

## CVH CARBURETOR JET SIZES

Model	Main Fuel Jet No.	Slow Fuel Jet No.
49 state	190	45
HDI	195	45
California	185	45

## FUEL TANK CAPACITY

Capacity	English	Metric
Total	5.0 Gallons	18.9 liters
Reserve	0.9 Gallons	3.4 liters

## TORQUE VALUES

Item	ft/in-lbs	Nm
Enrichener cable mounting bracket hex nut	20-35 <b>in-lbs</b>	2.3-4.0 Nm
Cylinder head breather bolts	120-144 <b>in-lbs</b>	13.6-16.3 Nm
Air cleaner cover bracket screws	40-60 <b>in-lbs</b>	4.5-6.8 Nm
Air cleaner cover screw	36-60 <b>in-lbs</b>	4.1-6.8 Nm
Fuel valve hex jam nut	15-20 ft-lbs	20-27 Nm
Fuel tank adapter	22-26 ft-lbs	30-35 Nm
Fuel tank rear mounting bolt	15-20 ft-lbs	20-27 Nm
Fuel tank front mounting bolts	15-20 ft-lbs	20-27 Nm
Battery hold-down clamp screw	15-20 ft-lbs	20-27 Nm
Console mounting bolt acorn nut	50-90 <b>in-lbs</b>	5.7-10.2 Nm

# FUEL SYSTEM TROUBLESHOOTING (CARBURETED) 4.2

## CARBURETOR TROUBLESHOOTING

### OVERFLOW

**Check for:**

1. Restricted fuel tank vent system.
2. Loose float bowl screws.
3. Damaged float bowl O-ring.
4. Improper fuel level in float bowl.
5. Damaged or leaking float assembly.
6. Particle contamination in fuel inlet fitting cavity.
7. Worn or dirty inlet valve or seat.

**Remedy:**

1. Correct restricted hose. Replace vapor valve.
2. Tighten screws.
3. Replace O-ring.
4. Adjust float tab for correct fuel level.
5. Replace float assembly.
6. Clean and clear cavity and fuel supply tract.
7. Clean or replace valve and clean seat.

### POOR IDLING

**Check for:**

1. Idle speed improperly adjusted.
2. Inlet system air leak (faster idling).
3. Loose low speed jet.
4. Contaminated or plugged low speed system.
5. Enrichener valve not seated or leaking.
6. Leaking accelerator pump.

**Remedy:**

1. Adjust operating idle speed.
2. Correct as required.
3. Tighten jet.
4. Clean contaminants and clear passages.
5. Adjust, clean or replace.
6. Repair.

### POOR FUEL ECONOMY

**Check for:**

1. High speed riding style.
2. Excessive use of enrichener system.
3. Fuel level too high.
4. Restricted fuel tank vent system.
5. Dirty air cleaner element.
6. Excessive accelerator pump output.
7. Plugged or restricted bowl vent.
8. Vacuum piston assembly malfunction.
9. Loose jets.
10. Worn or damaged needle or needle jet.
11. Plugged air jets or passages.
12. Enrichener valve not seated or leaking.
13. Idle speed improperly adjusted.

**Remedy:**

1. Modify riding habits.
2. Limit system use.
3. Adjust float level.
4. Correct restricted hose. Replace vapor valve.
5. Clean or replace as required.
6. Check and clean accelerator pump bypass orifice.
7. Clean and clear passages.
8. See Vacuum Piston Troubleshooting.
9. Tighten jets.
10. Replace needle or needle jet.
11. Clean and clear passages.
12. Adjust, clean or replace.
13. Adjust operating idle speed.

### POOR ACCELERATION

**Check for:**

1. Throttle cables misadjusted.
2. Inlet system air leak.
3. Restricted fuel tank vent system.
4. Restricted fuel supply passages.
5. Plugged bowl vent or overflow.
6. Enrichener valve not seated or leaking.
7. Worn or damaged needle or needle jet.
8. Vacuum piston malfunction.
9. Plugged jets or passages.
10. Fuel level (float chamber) too low.
11. Accelerator pump leaking or no output.

**Remedy:**

1. Adjust throttle cables.
2. Correct as required.
3. Correct restricted hose. Replace vapor valve.
4. Correct and clear restriction.
5. Clean and clear passages.
6. Adjust, clean or replace.
7. Replace assembly.
8. See Vacuum Piston Troubleshooting.
9. Clean and clear as required.
10. Adjust float level.
11. Repair as necessary.

HARD STARTING	
<b>Check for:</b> <ol style="list-style-type: none"><li>1. Enrichener system plugged, not properly functioning or improperly operated.</li><li>2. Inlet system air leak.</li><li>3. Restricted fuel supply.</li><li>4. Fuel overflow.</li><li>5. Plugged slow jet or passages.</li></ol>	<b>Remedy:</b> <ol style="list-style-type: none"><li>1. Clean, adjust, or replace; or read Owner's Manual.</li><li>2. Correct as required.</li><li>3. Check fuel supply and/or passages. Verify that vacuum operated fuel valve is functional.</li><li>4. See Overflow Troubleshooting.</li><li>5. Clean and clear jet or passages.</li></ol>
POOR PERFORMANCE ON ROAD	
<b>Check for:</b> <ol style="list-style-type: none"><li>1. Inlet system air leak.</li><li>2. Restricted fuel tank vent system.</li><li>3. Dirty or damaged air cleaner element.</li><li>4. Accelerator pump inoperative.</li><li>5. Plugged bowl vent or overflow.</li><li>6. Vacuum piston assembly malfunction.</li><li>7. Loose or plugged fuel and air jets or passages.</li><li>8. Worn or damaged needle or needle jet.</li><li>9. Restricted fuel supply tract.</li><li>10. Enrichener valve not seated or leaking.</li><li>11. Idle speed improperly adjusted.</li></ol>	<b>Remedy:</b> <ol style="list-style-type: none"><li>1. Correct as required.</li><li>2. Correct restricted hose. Replace vapor valve.</li><li>3. Clean or replace.</li><li>4. Repair as required.</li><li>5. Clean and clear passages.</li><li>6. See Vacuum Piston Troubleshooting.</li><li>7. Clean, clear and correct as required.</li><li>8. Replace assembly.</li><li>9. Correct and clear restriction.</li><li>10. Adjust, clean or replace.</li><li>11. Adjust operating idle speed.</li></ol>
POOR HIGH SPEED PERFORMANCE	
<b>Check for:</b> <ol style="list-style-type: none"><li>1. Inlet system air leak.</li><li>2. Restricted fuel tank vent system.</li><li>3. Dirty or damaged air cleaner element.</li><li>4. Accelerator pump inoperative.</li><li>5. Plugged bowl, vent or overflow.</li><li>6. Vacuum piston assembly malfunction.</li><li>7. Restricted fuel supply tract.</li><li>8. Loose or plugged main jets or passages.</li><li>9. Improper fuel level.</li><li>10. Worn or damaged needle or needle jet.</li><li>11. Enrichener valve not seated or leaking.</li></ol>	<b>Remedy:</b> <ol style="list-style-type: none"><li>1. Clean or replace.</li><li>2. Correct restricted hose. Replace vapor valve.</li><li>3. Clean or replace.</li><li>4. Repair as required.</li><li>5. Clean and clear passages.</li><li>6. See Vacuum Piston Troubleshooting.</li><li>7. Correct and clean restriction.</li><li>8. Tighten, clean, clear as required.</li><li>9. Adjust float level.</li><li>10. Replace assembly.</li><li>11. Adjust, clean or replace.</li></ol>

## VACUUM PISTON ASSEMBLY TROUBLESHOOTING

### PISTON DOES NOT RAISE PROPERLY

**Check for:**

1. Diaphragm cap loose, damaged or leaking.
2. Diaphragm pinched at lip groove.
3. Piston atmosphere vent blocked.
4. Piston vacuum passage plugged.
5. Torn diaphragm.
6. Piston binding.
7. Spring binding.
8. Enrichener valve open, not seated or leaking.

**Remedy:**

1. Tighten or replace cap.
2. Reposition diaphragm lip.
3. Clear vent.
4. Clean and clear passage.
5. Replace piston diaphragm assembly.
6. Clean piston slides and body or replace piston.
7. Correct or replace spring.
8. Adjust, clean or replace.

### PISTON DOES NOT CLOSE PROPERLY

**Check for:**

1. Piston diaphragm ring dirty or damaged.
2. Piston binding.
3. Spring damaged.

**Remedy:**

1. Clean or replace piston.
2. Clean piston slides and body or replace piston.
3. Replace spring.

## GENERAL

The carburetor is a constant velocity, gravity fed type with a float operated inlet valve, a variable venturi, a throttle stop screw for idle speed adjustment and a fuel enrichment system for starting. See [Figure 4-1](#).

The fuel enrichment circuit will cause engine idle speed to increase to approximately 2000 rpm with enricher knob pulled out fully and engine running at normal operating temperature. With enricher knob pulled out partially and engine running at normal operating temperature, engine idle speed will also increase above normal idle speed. The increase in idle speed is intended to alert the rider that engine is warmed up, and that enricher knob should be pushed in all the way. Continued use of enricher after engine is warmed up may cause fouled spark plugs.

Idle and transfer ports provide a balanced fuel mixture during the transition period from stop to mid-range. A vacuum piston controls venturi opening.

The carburetor is specifically designed to control exhaust emissions. All jets are fixed. The idle mixture has been pre-set at the factory.

The idle mixture screw is recessed in the carburetor casting. The opening is sealed with a plug because it is intended that the idle mixture be non-adjustable.

*NOTE*

*Adjusting mixture setting by procedures other than specified in this section may be in violation of Federal or State regulations.*

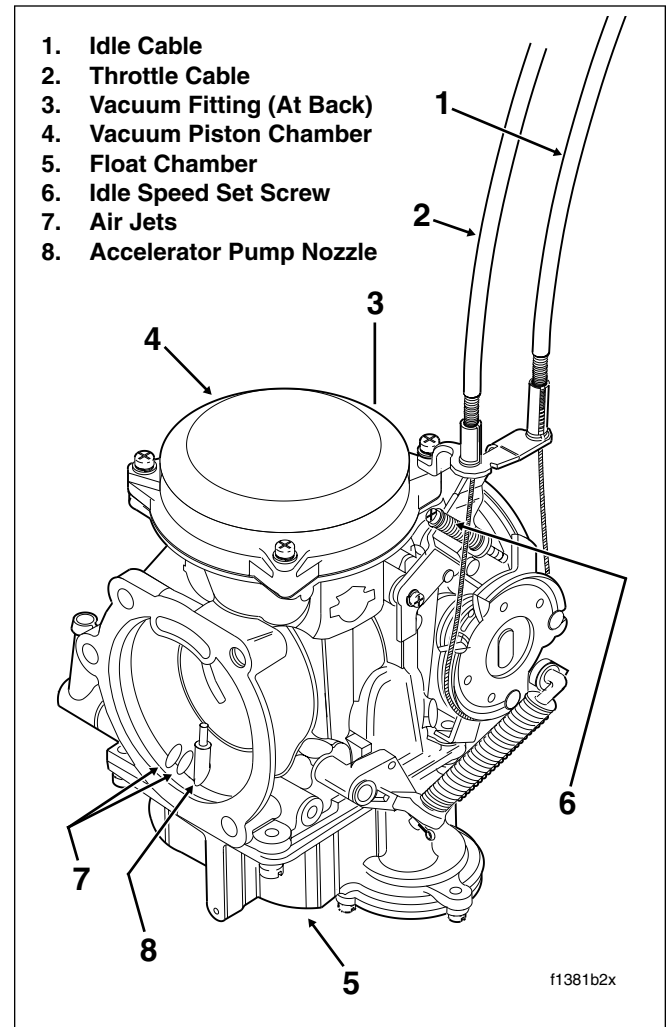
This system partially compensates for changes in the mixture that are normally caused by changes in altitude. Because atmospheric pressure decreases as altitude increases, the pressure difference in the upper and lower chambers is reduced, which provides less fuel to the engine.

The carburetor is equipped with an accelerator pump. The accelerator pump system uses sudden throttle openings (rapid accelerations) to quickly inject fuel into carburetor venturi to provide extra fuel for smooth acceleration.

## OPERATION

## Enrichener

The enricher knob, located under the left side of the fuel tank, controls opening and closing of the enricher circuit in the carburetor. The enricher knob can be adjusted to any position, from full-in to full-out.



### Figure 4-1. CVH Carburetor

## CAUTION

**Never accelerate the engine above 2500 RPM immediately after a cold start. Allow the engine to run slowly for 15-30 seconds. This will allow the engine to warm up and let oil reach all surfaces needing lubrication. Extended idling with enricher in the full out position for a period longer than 30 seconds is not recommended.**

**NOTE**

- *H-D CV carburetors have an enricher circuit that will cause the engine to idle at approximately 2000 rpm with the engine at normal operating temperature and the enricher knob pulled fully out.*

- The increase in idle speed is intended to alert the rider that the engine is warmed up to normal operating temperature and the enrichener knob should be pushed all the way in.
- Continuing to use the enrichener when the engine is at full operating temperature WILL CAUSE FOULED SPARK PLUGS.

### CAUTION

Pay close attention to the vehicle's warm-up time. Either excessive or insufficient use of the enrichener may cause poor performance, erratic idle, poor fuel economy and spark plug fouling.

### NOTE

The following starting and operating instructions for all carbureted motorcycles should be viewed as recommendations only. They may be modified for individual vehicles.

## Cool Engine

### Outside Temperature Cooler than 60° F

Turn the fuel valve to the ON position. BE SURE THAT THE THROTTLE IS CLOSED. Pull the enrichener knob to the "full out" position. Turn the Ignition/Light Key Switch knob to the IGNITION position. Turn the Engine Stop Switch to the RUN position. Press the Engine Start Switch to operate the electric starter.

1. After initial 15-30 second warm-up, ride for 3 minutes or 2 miles (3.2 km) with enrichener knob in full out position. See [Figure 4-2](#).
2. Push the enrichener knob in to the 1/2 way position. Ride an additional 2 minutes or 2 miles (3.2 km).
3. Push the enrichener knob fully in.

### NOTE

If outside temperature is cooler than 20° F it may be necessary to pump the throttle control grip 2 or 3 times.

### Outside Temperature Warmer than 60° F

Turn the fuel valve to the ON position. BE SURE THAT THE THROTTLE IS CLOSED. Pull the enrichener knob to the "full out" position. Turn the Ignition/Light Key Switch knob to the IGNITION position. Turn the Engine Stop Switch to the RUN position. Press the Engine Start Switch to operate the electric starter.

1. After the initial 15-30 second warm-up, ride for 1 minute or 1/2 mile (0.8 km) with enrichener knob in full out position. See [Figure 4-2](#).

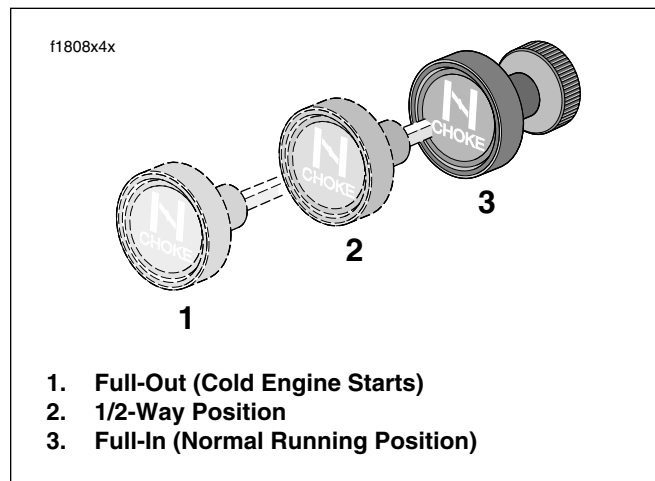


Figure 4-2. Set the Enrichener Knob

2. Push the enrichener knob in to the 1/2 way position. Ride an additional 1 minute or 1/2 mile (0.8 km).
3. Push the enrichener knob fully in.

## Warm Climate Or Hot Engine

Turn the fuel valve to the ON position. Turn the Ignition/Light Key Switch knob to the IGNITION position. Turn the Engine Stop Switch to the RUN position. Open throttle 1/8 - 1/4 turn. Press the Engine Start Switch to operate the electric starter. DO NOT USE ENRICHENER.

### NOTE

If the engine does not start after a few turns or if one cylinder fires weakly but engine does not start, it is usually because of an over-rich (flooded) condition. This is especially true of a hot engine. If the engine is flooded, push enrichener knob in all the way, turn ignition on and operate starter with throttle wide open. DO NOT "pump" the throttle while turning over the engine.

## ADJUSTMENTS

### Slow Idle

### NOTE

Make certain enrichener knob is pushed all the way in before adjusting engine idle. The CV carburetor enrichener-circuit will cause the engine idle speed to increase to between 1500 and 2000 rpm with the enrichener knob pulled out fully and the engine at normal operating temperature. (With the enrichener knob pulled out partially and normal engine operating temperature, the engine idle speed will increase above normal idle speed (950-1050 rpm) to approximately 2000 rpm

*maximum with the enrichener knob pulled out fully). The increase in idle speed is intended to alert the rider that the engine is warmed-up and the enrichener knob should be pushed all the way in. Continued use of the enrichener, after engine is at normal operating temperature, may cause fouled spark plugs.*

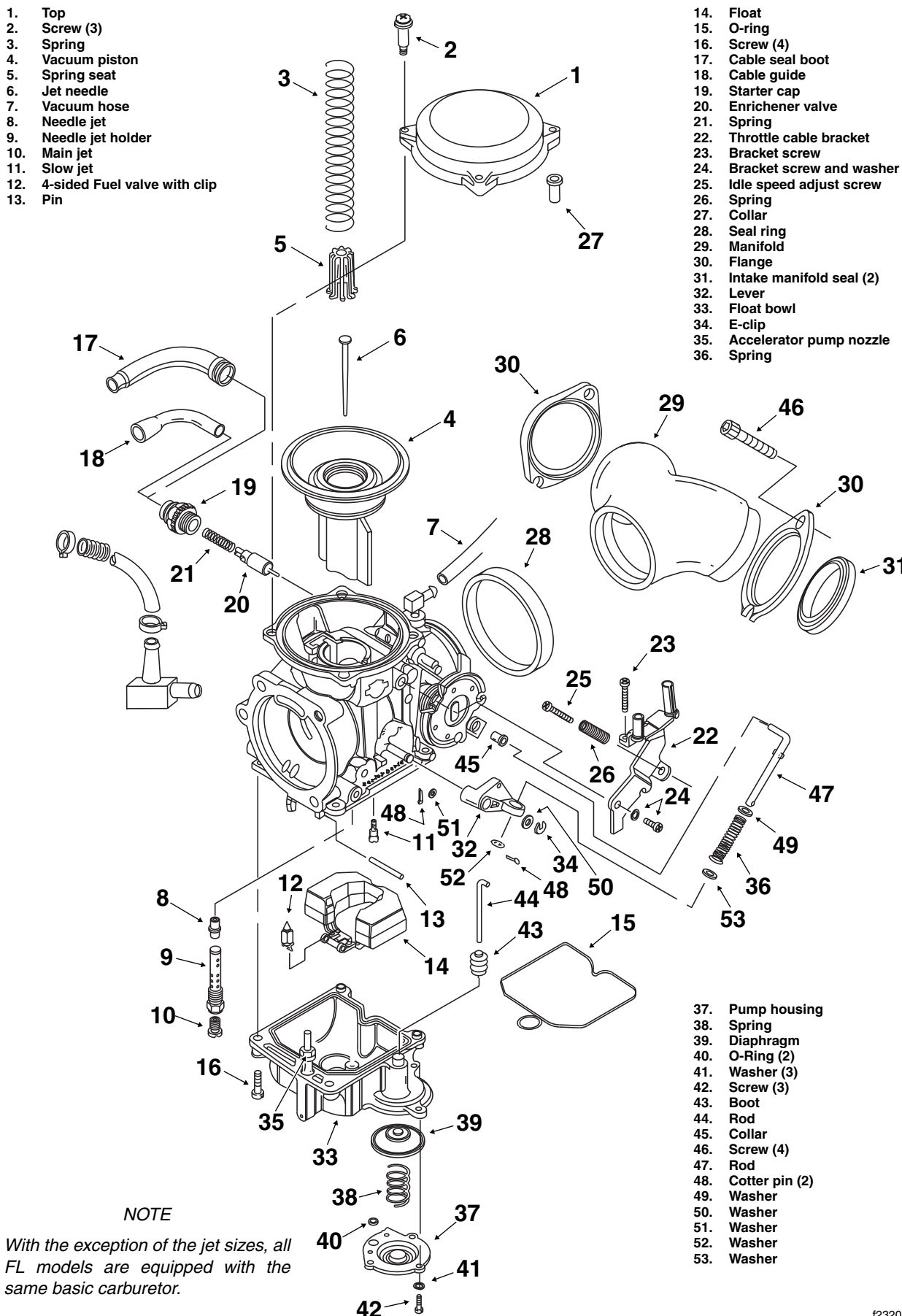
With the engine at normal operating temperature and the enrichener all the way in (enrichener valve closed) adjust the throttle stop screw so the engine idles at 1000 rpm.

#### **NOTE**

*Use a test tachometer, connected to negative ignition coil terminal to measure engine rpm on models without tachometers.*

## **Enrichener Control**

The fuel enrichener knob should open, remain open and then close without binding. The knurled plastic nut next to the enrichener knob controls the ease at which the cable slides within the conduit. If adjustment is needed, see Section [1.12 ENRICHENER CONTROL](#).



f2320x4x

Figure 4-3. Carburetor



## REMOVAL

**⚠ WARNING**

Gasoline is extremely flammable and highly explosive. When servicing the fuel system, do not smoke or allow open flame or sparks in the vicinity. Inadequate safety precautions could result in death or serious injury.

1. Remove maxi-fuse. See Section 8.3 SYSTEM FUSES, MAXI-FUSE, REMOVAL.
2. Remove air cleaner assembly. See Section 4.5 AIR CLEANER, REMOVAL.
3. Locate the fuel enricher knob under the left side of the fuel tank, and loosen hex nut at backside of mounting bracket. Slide cable assembly free of slot in mounting bracket.
4. Rotate handle on fuel valve to the horizontal position to shut the gasoline supply to the carburetor OFF.

**⚠ WARNING**

Some gasoline will drain from the fuel inlet hose when disconnected from the carburetor. Thoroughly wipe up any spilled fuel immediately. Dispose of rags in a suitable manner. Gasoline is extremely flammable and highly explosive. Inadequate safety precautions could result in death or serious injury.

5. Using a side cutters, cut clamp and remove fuel inlet hose from fitting at side of carburetor.

**NOTE**

On California models, pull purge tube from fitting on same side of carburetor.

6. Gently work carburetor free of seal ring on intake manifold.

**⚠ WARNING**

As the carburetor is removed, be sure to keep assembly upright as the float bowl contains gasoline. Tilting the carburetor or turning it upside down will cause the gasoline to drain onto surrounding area. Gasoline is extremely flammable and highly explosive. Inadequate safety precautions could result in death or serious injury.

7. If cruise control equipped, remove E-clip from groove at end of cruise cable housing. Remove cruise cable housing from cable guide in throttle cable bracket. Push plastic end fitting on cruise cable to outboard side to release from wheel pin.

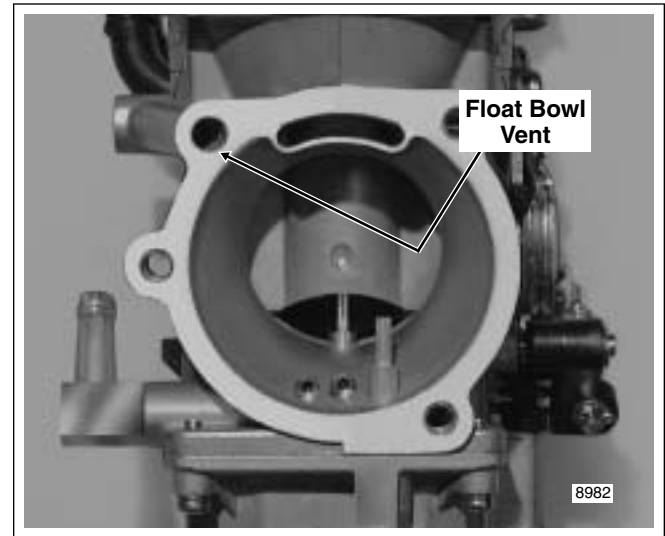


Figure 4-4. Drain Carburetor Float Bowl

8. Using a needle nose pliers, carefully pull idle cable barrel from upper inboard hole in throttle wheel. Pull throttle cable barrel from remaining hole. Release idle and throttle cables from guides in throttle cable bracket.
9. Pull vacuum hose elbow from fitting on inboard side of carburetor.
10. Carefully remove carburetor while drawing enricher cable to right side of motorcycle.
11. Keeping carburetor upright, move assembly to bench area. Tilting carburetor, carefully pour gasoline in float bowl into a suitable container. Gasoline will exit float bowl vent shown in Figure 4-4.

## INSTALLATION

1. Place carburetor into approximate position on right side of motorcycle while feeding enricher cable over to left side.
2. Push vacuum hose elbow onto fitting on inboard side of carburetor.
3. Install sleeve on throttle cable housing into shorter cable guide in throttle cable bracket. Drawing throttle cable downward, fit barrel end into lower outboard hole in throttle wheel. Install sleeve and spring on idle cable housing into longer cable guide inserting barrel end into upper inboard hole in throttle wheel.



**Figure 4-5. Remove Enrichener Cable**

4. Verify that cables are fully seated in channel of throttle wheel, and using cable adjusters at handlebar, tighten cables as necessary to keep barrel ends from dislodging. Verify operation by turning throttle grip and observing cable action.
5. If cruise control equipped, slide plastic end fitting over cap of wheel pin. Push on end fitting until it snaps in place. Slip cruise cable housing into cable guide in throttle cable bracket. Install **new** E-clip into groove at end of cruise cable housing.

#### NOTE

*The fit between the carburetor and seal ring is tight. Prior to assembly, lubricate mating surfaces with liquid dishwashing soap or tire mounting lube. Always install **new** seal ring if dried out, cracked or otherwise damaged.*

6. Lubricate inside diameter of seal ring. Also apply a light film of lubricant to carburetor housing where casting comes into contact with seal ring. Gently work carburetor into seal ring.
7. Slide **new** clamp onto free end of fuel inlet hose. Install hose onto brass fitting at side of carburetor. Making sure clamp is positioned inboard of lip on fitting, crimp clamp using HOSE CLAMP PLIERS (HD-97087-65B).

#### NOTE

*On California models, push purge tube onto fitting on same side of carburetor.*

8. Moving to left side of motorcycle, slide threaded portion of enrichener cable into slot of mounting bracket. Flat on threads must face rear of motorcycle for script on enrichener knob to be right side up. With the external tooth lockwasher and hex nut positioned on the inboard side of the mounting bracket, tighten hex nut to 20-35 **in-lbs** (2.3-4.0 Nm).
9. Adjust throttle cables. See Section 2.21 **THROTTLE CABLES (NON-CRUISE), ADJUSTMENT**.

10. Install air cleaner assembly. See Section 4.5 **AIR CLEANER, INSTALLATION**.
11. Install maxi-fuse. See Section 8.3 **SYSTEM FUSES, MAXI-FUSE, INSTALLATION**.
12. Rotate handle of fuel valve clockwise to the vertical position and carefully inspect for leaks. Return the valve to the OFF position when finished.
13. Adjust the engine idle speed. See Section 4.3 **ENRICHENER (CARBURETED), ADJUSTMENTS**.

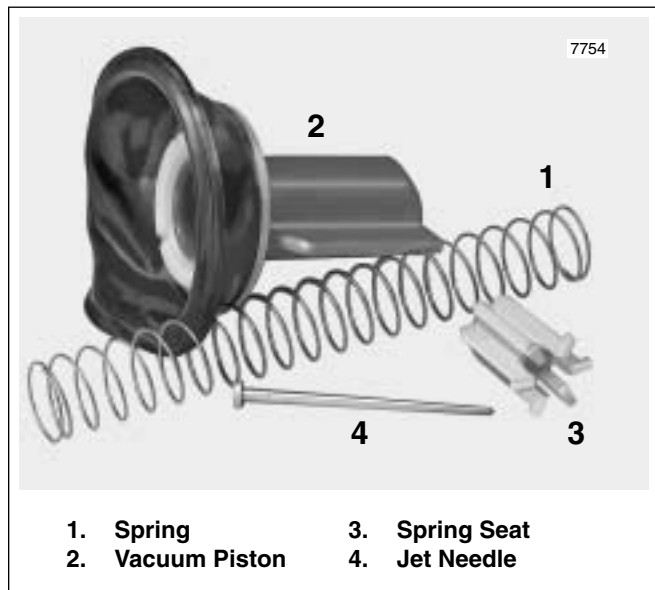
## DISASSEMBLY

### Vacuum Piston Chamber

1. Placing a 14mm open end wrench on hex, loosen plastic fitting at enrichener bore of carburetor housing. See [Figure 4-5](#). Rotate enrichener cable in a counterclockwise direction to unthread fitting and remove valve assembly.
2. Remove gold Phillips screw (with lockwasher) at side of carburetor to release throttle cable bracket. Remove gold Phillips screw (with top collar) to free throttle cable bracket from carburetor top. Set bracket aside.
3. Remove three remaining top screws to release carburetor top from body.
4. Remove vacuum piston spring. Carefully raise diaphragm to remove vacuum piston assembly. Remove spring seat and jet needle from vacuum piston bore. See [Figure 4-6](#).

### Float Chamber

1. Turn carburetor upside down and remove four Phillips screws at bottom to remove float bowl from carburetor body.



- |                  |                |
|------------------|----------------|
| 1. Spring        | 3. Spring Seat |
| 2. Vacuum Piston | 4. Jet Needle  |

**Figure 4-6. Vacuum Piston Chamber Components**

## NOTE

Since accelerator pump rod is now loose, remove from hole in lever at side of carburetor body.

## CAUTION

Tapping the float pin out from the squared pedestal side will result in damage that requires carburetor replacement

2. Using a small center punch and hammer, carefully tap float pin from holes in pedestals. The rounded pedestal has an interference fit to ensure that the float pin is securely held, so always tap out the pin in the direction of the cast-in arrow (that is, from the interference side). See Figure 4-7.
3. Remove float and fuel valve. Carefully slide wireform clip on fuel valve from tab on float. Remove wireform clip from groove in fuel valve. See A of Figure 4-8.
4. Using slot at top, turn main jet with flat tip screwdriver to unthread from needle jet holder. If necessary, hold hex on needle jet holder with a 5/16 inch wrench to prevent rotation. See Figure 4-10.
5. Using a 5/16 inch wrench, turn hex on needle jet holder to unthread from main jet bore.
6. Turn carburetor right side up to drop out needle jet, which is loose in main jet bore. See B of Figure 4-8.
7. Insert thin bladed flat tip screwdriver into slow jet bore. See Figure 4-10. Using slot at top of slow jet, unthread to remove. See C of Figure 4-8.
8. Disassemble accelerator pump from float bowl. See Figure 4-9. Proceed as follows:

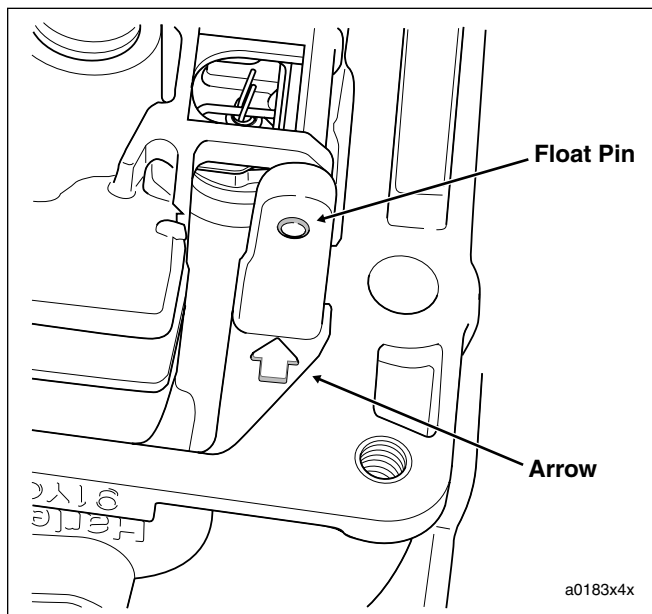


Figure 4-7. Remove Float Pin in Direction of Arrow

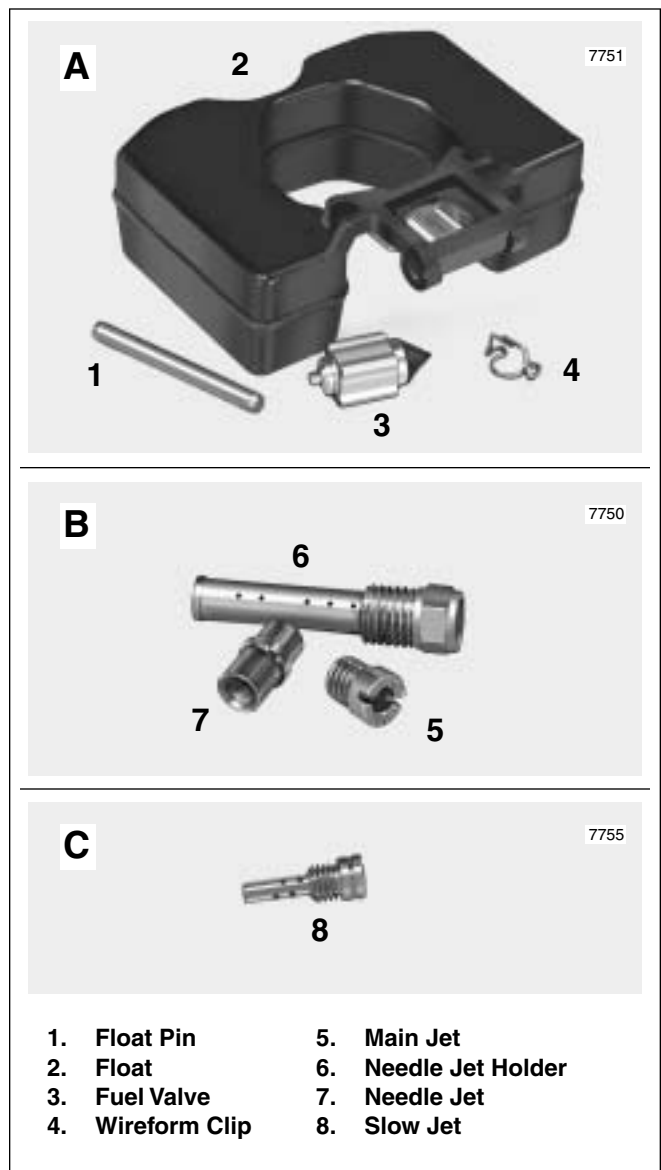


Figure 4-8. Float Chamber Components

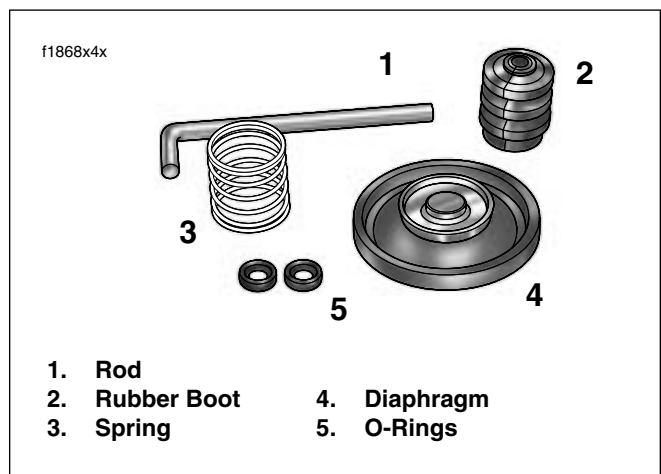


Figure 4-9. Accelerator Pump Components

- a. Remove rubber boot from post at top of accelerator pump upper housing.
- b. Turn float bowl upside down. Alternately loosen and then remove three Phillips screws (with lock-washers) to release accelerator pump lower housing.
- c. Remove spring and diaphragm from accelerator pump upper housing. Remove two O-rings from lower housing.

## CLEANING AND INSPECTION

### Carburetor Housing

1. Clean all internal air/fuel passages in carburetor housing with carburetor cleaner. Blow out passages using low pressure compressed air. Proceed as follows:

#### **⚠ WARNING**

**Compressed air can pierce the skin and flying debris from compressed air could cause serious eye injury. Wear safety glasses when working with compressed air. Never use your hand to check for air leaks or to determine air flow rates. (00061a)**

#### Slow Speed Circuit

- a. Spray carburetor cleaner into air inlet hole of slow speed circuit. See A of [Figure 4-11](#). While spraying, verify that solution exits slow jet bore at bottom of carburetor housing. See B of [Figure 4-11](#). Placing gloved finger over slow jet bore, verify that solution exits four pin holes just inboard of the throttle plate, as well as the single pin hole outboard of the throttle plate.

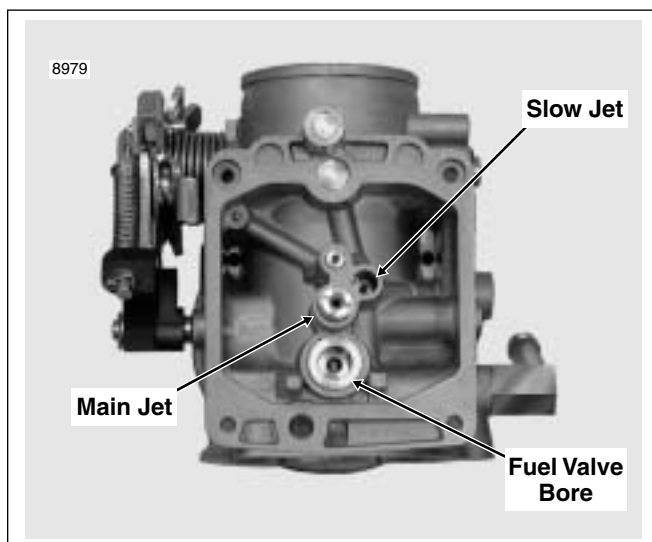


Figure 4-10. Carburetor Housing

- b. Using a tapered, rubber-tipped nozzle on the air hose (to prevent both loss of air pressure and to avoid scratching or nicking the bore), apply low pressure compressed air into air inlet hole to blow carburetor cleaner out of slow jet bore. Placing gloved finger over slow jet bore, blow carburetor cleaner out of pin holes inboard and outboard of throttle plate.

#### Main Circuit

- a. Plugging main jet hole in carburetor throat, spray carburetor cleaner into air inlet hole of main circuit. See A of [Figure 4-11](#). While spraying, verify that solution exits main jet bore at bottom of carburetor housing. See B of [Figure 4-11](#).
- b. Using a tapered, rubber-tipped nozzle on the air hose (to prevent both loss of air pressure and to avoid scratching or nicking the bore), apply low pressure compressed air into air inlet hole to blow carburetor cleaner out of hole in carburetor throat. Placing gloved finger over hole in carburetor throat, blow carburetor cleaner out of main jet bore at bottom of carburetor housing.

#### Float Bowl Vent

- a. Spray carburetor cleaner into air inlet hole of float bowl vent. See A of [Figure 4-11](#). While spraying, verify that solution exits two vent holes in float bowl chamber at bottom of carburetor housing. See B of [Figure 4-11](#).
- b. Using a tapered, rubber-tipped nozzle on the air hose (to prevent both loss of air pressure and to avoid scratching or nicking the bore), apply low pressure compressed air into air inlet hole of float bowl vent to blow carburetor cleaner out of holes in float bowl chamber.

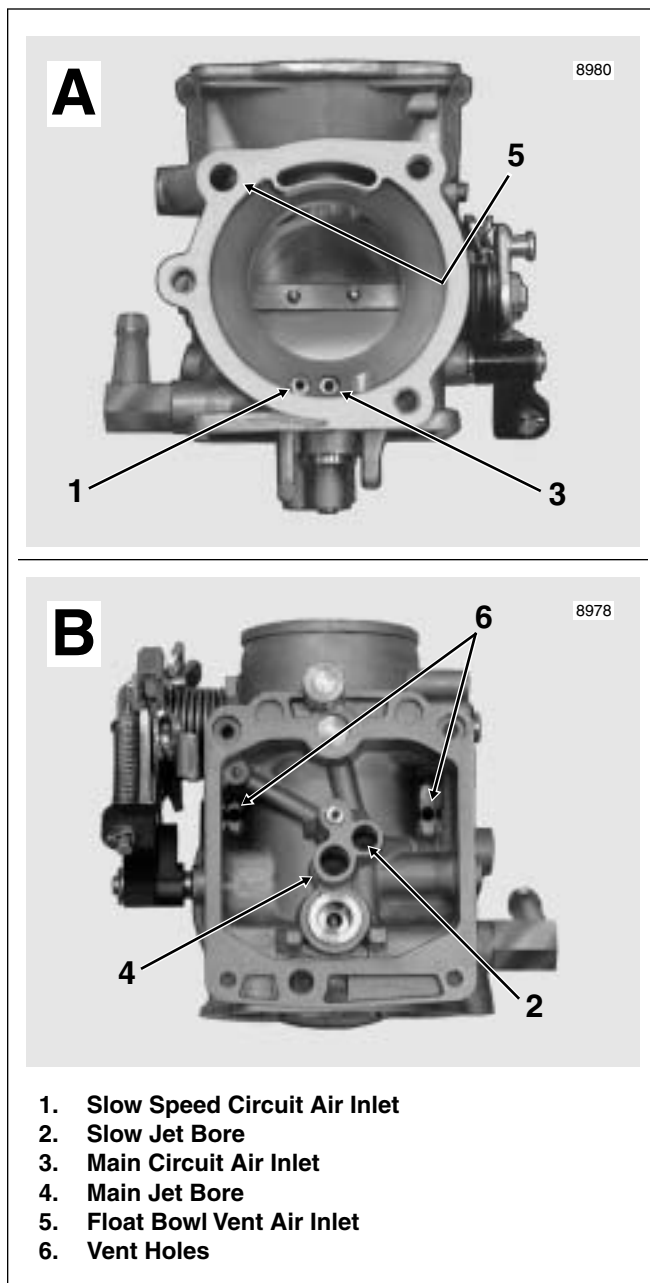
### Vacuum Piston Chamber Components

1. Thoroughly clean all loose parts (except diaphragm) with carburetor cleaner. See [Figure 4-6](#). Blow dry using low pressure compressed air.

#### **⚠ WARNING**

**Compressed air can pierce the skin and flying debris from compressed air could cause serious eye injury. Wear safety glasses when working with compressed air. Never use your hand to check for air leaks or to determine air flow rates. (00061a)**

2. Inspect parts as follows:
  - a. Hold vacuum piston up to strong light source. Examine diaphragm for pin holes, cuts, tears or pinching. Replace if any damage is found.
  - b. Examine passage at bottom of vacuum piston bore. Verify that passage is clean and open.



**Figure 4-11. Clean Air/Fuel Passages**

- c. Examine vacuum piston spring for stretching, kinking, distortion or other damage. Inspect spring seat for cracks. Replace parts if necessary.
- d. Examine slides at sides of vacuum piston to verify that surfaces are clean and smooth. Clean or buff out any rough surfaces.
- e. Examine tip of jet needle for grooves or scratches. Needle should be completely straight, while surface condition at taper should be smooth and even. Replace needle if necessary.

## Float Chamber Components

1. Thoroughly clean all loose parts with carburetor cleaner. See [Figure 4-8](#). Blow dry using low pressure compressed air.

### **⚠ WARNING**

**Compressed air can pierce the skin and flying debris from compressed air could cause serious eye injury. Wear safety glasses when working with compressed air. Never use your hand to check for air leaks or to determine air flow rates. (00061a)**

2. Inspect parts as follows:
  - a. Inspect O-ring in groove of float bowl for cuts, tears or signs of deterioration. Replace O-ring if distorted or if sealing surface is damaged.
  - b. Inspect float pin for damage or distortion. Replace float pin if corroded, nicked or bent.
  - c. Clean float and inspect for cracks or other damage. Submerge float in a glass of water. Replace float if not water tight.
  - d. Depress pin on fuel valve to verify that it returns to the full-out position. Thoroughly clean valve with carburetor cleaner if pin is dirty or sticks. Inspect rubber cone on valve for dirt, cracks, hardening or wear. Inspect wireform clip for distortion. Replace fuel valve assembly if any of these conditions are found.
  - e. Inspect fuel valve seat in carburetor housing for dirt, damage or corrosion. Replace carburetor if seat damage or corrosion is present.
  - f. Verify cleanliness of main jet, needle jet holder and needle jet. Verify that orifices in needle jet holder are clean and open. Replace parts if damaged.
  - g. Verify cleanliness of slow jet. Be sure that all orifices are clean and open. Replace jet if damaged.

## Accelerator Pump

- h. Inspect the accelerator pump diaphragm for holes, cuts, tears or cracks. Replace diaphragm if deformed or damaged.
- i. Examine spring for stretching, kinking or distortion. Replace if any damage is found.
- j. Inspect the accelerator pump rod for straightness. Replace the rod if bent.
- k. Inspect rubber boot and two O-rings for cuts, tears or signs of deterioration. Replace if necessary.



## ASSEMBLY

### Vacuum Piston Chamber

1. Install vacuum piston into carburetor body. Slides on piston are offset, so piston will fit into slide track groove only one way. If vacuum piston does not fit, rotate assembly 180°.
2. Insert jet needle into vacuum piston bore, so that it enters center hole at bottom. In the installed position, head of needle contacts boss at bottom of vacuum piston bore, while length of shaft resides in main jet bore.
3. With the legged side down, slide spring seat over top of needle in vacuum piston bore. Slide spring over spring seat.
4. Verify that lip on edge of diaphragm is seated in groove of carburetor flange.

#### NOTE

*Diaphragm expands when in contact with fuel. If diaphragm is difficult to seat in groove because of this condition, allow diaphragm to dry before attempting to install.*

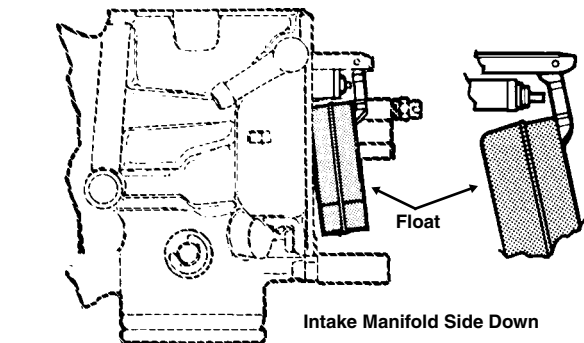
5. Fit free end of spring over boss on inboard side of carburetor top, and keeping spring straight, align holes in top with those in flange.
6. Holding top to flange, check for proper diaphragm seal by pushing up on vacuum piston (from intake side) and releasing. If diaphragm is sealed correctly, very slight resistance should be felt when pushing up, and piston should be slow to extend. If piston movement is restricted, spring is cocked. Lift up on top and then lower carefully keeping spring coils straight.
7. Install three black top screws in holes furthest from throttle wheel. Alternately tighten screws until snug.
8. Slide gold top collar into remaining hole in carburetor top. With end of idle screw resting against idle cam stop, align holes in throttle cable bracket with those in carburetor body and top cover. To prevent bending bracket or cam stop, first install gold Phillips screw (with lock-washer) at side of carburetor. At carburetor top, install remaining Phillips screw.
9. Carefully insert enricher valve into carburetor bore. Start threaded end of plastic fitting into bore, and then rotate cable in a clockwise direction to install. Exercising caution to avoid damaging the plastic construction, tighten fitting using a 14mm open end wrench. See [Figure 4-5](#).

### Float Chamber

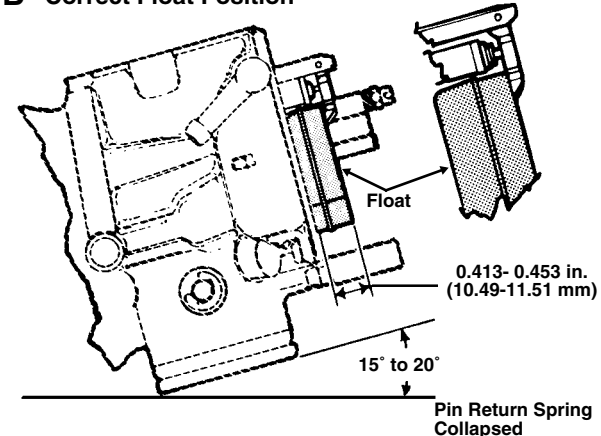
1. Place needle jet into main jet bore. See [Figure 4-10](#). Be sure end with chamfered edge and larger ID goes in first.
2. Insert needle jet holder into main jet bore, and using a 5/16 inch wrench, turn hex until snug.
3. Thread main jet into needle jet holder. Using slot at top of main jet, tighten with flat tip screwdriver until snug.

#### A Start Float Position

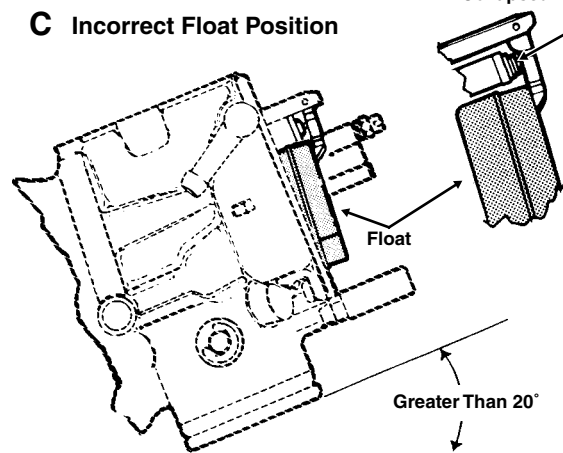
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#### B Correct Float Position



#### C Incorrect Float Position



**Figure 4-12. Float Check and Adjustment**

4. Insert slow jet into slow jet bore. See [Figure 4-10](#). Insert thin bladed flat tip screwdriver into bore, and using slot at top of slow jet, tighten until snug.
5. Install wireform clip into groove on pin side of fuel valve, if removed. Using wireform clip, carefully hang fuel valve onto tab of float, so that tip of rubber cone hangs flush with top of float (the top being the side opposite the pivot arm).

6. Place float into cavity of carburetor inserting fuel valve into bore between pedestals. See [Figure 4-10](#).

### CAUTION

**Tapping the float pin in from the rounded pedestal side will result in damage that requires carburetor replacement.**

7. Insert float pin through squared pedestal and pivot arm of float into rounded pedestal. Since the rounded pedestal has an interference fit to ensure that the float pin is securely held, always install pin from the loose side (in the direction opposite the cast-in arrow). Using a small center punch and hammer, carefully tap float pin until ends are flush with outboard sides of pedestals.
8. Perform float level check as follows:
  - a. Place carburetor on a clean flat surface with the intake manifold side down. See A of [Figure 4-12](#).
  - b. Tilt the carburetor 15° to 20° in a counter-clockwise direction until float comes to rest. See B of [Figure 4-12](#).

### NOTE

*The measurements will be incorrect if the carburetor is tilted less than 15° or more than 20°.*

- c. Using a dial vernier caliper or dial caliper depth gauge, measure the distance from the face of the carburetor flange to the outboard edge of the float. Be careful not to push on float while measuring.
- d. If the measurement is between 0.413 inch and 0.453 inch (10.49 -11.51 mm), then the float level is within specification. Proceed to step 9.
- e. If the float level is not within specification, remove the float, and referencing the table below, carefully bend the tab slightly to adjust the float level. For example, to increase the float measurement, bend the tab toward the carburetor body. This will have the affect of decreasing the amount of gas in the float bowl after assembly.

**Table 4-1. Float Level Tab**

Float Measurement	Bend Tab	Amount of Gas in Float Bowl
To Increase	<u>Toward</u> Carburetor Body	Decreased
To Decrease	<u>Away</u> From Carburetor Body	Increased

- f. Install float and check float level again. Repeat procedure as necessary until float level is within specification.
9. Install new O-ring into groove of float bowl, if removed. Be sure to thoroughly clean groove before O-ring installation.
10. Assemble accelerator pump as follows:
  - a. With the flat side toward the casting, install two O-rings into counterbores of accelerator pump lower housing.
  - b. Install diaphragm into accelerator pump upper housing. Verify that lip on edge of diaphragm is fully seated in groove.
  - c. Place spring onto spring seat at center of installed diaphragm.
  - d. Keeping spring straight, mate upper and lower housings of accelerator pump. Install three Phillips screws (with lockwashers).
  - e. Install rubber boot onto post at top of accelerator pump upper housing.
  - f. Hook accelerator pump rod into hole on inboard side of lever at side of carburetor body.
11. Install float bowl at bottom of carburetor body engaging free end of accelerator pump rod in hole of rubber boot.
12. Install four Phillips screws to secure float bowl at bottom of carburetor body. Tighten screws until snug.

## REMOVAL

1. Remove large allen head socket screw in center of air cleaner cover. Remove air cleaner cover with rubber seal. See Figure 4-13.
2. Remove three T27 TORX screws to release cover bracket from filter element.
3. Remove filter element pulling two breather tubes from holes on inboard side.
4. Remove gasket from sleeve on inboard side of filter element. Discard gasket.
5. Remove breather tubes from fittings on two cylinder head breather bolts.
6. Remove two cylinder head breather bolts from backplate using a 7/16 inch deepwell socket.
7. Remove backplate from cylinder heads. On carbureted California models, pull clean air inlet tube (to charcoal canister) from hole on inboard side of backplate.
8. Remove two O-rings from grooves around breather bolt holes on inboard side of backplate. Discard O-rings.
9. Remove gasket from inboard side of backplate. Discard gasket.

## CLEANING AND INSPECTION

1. Thoroughly clean air cleaner cover, breather tubes and backplate with warm, soapy water.
2. Clean the filter element as follows:

**⚠ WARNING**

**Do not use gasoline or solvents to clean filter element. Flammable cleaning agents can cause an intake system fire, which could result in death or serious injury. (00101a)**

- a. Wash the filter element in warm, soapy water. To remove soot and carbon, soak element for 30 minutes in warm water with mild detergent.

**⚠ WARNING**

**Compressed air can pierce the skin and flying debris from compressed air could cause serious eye injury. Wear safety glasses when working with compressed air. Never use your hand to check for air leaks or to determine air flow rates. (00061a)**

- b. Dry the filter element using low pressure compressed air (32 psi/221 kPa maximum). Rotate the element while moving air nozzle up and down the element interior. Do not rap the element on a hard surface.

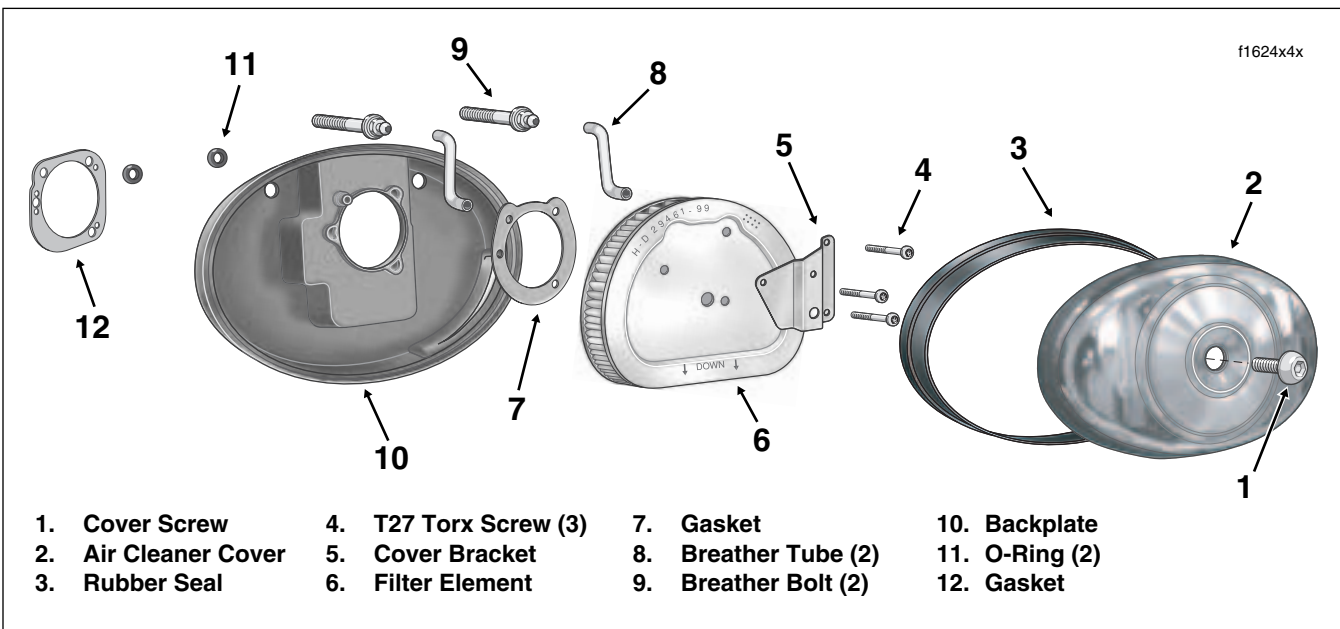


Figure 4-13. Air Cleaner Assembly



- c. Hold the filter element up to a strong light source. The element can be considered sufficiently clean if light is uniformly visible through the media.

#### NOTE

*Replace the filter element if damaged or if filter media cannot be adequately cleaned.*

3. Inspect the breather tubes and rubber seal for cuts, tears, holes or signs of deterioration. Replace as necessary. Direct compressed air through the breather tubes to be sure that they are not plugged.

## INSTALLATION

---

1. Install **new** O-rings in grooves around breather bolt holes on inboard side of backplate.
2. Aligning flat edge of gasket with molded tab, install **new** gasket on inboard side of backplate. On California models, install gasket by aligning small holes with plastic pins.
3. On California models, push clean air inlet tube (to charcoal canister) into hole on inboard side of backplate.
4. Align holes in backplate with those in cylinder heads and install cylinder head breather bolts. Using a 7/16 inch deepwell socket, alternately tighten bolts to 120-144 **in-lbs** (13.6-16.3 Nm).
5. Slide **new** gasket over sleeve on inboard side of filter element. Be sure holes in gasket are aligned with those in filter.
6. Insert breather tubes about 1/4 inch (6.4 mm) into holes on inboard side of filter element.
7. Install breather tubes onto fittings of two cylinder head breather bolts.

#### NOTE

*Air cleaner mounting without installation of the breather tubes allows crankcase vapors to be vented into the atmosphere in violation of legal emissions standards.*

8. Place filter element onto backplate with the flat side down, so that hole on inboard side of element fits over molded boss in backplate.
9. Align holes in cover bracket with those in filter element and start three T27 TORX screws. Stamp on cover bracket points to downside. Alternately tighten screws to 40-60 **in-lbs** (4.5-6.8 Nm).
10. Verify that rubber seal is properly seated around perimeter of air cleaner cover.
11. Fit air cleaner cover into backplate. Apply a small dab of Loctite Medium Strength Threadlocker 243 (blue) to threads of large allen head socket screw. Install screw in center of air cleaner cover and tighten to 36-60 **in-lbs** (4.1-6.8 Nm).

## GENERAL

A fuel valve is located under the fuel tank on the left side of the motorcycle. The gasoline supply to the carburetor is dependent upon the position of the valve handle as well as the internal workings of the vacuum-operated valve.

To access the main fuel supply, turn the valve handle **down** to the fully vertical position, so that the indicator points up to ON. To access the reserve supply, turn the handle **up** to the fully vertical position, so that the indicator points down to RES(ERVE). Move the handle to the horizontal position to shut the gasoline supply to the carburetor OFF. Always turn the valve to the OFF position to refuel, or whenever the engine is not running.

Gasoline will not flow through the fuel valve until the following conditions are met:

1. The valve handle must be turned to the ON or RES(ERVE) position.
2. A vacuum of approximately 0.5-1.0 inches of Mercury (Hg) must be applied to the vacuum fitting at the back of the fuel valve.

In service, the vacuum fitting is connected to the intake manifold. The partial vacuum applied at the fitting creates a difference in pressure between the front side of the diaphragm (which is vented to the atmosphere via the bottom fitting on the fuel valve) and the rear. This pressure differential causes the diaphragm to move against an internal spring, thereby opening an orifice that enables the flow of gasoline to the carburetor. When the vacuum at the vacuum fitting is removed, the internal spring pressure closes the orifice, which effectively halts the supply of fuel to the carburetor.

## TROUBLESHOOTING

If the fuel valve is not functioning properly, refer to the troubleshooting chart on the next page.

## REMOVAL

### DRAINING FUEL TANK

#### ⚠ WARNING

When servicing the fuel system, do not smoke or allow open flame or sparks in the vicinity. Gasoline is extremely flammable and highly explosive, which could result in death or serious injury. (00330a)

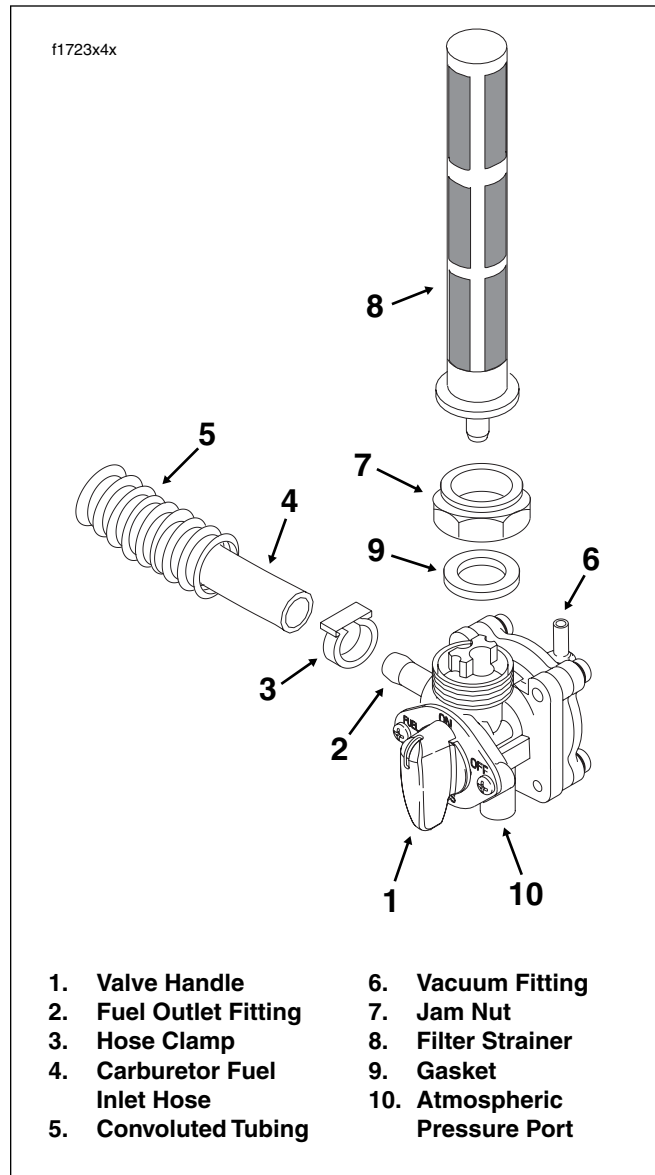


Figure 4-14. Vacuum Operated Fuel Valve

1. Turn the handle of the fuel valve to OFF.

#### ⚠ WARNING

A small amount of gasoline may drain from the carburetor fuel inlet hose when disconnected from the fuel valve fitting. Thoroughly wipe up any spilled fuel immediately and dispose of rags in a suitable manner. Gasoline is extremely flammable and highly explosive. Inadequate safety precautions could result in death or serious injury.

2. Using a side cutters, cut clamp and remove hose from fuel outlet fitting at the front of the fuel valve. See [Figure 4-14](#). Drain free end of hose into a suitable container.
3. Remove elbow of intake manifold vacuum tube from fitting on inboard side of the fuel valve.
4. Attach a length of fuel hose to the fuel outlet fitting. The hose must be long enough to reach a suitable gasoline container.
5. Turn the handle of the fuel valve to RES(ERVE).
6. Using the correct hose adapter, connect the Mity-Vac® Hand Pump (HD-23738A) to the vacuum fitting.

### CAUTION

**To avoid damage to the diaphragm of the fuel valve, do not apply a vacuum greater than 25 inches of Mercury (Hg) to the vacuum fitting.**

7. Gently apply a vacuum of 1-10 inches of Mercury (Hg) to the vacuum fitting to get a good flow of gasoline through the valve.
8. When the fuel tank is completely drained, remove the Mity-Vac® Hand Pump from the vacuum fitting.
9. Holding fuel tank adapter, turn the hex jam nut in a clockwise direction to remove the fuel valve assembly.
10. Remove the fuel filter strainer from the valve head.
11. Remove the hex jam nut from the fuel valve.
12. Remove the gasket from the valve head. Discard the gasket.

## CLEANING AND INSPECTION

1. Clean or replace the fuel filter strainer.
2. Flush the tank. See [Section 4.7 FUEL TANK \(CARBURETED\)](#), [CLEANING AND INSPECTION](#).

## INSTALLATION

1. Install a **new** gasket on the valve head.
2. Install the fuel filter strainer fitting the internal tube into the larger hole in the valve head.
3. Clean threads and sealing surface of fuel tank adapter and inspect for damage. Replace if necessary. See [FUEL TANK ADAPTER](#) on the next page.
4. With the hex side down, turn the jam nut two full turns in a counterclockwise direction to thread onto fuel tank adapter.
5. Insert fuel filter strainer into fuel tank. Holding the hex jam nut to prevent rotation, turn the fuel valve two full turns in a clockwise direction to thread onto hex jam nut.

### WARNING

**Do not thread fuel valve onto hex jam nut more than two turns or nut may “bottom” on valve, a condition which may result in a gasoline leak. Any gasoline leak is a potential fire hazard that could result in death or serious injury.**

**Table 4-2. Troubleshooting Vacuum Operated Fuel Valve**

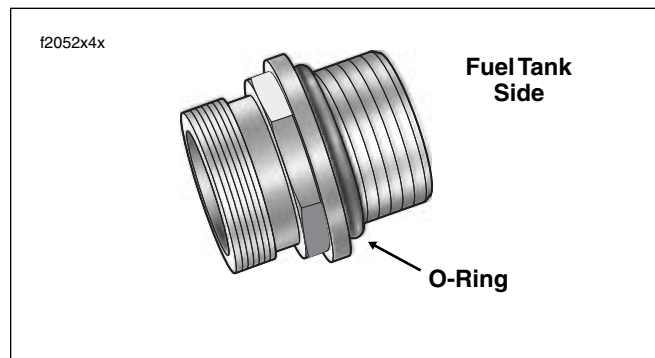
Problem	Cause	Solution
1. Vacuum valve not opening.	1.1 Hose not connected to vacuum fitting.	1.1.1 Connect hose to vacuum fitting.
	1.2 Leaking diaphragm.	1.2.1 Replace fuel valve assembly.
	1.3 Hose connected to atmospheric pressure port.	1.3.1 Connect hose to vacuum fitting.
	1.4 Vacuum hose assembly pinched or cracked.	1.4.1 Replace vacuum hose assembly.
2. Vacuum valve does not close.	2.1 Damaged sealing surface on valve side of diaphragm.	2.2.1 Replace fuel valve assembly.
	2.2 Plugged vacuum fitting.	2.2.2 Clean as necessary.
	2.3 Broken or missing internal spring.	2.3.1 Replace fuel valve assembly.
3. Valve leaks gasoline at atmospheric pressure port.	3.1 Leaking diaphragm.	3.1.1 Replace fuel valve assembly.
	3.2 Loose diaphragm housing screws.	3.2.1 Tighten screws.

6. Holding the fuel valve to prevent rotation, turn the hex jam nut in a counterclockwise direction until snug. Tighten the hex jam nut to 15-20 ft-lbs (20.3-27.1 Nm).

### CAUTION

**Do not allow dirt or fluids to get into the vacuum tube that connects the fuel valve to the intake manifold. Contaminants can block the vacuum signal which could cause the fuel valve to malfunction.**

7. Connect elbow of intake manifold vacuum tube to fitting on inboard side of the fuel valve.
8. Slide **new** clamp onto free end of carburetor fuel inlet hose. Install hose onto fuel outlet fitting at front of fuel valve. Crimp clamp using HOSE CLAMP PLIERS (HD-97087-65B).
9. Turn the handle of the fuel valve to OFF and fill the fuel tank. Carefully inspect for leaks at fitting.
10. Turn the valve handle to ON and start engine. No priming or special procedures are required to start fuel flow. Carefully inspect for leaks at fitting.
11. Stop engine and return the valve to the OFF position.



**Figure 4-15. Fuel Tank Adapter**

## FUEL TANK ADAPTER

If leakage or damage is observed at the fuel tank adapter, replace O-ring and/or adapter as follows:

1. Remove fuel valve assembly. See [REMOVAL](#) in this section.
2. Slide a 7/8 inch socket over hex on adapter, and looking down at top of fuel tank, rotate in a clockwise direction to remove. See [Figure 4-15](#).
3. Remove O-ring from adapter. Discard O-ring.
4. Apply a very thin film of clean H-D 20W50 engine oil to **new** O-ring. Install O-ring into groove of adapter.
5. Hand thread adapter into fuel tank bore. Looking down at top of fuel tank, rotate adapter in a counterclockwise direction until snug.
6. Slide a 7/8 inch socket over hex and tighten to 22-26 ft-lbs (30-35 Nm).
7. Install fuel valve assembly. See [INSTALLATION](#) in this section.

## COMPLETE REMOVAL

## NOTE

For fuel injected models, see Section 9.4 [FUEL TANK \(FUEL INJECTED\)](#) for removal and installation instructions.

## FLHX, FLHT

1. Remove seat. See Section 2.25 [SEAT, REMOVAL](#).

**⚠ WARNING**

To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative (-) battery cable before proceeding. (00048a)

2. Unthread bolt and remove battery negative cable (black) from battery negative (-) terminal.

**⚠ WARNING**

When servicing the fuel system, do not smoke or allow open flame or sparks in the vicinity. Gasoline is extremely flammable and highly explosive, which could result in death or serious injury. (00330a)

3. Drain the fuel tank. See Section 4.6 [VACUUM OPERATED FUEL VALVE \(CARBURETED\), DRAINING FUEL TANK](#), steps 1-8.
4. Disconnect fuel tank harness connector [13], 4-place Multilock, in front of battery. See Figure 4-16.
5. Remove two fuel tank front mounting bolts (with flat washers) from left and right side of frame. Remove bolt (with flat washer) to free rear of fuel tank from frame backbone. On FLHX models, removal of rear bolt also releases console bracket.
6. Open fuel door on console. Remove two Allen head screws inboard of rubber bumpers. These screws secure console to clip nuts on the canopy bracket. If present, also remove Allen head screw to detach flange at rear of console from clip nut on fuel tank weldment (absent on FLHX models).
7. Lay a clean shop cloth on forward part of rear fender. Remove filler cap from neck of fuel tank. Remove console and lay upside down on shop cloth. Reinstall filler cap.
8. Gently pry fuel vapor vent tube from fitting on filler neck of fuel tank. Exercise caution to avoid pulling fitting from filler neck.
9. Remove two fuel tank front mounting bolts (with flat washers) from left and right side of frame. Remove bolt (with flat washer) to free rear of fuel tank from frame backbone.

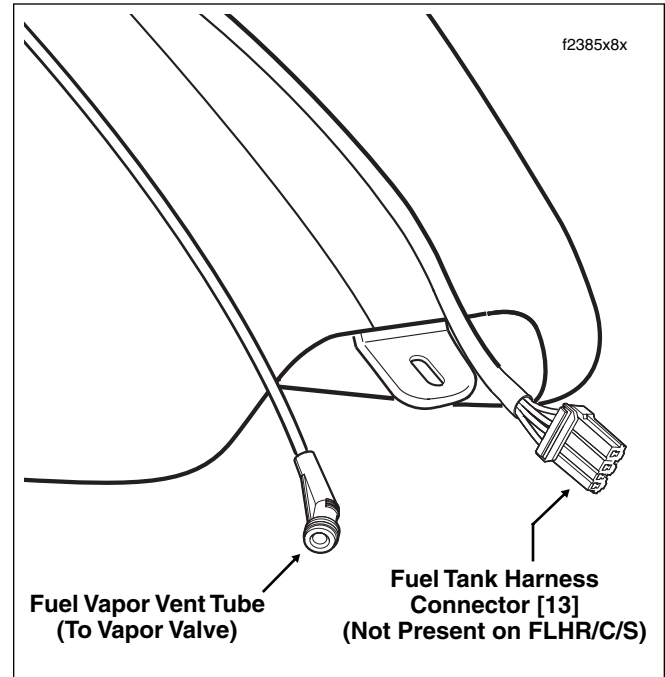


Figure 4-16. Fuel Level Sender Connector (FLHX, FLHT)

**⚠ WARNING**

A small amount of gasoline may drain from the cross-over hose when disconnected from the fuel tank. Thoroughly wipe up any spilled fuel immediately and dispose of rags in a suitable manner. Gasoline is extremely flammable and highly explosive. Inadequate safety precautions could result in death or serious injury.

10. Using a side cutters, cut clamp from one end of cross-over hose beneath fuel tank. Drain free end of hose into a suitable container.
11. Remove fuel tank from motorcycle.

## FLHR/S

1. Remove seat. See Section 2.25 [SEAT, REMOVAL](#).

**⚠ WARNING**

To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative (-) battery cable before proceeding. (00048a)

2. Unthread bolt and remove battery negative cable (black) from battery negative (-) terminal.

**⚠ WARNING**

**When servicing the fuel system, do not smoke or allow open flame or sparks in the vicinity. Gasoline is extremely flammable and highly explosive, which could result in death or serious injury. (00330a)**

3. Drain the fuel tank. See Section [4.6 VACUUM OPERATED FUEL VALVE \(CARBURETED\)](#), [DRAINING FUEL TANK](#), steps 1-8.
4. Remove two fuel tank front mounting bolts (with flat washers) from left and right side of frame. Remove bolt (with flat washer) to free rear of fuel tank from frame backbone. On FLHRS models, removal of rear bolt also releases instrument console bracket.
5. Remove acorn nut from instrument console. If present, also remove Phillips screw and large flat washer (absent on FLHRS models).
6. Raise instrument console and bend back flexible clamp on canopy to release main harness conduit. Remove fuel level sender connector [141], 4-place Packard, at top of canopy.

**CAUTION**

**When removing instrument console, exercise caution to avoid damaging speedometer unit. Wrap console in a clean, dry shop towel to prevent damage.**

7. Secure instrument console to top of rear fender using bungee cords.
8. Remove console mounting bolt from slot at top of canopy.
9. Gently pry fuel vapor vent tube from fitting.
10. At bottom left side of fuel tank, gently pull on convoluted tubing to draw fuel gauge connector [117], 4-place Multilock, out of tunnel. Depress button on socket terminal side and pull apart pin and socket halves.

**⚠ WARNING**

**A small amount of gasoline may drain from the crossover hose when disconnected from the fuel tank. Thoroughly wipe up any spilled fuel immediately and dispose of rags in a suitable manner. Gasoline is extremely flammable and highly explosive. Inadequate safety precautions could result in death or serious injury.**

11. Using a side cutters, cut clamp from one end of crossover hose beneath fuel tank. Drain free end of hose into a suitable container.
12. Remove fuel tank from motorcycle.

## CLEANING AND INSPECTION

1. Inspect the fuel tank for leaks and other damage. Replace damaged tanks that cannot be successfully repaired.
2. If sludge, rust or varnish deposits are evident, clean fuel tank as follows:

**⚠ WARNING**

**Even with the fuel tank completely drained, a small amount of gasoline may leak from the bore when the fuel valve is loosened or removed. Thoroughly wipe up any spilled fuel immediately and dispose of rags in a suitable manner. Gasoline is extremely flammable and highly explosive. Inadequate safety precautions could result in death or serious injury.**

- a. Remove the fuel valve assembly and plug fuel tank opening. See Section [4.6 VACUUM OPERATED FUEL VALVE \(CARBURETED\)](#), [REMOVAL](#).
- b. Remove canopy as follows:

**FLHX, FLHT, FLTR:** See Section [8.30 FUEL LEVEL SENDER \(CARBURETED\)](#), [FLHX, FLHT CANOPY, REMOVAL](#), steps 10-12.

**FLHR:** See Section [8.30 FUEL LEVEL SENDER \(CARBURETED\)](#), [FLHR/S CANOPY, REMOVAL](#), steps 10-12.

**⚠ WARNING**

**An open flame or spark may cause a fuel tank explosion if all traces of fuel are not purged from the tank. Use extreme caution when servicing fuel tanks. Inadequate safety precautions could result in death or serious injury.**

- c. Fill the tank with commercial cleaning solvent or a soap and water solution. Shake the tank to agitate the cleaning agent.

**⚠ WARNING**

**Use only lead pellets to loosen deposits. Metal balls, such as ball bearings, can cause a spark and explosion, which could result in death or serious injury. (00261a)**

- d. If necessary, non-ferrous metallic balls or pellets may be added to the tank to help loosen deposits.
- e. Thoroughly flush the fuel tank after cleaning. Allow tank to air dry.
- f. Install fuel valve assembly. See Section [4.6 VACUUM OPERATED FUEL VALVE \(CARBURETED\)](#), [INSTALLATION](#).



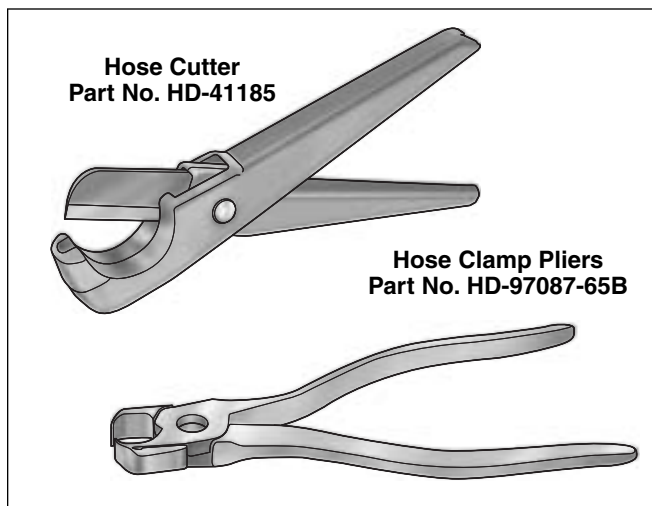


Figure 4-17. Hose Cutter/Hose Clamp Pliers

- g. Install canopy as follows:

**FLHX, FLHT, FLTR:** See Section 8.30 FUEL LEVEL SENDER (CARBURETED), FLHX, FLHT CANOPY, INSTALLATION, steps 1-3.

**FLHR:** See Section 8.30 FUEL LEVEL SENDER (CARBURETED), FLHR/S CANOPY, INSTALLATION, steps 1-3.

3. Inspect crossover hose for cuts, cracks, nicks or other damage. Be sure aging has not caused the hose to become hard and brittle. If replacing from bulk storage, use SAE R9 or equivalent fuel hose only. Remove old hose and cut new hose to same length using HOSE CUTTER (HD-41185). See Figure 4-17.

## INSTALLATION (AFTER COMPLETE REMOVAL)

### FLHX, FLHT

1. Work fuel tank into position aligning front flange holes with those in left and right side of frame.
2. Start fuel tank front mounting bolts (with flat washers).
3. Route free end of crossover hose under frame backbone and in front of ignition coil to other side of fuel tank. Install convoluted tubing, if removed, and **new** clamp onto hose. Install hose onto fitting at bottom of fuel tank and crimp clamp using HOSE CLAMP PLIERS (HD-97087-65B). See Figure 4-17.
4. Slide **new** clamp onto free end of carburetor fuel inlet hose. Install hose onto fuel outlet fitting at side of fuel valve. Crimp clamp.

5. Install the intake manifold vacuum hose onto the vacuum fitting at the back of the fuel valve.
6. Connect fuel vapor vent tube to fitting on filler neck of fuel tank.
7. Remove filler cap. Exercising caution to avoid pinching harness, overflow hose and vent tube, position console on canopy as shown in Figure 4-18. Reinstall filler cap.
8. Install bolt (with flat washer) to secure rear of fuel tank to frame backbone. On FLHX models, capture console bracket during installation. Tighten bolt to 15-20 ft-lbs (20-27 Nm).
9. Tighten fuel tank front mounting bolts to 15-20 ft-lbs (20-27 Nm).
10. Open fuel door on console. Install two Allen head screws to secure front of console to clip nuts on canopy bracket. Alternately tighten screws to 25-30 in-lbs (2.8-3.4 Nm). If present, also install Allen head screw to fasten rear flange of console to clip nut on fuel tank weldment (absent on FLHX models). Tighten screw to 25-30 in-lbs (2.8-3.4 Nm).
11. Connect fuel tank harness connector [13], 4-place Multilock, in front of battery. See Figure 4-16.
12. Insert bolt through battery negative cable (black) into threaded hole of battery negative (-) terminal. Tighten bolt to 60-96 in-lbs (6.8-10.9 Nm).
13. Install seat. See Section 2.25 SEAT, INSTALLATION.
14. Turn the handle of the fuel valve to OFF and fill the fuel tank. Carefully inspect for leaks. Turn the valve handle to ON and start engine. Repeat inspection.
15. Stop engine and return the valve to the OFF position.

### FLHR/S

1. Work fuel tank into position aligning front flange holes with those in left and right side of frame.
2. Start fuel tank front mounting bolts (with flat washers).
3. Route free end of crossover hose under frame backbone and in front of ignition coil to other side of fuel tank. Install convoluted tubing, if removed, and **new** clamp onto hose. Install hose onto fitting at bottom of fuel tank and crimp clamp using HOSE CLAMP PLIERS (HD-97087-65B). See Figure 4-17.
4. Slide **new** clamp onto free end of carburetor fuel inlet hose. Install hose onto fuel outlet fitting at side of fuel valve. Crimp clamp.
5. Install the intake manifold vacuum hose onto the vacuum fitting at the back of the fuel valve.
6. Connect fuel vapor vent tube to fitting at top of canopy.

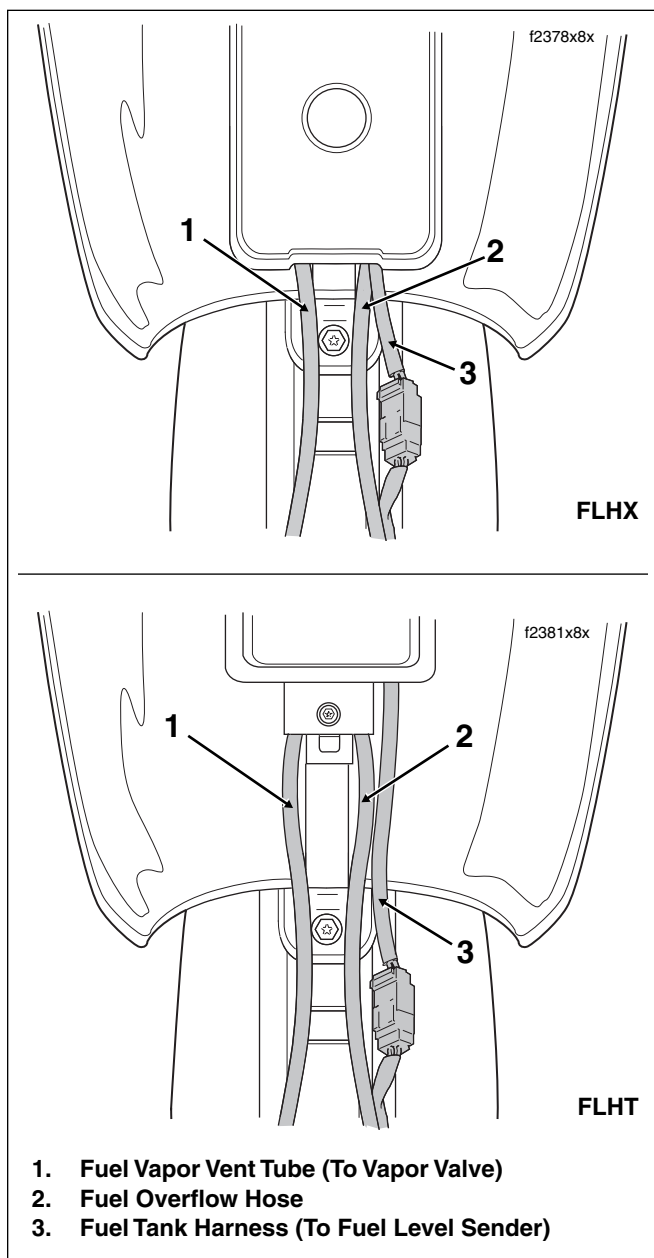


Figure 4-18. Console Cable/Hose Routing (FLHX, FLHT)

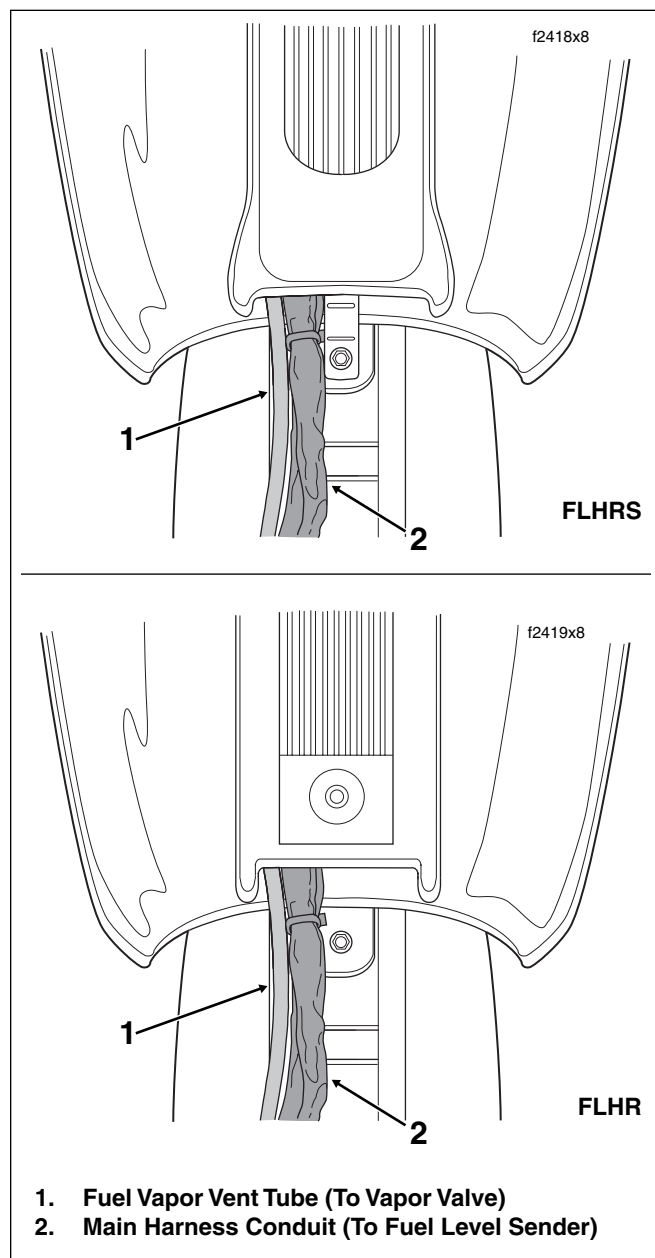


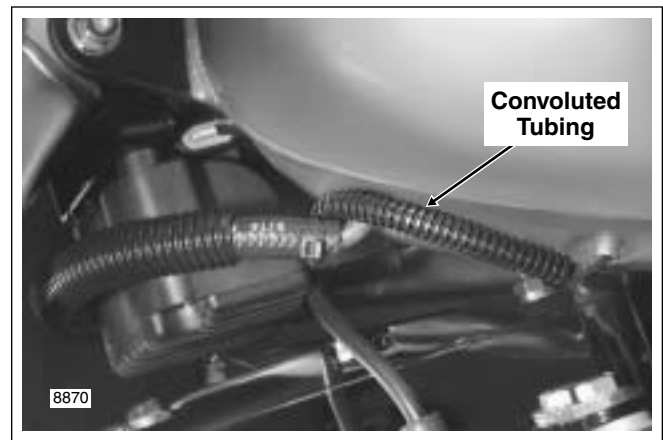
Figure 4-19. Console Cable/Hose Routing (FLHR/S)

7. Slide head of console mounting bolt into slot at top of canopy.
8. Moving instrument console toward installed position, install fuel level sender connector [141], 4-place Packard, at top of canopy. Bend flexible clamp to capture main harness conduit.
9. Exercising caution to avoid pinching harness and vent tube, align hole in instrument console with console mounting bolt and place into position on fuel tank. See [Figure 4-19](#).

10. Install bolt (with flat washer) to secure rear of fuel tank to frame backbone. On FLHRS models, capture instrument console bracket during installation. Tighten bolt to 15-20 ft-lbs (20-27 Nm).
11. Tighten fuel tank front mounting bolts to 15-20 ft-lbs (20-27 Nm).
12. Install acorn nut at top of instrument console and tighten to 50-90 **in-lbs** (5.7-10.2 Nm). If present, also install Phillips screw and large flat washer (absent on FLHRS models). Tighten screw to 36-60 **in-lbs** (4.1-6.8 Nm).



13. Connect fuel gauge to main harness. Route pin housing and convoluted tubing forward and then inboard between front of crossover hose fitting and bottom of fuel tank. Mate pin and socket halves of fuel gauge connector [117], 4-place Multilock. Feed connector into tunnel of fuel tank. See [Figure 4-20](#).
14. Insert bolt through battery negative cable (black) into threaded hole of battery negative (-) terminal. Tighten bolt to 60-96 **in-lbs** (6.8-10.9 Nm).
15. Install seat. See Section [2.25 SEAT, INSTALLATION](#).
16. Turn the handle of the fuel valve to OFF and fill the fuel tank. Carefully inspect for leaks. Turn the valve handle to ON and start engine. Repeat inspection.
17. Stop engine and return the valve to the OFF position.



**Figure 4-20. Fuel Gauge (FLHR/S)**

## PARTIAL REMOVAL

### NOTE

For fuel injected models, see Section [9.4 FUEL TANK \(FUEL INJECTED\)](#) for removal and installation instructions.

### FLHX, FLHT

1. Remove seat. See Section [2.25 SEAT, REMOVAL](#).

### WARNING

**To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative (-) battery cable before proceeding. (00048a)**

2. Unthread bolt and remove battery negative cable (black) from battery negative (-) terminal.
3. Disconnect fuel tank harness connector [13], 4-place Multilock, in front of battery. See [Figure 4-16](#).
4. Remove two fuel tank front mounting bolts (with flat washers) from left and right side of frame. Remove bolt (with flat washer) to free rear of fuel tank from frame backbone. On FLHX models, removal of rear bolt also releases console bracket.
5. Open fuel door on console. Remove two Allen head screws inboard of rubber bumpers. These screws secure console to clip nuts on the canopy bracket. If present, also remove Allen head screw to detach flange at rear of console from clip nut on fuel tank weldment (absent on FLHX models).
6. Lay a clean shop cloth on forward part of rear fender. Remove filler cap from neck of fuel tank. Remove console and lay upside down on shop cloth. Reinstall filler cap.
7. Gently pry fuel vapor vent tube from fitting on filler neck of fuel tank. Exercise caution to avoid pulling fitting from filler neck.

8. Raise the fuel tank approximately 2 inches. Move the fuel tank crossover hose to the rear of the ignition coil, so that the tank can be raised an additional 2-3 inches. Move fuel tank straight back and rest on frame backbone.
9. Obtain three 1 x 2 inch wooden blocks. Raise the front of the fuel tank off the frame backbone by placing one block in the recess centered at the bottom of the tank. At the rear of the tank, place two blocks in the recess, one block on top of the other.

### FLHR/S

1. Remove seat. See Section [2.25 SEAT, REMOVAL](#).

### WARNING

**To prevent accidental vehicle start-up, which could cause death or serious injury, disconnect negative (-) battery cable before proceeding. (00048a)**

2. Unthread bolt and remove battery negative cable (black) from battery negative (-) terminal.
3. Remove two fuel tank front mounting bolts (with flat washers) from left and right side of frame. Remove bolt (with flat washer) to free rear of fuel tank from frame backbone. On FLHRS models, removal of rear bolt also releases instrument console bracket.
4. Remove acorn nut from instrument console. If present, also remove Phillips screw and large flat washer (absent on FLHRS models).
5. Raise instrument console and bend back flexible clamp on canopy to release main harness conduit. Remove fuel level sender connector [141], 4-place Packard, at top of canopy.

**CAUTION**

**When removing instrument console, exercise caution to avoid damaging speedometer unit. Wrap console in a clean, dry shop towel to prevent damage.**

6. Secure instrument console to top of rear fender using bungee cords.
7. Remove console mounting bolt from slot at top of canopy.
8. Gently pry fuel vapor vent tube from fitting.
9. At bottom left side of fuel tank, gently pull on convoluted tubing to draw fuel gauge connector [117], 4-place Multilock, out of tunnel. Depress button on socket terminal side and pull apart pin and socket halves.
10. Raise the fuel tank approximately 2 inches. Move the fuel tank crossover hose to the rear of the ignition coil, so that the tank can be raised an additional 2-3 inches. Move fuel tank straight back and rest on frame backbone.
11. Obtain three 1 x 2 inch wooden blocks. Raise the front of the fuel tank off the frame backbone by placing one block in the recess centered at the bottom of the tank. At the rear of the tank, place two blocks in the recess, one block on top of the other.

## INSTALLATION (AFTER PARTIAL REMOVAL)

### FLHX, FLHT

1. Remove wooden blocks and move fuel tank toward its installed position. Half way down, move fuel tank crossover hose in front of ignition coil. Work fuel tank into position aligning front flange holes with those in left and right side of frame.
2. Start fuel tank front mounting bolts (with flat washers).
3. Connect fuel vapor vent tube to fitting on filler neck of fuel tank.
4. Remove filler cap. Exercising caution to avoid pinching harness, overflow hose and vent tube, position console on canopy as shown in [Figure 4-18](#). Reinstall filler cap.
5. Install bolt (with flat washer) to secure rear of fuel tank to frame backbone. On FLHX models, capture console bracket during installation. Tighten bolt to 15-20 ft-lbs (20-27 Nm).
6. Tighten fuel tank front mounting bolts to 15-20 ft-lbs (20-27 Nm).
7. Open fuel door on console. Install two Allen head screws to secure front of console to clip nuts on canopy bracket. Alternately tighten screws to 25-30 in-lbs (2.8-3.4 Nm). If

present, also install Allen head screw to fasten rear flange of console to clip nut on fuel tank weldment (absent on FLHX models). Tighten screw to 25-30 in-lbs (2.8-3.4 Nm).

8. Connect fuel tank harness connector [13], 4-place Multilock, in front of battery. See [Figure 4-16](#).
9. Insert bolt through battery negative cable (black) into threaded hole of battery negative (-) terminal. Tighten bolt to 60-96 **in-lbs** (6.8-10.9 Nm).
10. Install seat. See Section [2.25 SEAT, INSTALLATION](#).

### FLHR/S

1. Remove wooden blocks and move fuel tank toward its installed position. Half way down, move fuel tank crossover hose in front of ignition coil. Work fuel tank into position aligning front flange holes with those in left and right side of frame.
2. Start fuel tank front mounting bolts (with flat washers).
3. Connect fuel vapor vent tube to fitting at top of canopy.
4. Slide head of console mounting bolt into slot at top of canopy.
5. Moving instrument console toward installed position, install fuel level sender connector [141], 4-place Packard, at top of canopy. Bend flexible clamp to capture main harness conduit.
6. Exercising caution to avoid pinching harness and vent tube, align hole in instrument console with console mounting bolt and place into position on fuel tank. See [Figure 4-19](#).
7. Install bolt (with flat washer) to secure rear of fuel tank to frame backbone. On FLHRS models, capture instrument console bracket during installation. Tighten bolt to 15-20 ft-lbs (20-27 Nm).
8. Tighten fuel tank front mounting bolts to 15-20 ft-lbs (20-27 Nm).
9. Install acorn nut at top of instrument console and tighten to 50-90 **in-lbs** (5.7-10.2 Nm). If present, also install Phillips screw and large flat washer (absent on FLHRS models). Tighten screw to 36-60 **in-lbs** (4.1-6.8 Nm).
10. Connect fuel gauge to main harness. Route pin housing and convoluted tubing forward and then inboard between front of crossover hose fitting and bottom of fuel tank. Mate pin and socket halves of fuel gauge connector [117], 4-place Multilock. Feed connector into tunnel of fuel tank. See [Figure 4-20](#).
11. Insert bolt through battery negative cable (black) into threaded hole of battery negative (-) terminal. Tighten bolt to 60-96 **in-lbs** (6.8-10.9 Nm).
12. Install seat. See Section [2.25 SEAT, INSTALLATION](#).

## CALIFORNIA MODELS ONLY

## GENERAL

Harley-Davidson motorcycles sold in the state of California are equipped with an evaporative (EVAP) emissions control system. In conformance with California Air Resource Board (CARB) regulations, the EVAP system prevents both fuel and crankcase vapors from escaping into the atmosphere. See [Figure 4-21](#).

The EVAP system functions as follows:

- The fuel vapor vent tube connected to a fitting on the filler neck (top of canopy on FLHR/C/S models) allows fuel vapors in the fuel tank to be vented through the vapor valve to the charcoal canister. If the motorcycle is tipped, the vapor valve also prevents the loss of gasoline through the vent tube.
- When the engine is running, negative pressure (vacuum) draws the fuel vapors stored in the charcoal canister through the purge tube to the carburetor (or induction module) where they are burned as part of the normal combustion process.
- On carbureted models, fuel vapors emanating from the carburetor throat are drawn to the charcoal canister through the clean air inlet tube connected to the inboard side of the air cleaner backplate. Crankcase vapors passing from the breather tubes into the air filter element follow the fuel vapors to the charcoal canister. These vapors, after passing through the charcoal canister, also travel through the purge tube to the carburetor where they are burned.
- When the engine is not running, the gravity-operated baffle plate at the air cleaner air inlet port closes to prevent fuel and crankcase vapors from escaping into the atmosphere.

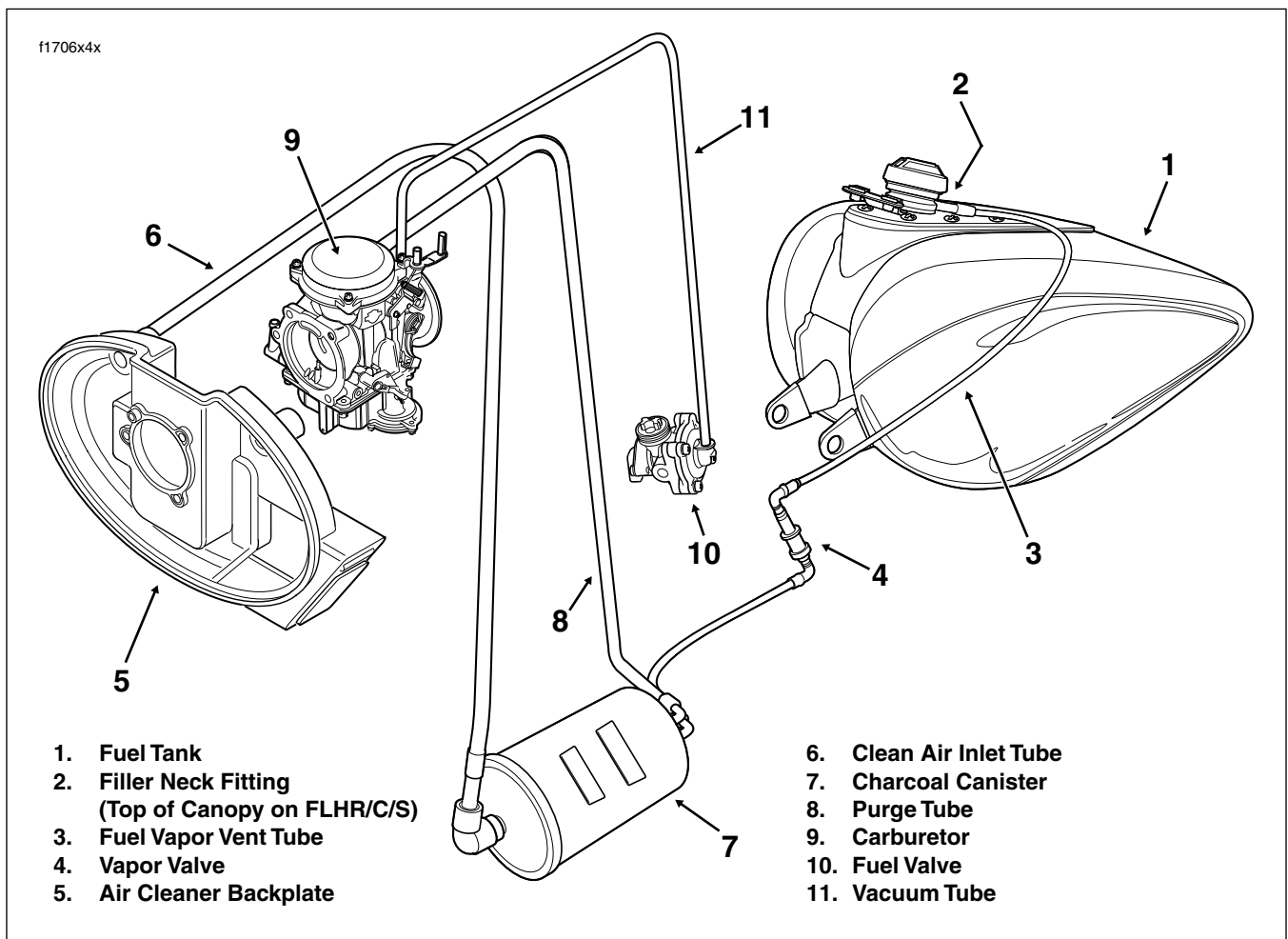


Figure 4-21. California Evaporative Emissions Control System (Carbureted Models)

**⚠ WARNING**

Verify that the evaporative emissions tubes/hoses do not contact hot exhaust or engine parts. Tubes/hoses contain flammable vapors that can be ignited if damaged, possibly causing fire or explosion which could result in death or serious injury.

## TROUBLESHOOTING

The EVAP system has been designed to operate with a minimum of maintenance. Check that all tubes/hoses are correctly routed and properly connected. Also, verify that the tubes/hoses are not pinched or kinked.

## VAPOR VALVE

**NOTE**

On 49 State models, the charcoal canister is absent and the bottom tube of the vapor valve is vented to the atmosphere.

## REMOVAL

1. Remove seat. See Section 2.25 SEAT, REMOVAL.
2. Remove left side saddlebag. See Section 2.26 SADDLE-BAG, REMOVAL.
3. Gently pull side cover from frame downtubes (no tools required).
4. Locate vapor valve attached to mounting bracket on left side of frame crossmember (in front of battery box). See Figure 4-22.
5. Cut cable strap to release vapor valve from mounting bracket.
6. Remove 135° elbow from fitting at top of vapor valve.
7. On California models, raise vapor valve slightly and pull vent tube from fitting at bottom of vapor valve.

**NOTE**

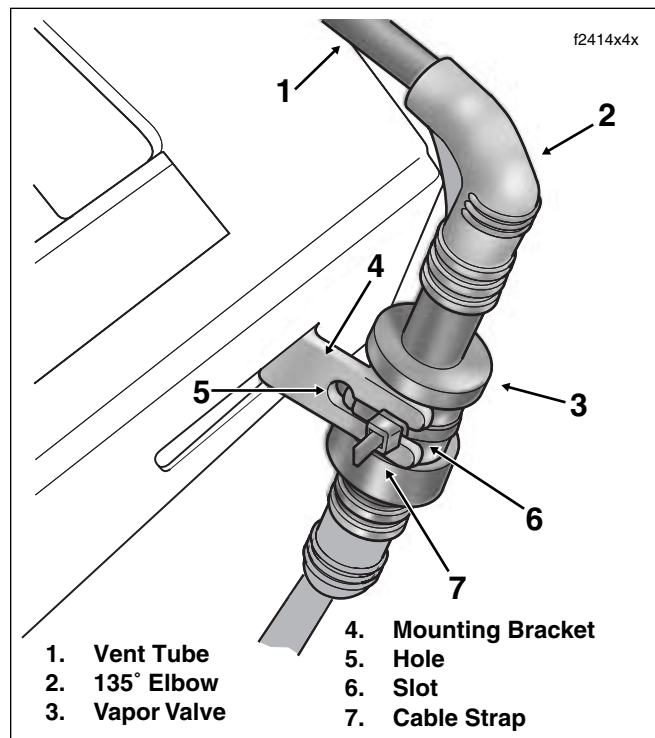
On 49 State models, just pull out vapor valve with bottom vent tube attached. Remove vent tube from bottom fitting of vapor valve.

## INSTALLATION

1. Hold vapor valve in its approximate position on right side of mounting bracket (oriented with longer fitting at the top). On California models, install vent tube onto bottom fitting of vapor valve.

**NOTE**

On 49 State models, attach vent tube to bottom fitting on vapor valve. Insert vapor valve through opening above fuse block bracket (upper weldment between downtubes), and hold in its approximate position on right side of mounting bracket.



**Figure 4-22. Vapor Valve Mounting Bracket (Left Side View)**

2. From left side of mounting bracket, insert end of small cable strap (P/N 10065) through hole and then around body of vapor valve. Mate ends of cable strap and pull tight engaging strap in slot. Cut any excess cable strap material. See Figure 4-22.
3. Install free end of 135° elbow onto fitting at top of vapor valve.
4. Verify that vapor valve is completely vertical. Momentarily push on top of vapor valve to verify that it returns to the completely vertical position.

**⚠ WARNING**

Verify that the vent tubes do not contact hot exhaust or engine parts. Tubes contain flammable vapors that can be ignited if damaged, possibly causing fire or explosion, which could result in death or serious injury.

5. Recheck bottom vent tube routing to be sure that hose fittings are not pinched or kinked, and that there is no contact with the drive belt. For California models, see Figure 4-24.

On 49 State models, verify that vent tube at bottom of vapor valve is routed through opening above fuse block bracket (upper weldment between downtubes) to out-board side. Orient vent tube so that it runs downward along the back of the forward frame downtube, where the free end is then tucked into opening at front of lower weldment (containing side cover grommet).

6. Align barbed studs in side cover with grommets in frame downtubes and push firmly into place (no tools required).
7. Install left side saddlebag. See Section [2.26 SADDLEBAG, INSTALLATION](#).
8. Install seat. See Section [2.25 SEAT, INSTALLATION](#).

## CHARCOAL CANISTER

### REMOVAL

1. Remove rear fender. See Section [2.34 REAR FENDER, REMOVAL](#).

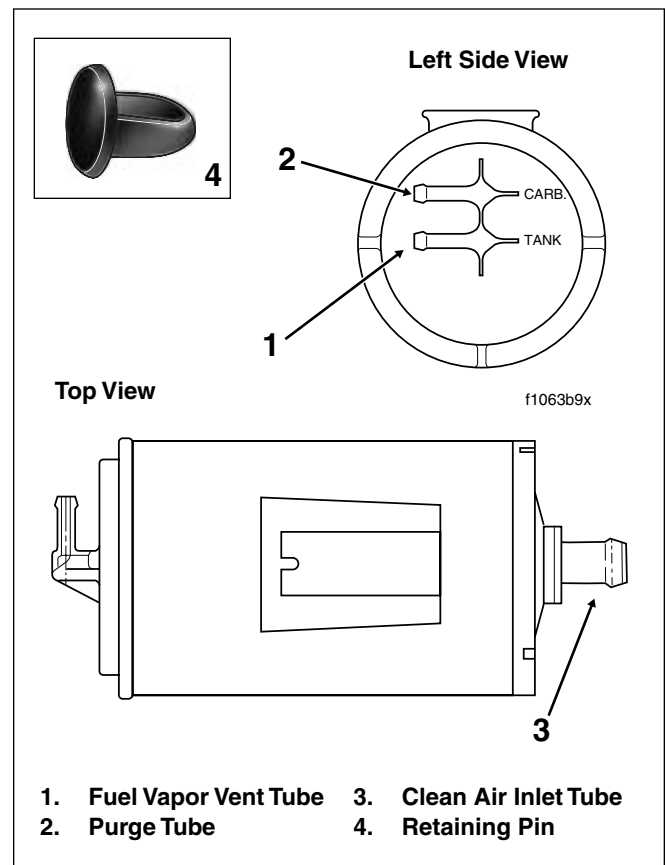
#### WARNING

**Disconnect negative (-) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00049a)**

2. Unthread bolt and remove battery negative cable (black) from battery negative (-) terminal.
3. Unthread bolt and remove battery positive cable (red) from battery positive (+) terminal.
4. Loosen T40 TORX bolt and move lip of hold-down clamp off edge of battery. Remove battery from battery box.
5. Reaching into battery box, pry plastic retaining pin out of hole on left side. See inset of [Figure 4-23](#).
6. Reaching in between battery box and right side frame member, pull clean air inlet tube (to air cleaner backplate on carbureted models) from fitting on right side of charcoal canister. On fuel injected models, pull 90° elbow connector from fitting.
7. Moving to rear left side of motorcycle, center a flashlight on drive belt and direct the beam forward. Note the two tube connections on the left side of the canister. See [Figure 4-23](#). Reaching in between battery box and frame member, pull tubes from canister.
8. With the handle of a rubber mallet, rap canister toward left side of motorcycle until tongue at top of canister is free of grooves in bottom of battery box. From right side of motorcycle, pull canister out of opening between battery box and frame member.

### INSTALLATION

1. With tongued side up, slide canister into cavity using opening between battery box and right side frame member. Start tongue into grooves on left side of battery box. Push the canister toward the right side of the motorcycle until fully engaged. Snap plastic retaining pin into hole at bottom of battery box (left side) to lock position of canister. See inset of [Figure 4-23](#).



**Figure 4-23. Charcoal Canister**

2. Attach tubes to fittings on left side of canister. Install the purge tube to the carburetor (or induction module) onto the top fitting stamped "CARB." Install the fuel vapor vent tube from the fuel tank (via the vapor valve) to the bottom fitting stamped "TANK."
3. Moving to rear right side of motorcycle, attach clean air inlet tube (to air cleaner backplate on carbureted models) to fitting on right side of canister. On fuel injected models, install 90° elbow connector with the free end pointing down.

#### NOTE

*The clean air inlet tube is absent on fuel injected models.*

4. Place battery in battery box, terminal side forward.

#### WARNING

**Connect positive (+) battery cable first. If positive (+) cable should contact ground with negative (-) cable connected, the resulting sparks can cause a battery explosion, which could result in death or serious injury. (00068a)**



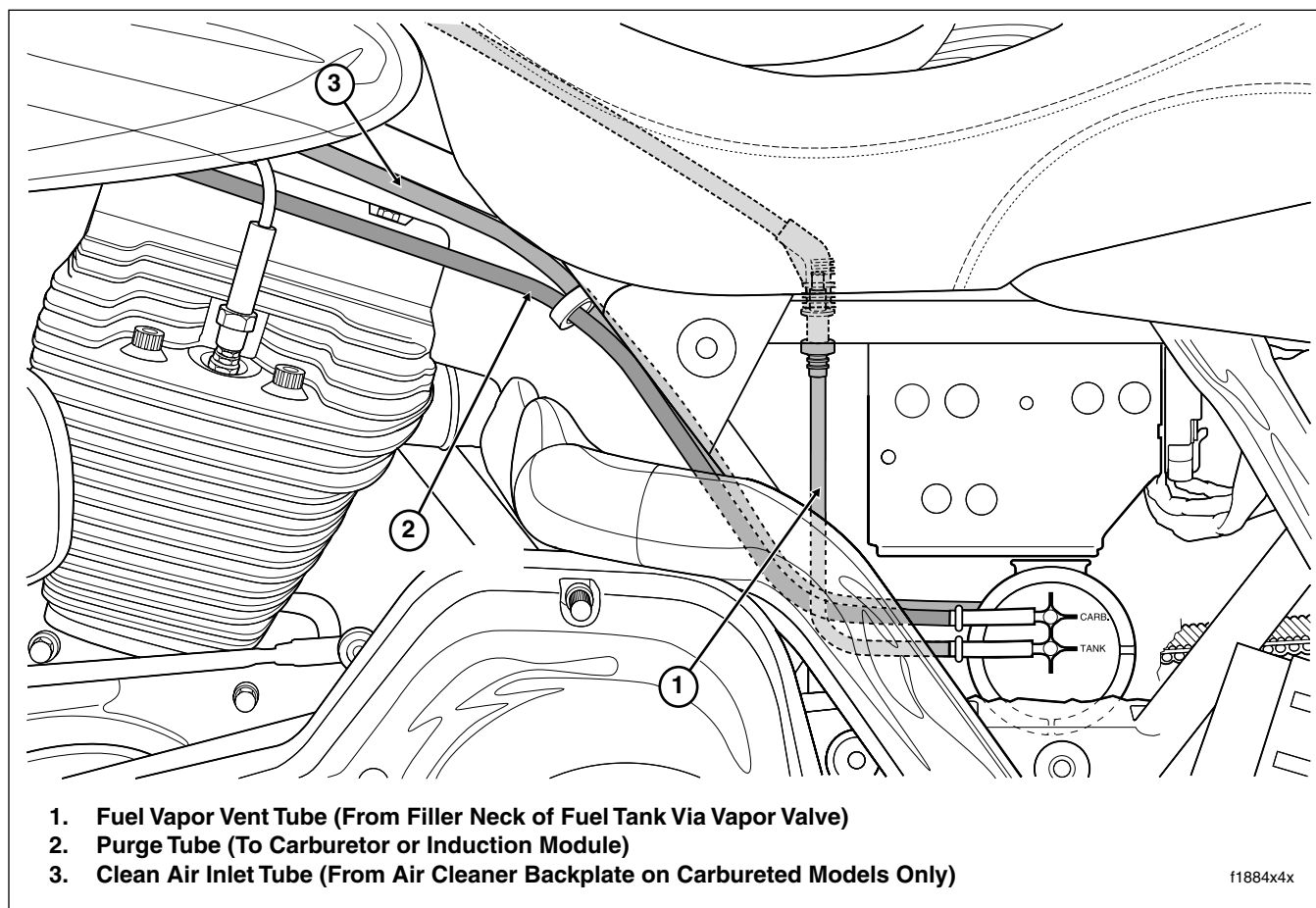


Figure 4-24. Charcoal Canister Tube/Hose Routing (Left Side View)

5. Insert bolt through battery positive cable (red) into threaded hole of battery positive (+) terminal. Tighten bolt to 60-96 **in-lbs** (6.8-10.9 Nm).
6. Insert bolt through battery negative cable (black) into threaded hole of battery negative (-) terminal. Tighten bolt to 60-96 **in-lbs** (6.8-10.9 Nm).
7. Rotate hold-down clamp so that the lip (with rubber pad) rests on the edge of the battery. Tighten the T40 TORX bolt to 15-20 ft-lbs (20-27 Nm).
8. Install rear fender. See Section [2.34 REAR FENDER, INSTALLATION](#).

## Charcoal Canister Hose Routing

### WARNING

Verify that the vent tubes do not contact hot exhaust or engine parts. Tubes contain flammable vapors that can be ignited if damaged, possibly causing fire or explosion, which could result in death or serious injury.

### Purge Tube:

From top fitting on left side of charcoal canister (stamped "CARB"), purge tube is routed forward where it runs under frame crossmember, and then angles upward between crossmember and inner primary housing. Captured in clip anchored in hole at front of crossmember (rear and inboard of cruise hole), purge tube goes over crossover pipe, runs along left side of rear cylinder rocker cover and into tunnel of fuel tank. It then crosses to right side of motorcycle just to the rear of the top engine mounting bracket, where it connects to a fitting on the carburetor (or induction module). See [Figure 4-24](#).

### Fuel Vapor Vent Tube:

From bottom fitting on left side of charcoal canister (stamped "TANK"), vent tube is routed forward and then upward in front of battery box to bottom fitting on vapor valve mounted to rear of upper frame crossmember.

Another section connected to top fitting of vapor valve follows the inboard side of the main harness bundle, where it is captured in anchored cable strap on left side of frame backbone before passing under console pod/instrument console to fitting on filler neck of fuel tank (top of canopy on FLHR/C/S models).

## Clean Air Inlet Tube:

From 90° elbow connector on right side of charcoal canister, clean air inlet tube runs forward under frame crossmember and then upward (inboard of starter connections) following angle of crossmember, where it is routed over crossover pipe and rear cylinder rocker cover into tunnel of fuel tank on right side of frame backbone. Tube turns right just to the rear of the top engine mounting bracket, where it connects to fitting on inboard side of air cleaner backplate.

### NOTE

*The clean air inlet tube is absent on fuel injected models, so the fitting on the right side of the canister terminates in a 90° elbow connector (the free end pointing down).*

# NOTES

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