

| Problem: Starter button not effective | |
|---|---|
| **Condition** | **Remedy** |
| 1. **Battery charge** low | 1. Charge - replace battery |
| 2. **Switch contacts** defective | 2. Replace switch |
| 3. **Starter motor brushes** not seating | 3. Repair - replace brushes |
| 4. **Starter relay** defective | 4. Replace relay |
| 5. **Emergency stop - ignition switch** off | 5. Turn on switches |
| 6. **Wiring connections** loose - disconnected | 6. Connect - tighten - repair connections |
| **Problem: Battery "sulfation" (Acidic white powdery substance or spots on surfaces of cell plates)** | |
| **Condition** | **Remedy** |
| 1. **Charging rate** too low - too high | 1. Replace battery |
| 2. **Battery electrolyte** insufficient | 2. Keep electrolyte to prescribed level |
| 3. **Specific gravity** too low | 3. Charge battery - add distilled water |
| 4. **Battery** run-down - damaged | 4. Replace battery |
| 5. **Electrolyte** contaminated | 5. Replace battery |
| **Problem: Battery discharges too rapidly** | |
| **Condition** | **Remedy** |
| 1. **Electrolyte** contaminated | 1. Replace battery |
| 2. **Specific gravity** too low | 2. Charge battery - add distilled water |
| 3. **Charging system** not charging | 3. Check magneto - regulator/rectifier - circuit connections |
| 4. **Cell plates** overcharged - damaged | 4. Replace battery - correct charging system |
| 5. **Battery** short-circuited | 5. Replace battery |
| 6. **Specific gravity** too low | 6. Charge battery |
| **Problem: Battery polarity reversed** | |
| **Condition** | **Remedy** |
| 1. **Battery** incorrectly connected | 1. Reverse connections - replace battery - repair damage |

# Steering/Suspension

| Problem: Handling too heavy or stiff | |
|---|---|
| **Condition** | **Remedy** |
| 1. **Front wheel alignment** incorrect | 1. Adjust alignment |
| 2. **Lubrication** inadequate | 2. Lubricate appropriate components |
| 3. **Tire inflation pressure** low | 3. Adjust pressure |
| 4. **Tie rod ends** seizing | 4. Replace tie rod ends |
| 5. **Linkage connections** seizing | 5. Repair - replace connections |
| **Problem: Steering oscillation** | |
| **Condition** | **Remedy** |
| 1. **Tires** inflated unequally | 1. Adjust pressure |
| 2. **Wheel(s)** wobbly | 2. Replace wheel(s) |
| 3. **Wheel hub cap screw(s)** loose - missing | 3. Tighten - replace cap screws |
| 4. **Wheel hub bearing** worn - damaged | 4. Replace bearing |
| 5. **Tie rod ends** worn - loose | 5. Replace - tighten tie rod ends |
| 6. **Tires** defective - incorrect | 6. Replace tires |
| 7. **A-arm bushings** damaged | 7. Replace bushings |
| 8. **Bolts - nuts (frame)** loose | 8. Tighten bolts - nuts |
| **Problem: Steering pulling to one side** | |
| **Condition** | **Remedy** |
| 1. **Tires** inflated unequally | 1. Adjust pressure |
| 2. **Front wheel alignment** incorrect | 2. Adjust alignment |
| 3. **Wheel hub bearings** worn - broken | 3. Replace bearings |
| 4. **Frame** distorted | 4. Repair - replace frame |
| 5. **Shock absorber** defective | 5. Replace shock absorber |
| **Problem: Tire wear rapid or uneven** | |
| **Condition** | **Remedy** |
| 1. **Wheel hub bearings** worn - loose | 1. Replace bearings |
| 2. **Front wheel alignment** incorrect | 2. Adjust alignment |
| 3. **Tire inflation pressure** incorrect | 3. Adjust pressure |
| **Problem: Steering noise** | |
| **Condition** | **Remedy** |
| 1. **Caps screws - nuts** loose | 1. Tighten cap screws - nuts |
| 2. **Wheel hub bearings** broken - damaged | 2. Replace bearings |
| 3. **Lubrication** inadequate | 3. Lubricate appropriate components |
| **Problem: Suspension too soft** | |
| **Condition** | **Remedy** |
| 1. **Spring(s)** weak | 1. Replace spring(s) |
| 2. **Shock absorber** damaged | 2. Replace shock absorber |
| 3. **Shock absorber preload** too low | 3. Adjust shock absorber preload |
| **Problem: Suspension too stiff** | |
| **Condition** | **Remedy** |
| 1. **A-arm-related bushings** worn | 1. Replace bushing |
| 2. **Shock absorber preload** too high | 2. Adjust shock absorber preload |
| **Problem: Suspension noisy** | |
| **Condition** | **Remedy** |
| 1. **Cap screws (suspension system)** loose | 1. Tighten cap screws |
| 2. **A-arm-related bushings** worn | 2. Replace bushings |

| Problem: Rear wheel oscillation | |
|---|---|
| **Condition** | **Remedy** |
| 1. **Rear wheel hub bearings** worn - loose | 1. Replace bearings |
| 2. **Tires** defective - incorrect | 2. Replace tires |
| 3. **Wheel rim** distorted | 3. Replace rim |
| 4. **Wheel hub cap screws** loose | 4. Tighten cap screws |
| 5. **Axle shaft nut** loose (Manual Transmission) | 5. Tighten nut (Manual Transmission) |
| 6. **Auxiliary brake** adjusted incorrectly | 6. Adjust brake |
| 7. **Rear suspension arm-related bushing** worn | 7. Replace bushing |
| 8. **Rear shock absorber** damaged | 8. Replace shock absorber |
| 9. **Rear suspension arm nut** loose | 9. Tighten nut |

# Brakes

| Problem: Braking poor | |
|---|---|
| **Condition** | **Remedy** |
| 1. **Pad** worn | 1. Replace pads |
| 2. **Pedal free-play** excessive | 2. Replace pads |
| 3. **Brake fluid** leaking | 3. Repair - replace hydraulic system component(s) |
| 4. **Hydraulic system** spongy | 4. Bleed hydraulic system - correct or repair leaks |
| 5. **Master cylinder/brake cylinder seal** worn | 5. Replace master cylinder |
| **Problem: Brake lever travel excessive** | |
| **Condition** | **Remedy** |
| 1. **Hydraulic system** entrapped air | 1. Bleed hydraulic system |
| 2. **Brake fluid** low | 2. Add fluid to proper level |
| 3. **Brake fluid** incorrect | 3. Drain system - replace with correct fluid |
| 4. **Piston seal - cup** worn | 4. Replace master cylinder |
| **Problem: Brake fluid leaking** | |
| **Condition** | **Remedy** |
| 1. **Connection joints** loose | 1. Tighten joint |
| 2. **Hose** cracked | 2. Replace hose |
| 3. **Piston seal** worn | 3. Replace brake caliper |