

Table 4-1. Capacities

FUEL TANK CAPACITY	GALLONS	LITERS
Total	3.7	14

TORQUE VALUES

ITEM	TORQUE		NOTES
Fuel plate lock ring	54-61 Nm	40-45 ft-lbs	page 4-4
Fuel tank bracket bolts	40-48 Nm	30-35 ft-lbs	page 4-9
Mud flap stud plate fasteners	8-12 Nm	71-106 in-lbs	page 4-12
Purge solenoid bolt	6-10 Nm	53-88 in-lbs	page 4-12

FUEL PUMP/FILTERS/FUEL LEVEL SENDER ASSEMBLY 4.2

REMOVAL

PART NO.	SPECIALTY TOOL
HD-45324	Fuel cap remover/installer

1. Unlatch and open seat. Remove fuel cap, remove fuel filler boot, and replace fuel cap.

⚠ WARNING

Gasoline is extremely flammable and highly explosive. Always stop the engine when refueling or servicing the fuel system. Do not smoke or allow open flame or sparks near the work site. Inadequate safety precautions could result in death or serious injury.

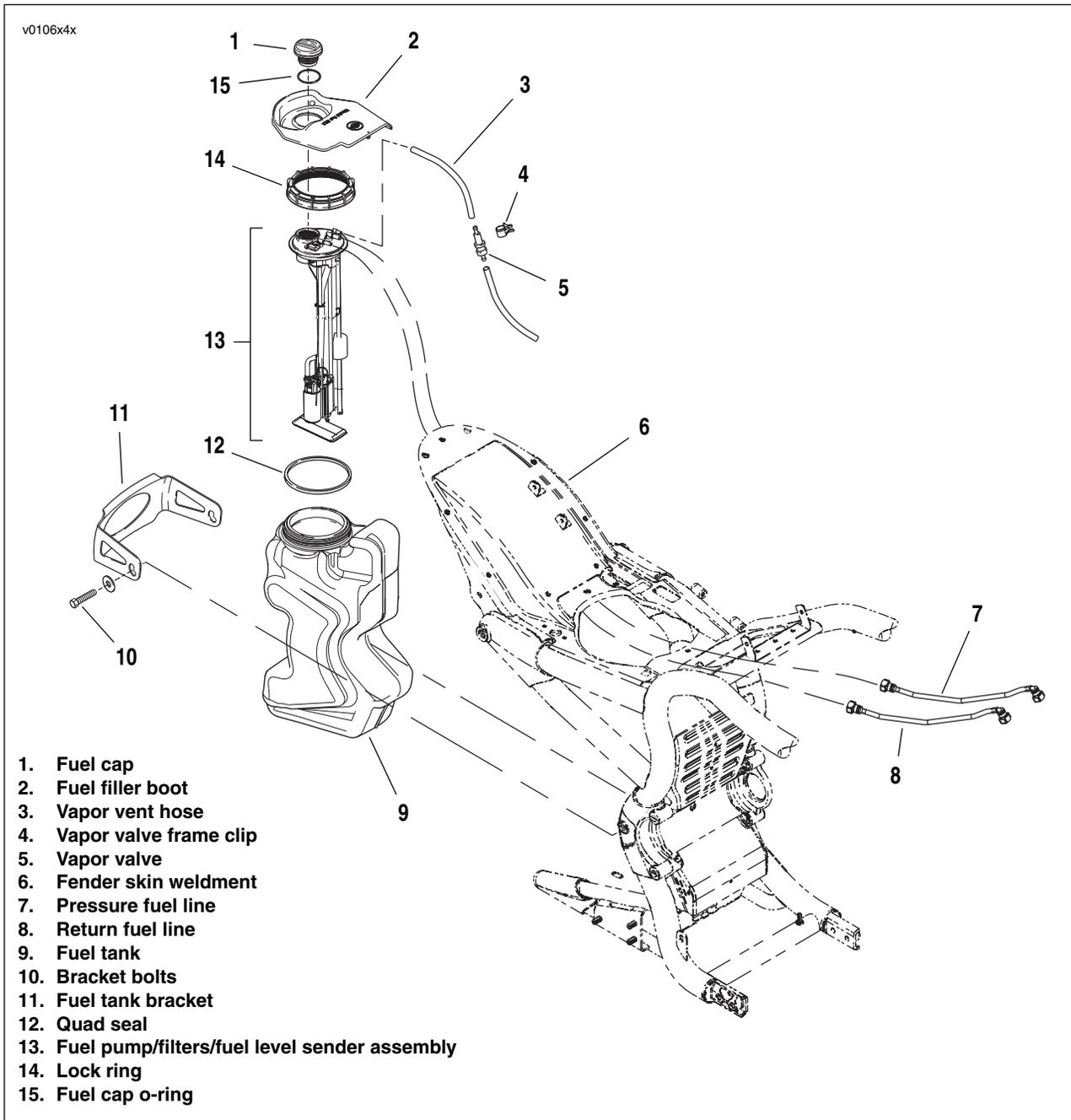


Figure 4-1. Fuel System

⚠ WARNING

The gasoline in the fuel supply line downstream of the fuel pump is under high pressure (400 kPa, 58 psi). To avoid an uncontrolled discharge or spray of gasoline, always purge the system of high pressure gas before removing the fuel supply line from the fuel tank. Gasoline is extremely flammable and highly explosive. Inadequate safety precautions could result in death or serious injury.

2. Purge the fuel supply line of high pressure gasoline.
 - a. See [Figure 4-2](#). Disconnect the fuel pump and sender connector (5) [141] from the top plate (1).
 - b. Start the engine and allow the vehicle to run.
 - c. When the engine stalls, operate the starter for 3 seconds to remove any remaining fuel from the fuel lines.
3. Remove right side cover and remove maxi-fuse. See [8.5 MAXI-FUSE](#).
4. Remove airbox. See [1.4 AIRBOX AND AIR FILTER](#).

⚠ WARNING

To protect against shock and accidental start-up of vehicle, disconnect the negative battery cable before proceeding. Inadequate safety precautions could result in death or serious injury.

5. Disconnect the negative battery cable.

6. Determine how long before the assembly can be re-installed.
 - a. If the fuel tank is to be left unattended for any length of time, remove the fuel cap and drain the fuel tank. Use a pump or siphon and an approved gasoline storage container of sufficient capacity.
 - b. If the fuel pump/filters/fuel level sender assembly is to be repaired and reinstalled immediately, the open fuel tank can be covered temporarily until the fuel pump/filters/fuel level sender assembly is re-installed.

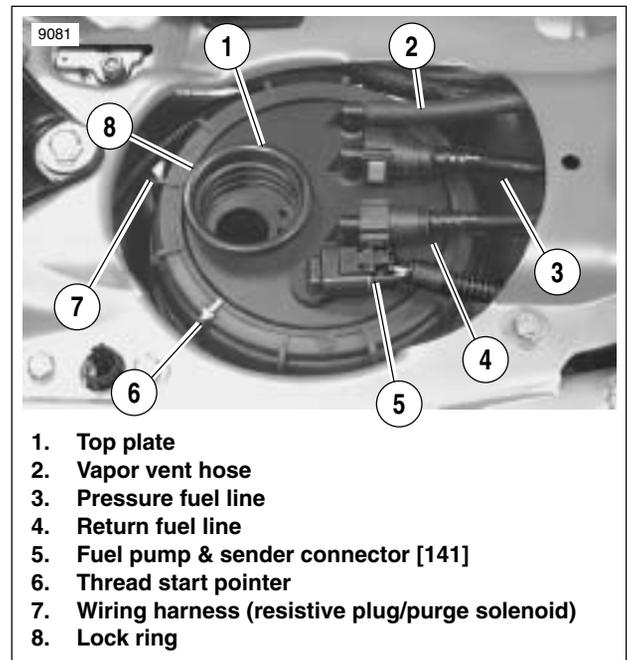


Figure 4-2. Fuel Tank Top Plate

⚠ WARNING

Some gasoline will drain from the fuel lines when disconnected from the fuel tank top plate. 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.

7. See [Figure 4-2](#). At the fuel rail, disconnect the larger pressure fuel line (3) and the smaller return fuel line (4) by pressing blue buttons with thumb and first finger.
8. Disconnect both fuel lines from the fuel tank top plate. Pull the lines out of the rotational path of the lock ring.
9. Use opposite thumbs to push the vapor vent hose (2) off of the outlet tube.

- Assure that all components are out of the rotational path of the lock ring.

NOTE

Motorcycles not equipped with the H-D Security System will have the siren connector terminated to a cap attached to the wiring harness of the fuel module connector. Pull the siren connector and press the wiring harness out of the way before turning lock ring.



Figure 4-3. Fuel Cap Remover/Installer (HD-45324)

- See [Figure 4-3](#). Use FUEL CAP REMOVER/INSTALLER (HD-45324) to unthread and lift off the lock ring.

⚠ 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.

- Lift the fuel pump/filters/fuel level sender assembly out of the fuel tank.
- Cover the fuel tank opening or drain the fuel tank as required.

INSTALLATION

PART NO.	SPECIALTY TOOL
HD-45324	Fuel cap remover/installer

- Apply a small dab of silicone gasket sealer at four spots around the bottom side of a **new** quad seal. Install the quad seal onto shoulder of the tank opening. Let the gasket sealer cure for five minutes.
- See [Figure 4-4](#). Insert fuel pump/filters/fuel level sender assembly into fuel tank. The two side by side tabs (1) on the right underside of the top plate mate to a notch in the collar in the fuel tank allowing the top plate to fall into position and the rubber spacer/bumper (5) on the bottom of the fuel pump/filters/fuel level sender assembly to rest on the bottom of fuel tank.
- See [Figure 4-2](#). Orient the pointer (6) on the lock ring to point 90 degrees to the left side of the motorcycle. In this position the start of the lock ring threads match the start of the threads on the collar of the opening in the fuel tank. Thread on lock ring. Use FUEL CAP REMOVER/INSTALLER (HD-45324) to tighten the lock ring to 54-61 Nm (40-45 ft-lbs).
- Mate the fuel pump and sender connector half (5) [141B] while supporting the top plate connector half [141A] with the opposite hand.

NOTE

To avoid bending the connector pins, gently press the socket fuel module connector parallel or straight into the pin fuel module connector on the fuel tank top plate.

- Install the smaller return fuel line (4) and the larger pressure fuel line (3) while supporting the mating port. Press the lines on until the click is heard that indicates engagement.

WARNING

Connecting the fuel lines to the wrong outlet port can result in a reverse flow of gasoline upon start up. Inadequate safety precautions could result in death or injury.

6. Attach the pressure (3) and the return (4) fuel lines to the fuel rail.
7. Press on the fuel vapor vent hose (2) while supporting the mating port.
8. Replace fuel filler boot. Fuel as required and replace the fuel cap.

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.

9. Connect negative battery cable.
10. Install airbox. See [1.4 AIRBOX AND AIR FILTER](#).
11. Close and latch seat.
12. Replace the maxi-fuse and right side cover.
13. Check fuel system pressure. See [9.10 FUEL PRESSURE TEST](#).

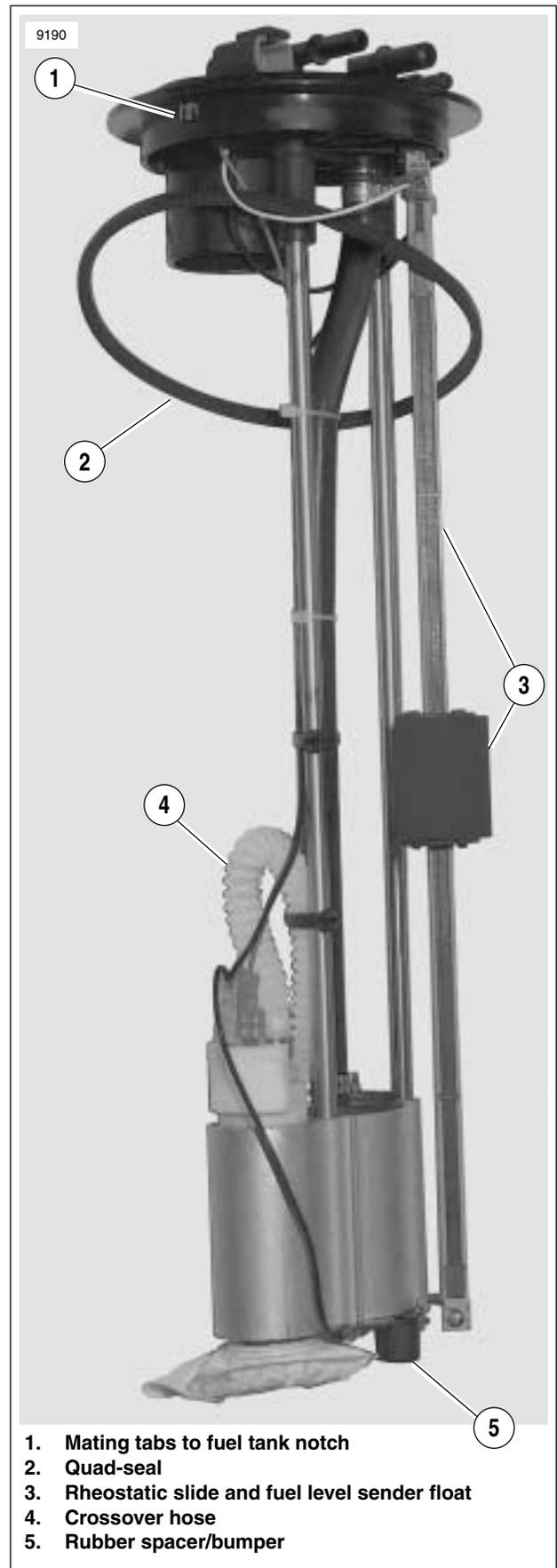


Figure 4-4. Fuel Pump/Filters/Fuel Level Sender Assembly

SUCTION SIDE FUEL FILTER

WARNING

Some gasoline will drain from the individual components when disconnected from the fuel pump/filters/fuel level sender assembly. 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.

See Figure 4-5. The suction side filter (4) filters the fuel as it enters the strained intake of the fuel pump. The suction side filter is replaced at the service interval of 161,000 kilometers (100,000 miles).

PRESSURE SIDE FUEL FILTER

See Figure 4-5. The pressure side filter (2) filters the fuel before it enters the pressure fuel line. The pressure side filter is serviced at a service interval of 161,000 kilometers (100,000 miles) or at anytime the fuel pump is serviced.

Removal

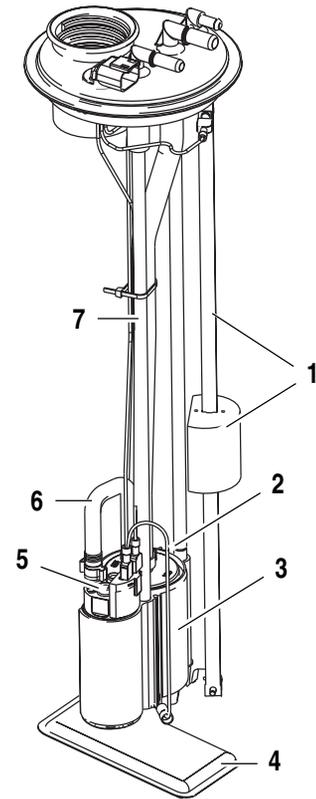
PART NO.	SPECIALTY TOOL
HD-41137	Hose clamp pliers

To remove, cut the clamps and disconnect the two hoses (6) from the filter. Press the pressure side filter up and out of the bracket.

Installation

To replace, press a **new** pressure side filter into its bracket up against the bracket stop, replace the fuel crossover hose and the pressure fuel line, and install a **new** clamp over the crossover hose using side of HOSE CLAMP PLIERS (HD-41137).

v0023b



1. Sending unit
2. Pressure side filter
3. Bracket
4. Suction side filter
5. Fuel pump
6. Crossover hose
7. Support rod

Figure 4-5. Fuel Pump/Filters/Fuel Level Sender Assembly

FUEL PUMP

General

The fuel pump pumps fuel from the tank sump and provides filtered, pressurized fuel to the fuel rail. The fuel rail pressure is controlled by a pressure regulator. The injectors receive fuel directly from the fuel rail. The bypass fuel from the pressure regulator is returned to the tank sump via the external fuel return line.

NOTE

Before removing the fuel pump, perform appropriate diagnostics listed in the VRSC Electrical Diagnostic Manual.

Removal

1. See [Figure 4-5](#). Remove the black and red wire leads from the fuel pump (5).
2. Pull the suction side filter off of the inlet port. The retaining ring will remain on the fuel pump.
3. Cut clamp holding crossover hose (6) to pressure side filter and pull fuel crossover hose off pressure side filter.
4. Push fuel pump up and out of its bracket (3).
5. Inspect fuel pump and fuel level sending unit (1) wiring.

CAUTION

Carefully inspect hoses for cuts, tears, holes or other damage. Replace hose if any damage is found. Even the smallest hole can cause a reduction in fuel pressure.

Installation

PART NO.	SPECIALTY TOOL
HD-41137	Hose clamp pliers

1. See [Figure 4-5](#). Push a **new** fuel pump (5) down into its bracket (3) against the screwed on bracket stop.
2. Route **new** crossover hose (6) on the side of the support rod (7) opposite the fuel level sender float.
3. Install **new** clamps over **new** crossover hose (6) and attach to the pressure side filter using side of HOSE CLAMP PLIERS (HD-41137).
4. If required, replace fuel pump wiring or fuel level sender wiring.

CAUTION

Do not replace the special teflon coated fuel pump wiring with ordinary bulk wire. Ordinary insulation materials may deteriorate when in contact with gasoline.

5. Press the black and red wire leads onto the clips.
6. Press a **new** suction side filter (4) onto the strainer inlet at the bottom of the fuel pump (5).
7. Install fuel pump/filters/fuel level sender assembly into gas tank. See [4.2 FUEL PUMP/FILTERS/FUEL LEVEL SENDER ASSEMBLY](#).
8. After installation of fuel pump/filters/fuel level sender assembly, verify fuel pump operation with a fuel system pressure test. See [9.10 FUEL PRESSURE TEST](#).

FUEL LEVEL SENDER

WARNING

Some gasoline will drain from the individual components when disconnected from the fuel pump/filters/fuel level sender assembly. 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.

Removal

1. See [Figure 4-4](#). Remove yellow wire lead and the double black wire leads from the rheostatic slide (3).
2. Inspect and replace as required all fuel level sender wiring.
3. Remove the retaining screw at the bottom of the rheostatic slide (3).
4. Pull the rheostatic slide (3) from its slot in the top plate and remove the fuel level sender float (3).

Installation

1. See [Figure 4-4](#). Slide rheostatic slide with fuel level sender float (3) into notch in top plate. Orient the scale so that the graduated side of the slide faces the fuel level wire connector on the top plate.
2. With the fuel level sender float on the slide (3) so that the half-round side faces out, thread in and tighten the retaining screw into the stop bracket at the bottom of the rheostatic slide (3).
3. Attach the yellow wire lead to the graduated side of the rheostatic slide (3) and the double black lead to the opposite side.
4. Install fuel pump/filters/fuel level sender assembly into gas tank. See [4.2 FUEL PUMP/FILTERS/FUEL LEVEL SENDER ASSEMBLY](#).
5. Verify that the fuel gauge indicates the corresponding fuel level after installing the fuel pump/filters/fuel level sender assembly.

REMOVAL

1. Purge the fuel supply line of high pressure gasoline.
 - a. Disconnect the fuel module connector from the top plate. See [4.2 FUEL PUMP/FILTERS/FUEL LEVEL SENDER ASSEMBLY](#).
 - b. Start the engine and allow the vehicle to run. When the engine stalls, operate the starter for 3 second
2. Remove right side cover.
3. Locate and remove maxi-fuse. See [8.5 MAXI-FUSE](#).
4. Unlatch and open seat.
5. Remove the airbox. See [1.4 AIRBOX AND AIR FILTER](#).

WARNING

To protect against shock and accidental start-up of vehicle, disconnect the negative battery cable before proceeding. Inadequate safety precautions could result in death or serious injury.

6. Disconnect the negative battery cable.
7. Remove rear wheel and rear fork. See [2.24 REAR WHEEL](#) and [2.35 REAR FORK](#).
8. Remove the two hex-nuts fastening the mud flap stud plate and the mud flap to the frame fender weldment. Remove the mud flap and the stud plate. See [2.38 REAR FENDER/SUPPORTS](#).
9. Remove fuel cap and fuel filler boot. Replace fuel cap.

WARNING

Some gasoline will drain from the fuel lines when disconnected from the fuel tank top plate. 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.

10. See [Figure 4-2](#). At the fuel rail, disconnect the larger pressure fuel line (3) and the smaller return fuel line (4) by pressing blue buttons with thumb and first finger. Then disconnect both fuel lines from the fuel tank top plate.
11. Use opposite thumbs to push the vapor vent hose off of the outlet tube.

12. Unbolt the two bolts and their washers on the bracket that holds the fuel tank against the frame.
13. Remove fuel tank from motorcycle.

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.

14. If the fuel tank is going to be stored prior to service, either drain using a siphon or cap the pressure fuel port, the return fuel port, and the vapor vent port on the fuel tank top plate.

CLEANING AND INSPECTING

1. Drain the fuel tank. Use a common pump or siphon and an approved gasoline storage container of sufficient capacity.
2. Remove fuel pump/filter/fuel level sender assembly from tank.
3. Clean the tank interior with commercial cleaning solvent or a soap and water solution. Shake the tank to agitate the cleaning agent.
4. Flush the tank thoroughly after cleaning and allow it to air dry.

WARNING

Extreme caution should be taken when repairing tanks. If all traces of fuel are not purged, an open flame repair may result in a tank explosion which could result in death or serious injury.

5. Inspect the evaporative emissions system vapor valve line and pressure and return fuel lines for cuts, cracks or holes. Replace lines as needed.
6. Inspect the tank for leaks and other damage. If damaged, replace it.

INSTALLATION

1. Position the fuel tank in the frame and position the fuel tank mounting bracket to the frame.
2. See [Figure 4-6](#). Loosely thread in the two mounting bolts (1) and washers (2) through the forward lower slot ends (4) of the bracket into the threaded boss on the frame.
3. Evenly press forward and downward on the bracket against the fuel tank until the mounting bolts slide back and up into the upper slot ends (3).
4. Tighten the mounting bolts to 40-48 Nm (30-35 ft-lbs).
5. Connect the fuel module connector while supporting the top plate connector half with the opposite hand.
6. See [Figure 4-2](#). Install the smaller return line (4) and the larger pressure line (3) while supporting the mating port. Press the lines on until the click is heard that indicates engagement.
7. Attach the larger pressure line (3) and the smaller return line (4) to the fuel rail.
8. Press on the vapor vent hose while supporting the mating port with the opposite hand.
9. Install mud flap and stud plate. See [2.38 REAR FENDER/SUPPORTS](#).
10. Install rear fork. See [2.35 REAR FORK](#).
11. Install the rear wheel assembly and adjust the drive belt tension. See [2.24 REAR WHEEL](#).

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.

12. Replace the filler boot and fuel the motorcycle as required. Replace the fuel cap.
13. Install airbox. See [1.4 AIRBOX AND AIR FILTER](#).
14. Connect negative battery cable.
15. Install airbox cover by positioning the airbox cover with the locating pins in the holes on the frame tabs. Turn bail-head fastener 1/4 turn clockwise.
16. Close and latch seat.
17. Replace the maxi-fuse and the side cover.
18. Check fuel system pressure. See [9.10 FUEL PRESSURE TEST](#).

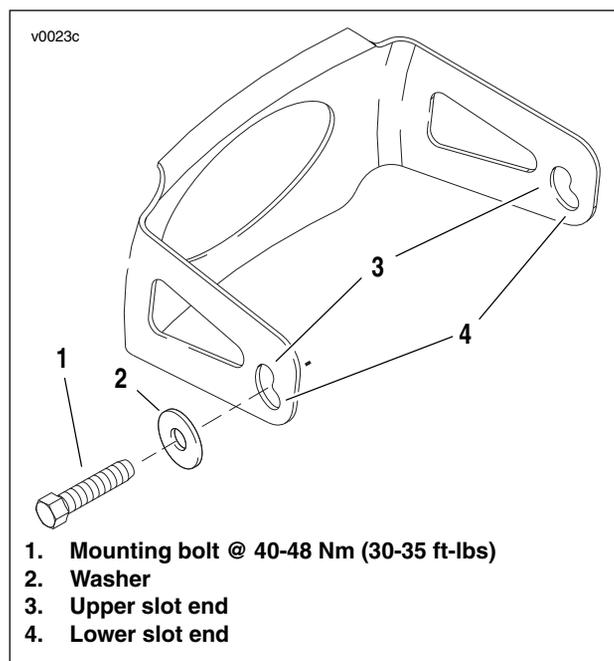


Figure 4-6. Fuel Tank Mounting Bracket

GENERAL

See [Figure 4-7](#). The vapor valve is mounted to the left hand frame rail directly in front of the fuel tank. Hydrocarbon vapors in the fuel tank are vented through a hose to the vapor valve. If the vehicle is tipped at an abnormal angle, the vapor valve closes to prevent liquid gasoline from leaking out of the fuel tank through the vent hose.

WARNING

The vapor valve must be mounted in a vertical position, with the long fitting at the top, otherwise, excessive fuel vapor pressure may build up in the fuel tank. Excessive pressure could cause a fuel leak resulting in a fire or an explosion which could result in death or serious injury.

REPLACEMENT

Pull off the upper formed fuel vapor valve hose and the lower hose. Remove the vapor valve from its clip. When installing the vapor valve, place the valve back into the clip with the long necked end at the top.

NOTE

On non-California models, the bottom hose is vented to the atmosphere. On California models, the hose from the vapor valve bottom fitting goes to a evaporative (EVAP) emissions control system. See [4.5 EVAPORATIVE EMISSIONS CONTROL: CA MODELS](#).

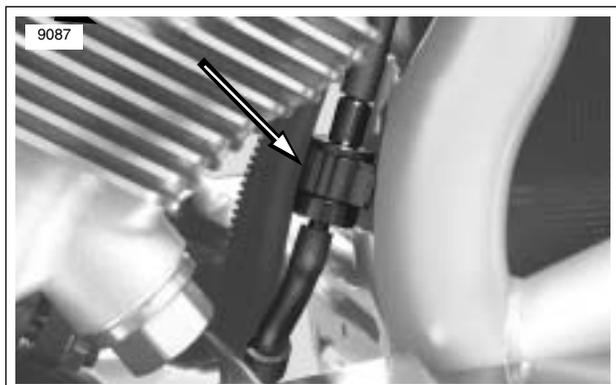


Figure 4-7. Vapor Valve

RESISTIVE PLUG

California models have a purge solenoid to allow hydrocarbon vapor to flow from the charcoal canister to the throttle body.

See [Figure 4-8](#). All non-California models have a resistive plug connected to the purge solenoid connector. The diagnostic system will display the same diagnostic codes whether a resistive plug is in place or the connection is made to a purge solenoid.

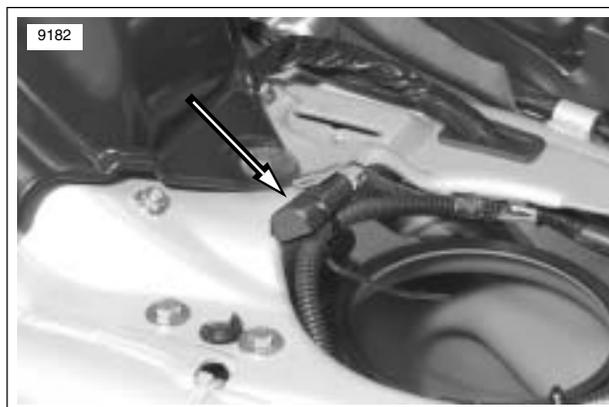


Figure 4-8. Resistive Plug

GENERAL

Harley-Davidson motorcycles sold in the state of California are equipped with an evaporative (EVAP) emissions control system. The EVAP system prevents fuel hydrocarbon vapors from escaping into the atmosphere and is designed to meet the California Air Resource Board (CARB) regulations in effect at the time of manufacture.

The EVAP functions in the following manner:

- Hydrocarbon vapors in the fuel tank are directed through the vapor valve and stored in the charcoal canister. If the vehicle is tipped at an abnormal angle, the vapor valve closes to prevent liquid gasoline from leaking out of the fuel tank through the vent hose.
- When the engine is running, intake venturi negative pressure (vacuum) draws off the hydrocarbon vapors from the charcoal canister when the purge solenoid is open. These vapors pass through the intake and are burned as part of normal combustion in the engine. The purge solenoid is timed to the throttle position but is disabled at startup, low engine temperature, low engine speed, or low vehicle speed.

WARNING

Verify that the evaporative emissions vent hoses do not contact hot exhaust or engine parts. The hoses contain flammable vapors that can be ignited if damaged which could result in death or serious injury.

NOTE

The EVAP system has been designed to operate with a minimum of maintenance. Check that all hoses are properly connected, are not pinched or kinked and are routed properly. Improper connections could leak charcoal from canister.

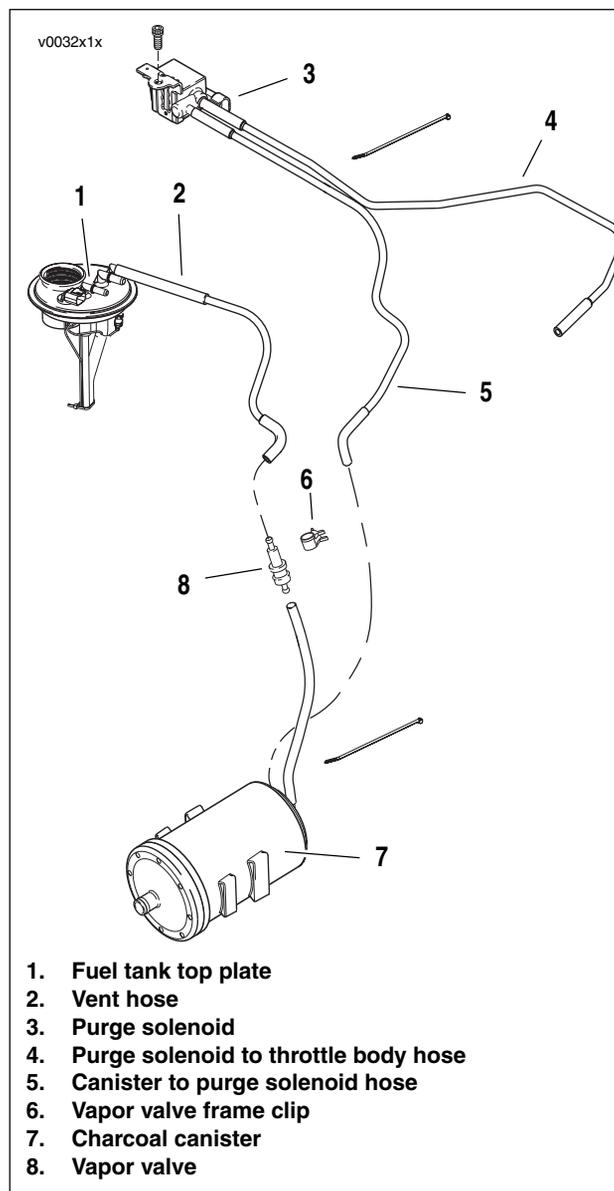


Figure 4-9. Evaporative Emissions Control System

PURGE SOLENOID

The purge solenoid allows hydrocarbon vapor flow from the charcoal canister to the throttle body. The purge solenoid is timed to the throttle position but is disabled at startup, low engine temperature, low engine speed, or low vehicle speed. The power for the solenoid comes from the system relay. The EVMS provides the path to ground to trigger the purge solenoid.

NOTE

Before removing the purge solenoid, perform diagnostics listed in the VRSC Electrical Diagnostic Manual.

Removal

1. Remove right side cover and remove maxi-fuse. See 8.5 MAXI-FUSE.

⚠ WARNING

To avoid accidental start-up of vehicle and possible personal injury, remove the maxi-fuse before proceeding. Inadequate safety precautions could result in death or serious injury.

2. Remove the two hex-nuts fastening the mud flap stud plate and the mud flap to the frame fender weldment. Remove the mud flap and the stud plate. See 2.38 REAR FENDER/SUPPORTS.
3. Disconnect the wire connector to the purge solenoid.
4. Gently pull off the charcoal canister to purge solenoid hose.
5. Gently pull off the purge solenoid to throttle body hose.
6. Remove the hold down bolt and the purge solenoid.

Installation

1. Thread the purge solenoid bolt into the threaded fender skin weldment boss and tighten it into the purge solenoid under the fender skin. Tighten to 6-10 Nm (53-88 **in-lbs**).
2. Push on the purge solenoid to throttle body hose.
3. Push on the charcoal canister to purge solenoid hose.
4. Connect the wire connector.
5. Install the mud flap and stud plate to the frame fender weldment. Thread on and tighten the two hex-nuts to 8-12 Nm (71-106 **in-lbs**). See 2.38 REAR FENDER/SUPPORTS.
6. Replace the maxi-fuse and the right side cover.

NOTE

On non-California models the wire connector to the purge solenoid is capped with a resistive plug. However, the diagnostic codes will be the same. See RESISTIVE PLUG in 4.4 VAPOR VALVE.



Figure 4-10. Purge Solenoid (mud flap removed)

VAPOR VALVE

⚠ WARNING

The vapor valve must be mounted in a vertical position, with the long fitting at the top, otherwise, excessive fuel vapor pressure may build up in the fuel tank. Excessive pressure could cause a fuel leak resulting in a fire or an explosion which could result in death or serious injury.

See Figure 4-7. The vapor valve is mounted to the left hand frame rail directly in front of the fuel tank. See 4.4 VAPOR VALVE.

NOTE

On CA (California) models, the hose from the vapor valve bottom fitting goes to the charcoal EVAP canister.

CHARCOAL CANISTER

Removal/Inspection

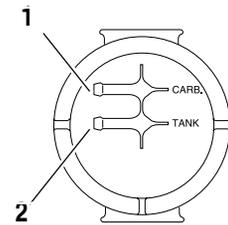
The EVAP charcoal canister is mounted below the swingarm pivot in front of the fuel tank on the shield. It can be accessed from the left side of the motorcycle.

1. See Figure 4-11. Note the two hose connections, CARB (1) and TANK (2), on the left side of the canister. Gently pull the hoses off the charcoal canister.
2. See Figure 4-12. With a screwdriver, press the retention tang (3) in on the bottom of the canister bracket while pressing on the opposite side of the canister. When the bracket on the canister slides just far enough out of the bracket clips (1) to hold the bottom tang in, press in on the top tang (2) and continue to slide the charcoal canister out until it drops free from the bracket clips.
3. Remove charcoal canister.
4. Inspect and replace as required the hose sections to vapor valve.
5. Inspect and replace as required the charcoal canister to purge solenoid hose segments.

Installation

1. Position the two segments of the brackets on the **new** charcoal canister between the two segments of the canister mounting bracket welded to the frame.
2. See Figure 4-12. Press the canister in toward the bracket until it holds both the upper and lower retention tangs in.
3. Slide the canister into the bracket clips (1) until the tangs (2, 3) snap into place.
4. See Figure 4-11. Attach hoses to left side canister connections (1, 2) as marked.
5. Install **new** EVAP system label on front frame down tube.

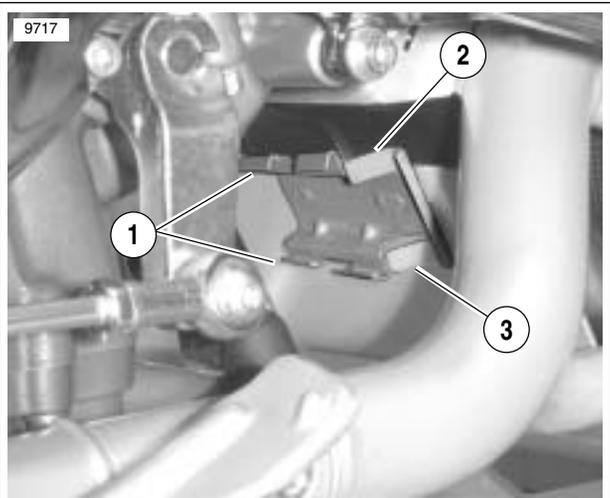
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1. Purge hose to canister (CARB)
2. Vent hose from vapor valve and fuel tank (TANK)

Figure 4-11. Charcoal Canister Connections

9717



1. Bracket clips
2. Top retention tang
3. Bottom retention tang

Figure 4-12. Charcoal Canister Mounting Bracket

HOSE ROUTING/REPLACEMENT

NOTE

Record location of cable ties before removal. Install cable ties in same location when installing.

WARNING

Gasoline is extremely flammable and highly explosive. Always stop the engine when refueling or servicing the fuel system. Do not smoke or allow open flame or sparks near the work site. Inadequate safety precautions could result in death or serious injury.

1. Route purge solenoid hoses.
 - a. See [Figure 4-9](#). Attach the purge solenoid to throttle body hose (4) to the throttle body.
 - b. Route purge solenoid to throttle body hose (4) under frame tube to purge solenoid (3). Install cable ties.
 - c. Attach the canister to purge solenoid hose (5) to the purge solenoid.
 - d. Route canister to purge solenoid hose (5) to the charcoal canister (7). See [Figure 4-11](#). Attach the hose to the fitting marked CARB (1) on left side of canister. Install cable ties.
2. Route fuel tank vapor vent hoses.
 - a. See [Figure 4-9](#). Route fuel tank vent hose (2) along left side of frame to top or long end of the vapor valve (8) clipped on frame tube. Install cable ties. Gently press the hose onto the top plate outlet port and onto the long end of the vapor valve.
 - b. See [Figure 4-11](#). Attach short segment of hose to the bottom or short end of the vapor valve and to the fitting marked TANK (2) on left side of the charcoal canister.