2003 Indian® Chief® Vintage Motorcycle Service Manual

Indian Chief Vintage Models

P/N 98-173

Component and System Descriptions

Chassis

Front suspension — The Chief Vintage is fitted with a conventional-style front suspension with hydraulic compression and rebound damping. Chief Vintage models are equipped with the Paioli front suspension components. The Paioli front suspension has the caliper-mounting bracket as an integral part of the left-front fork slider, unlike previous versions which used a separate caliper mounting bracket.

The 41 mm upper fork tubes (stanchions) of the Paioli assembly are hard chromed with fork sliders that are forged EN-AW-6082 aluminum. The fork sliders are finished with tri-plate chrome.

Steering — The rake of the front forks is 34 degrees. This rake provides a front-wheel trail dimension of 5.92" with the standard MT90-16 sized tires.

Rear suspension — The rear swingarm is suspended at the top on a single KW rising-rate spring and shock absorber that provides 4.25" of travel. Spring preload is adjustable.

Brakes — Single-disc brakes are used on both the front and rear wheels at the left and right sides respectively. Both feature Brembo, differential bore, four-piston calipers in combination with 11.5" rotors.

Wheels and tires — The wheels are chrome with 60 spokes and 16" x 3.5" rims. These are fitted with size MT90-16 tires at both front and rear locations.

Frame — The substantial frame is constructed of high-tensile steel and protected with a black powder-coated finish. Fitted with the standard rear swingarm and front suspension, the frame provides a wheelbase of 68.4".

Engine and Related Systems

Basic engine — At the core of the motorcycle is its engine. The Chief Vintage is powered by the Indian POWERPLUS™ engine and is a four-cycle, two-cylinder engine with a 45-degree V-configuration. Its large bore and stroke give it a displacement of 100 cubic inches. The design is also traditional, carrying forward the characteristic “round” cylinders found in earlier Indian Chief motorcycles. At a compression ratio of 9.2:1, the engine produces 78 foot-pounds of torque at 3800 rpm and 67 hp at 4750 rpm.

Figure 3 — Indian POWERPLUS™ engine

The piston connecting rods are a fork-and-blade style connected to a common crank pin joining two flywheels. The crank pin is set between the pinion shaft flywheel to the right and the sprocket shaft flywheel to the left. The sprocket shaft drives the compensator sprocket in the primary case at the left side of the motorcycle. The sprocket shaft carries the alternator rotor, between the engine crankcase and the compensator. The pinion shaft drives the camshaft, oil pump and breather valve through gearing at the right side of the engine.

The camshaft actuates the intake and exhaust valves through a valve train that includes roller lifters, pushrods and rocker shaft assemblies. The roller lifters, following the cam lobes, raise the pushrods and rocker arms to open the intake and exhaust valves at the appropriate times in the intake and exhaust cycles.

Lubrication system — The lubrication system incorporates a gerotor-type oil pump located at the front of the cam housing. The pump, which is driven by a worm gear fitted on the pinion shaft, provides positive lubrication to the engine. At the rear of the cam housing is a full-flow, spin-on type filter to screen the lubricating oil as it circulates through the system.

Fuel system — The fuel system includes dual tanks with a total capacity of 5.5 gallons including the 1.2-gallon reserve. Fuel is gravity fed to a Mikuni HSR carburetor mounted at the left side of the engine between the cylinder heads. The carburetor features a 42 mm bore with a flat-slide throttle valve.

Ignition system — Combustion is controlled with a computerized electronic ignition system. The system’s electronic module and timing sensor controls output to the spark plugs in the cylinders. The ignition rotor, attached to the end of the pinion shaft, in combination with the sensor in the ignition cover, provides the “trigger” signal for the electronic ignition system.

EMISSION CONTROL SYSTEM TROUBLESHOOTING

Evaporative System Checks

Problems with the evaporative emission system are primarily the result from the failure of the air valve to open or close. This can affect the performance of the engine, resulting in poor acceleration and failure to reach highway cruising speeds.

The air valve door does not open or close:

- Check the operation of the solenoid. Replace it if it is malfunctioning.
- Check the electrical circuit supplying power to the solenoid for continuity and appropriate power. Repair the circuit as necessary.
- Check the mechanical linkage between the solenoid and the air valve door for proper setup and operation. Replace any broken or damaged parts.

Problem conditions in the vapor lines and carbon canister are not so obvious and may not affect engine performance in any noticeable way. However, these components must be checked to ensure proper operation of the system. Refer to System Inspection in the EMISSION CONTROL SYSTEM SERVICE section.

IGNITION SYSTEM TROUBLESHOOTING

Spark Plug Condition

When removing the spark plugs to check their condition, make a note of the cylinder from which each plug is removed. This will be helpful in identifying a problem cylinder. Refer to the IGNITION SYSTEM SERVICE section for removal and installation instructions.

Tools required:

Small file

Wire brush

Inspection and Cleaning

Visually inspect the electrodes for erosion and both the electrodes and insulators for the nature of any accumulated deposits. A spark plug with light powder-like brown or tan deposits and very little erosion of the electrodes is a normal condition and the plugs can be reinstalled. However, the following conditions are indictors of problems that need to be corrected.

Wet sludge-like deposits — This is an indication of excessive oil entering the cylinder. The cause may be worn rings or valve guides.

Dry black powder-like deposits — Deposits of this type are an indicator of incomplete combustion. The cause may be an improper fuel-air mixture, a spark plug with the incorrect heat range or an ignition system that is not functioning properly.

Eroded electrodes and burned/blistered insulator tips — This condition indicates plugs that have been subjected to overheating. The cause is typically incorrect ignition timing, a spark plug that is loose, the use of low-grade fuel or an excessively lean air/fuel ratio.

If the spark plugs are acceptable for reinstallation, lightly file the firing gap surfaces of the side and center electrodes, making sure they are clean, square and parallel. Adjust the firing gap to specification and then clean the threads of the plug shell of any dirt and debris. This will ensure good contact with the cylinder head and proper heat dissipation.

ELECTRICAL TROUBLESHOOTING

Electrical Troubleshooting Charts

Alternator

Alternator Does Not Charge

Problem	Remedy
Voltage regulator not grounded.	Inspect and repair ground as necessary.
Engine ground wire loose or broken.	Inspect and repair ground as necessary.
Faulty voltage regulator.	Test and replace as necessary.
Loose or broken wires in charging circuit.	Repair or replace as necessary.
Faulty stator.	Test and replace as necessary.

Alternator Charge Rate Below Normal

Problem	Remedy
Weak or damaged battery.	Inspect, test, recharge or replace as necessary.
Low battery voltage.	Inspect, test, recharge or replace as necessary.
Loose or corroded connections.	Clean and tighten as necessary.
Faulty regulator.	Test and replace as necessary.
Faulty stator.	Test and replace as necessary.

Starter Motor

Starter Motor Does Not Operate or Does Not Turn Engine Over

Problem	Remedy
Engine stop switch in OFF position.	Place engine stop switch in RUN position.
Ignition switch in OFF position.	Place ignition switch in ON position.
Discharged battery.	Test, recharge or replace as necessary.
Loose or corroded battery or starter motor connections.	Clean and tighten connections as necessary.
Starter control circuit (a) Solenoid faulty (b) Starter relay (under dash) faulty	Replace as necessary.
Starter shaft pinion gear not engaging.	Inspect, clean or replace as necessary.
Starter overrunning clutch slipping.	Inspect and replace as necessary.

Starter Solenoid Test (Starter Removed)

The starter solenoid can be tested with the starter removed. Use a 12-volt test battery and three jumper wires to make the following test connections:

⚠ WARNING!

Battery fluid contains sulfuric acid. Do not allow this fluid to come in contact with eyes, skin or clothing. In case it does, immediately flush the area with water and seek medical attention if necessary.

⚠ WARNING!

Batteries produce hydrogen gas, which is both flammable and explosive. Keep flames or sparks away from batteries. Ventilate the area when charging a battery. Always protect your hands and eyes when working with batteries or battery acid. Failure to follow these warnings could result in personal injury.

With the solenoid mounted on the starter motor, disconnect the starter motor cable from the starter terminal on the solenoid and conduct the following checks in a quick, continuous sequence. If the solenoid fails any one of these checks, it is faulty and should be replaced.

Check the "pull-in" capability of the solenoid, using a 12-volt test battery and three jumper wires of a suitable gauge and length.

- Connect a jumper wire from the negative battery terminal to the starter terminal of the solenoid.
- Connect a second jumper wire from the negative battery terminal to a good ground on the solenoid housing.
- Connect a third jumper wire from the positive battery terminal to the control circuit terminal. The starter drive pinion should pull into the motor. If not, discontinue the test and replace the solenoid.

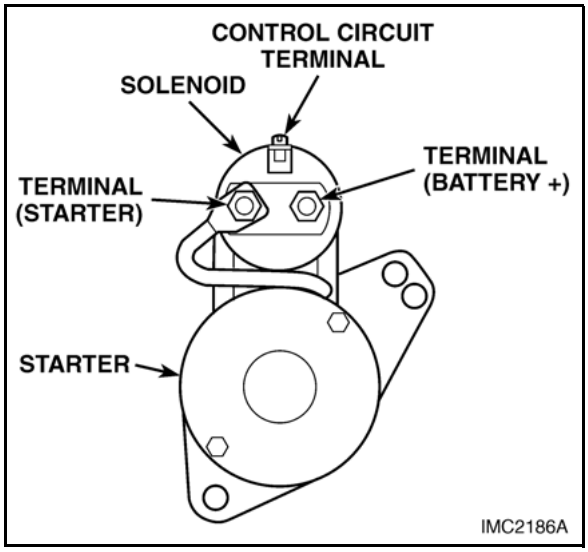

Figure 27— Starter solenoid terminals

- Next, check the "hold-in" capability of the solenoid by changing the connection of the starter terminal jumper wire from the negative battery terminal to the positive terminal. The drive pinion should remain pulled into the starter motor. If not, discontinue the test and replace the solenoid.
- Finally, check the "return" capability of the solenoid by disconnecting the control circuit jumper wire at the battery positive terminal. The drive pinion should release and spring back from the starter motor. If not, replace the solenoid.

Refer to the STARTING SYSTEM SERVICE section as necessary, for solenoid replacement procedures.

Flatten the tab of the washer used to secure the upper triple clamp crown nut, using a punch and hammer.

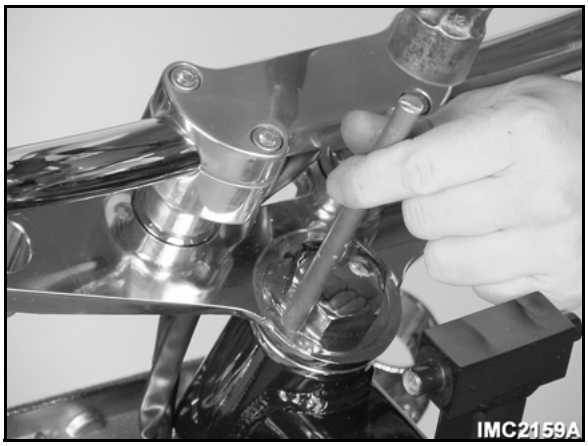

Figure 47— Flattening the tab washer

Support the handlebar assembly and remove the fork crown nut, using a 1-1/2" wrench. Remove and discard the tab washer.

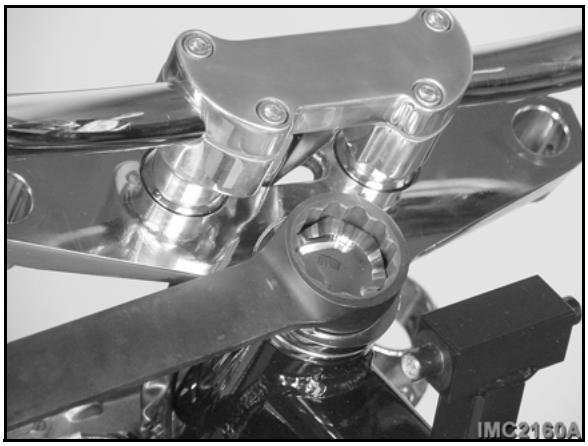

Figure 48— Crown nut removal

Remove the upper triple clamp and handlebar as an assembly. Place the triple clamp and handlebar in a secure position out-of-way.

Note: *It is recommended to place heavy padding over the fuel tanks and secure the triple clamp and handlebar in place on the padding.*

Figure 49— Upper triple clamp removal

Loosen the adjusting nut at the top of the fork stem, using a spanner wrench. Tap the top of the stem to loosen it from the upper bearing, using a soft-faced hammer.

Remove the adjusting nut from the stem. Support the lower triple clamp while removing the nut to prevent it from falling.

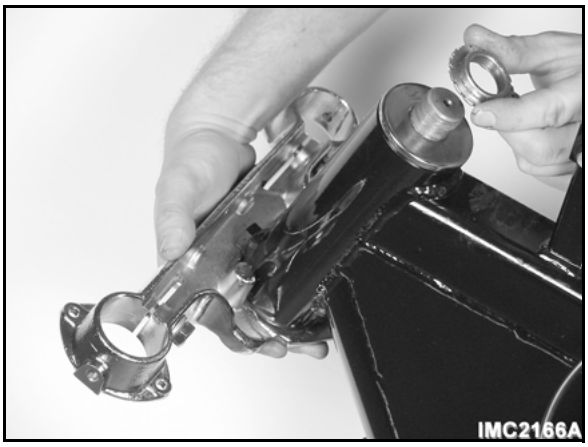

Figure 50— Stem adjusting nut removal

WHEEL AND TIRE SERVICE

Front Wheel Removal and Installation

Tools required:

6 mm hex bit

1/2" hex bit

3/4" socket

Torque wrench

Motorcycle lift

Removal

Raise the motorcycle off the ground, using a suitable lift.

Loosen the axle pinch bolt located on the bottom of the right fork slider, using a 6 mm hex bit.

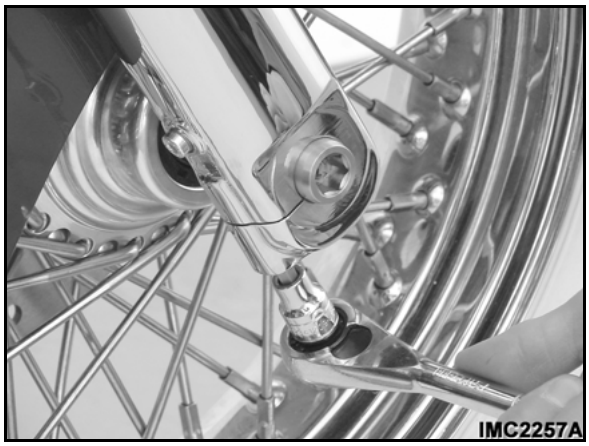

Figure 70 — Loosening pinch screw

Remove the axle nut, lock washer and flat washer from the left side of the axle, using a 3/4" socket. Use a 1/2" hex bit to prevent the axle from turning as the axle nut is being removed.

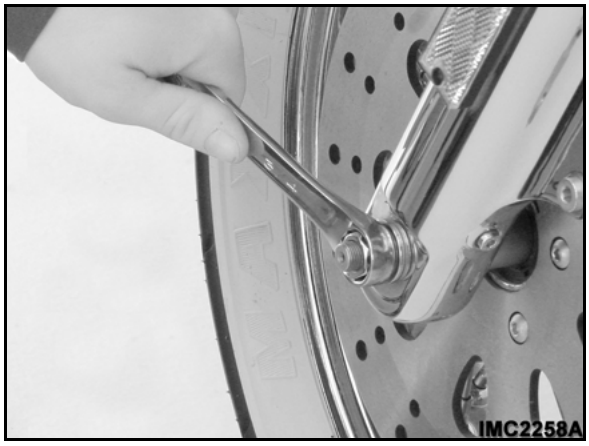

Figure 71 — Axle nut removal

Before removing the axle, note the position of the spacers on each side of the wheel.

Figure 72 — Note spacer position

Carefully remove the axle from the front wheel and fork sliders. Support the tire and wheel assembly while removing the axle. Remove the wheel assembly from the motorcycle.

Tighten spokes that are found to be loose, using a 6 mm open-end wrench. Tap each spoke as it is tightened, noting the tone.

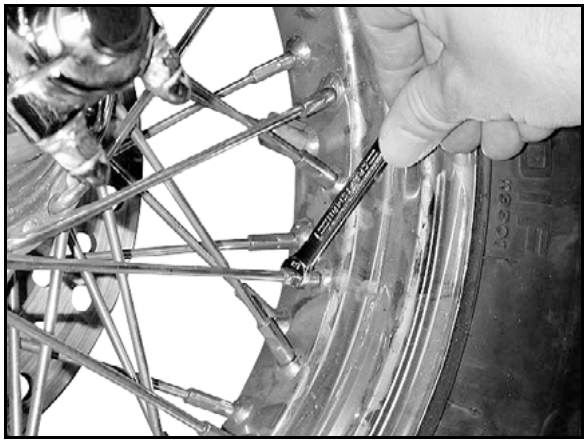

Figure 97— Tightening spokes

Once the spokes are tight, visually inspect the rim and hub for dents, cracks and out-of-roundness. Replace parts as necessary.

Spin the wheel and note any excessive drag or looseness in the bearings. Refer to Hub Bearing Cleaning and Inspection in this section if problems are found.

Repeat this procedure to inspect the rear wheel rim, hub and spokes.

Tire Inspection and Pressure Check

General Information

Tires are critical to the handling performance of the motorcycle. Tire pressures should be checked weekly and then visually inspected at the first 500-mile check.

Tire wear indicators are required by law. These indicators are located in a minimum of six places on the tread circumference and become visible at a tread depth of approximately 1/16" at which point the tire is considered worn out and should be replaced. The tread wear indicators are located in the tire grooves and appear as a solid band.

Please remember, just because a tire has not reached the tread wear indicators does not mean the tire's handling characteristics are not affected. A rear tire used primarily for touring typically wears in the center creating squared edges. This squared-edge wear pattern may cause an odd feeling when the bike is leaned over in a turn.

The tire should be replaced if any odd handling characteristics are encountered.

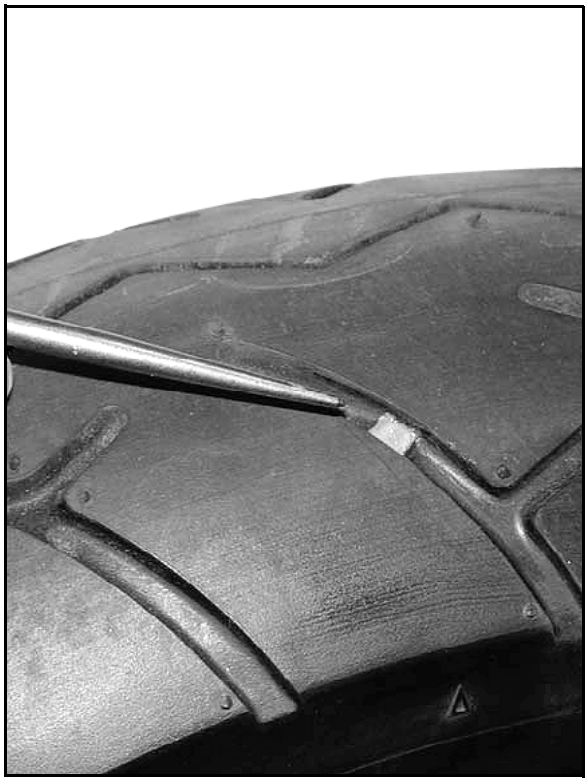

Figure 98— Wear indicator (painted for clarity)

Front tire wear typically occurs off center and produces steps at the water drain grooves. When leaned over, these steps can cause the handlebars to oscillate producing a weave of the motorcycle. Again, the tire does not have to be worn down to the wear bar indicators for this to occur. Prompt replacement of the tire typically restores handling back to an "as new" condition.

Proper inflation pressure is critical to tire longevity. Low inflation pressure will cause the tire to build up heat and break down the sidewall and tread. In extreme cases, the tire will form a bubble between the cords and rubber. When this occurs, a tread section may tear away from the tire, inducing a vibration that gets progressively worse with speed. The vibration affects handling and can lead to a flat tire at higher speeds, a dangerous situation.

Always adhere to the tire manufacturer's suggested pressures taking into consideration the weight of the motorcycle, weight of passengers and road conditions.

⚠ WARNING!

A mis-aligned caliper might be evidence of a more serious problem and should be investigated for a possible cause.

When the correct clearance is achieved, apply Blue Loctite 242 to the caliper mounting screws (5) and tighten to 23-30 foot-pounds.

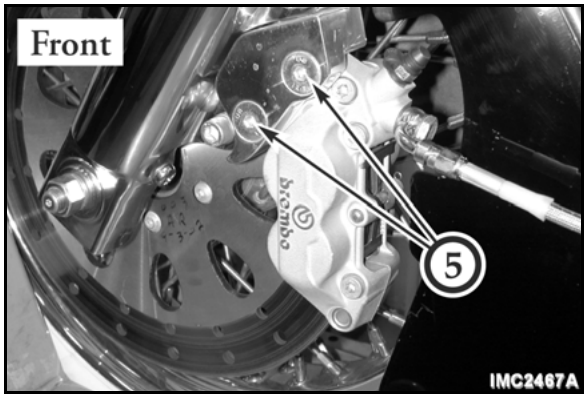

Figure 119— Caliper mounting screws

Thoroughly test the brakes before carrying out a full road test.

Front and Rear Brake Pad Removal and Installation

Assembly and disassembly of the brake pads is similar for both the front brake pads and rear brake pads.

Tools required:

1/8" hex bit

6 mm hex bit

#2 Phillips screwdriver

Large flat-blade screwdriver

Removal

Remove the two caliper mounting screws, using a 6 mm hex bit. Some motorcycles can be equipped with caliper shims. If equipped, carefully remove only one caliper mounting screw at a time and retain any shims. Do not mix any of the shims. The shims must remain in the same position relative to the caliper.

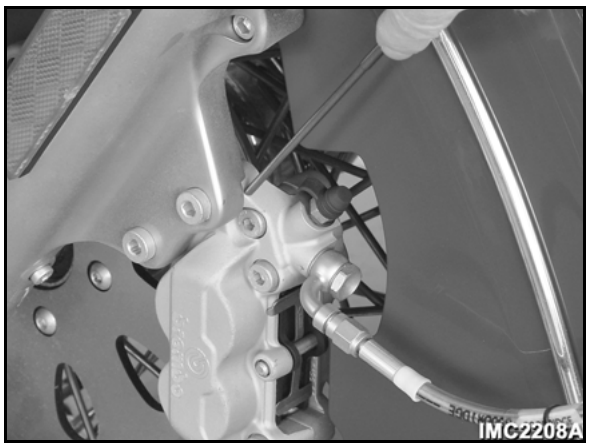

Figure 120— Caliper mounting shim location, if equipped

Slip the caliper from the mounting bracket and off the brake rotor.

Remove the push pin from the brake pad retaining pin and slide the retaining pin from the caliper.

Remove the brake pad clip from the top of the pads.

Remove the pads from the caliper.

Installation

Before seating the pistons into the caliper, thoroughly wipe any brake dust, dirt and grime from the pistons. Cleaning greatly reduces the chance of foreign material entering the dust boots and piston seals. Foreign material in the seals can cause leaks and can seize pistons.

Return the used brake pads to the caliper.

Place a spreader between the brake pads. Push the pistons back into the caliper. If the pistons do not seat completely, the master cylinder might be full of fluid. Remove some of the brake fluid from the master cylinder reservoir.

Install new pads into the caliper. Make sure the friction material on each brake pad faces the rotor when installed.

Position the brake pad clip over the brake pads. Make sure the arrow embossed on the clip faces in the direction of brake rotor rotation.

Tools required:

Suction gun

11 mm wrench

#2 Phillips screwdriver

3/16" hex bit

1/4" diameter clear tubing (30" length)

Clear catch container

DOT 5 brake fluid

Clean both the front and rear master cylinders before removing the covers.

Remove the reservoir cover from the front master cylinder, using a #2 Phillips screwdriver.

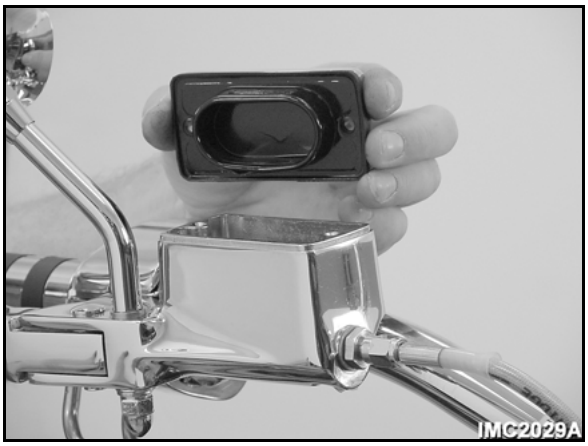

Figure 130 — Front master cylinder cover removal

Insert the suction gun into the reservoir and remove the brake fluid.

Replenish the master cylinder with fresh, clean DOT 5 brake fluid to within 1/4" from the top of the reservoir. Replace the reservoir cover.

Figure 131 — Brake fluid level

Remove the protective cap from the front caliper bleeder screw and install the 1/4" diameter clear tubing onto the screw.

Place the opposite end of the tube into a clear catch container. Add some DOT 5 brake fluid into the container.

Note: *When bleeding the front brake hydraulic system, make sure the front forks are facing straight ahead. The caliper must be as vertical as possible to ensure all air can be removed from the system. Also keep the motorcycle in the upright position.*

Pump the brake lever once or twice and hold. Loosen the front caliper bleeder screw approximately 1/4 turn, using a 7/16" wrench. Tighten the bleeder screw.

Note: *Do not release the brake lever until the bleeder screw is fully closed. Air can reenter the system.*

Again, pump the brake lever once or twice and hold. Loosen the bleeder screw approximately 1/4 turn, using a 7/16" wrench. Tighten the bleeder screw.

Remove the reservoir cover and replenish the brake fluid as necessary. Do not let the brake fluid level in the reservoir become too low. Pumping the brake lever with a low fluid level can cause air to reenter the system.

Continue pumping and holding the brake lever and loosening and tightening the bleeder screw. Do this as described, until fresh, clean fluid is coming from the bleed tube and there are no air bubbles.

Squeezing the brake lever should become firm when the brake pads are seated and the hydraulic system is bled of any air.

Remove the reservoir cover and replenish the master cylinder with DOT 5 brake fluid, until the level is 1/4" from the top of the reservoir.

Install the reservoir cover and tighten the screws to specification, using a #2 Phillips screwdriver.

Check for proper brake operation.

Perform the same service on the rear hydraulic system as done for the front brakes.

Kickstand Removal and Installation

Tools required:

6 mm hex bit

Spring pliers

Motorcycle lift

Procedure

Using a suitable lift, raise the motorcycle off the ground. Make sure that the lift is positioned in a way that allows full access to the kickstand components.

Using spring pliers, disconnect and remove the spring from the arm of the kickstand and the frame bracket.

Remove the pivot screw, using a 6 mm hex bit, and remove the kickstand arm from the motorcycle.

To install the kickstand, reverse the order of removal. Tighten the pivot bolt to specification.

Windshield Removal and Installation

Tool required:

3/16" hex bit

Removal

Using a 3/16" hex bit, loosen but do not remove the upper and lower mounting screws securing the spotlight bracket to the fork assembly. Do this on both sides of the fork assembly.

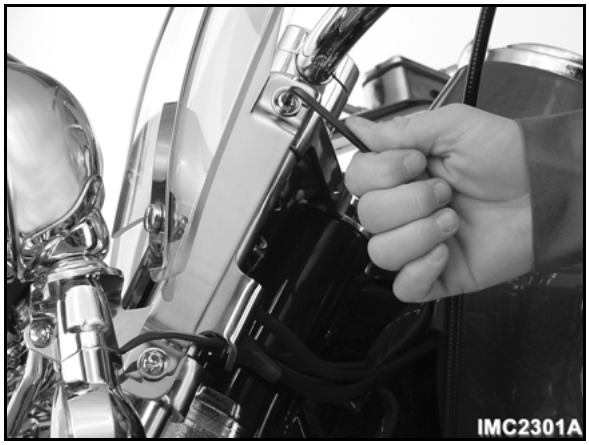

Figure 154 — Loosening mounting screws

Lift the windshield from its mounting.

Figure 155 — Remove windshield

Installation

To install the windshield, align the notches in the windshield bracket with the screws retaining the spotlight/turn signal brackets to the fork assembly.

Slip the bottom notches of the windshield bracket onto the lower mounting screws and then, slide the upper notches of the windshield bracket onto the upper mounting screws.

Figure 156 — Align bracket notches with mounting screws

AIR CLEANER AND FILTER ELEMENT SERVICE

Air Cleaner

To gain access to components such as the carburetor or engine for service, remove the air cleaner as a unit.

Tools required:

1/2" combination wrench

Slip-joint pliers

Flat-blade screwdriver

Removal

Loosen the two 5/16" nuts securing the air cleaner brackets to the engine mounting bracket, using a 1/2" combination wrench.

Slide the air cleaner with brackets off the studs of the engine mounting bracket. The air cleaner-to-carburetor adapter is a slip fit over the air inlet of the carburetor. Simply pull to remove the unit.

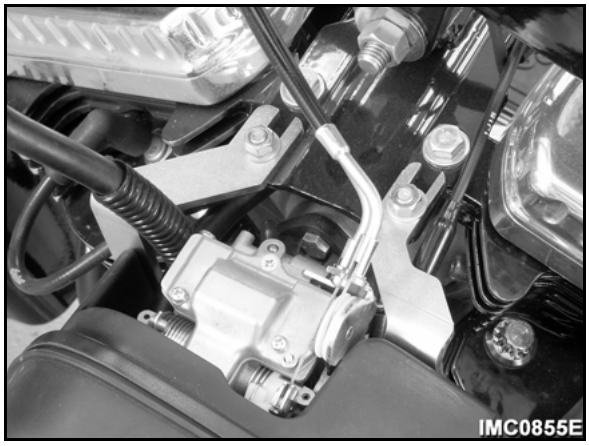

Figure 182 — Air cleaner mounting brackets

Disconnect the crankcase vent line from the back of the air cleaner housing.

Motorcycles for use in California are equipped with air cleaners having a solenoid and butterfly assembly. These components are used to minimize evaporative emissions. The butterfly assembly covers the inlet to the air cleaner and is closed when the engine is not running and the key is turned off. The solenoid opens the butterfly assembly when the key is turned on.

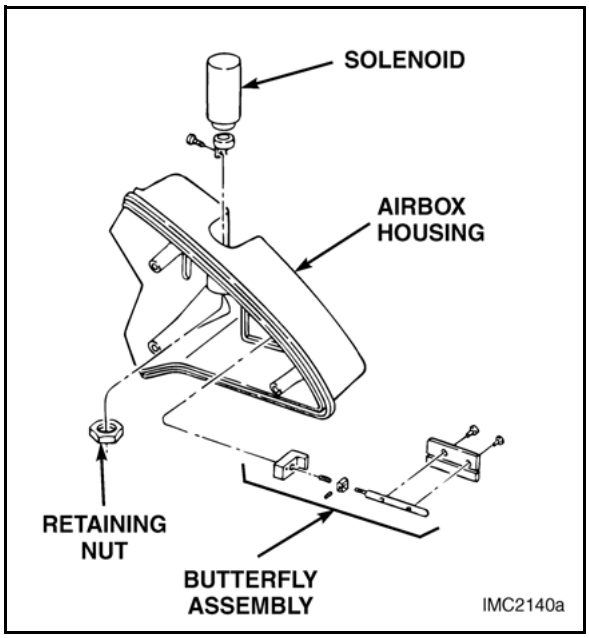

Figure 183 — Evaporative system (California only)

If equipped, disconnect the wires from the solenoid.

Remove the air cleaner.

Installation

Inspect the air cleaner-to-carburetor adapter seal and replace as necessary.

Apply a suitable lubricant to the air cleaner-to-carburetor adapter seal.

Position the air cleaner near the carburetor.

For California units, connect the wires to the solenoid of the air cleaner.

Connect the crankcase vent line to its fitting on the back of the air cleaner.

Support the tank and remove the mounting screws at the upper front and center of the tank, using a 1/2" wrench.

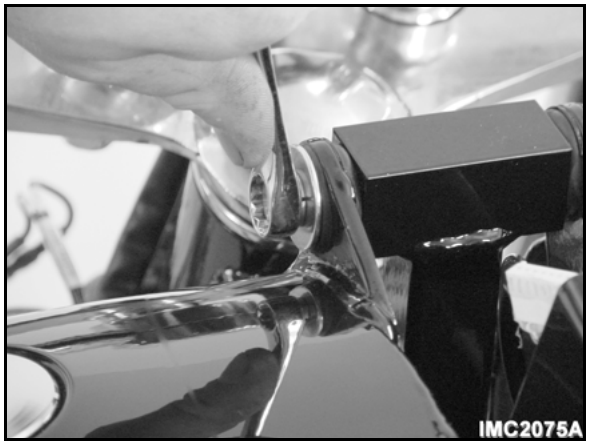

Figure 211 — Top-front mounting screw (left tank)

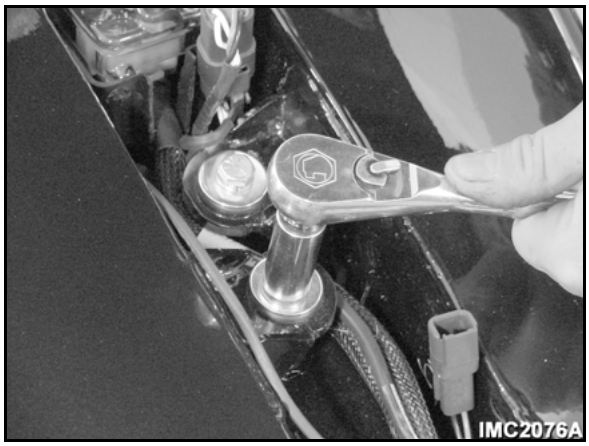

Figure 212 — Center mounting screw (left tank)

Remove the tank from the motorcycle.

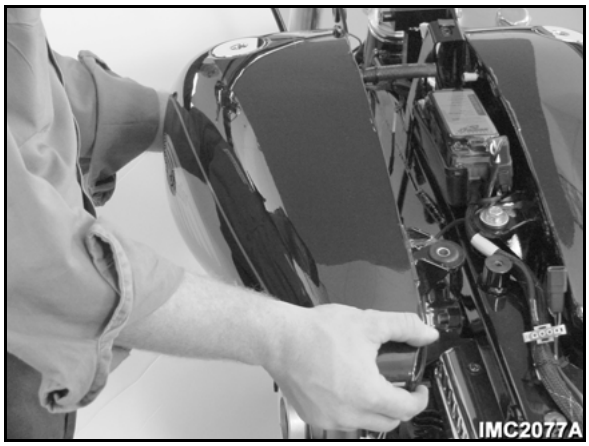

Figure 213 — Fuel tank removal (left shown)

Remove the right tank in the same manner by removing the three mounting screws at the lower front, upper front and center.

Tank Installation

Place the right fuel tank in position at the side of the upper frame tube and install the center and upper front mounting screws and washers, using a 1/2" socket. Tighten the screws to specification.

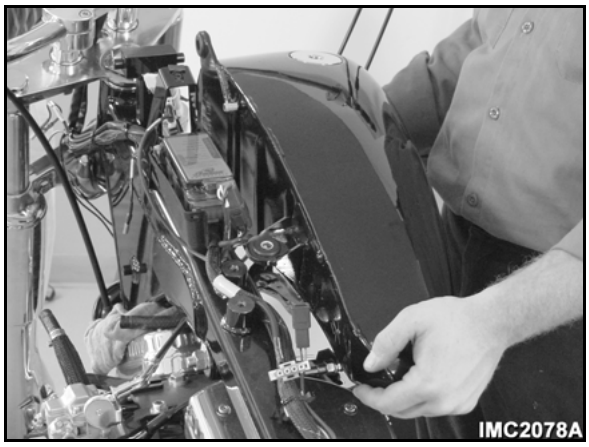

Figure 214 — Fuel tank installation (right shown)

Install the lower front mounting screw and bright-finish collar, using a 3/16" hex bit. Tighten the screw to specification.

Repeat the above steps to install the left fuel tank.

Install the vent tube and between the fuel tanks at the top. Tighten the clamps securely.

Figure 215 — Fuel vent tube

Install the fuel crossover line between the tanks. Tighten the clamps securely.

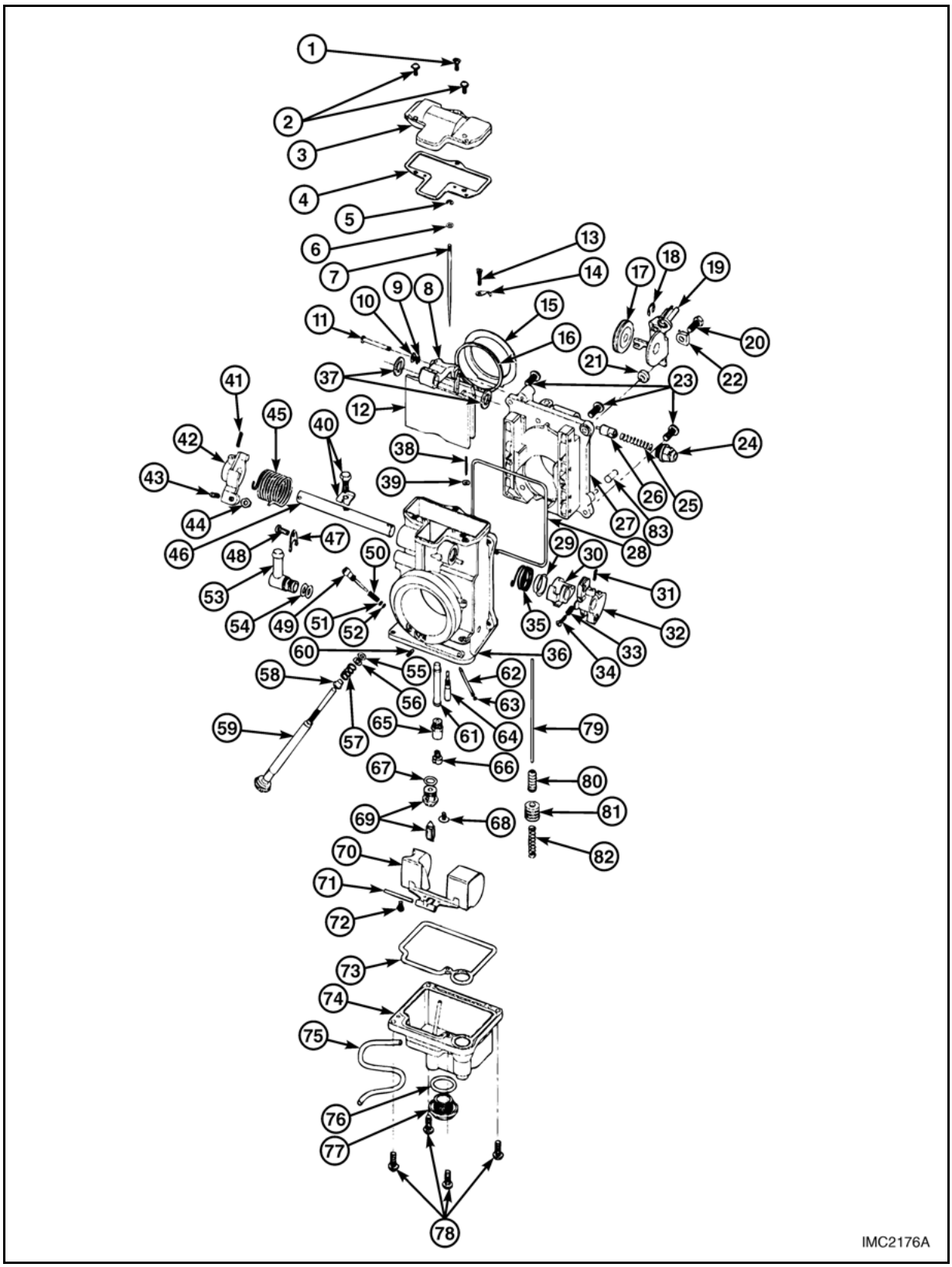

Figure 234 — Carburetor exploded view

When the engine is shut down and the ignition switch is "off," the air valve at the air cleaner intake is closed, blocking the outflow of fuel vapors. Vapors from the air cleaner housing and fuel tanks are vented through hoses to the carbon canister where they are absorbed and stored by the activated charcoal.

When the ignition switch is turned "on" and the start switch depressed, the air control solenoid is energized opening the valve and allowing air to flow to the carburetor. Once started, operating vacuum draws fresh air through the charcoal where it picks up stored vapors and delivers them through the purge line to the carburetor.

The system is equipped with a fuel vapor valve in the fuel tank at the vent line inlet. The valve prevents the entrance of liquid fuel into the vent line.

System Inspection

The evaporative system requires very little maintenance. However, it should be checked at scheduled intervals to ensure that all components are operational and not damaged. Check to see that the air valve door moves freely from closed to full open and does not bind. Check the carbon canister for cracks or damage. Vent and purge hoses should be in good condition without cracks or cuts. Also check the hose routings to make sure that they are secure and away from hot engine components.

⚠ WARNING!

Vent and purge hoses contain flammable fuel vapors. Hoses damaged by hot engine components can leak, with possible ignition of escaping vapors and resulting personal injury.

Replace any damaged components.

Carbon Canister Removal and Installation

Tool required:

Flat-blade screwdriver

Make sure the ignition and engine start switches are turned "off" and disconnect the battery cables (negative cable first) to prevent accidental engine start.

⚠ WARNING!

Batteries produce hydrogen gas, which is both flammable and explosive. Keep flames or sparks away from batteries.

Using a flat-blade screwdriver as assistance, disconnect the vent and purge hoses at the carbon canister.

To remove the carbon canister, use a flat-blade screwdriver to release the lock tabs on the canister bracket. Slide the carbon canister out of the bracket.

Figure 247— Remove carbon canister

To install the carbon canister, reverse the order of removal.

Air Valve Solenoid Removal and Installation

Tools required:

0.050" hex bit

1/8" hex bit

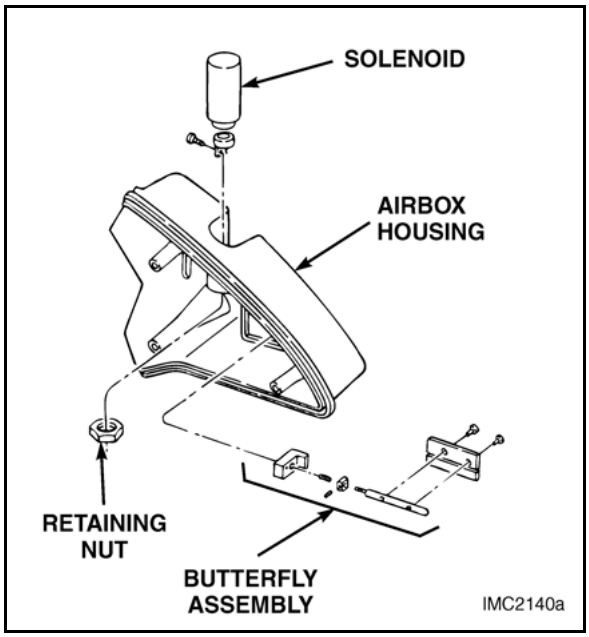

Figure 248— Air valve solenoid assembly

Place the left fuel tank in position at the side of the upper frame tube and install the two top retaining screws and washers, using a 1/2" socket.

Tighten the screws to specification. Install the bottom front retaining screw and bright-finish collar, using a 3/16" hex bit. Tighten the screw to specification.

Repeat the above step to install the right fuel tank.

Install the fuel crossover, vent lines and clamps. Tighten the clamps securely.

Connect the shutoff valve fuel line on the left tank to the carburetor.

Reconnect the wiring and then, position the instrument panel over the fuel tanks and secure the panel with the socket-head screw in the speedometer bezel and the socket-head screw at the rear of the panel. Using a 5/32" hex bit, tighten the screws to specification.

Reconnect the battery positive cable and then the negative cable to the battery terminals.

Position the seat on the frame and using a 3/16" hex bit, install the two screws to attach the seat to the frame. Tighten the screws to specification.

Removal

Remove the rocker box assembly (see Rocker Box Procedures).

Using a 1/2" wrench, remove the bolt from the support bracket (if so equipped) and carburetor flange at the intake manifold.

Loosen the 12-point nut securing the support bracket to the crankcase and remove the bracket.

Using a 1/4" hex bit, remove the outer intake manifold mounting screws from each cylinder head. Then, loosen and remove the two inner mounting screws and remove the intake manifold.

Using a 1/2" 12-point socket, remove the four head bolts from the cylinder studs. In removing the bolts, loosen each bolt 1/4 turn at least twice before completely removing them. This will slowly release pressure on the cylinder and cylinder head and avoid distortion.

Remove the cylinder head from the engine.

Remove the gasket and the two dowel pins from the cylinder. Discard the gasket.

Disassembly

Note: *As the cylinder head is being disassembled, mark all parts so they may be reinstalled in the same location.*

To remove the valves from the cylinder head, mount the valve spring compressor tool, JIMS® 96600-36B, in a vise.

Mount the cylinder head in the tool with the collar flange positioned over the spring and the driving screw centered on the valve head. Turn the driving screw in to compress the valve spring and remove the locks from the top of the valve stem.

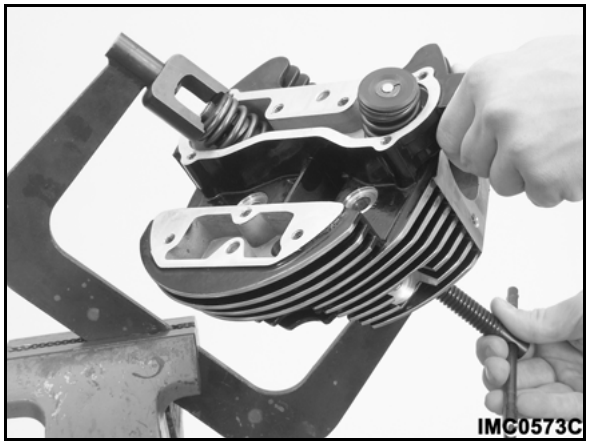

Figure 291 — Removing valves from cylinder head

Turn the driving screw out to release pressure on the spring and remove the cylinder from the tool.

Remove the upper collar and spring set from the top of the head. Pull the valve out from the bottom.

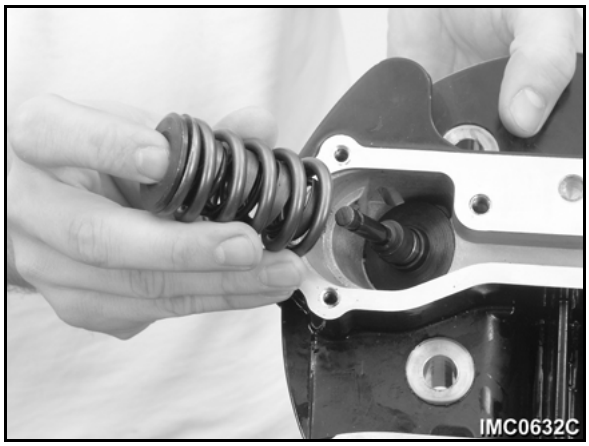

Figure 292 — Removing valve spring

Remove the valve seal and lower collar from the valve guide.

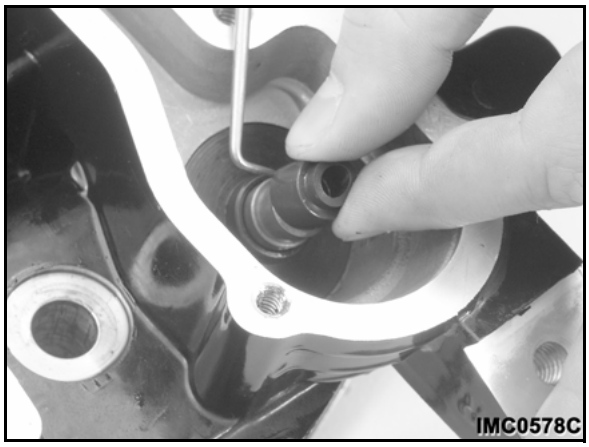

Figure 293 — Removing valve seal and lower spring collar

Ignition Cover Housing/Rotor Removal and Installation

Tools required:

1/8" hex bit

3/16" hex bit

Procedure

Remove the two ignition cover housing mounting screws, using a 3/16" hex bit. Remove the cover and discard the gasket.

Using a 1/8" hex bit, remove the screw retaining the rotor and remove the rotor.

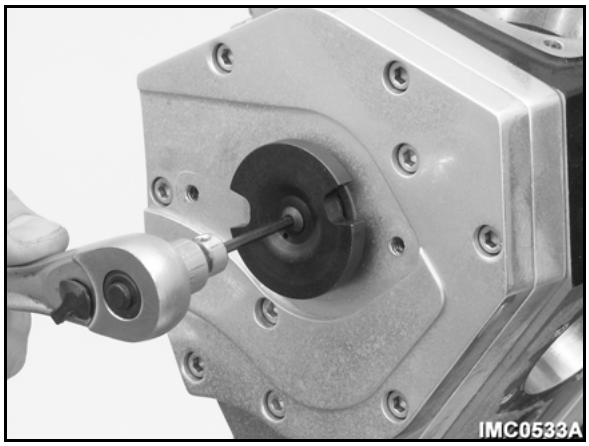

Figure 316 — Removing ignition rotor

Inspect the leads and connector for the sensor sealed in the cover. If damaged, repair or replace as necessary.

Position the rotor on the end of the camshaft with the alignment pin in the shaft slot. Apply blue threadlock to the threads of the retaining screw and install the screw, using a 1/8" hex bit. Tighten the screw to 48–72 inch-pounds.

Place a new gasket in position and install the ignition cover housing. Apply blue threadlock to the threads of the cover screws and install the screws. Tighten the screws to 8–12 foot-pounds. Do not overtighten the screws.

Lubricate and install the sprocket shaft spacer and position the seal in the case. The seal must be positioned with the rounded edge facing outward, away from the case.

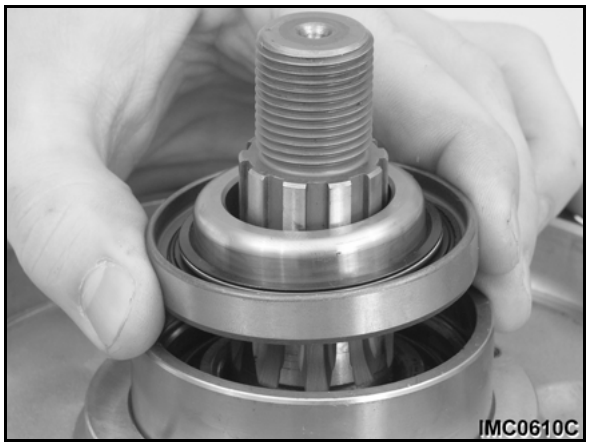

Figure 339 — Placing sprocket shaft seal in position on case

Using the motor sprocket shaft seal installation tool, JIMS® 39361-69, in combination with the bearing installation tool and locknut wrench, drive the seal in until it is fully seated in the case.

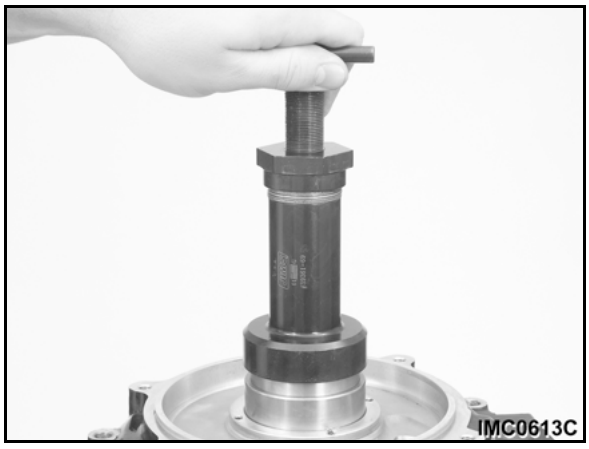

Figure 340 — Seating seal in case

Check end play and then remove the left case half, flywheel and crank assembly from the rebuilding jig.

Remove the rebuilding jig from the vise and install the sprocket shaft holder, JIMS® 1034, in the vise.

Position the left case half, flywheel and crank assembly in the holder, sprocket shaft down.

Lubricate the pinion shaft and install the pinion shaft bearing. Then lubricate the bearing.

Install the snap ring to retain the bearing.

Apply a bead of Loctite® 510 Gasket Eliminator to the case-mating surface.

Make sure that the connecting rods are centered in the cylinder bores and place the right case half in position on the pinion shaft. For later 2003 models, make sure to align the dowel pins and that the case halves mate together properly.

Apply blue threadlock to the threads of the crankcase bolts.

Note: *The six 5/16" bolts are through bolts retained with nuts. The shorter 3/8" bolt is threaded into the case. The one 1/4" bolt is a through bolt located at the top of the case between the cylinders and has a nut.*

For early 2003 models, place the three locator bolts in the proper locations and drive them into the case with a brass hammer. Install the nuts and tighten to 18 foot-pounds.

Install the remaining bolts and nuts. Tighten the nuts and the one bolt without the nut, to 18 foot-pounds. Tighten the one 1/4" through bolt to 10–12 foot-pounds.

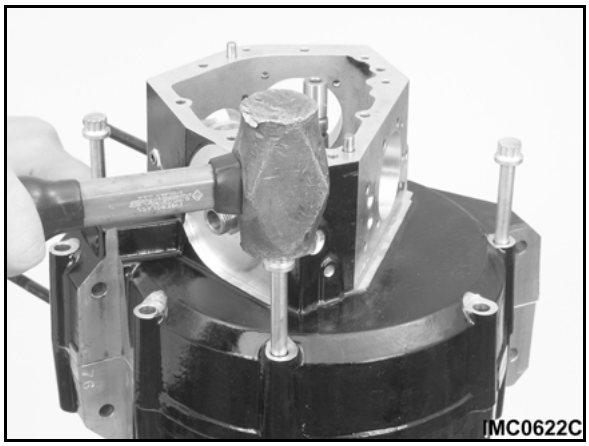

Figure 341 — Driving in locator bolts (early 2003 models)

Note: *Later 2003 model engines do not require driving in any locator bolts. Alignment dowels are used instead to align the case halves.*

Remove the assembled crankcase from the sprocket shaft holder and mount it in an engine stand, JIMS® 1006T, for engine assembly.

Wipe off any excess case sealant.

Position the outer housing to the inner housing and install the 15 screws with washers. Apply blue threadlock to the first four threads of the housing screws before installation.

Note: *The four shorter screws are located at the engine crankcase end of the housing.*

Using a 3/16" hex bit, tighten the 15 screws around the perimeter of the outer primary drive housing. Tighten the screws to specification, starting in the center and working outward in a cross pattern.

Figure 370 — Tightening primary drive housing screws

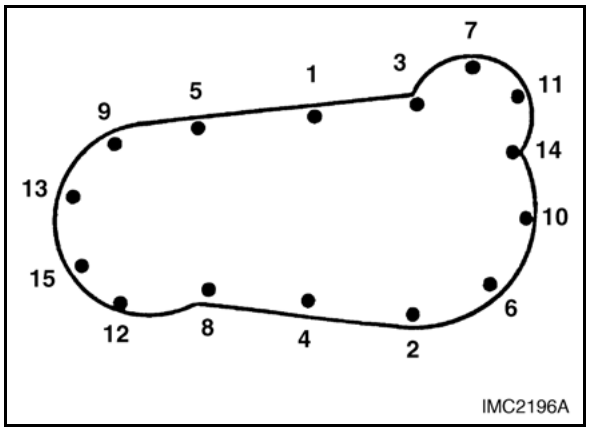

Figure 371 — Housing screw tightening sequence

Remove the three inspection cover screws, inspection cover and gasket. Fill the primary drive housing through the inspection cover opening, using the recommended amount and type of lubricant, 30 ounces of Indian brand primary oil.

Inspect the cover gasket and replace if torn or damaged. Apply blue threadlock to the first four threads of the cover screws. Install the three screws with washers and tighten to specification, using a 3/16" hex bit.

Make sure all fasteners and drain plug are tightened and that no leaks are evident.

Reconnect the shift rod to the shift lever. Apply blue threadlock to the first four threads of the bolt and tighten to 15–18 foot-pounds torque.

Engine and Transmission Alignment

Use the following procedure to properly align the engine and transmission with the inner primary housing when the engine and/or transmission have been removed for service.

Tools required:

1/2" socket

9/16" socket

1/4" hex bit

Torque wrench

Engine/Transmission Positioning

Place the removed component, engine and/or transmission in position on the respective mounts in the frame. Refer to the following illustration for referenced fastener locations.

- Snug rear engine bolts (1, 2).
- Torque engine inner primary bolts (3, 4, 5, 6) in an X pattern to 18 foot-pounds.
- Torque the transmission primary bolts (7, 8, 9, 10) in an X pattern to 18 foot-pounds.
- Torque rear engine bolts (1, 2) to 33 foot-pounds.
- If needed, add shims to front engine bolts (11, 12). Available sizes are:

  P/N: 97-025, 0.012" shim

  P/N: 97-026, 0.030" shim

  P/N: 97-027, 0.060" shim
- Torque front engine bolts (11, 12) to 33 foot-pounds.
- If needed, add shims to transmission studs (13, 14, 15, 16).
- Torque the four transmission nuts (13, 14, 15, 16) to 33 foot-pounds.

Using a 3/16" hex bit, remove the chain adjuster access cover from the outer primary housing and discard the gasket.

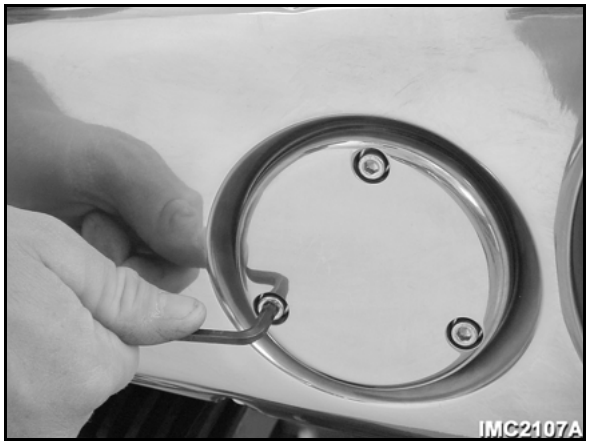

Figure 394 — Chain adjuster access cover removal

Fill the primary housing with 30 ounces of Indian primary oil.

Apply blue threadlock to the three access cover screws. Place a new gasket in position on the housing and install the cover. Tighten the cover screws to specification, using a 3/16" hex bit.

Lower the motorcycle to the ground and remove the lift.

Clutch Removal and Installation

Tools required:

3/16" hex bit

7/16" wrench/socket

10 mm socket

1/2" wrench/socket

9/16" wrench/socket

3/4" thin wall socket

Dental pik

Drain pan

Motorcycle lift

Torque wrench

Removal

Raise the motorcycle to a comfortable working height, using a lift.

To remove the complete clutch assembly (clutch pack, hub and sprocket case), refer to the PRIMARY DRIVE SERVICE section for instructions. If only the clutch pack requires service, proceed with the following steps.

Place a drain pan under the primary drive housing under the drain plug.

Using a 3/4" thin wall socket, remove the drain plug to allow the primary housing lubricant to drain. Inspect the nylon sealing washer on the drain plug for damage and replace as necessary. Apply blue threadlock to the drain plug and reinstall it into the outer primary drive housing and tighten to specification.

Remove the five retaining screws from the clutch cover, using a 3/16" hex bit. Remove the cover and discard the gasket.

Figure 395 — Clutch cover removal

Remove the six clutch pressure plate retaining screws and springs, using a 10 mm socket.

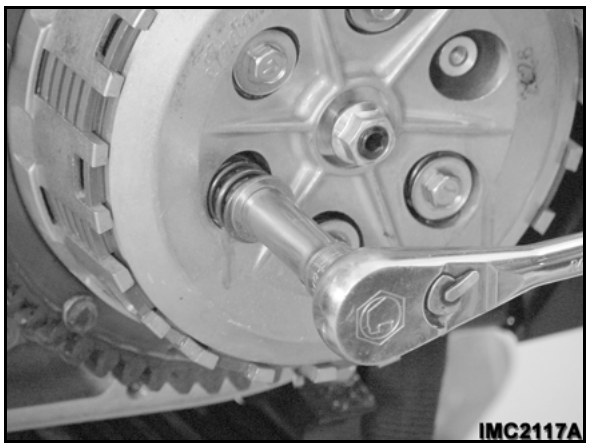

Figure 396 — Removing pressure plate retaining screws

TRANSMISSION REMOVAL AND INSTALLATION

When it is necessary, the transmission can be removed from the chassis for overhaul or replacement.

Transmission Removal

Tools required:

5/32" hex bit

3/16" hex bit

1/4" hex bit

5 mm hex bit

10 mm socket

7/16" wrench and/or socket

1/2" wrench and/or socket

9/16" wrench and/or socket

3/4" wrench and/or socket

15/16" wrench

1-3/16" socket

1-1/2" socket

Flat-blade screwdriver

Snap ring pliers

Torque wrench

Motorcycle lift

Drain pan

Transmission Removal

Drain the engine oil from the oil tank, and remove the oil tank following the procedure in the LUBRICATION SYSTEM SERVICE section.

Note: *If the transmission clutch cover (right side) is to be removed to disconnect the clutch control cable, drain the oil from the transmission before proceeding to the next step.*

Using a suitable lift, raise the motorcycle off the ground to a comfortable working height.

Disconnect the clutch control cable by one of the following two methods:

- If the oil has not been drained, disconnect the cable from the handlebar control and the retainer bracket on the frame. This frees the cable to be removed with the transmission.
- If the transmission oil has been drained, remove chrome clutch-control cover and secure it out-of-way. Refer to the procedures in the TRANSMISSION OVERHAUL section.

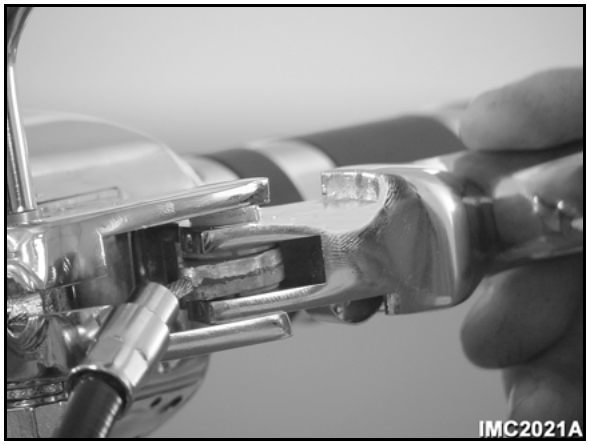

Figure 421 — Disconnecting clutch cable at handlebar control

Remove the fairings at each side of the rear swing arm stanchion. Remove the center front screw first, using a 5/32" hex bit. Then, remove each fairing by removing the two screws at the rear of each.

Note: *The left fairing has a cutout fitted with a grommet. This cutout fits over the ignition switch, which is mounted to the frame.*

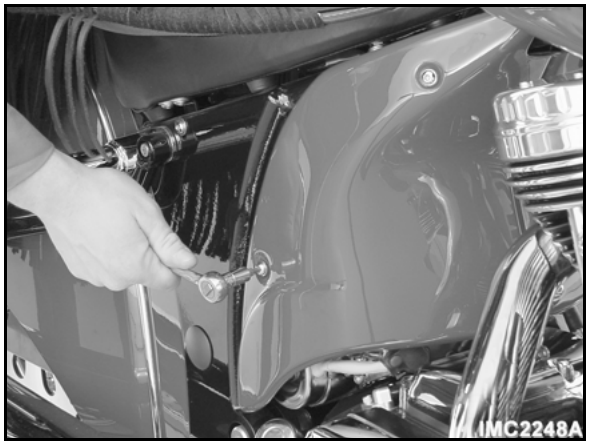

Figure 422 — Removing fairings

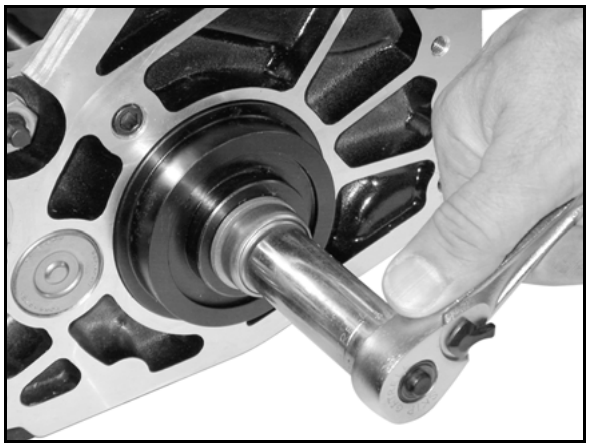

Figure 455— Pressing in main bearing

Install a new retaining ring with the sharp edge facing out, toward the main seal.

Lubricate the outside and inside diameter of the new main seal with grease and install, using a JIMS® Seal Driver for five speeds. Typically the seal can be installed by hand when the seal is lubricated and the case is clean.

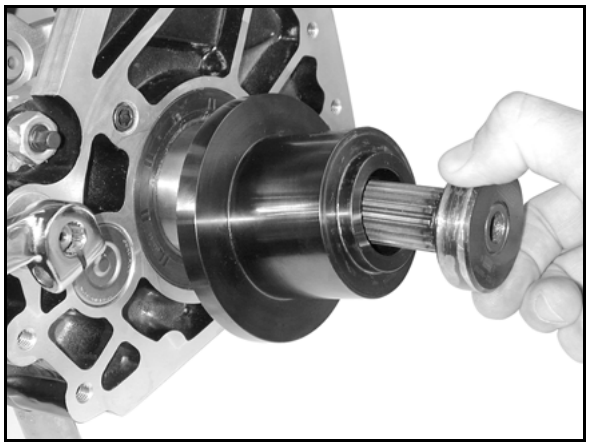

Figure 456— Setting up JIMS® Seal Driver for 5 speeds

The JIMS® tool will set the seal to the correct depth.

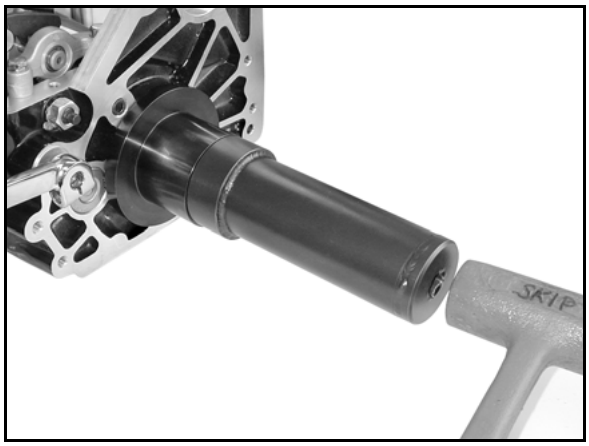

Figure 457— Installing new main seal

Case Needle Bearing Inspection and Replacement

Inspect the needle bearing pressed into the left case. Look for any pitting or grooving of the needles. The countershaft spins on this bearing. If it needs to be replaced, press the bearing from the case with a hydraulic press.

Figure 458— Inspecting needle bearing at left of case

Lubricate the inside and outer side of the needle bearing with transmission oil. Press the new needle bearing into the case. The bearing will need to be pressed flush or slightly below flush within 0.010" of the case face.

Slip 5th gear onto the countershaft followed by a retaining ring.

Figure 498 — Installing 5th gear onto countershaft

Installing Gearset into Transmission Case

Lubricate the pins used to align the trapdoor with the transmission case.

Lubricate the three needle bearings with transmission oil. Two of the bearings are in the main gear (5th gear) and the third is pressed into the case.

Place a new gasket on the trapdoor and align the gasket with the bolt holes.

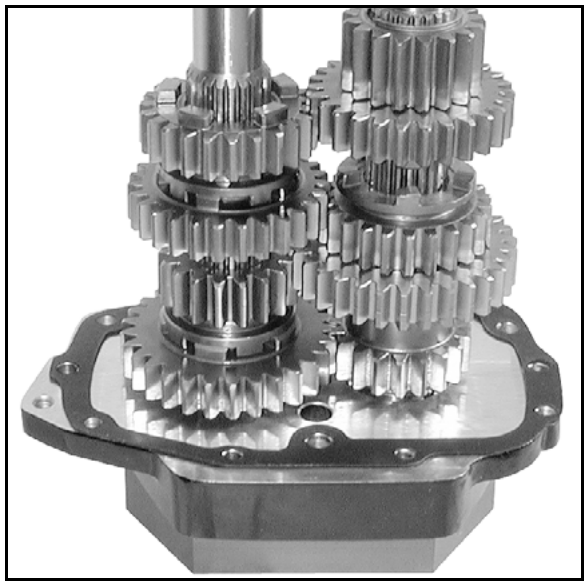

Figure 499 — Install new gasket on trapdoor

With the shafts facing upward, lower the transmission case over the shafts. Align the mainshaft with the main gear and the countershaft with the needle bearing. Align 5th gear of the mainshaft to 5th gear of the countershaft.

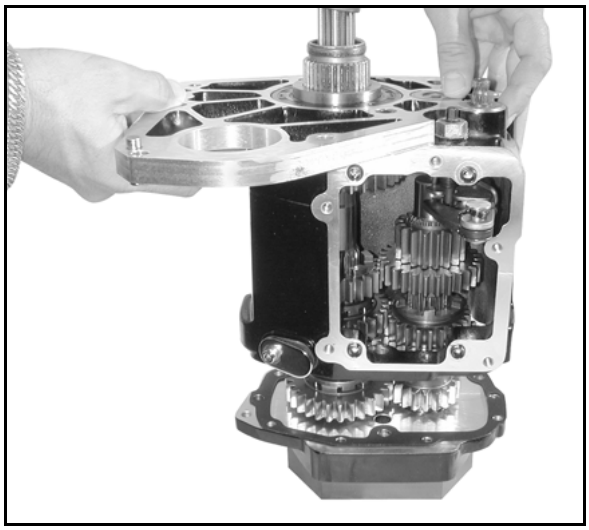

Figure 500 — Installing transmission case over shafts

Check that the alignment pins are aligned with their mating holes in the trapdoor.

Gently tap the trapdoor with a soft-faced hammer until seated against the case.

Apply blue threadlock to the six trapdoor retaining bolts. Install the four lower 5/16" bolts through the trapdoor and thread them into the case. Install the two upper 1/4" bolts through the trapdoor and thread them into the case.

Tighten the 5/16" bolts to 13–16 foot-pounds torque, using a 1/4" hex bit. Tighten the 1/4" bolts to 7–9 foot-pounds torque, using a 3/16" hex bit.

Lock the transmission. Move 3rd gear in either direction on the countershaft to engage either 1st gear or 2nd gear. Rotate the mainshaft by hand clockwise until it stops turning.

Tighten the mainshaft nut to 45–55 foot-pounds torque.

Rotate the countershaft clockwise by hand until it stops turning. Tighten the countershaft nut to 45–55 foot-pounds torque.

Disconnect the battery positive cable from the solenoid terminal, using a 12 mm socket. Disconnect the start switch wire lead at the solenoid terminal by unplugging the spade terminal.

Figure 530— Starter terminal

Using a 1/2" socket, remove the retaining nut and battery ground cable from the starter mounting stud screw and then remove the screw.

Remove the mounting screw from the other side of the starter, using a 1/4" hex bit. Remove the starter motor from the motorcycle.

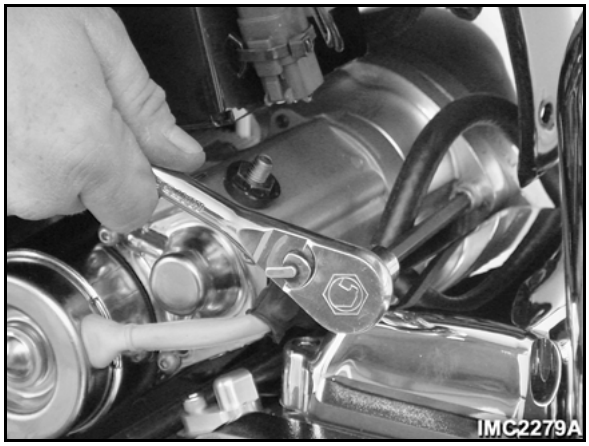

Figure 531— Starter mounting bolt removal

Starter Installation

Place the starter motor in position against the transmission end cover flange.

Apply blue threadlock to the threads of the starter mounting screws. Install the stud screw at the upper rear location, using a 1/2" socket. Using a 1/4" hex bit, install the mounting at the lower front location. Tighten the screws to specification.

Install the starter drive pinion bolt following the procedure described under Starter Drive Pinion.

Connect the battery positive cable and start switch wire to the terminals on the starter solenoid. Tighten the retaining nuts to specification, using a 12 mm socket.

Figure 532— Installing starter

Install the chassis fairings following the procedure included in the FRAME AND ACCESSORIES SERVICE section.

Connect the battery ground cable from the negative battery terminal. Refer to the procedure under Battery and Cables in the CHARGING SYSTEM SERVICE section.

Disassembly and Assembly

Generally, it is more cost effective to replace a starter motor with a new or rebuilt unit than it is to disassemble and repair one. However, a faulty solenoid is easily replaced if necessary using the following procedure.

Remove the throttle/switch housing screws, using a 5/32" hex bit. Slowly remove the top housing half and then remove the small ferrules to disconnect the throttle cable ends from the twist grip.

Figure 546— Remove/install throttle/switch housing screws

Using a Phillips screwdriver, remove the bracket holding the switch harness wiring in the housing. Remove the retainer and remove the malfunctioning switch (starter, engine stop, turn signal or brake light switch) from its socket in the housing.

Cut the switch wires close to the terminals (approximately 1/4") and remove the switch. Strip enough insulation (1/2") from the harness wires for splicing to the new switch and then slide insulating sheaths onto the wire ends. Push the sheaths far enough onto the wires so that stripped wire ends can be spliced to the new switch.

Match the wires from the switch to the proper harness wire ends. Twist the wires together and solder the joint, using rosin core solder. Slide the insulating sheaths back over the spliced joints and install the switch in the housing socket. Then secure the harness to the housing.

Apply a small amount of blue threadlock to the throttle/switch housing mounting screws.

Apply a small amount of grease to the cable ferrules and install the ferrules on the cable ends.

Slide the ferrules into the throttle rotator ring and make sure the rotator ring is seated correctly in the lower throttle housing section.

Carefully place the top throttle housing section onto the bottom section. Install the two mounting screws and tighten very lightly. Rotate the throttle, checking for smooth operation.

Align the throttle switch housing so that the parting line is parallel with the ground.

Tighten the two housing mounting screws, using a 5/32" hex bit.

Again, check for proper throttle rotation.

Remove the screws one at a time and reapply blue threadlock to the two master cylinder and brake lever assembly clamp screws. DO NOT tighten the clamp screws at this time.

Pull the brake lever to the handlebar and slide the brake assembly into the throttle/switch housing.

CAUTION!

Failure to pull the lever before sliding can damage the brake light switch.

Release the brake lever. Then, tighten the two brake assembly clamp screws, using a 5/32" hex bit.

Figure 547— Securing brake assembly

Left Handlebar Switch

Loosen and remove the mounting screws and clamp securing the clutch lever assembly, using a 5/32" hex bit. Remove the assembly and position it away from the switch housing.

Using a 5/32" hex bit, remove the retaining screws from the switch housing and separate the housing halves.

Using a Phillips screwdriver, remove the bracket holding the switch harness wiring in the housing. Remove the retainer and remove the malfunctioning switch (headlight, horn or turn signal) from its socket in the housing.

Cut the switch wires close to the terminals (approximately 1/4") and remove the switch. Strip enough insulation (1/2") from the harness wires for splicing to the new switch and then slide insulating sheaths onto the wire ends. Push the sheaths far enough onto the wires so that stripped wire ends can be spliced to the new switch.

Engine Fastener Torque Values

Part	Torque Value
Air filter element back plate screws	19–24 ft-lbs
Airbox assembly nuts	17–19 ft-lbs
Airbox evaporator door retaining screws (to shaft)	17–19 ft-lbs
Airbox housing cover retaining screws	19–24 in-lbs
Airbox housing retaining nuts	5 ft-lbs
Breather fitting (in rocker cover)	8–12 ft-lbs
Breather valve housing assembly screws	8–12 ft-lbs
Camshaft cover screws	8–12 ft-lbs
Carburetor adapter plate screws (to airbox)	19–24 in-lbs
Charcoal canister bracket retaining nuts	7–9 ft-lbs
Crank pin nut	210 ft-lbs
Crankcase bolts	18 ft-lbs (1/4 in. bolt 10–12 ft-lbs)
Cylinder head bolts (step torque)	(Step 1) lightly snug bolts in sequence
	(Step 2) 4–6 ft-lbs in sequence
	(Step 3) 13–15 ft-lbs in sequence
	(Step 4) Rotate 1/4 turn ± 2° in sequence
Cylinder studs	8–12 ft-lbs
Engine nameplate screws	7–9 ft-lbs (right screw) snug + 1/4 turn (left screw)
Evaporator door shaft link retaining screw	1–1.5 in-lbs
Exhaust head pipes (flange-to-cylinder)	10–12 ft–lbs
Exhaust header bracket (to transmission)	13–19 ft–lbs
Exhaust header clamp (to header bracket)	13–19 ft-lbs
Exhaust shield clamps	65–75 in-lbs
Exhaust studs	8–12 ft-lbs
Fuel tank mounting bolts	15–19 ft-lbs (rear) 19–23 ft-lbs (front, upper/lower)
Hose clamp, fuel line	15 in-lbs
Ignition housing mounting screws	8–12 ft-lbs
Ignition rotor screw	48–72 in-lbs
Intake manifold screws	16–20 ft-lbs
Intake manifold support bracket	16–20 ft-lbs
Intake stud	10–12 ft-lbs
Lifter block mounting screws	8–12 ft-lbs
Muffler clamp (to head pipe)	10–12 ft-lbs (Supertrap) 13–17 ft-lbs (Gibson)
Muffler mounting bolts (to support bracket)	13–17 ft-lbs
Muffler support bracket bolts (to frame)	22–25 ft-lbs
Oil drain plug	18 ft-lbs
Oil filter bung adapter	18 ft-lbs
Oil pressure sensor	8–12 ft-lbs
Oil pump mounting screws	8–12 ft-lbs
Oil tank mounting shoulder bolts	5 ft-lbs

IGNITION SYSTEM DIAGRAM

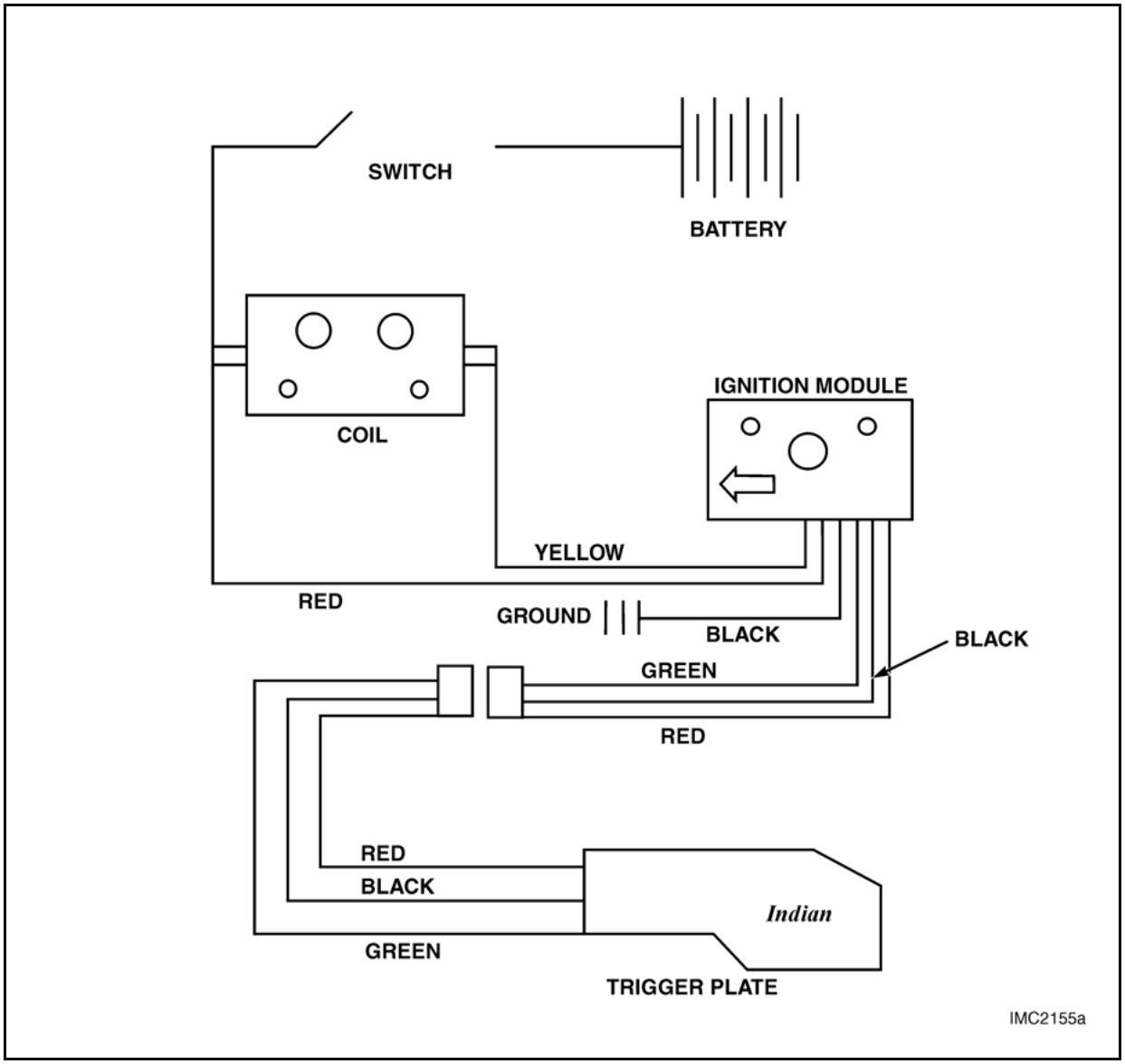

Figure 554 — POWERPLUS™ 100 engine ignition system

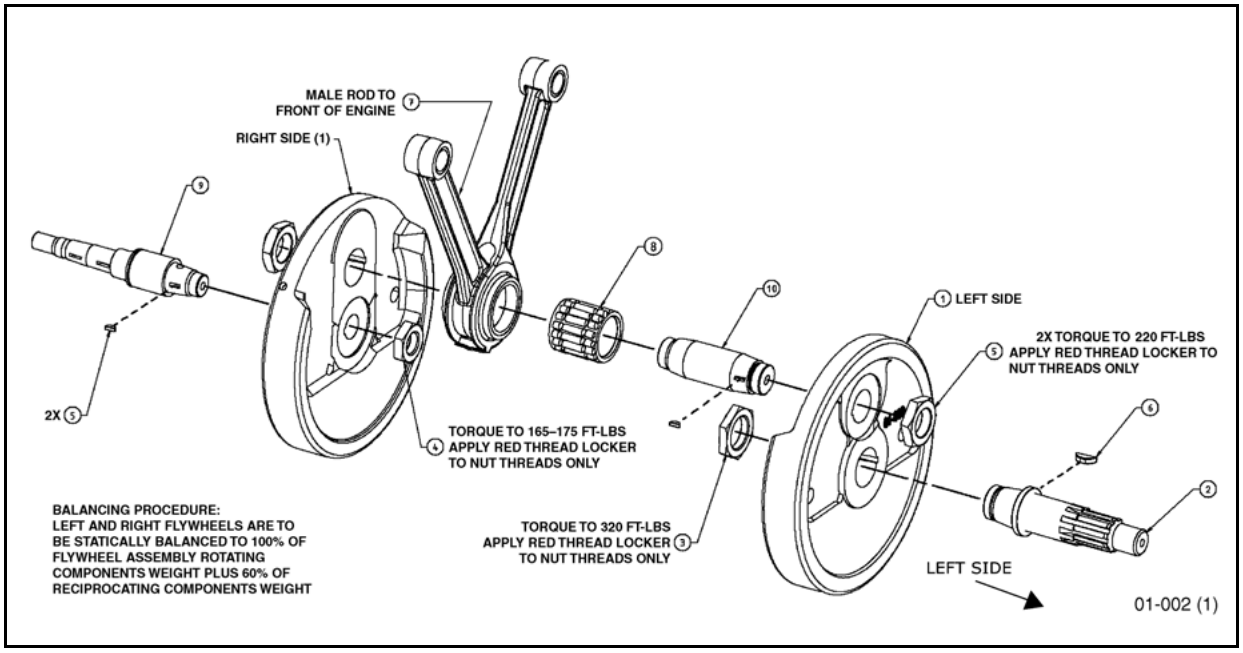

Figure 567— Flywheel assembly

Item	Part Number	Part Description	Qty.
1	01-030	Flywheel set	1
2	01-031	Shaft, left side (output)	1
3	01-033	Nut, sprocket shaft	1
4	01-034	Nut, pinion shaft	1
5	01-035	Key, right shaft & crank pin	2
6	01-036	Key, shaft (left flywheel)	1
7	01-912	Connecting rod set	1
8	01-026	Bearing, connecting rod	1
9	01-063	Shaft, right side (pinion)	1
10	01-172	Crank pin, flywheel	1

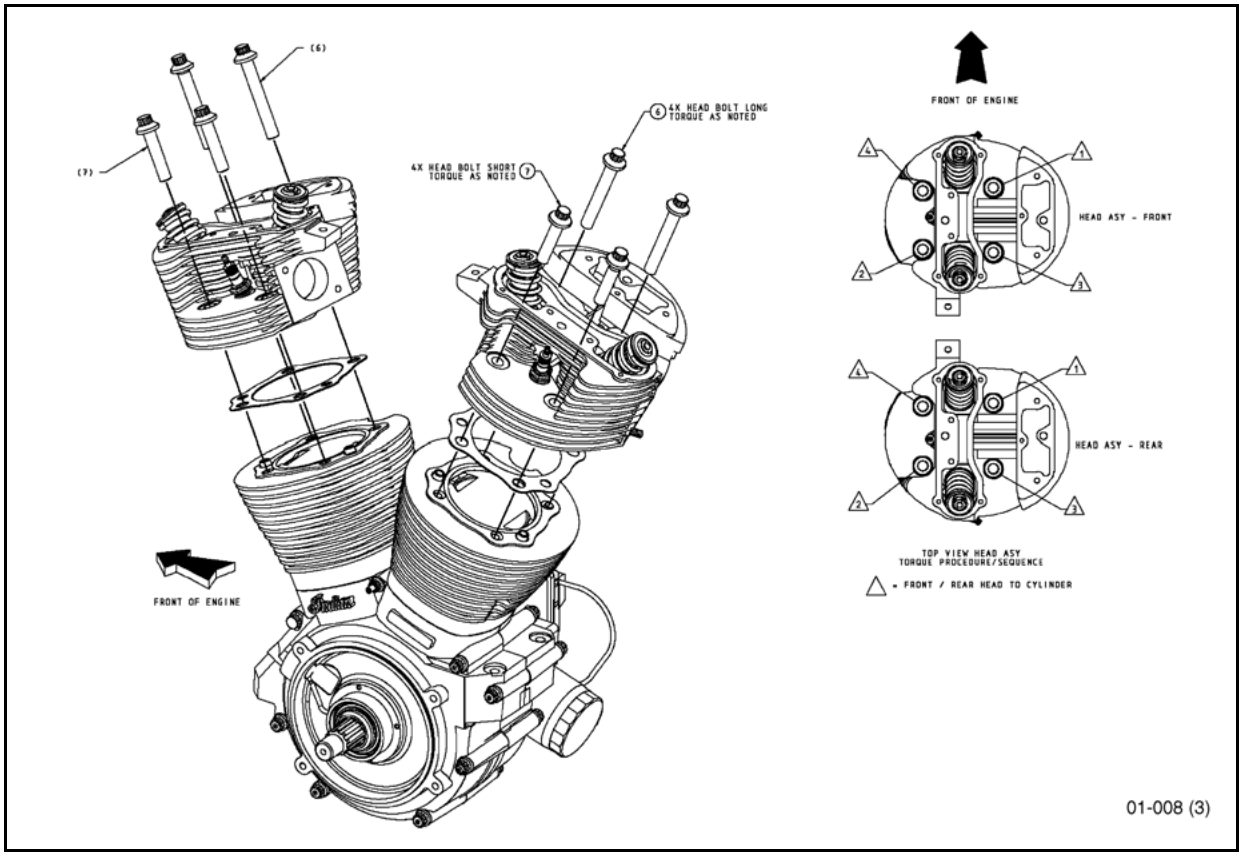

Figure 577— Cylinder head installation

Item	Part Number	Part Description	Qty.
6	01-170	Head bolt, long	2
7	01-171	Head bolt, short	2