

# LUBRICATION, MAINTENANCE AND TUNE-UP

This chapter covers lubrication, maintenance and tune-up procedures.

To maximize the service life of the motorcycle, and gain maximum safety and performance, it is necessary to perform periodic inspections and maintenance. Minor problems found during routine service can be corrected before they develop into major ones.

Consider the maintenance schedule a guide. Harder than normal use and exposure to mud, water or high humidity indicates the need for more frequent servicing of most maintenance items. Record all service and repairs in the maintenance log at the back of this manual. A running record will make it easier to evaluate future maintenance requirements and maintain the motorcycle in top condition.

Maintenance intervals, capacities, recommendations and specification are listed in **Tables 1-9** at the end of this chapter.

## FUEL TYPE

The recommended pump octane number is 89 or higher for 1986-1990 models and 87 or higher for 1991-2003 models. Using fuel with a lower octane number can cause ping or spark knock, and lead to engine damage.

When choosing gasoline and filling the fuel tank, note the following:

1. When filling the tank, do not overfill it. There should be no fuel in the filler neck (tube located between the fuel cap and tank).
2. Because oxygenated fuels can damage plastic and paint, do not spill fuel onto the fuel tank during filling.
3. DO NOT use gasoline containing methanol (methyl or wood alcohol).
4. DO NOT use gasoline containing more than 10% of ethanol (ethyl or grain alcohol).

## MAINTENANCE SCHEDULE

Refer to **Table 1** for a recommended maintenance schedule. If the motorcycle is operated under extreme conditions, perform the appropriate maintenance more frequently.

Most of the services in **Table 1** are described in this chapter. However, some procedures, which require more than minor disassembly or adjustment, are covered in the appropriate chapter.

## ROUTINE SAFETY CHECKS

### Pre-ride Inspection

1. Check wheel and tire condition. Check tire pressure. Refer to *Tires and Wheels* in this chapter.

2. Make sure all lights work. Refer to the *Lights and Horn* section.
3. Check engine, transmission and primary drive chaincase for oil leaks. If necessary, add oil as described in this chapter.
4. Check brake fluid level and condition. If necessary, add fluid as described in this chapter.
5. Check the operation of the front and rear brakes.
6. Check clutch operation. If necessary, adjust the clutch as described in this chapter.
7. Check the throttle operation. The throttle should move smoothly and return quickly when released. If necessary, adjust throttle free play as described in this chapter.
8. Inspect the front and rear suspension. They should have a solid feel with no looseness.
9. Check the exhaust system for leaks or damage.
10. Inspect the fuel system for leaks.
11. Check the fuel level in fuel tank.
12. If equipped with a drive chain, check chain free play as described in this chapter.
13. If equipped with a drive belt, check drive belt tension as described in this chapter.

#### CAUTION

*When checking the tightness of the exposed fasteners, do not check the cylinder head bolts without following the procedure described in Chapter Four.*

14. Check the tightness of exposed fasteners.

### Lights and Horn

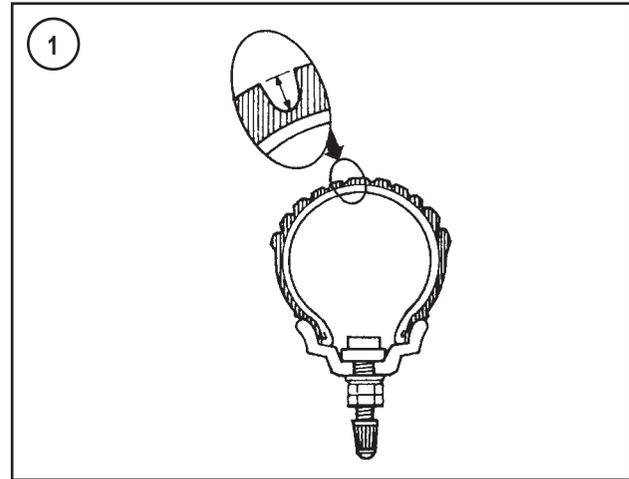
Turn the ignition switch on, and check the following:

1. Pull the front brake lever and make sure the brake light works.
2. Push the rear brake pedal down and verify the brake light operation.
3. Make sure the headlight and taillight work.
4. Move the dimmer switch between the high and low positions, and make sure both headlight elements are working.
5. Push the turn signal switch to the left and right positions, and make sure all four turn signal lights are working.
6. Make sure all accessory lights work properly, if so equipped.
7. Check the horn button operation.
8. If the horn or any light fails to work properly, refer to Chapter Twelve.

## TIRES AND WHEELS

### Tire Pressure

Check the tire pressure often to maintain tire profile, traction and handling, and to get the maximum life out of the tire. Carry a tire gauge in the motorcycle's tool kit. **Table 2** lists the cold tire pressures for the original equipment tires.



#### NOTE

*Always reinstall the air valve caps after checking and adjusting the air pressure. These caps prevent debris from collecting in the valve stems and causing air leaks or incorrect tire pressure readings.*

### Tire Inspection

Inspect the tires periodically for excessive wear, deep cuts and imbedded objects such as stones or nails. If a nail or other object is found in a tire, mark its location with a light crayon prior to removing it. This will help locate the hole for repair.

Measure the tread depth (**Figure 1**) with a gauge or a small ruler. As a guideline, replace tires when the tread depth is 1/16 in. (1.6 mm.) or less. On original equipment tires, wear bars on the tire will first appear flush with the surrounding rubber when wear depth reaches 1/32 in. (0.8 mm). Replace the tire before wear reaches the wear bars. Refer to Chapter Thirteen for tire changing and repair information.

### Laced Wheel Spoke Tension

On models with laced wheels, check for loose or damaged spokes. Refer to Chapter Thirteen for wheel service.

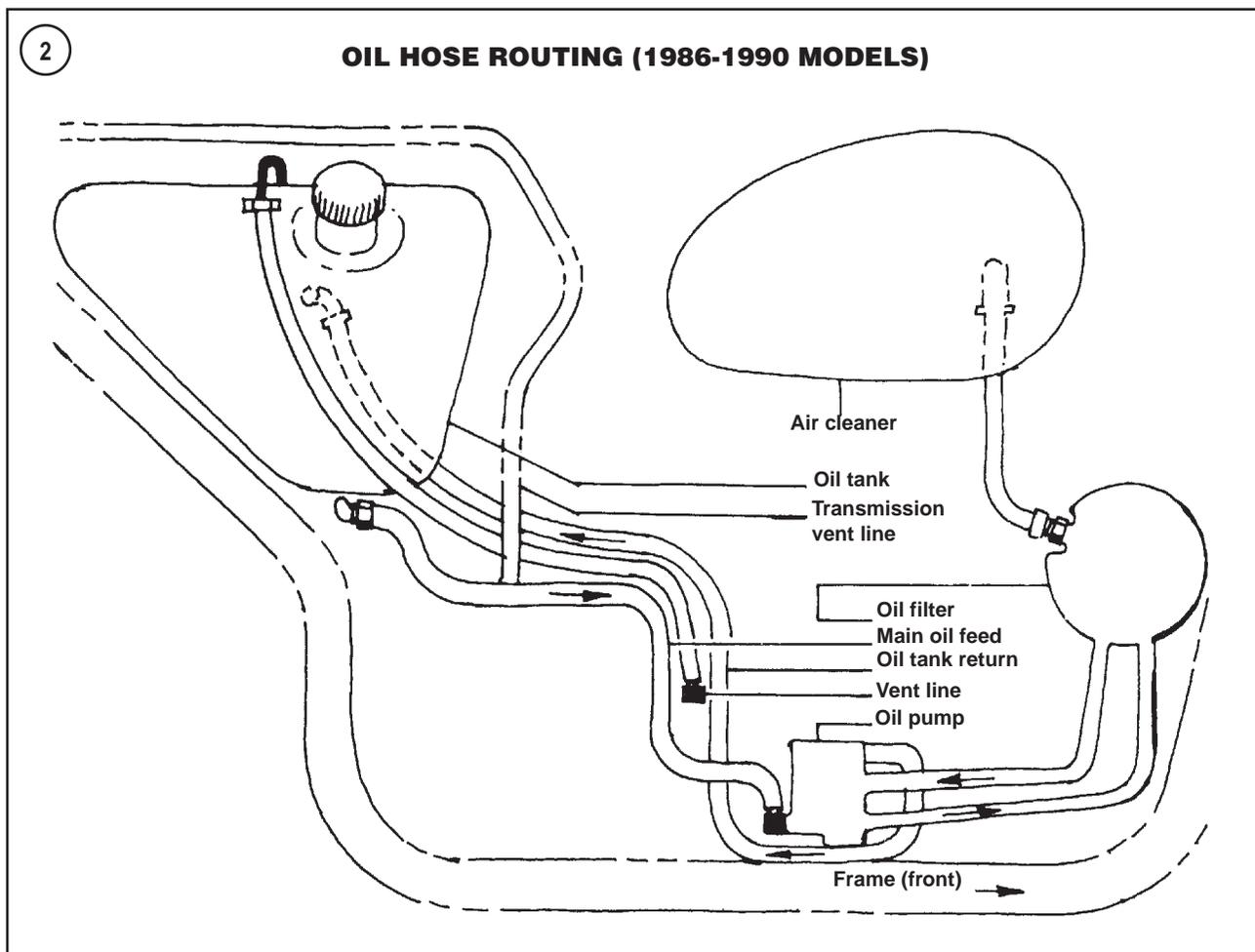
### Rim Inspection

Check the rims for cracks and other damage. Refer to Chapter Thirteen for wheel service.

## PERIODIC LUBRICATION

#### NOTE

*Never dispose of oil in the trash, on the ground or down a storm drain. Many service stations and oil retailers accept used oil for*

**OIL HOSE ROUTING (1986-1990 MODELS)**

*recycling. Do not combine other fluids with motor oil to be recycled.*

**Oil Tank and Oil Line Inspection**

Before inspecting the oil level, inspect the oil tank for cracks or other damage. If oil leaks are evident on or near the oil tank, locate and repair the problem. Check the oil tank mounting bolts for loose or missing fasteners; replace or tighten all fasteners. Check all oil line connections on the tank and the engine crankcase (**Figures 2-4**). Replace damaged oil lines as described in *Oil Tank* in Chapter Four.

**Engine Oil Level Check**

1. Run the engine until normal operating temperature is reached. Stop the engine and allow the oil to settle in the oil tank.

**CAUTION**

*Allowing the motorcycle to rest on the sidestand will result in an incorrect oil level reading.*

2. Place the motorcycle on a level surface and hold the motorcycle upright so it is not resting on the sidestand.
3. Wipe the area around the oil filler cap (**Figure 5**) with a clean rag. Remove the cap by pulling it up.
4. Wipe the dipstick with a clean rag, then reinstall the oil filler cap. Be sure the cap is fully seated.
5. Remove the filler cap and check the oil level on the dipstick (**Figure 6**). The oil level should be between the full (upper) and fill (lower) indicator grooves on the dipstick (**Figure 7**). If the oil level is even with or below the fill groove, continue with Step 6. If the oil level is correct, go to Step 7.
6. Add the recommended engine oil listed in **Table 3**.

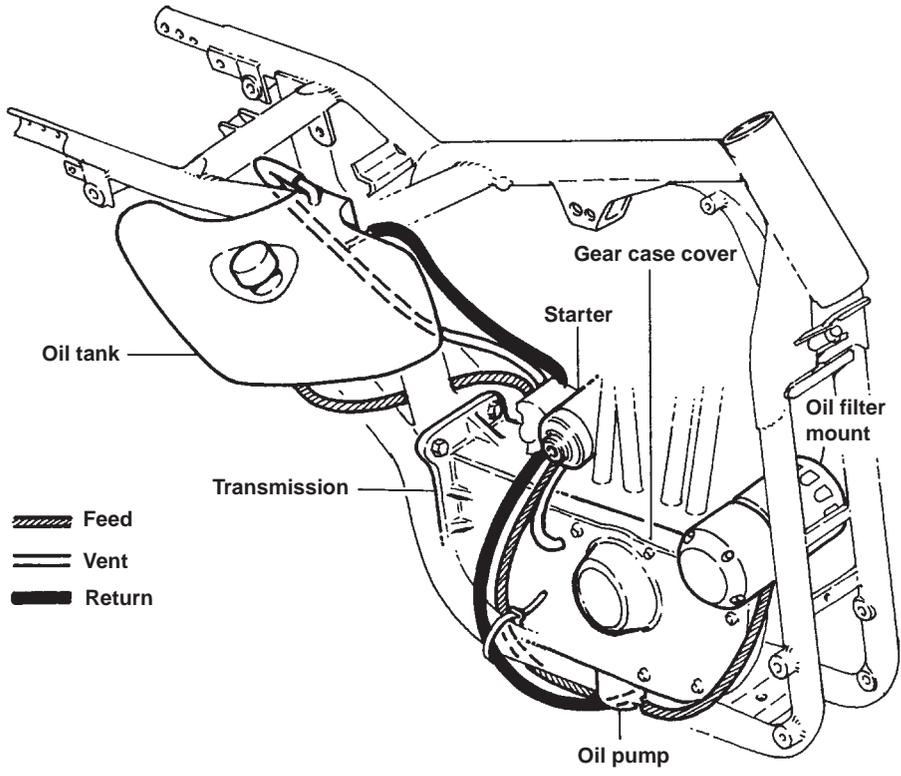
**CAUTION**

*Do not overfill the oil level in the oil tank. If the engine is cold, do not add oil so oil level reaches the full groove. Oil may be forced into the air cleaner causing engine malfunction or damage.*

7. Inspect the oil filler cap O-ring for cracks or other damage. Replace the O-ring if necessary.
8. Reinstall the oil filler cap. Be sure the cap is fully seated.

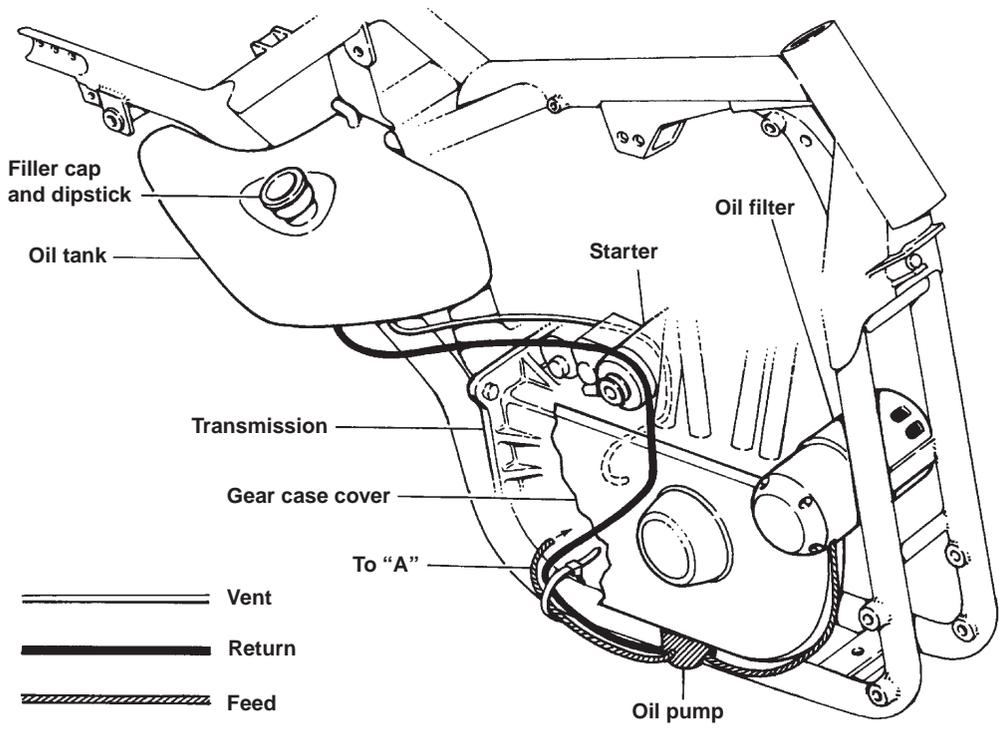
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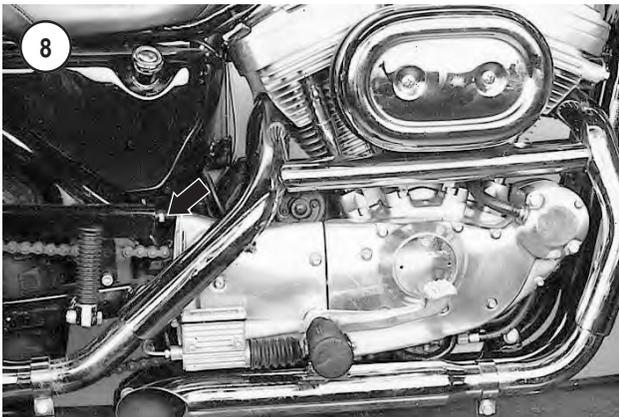
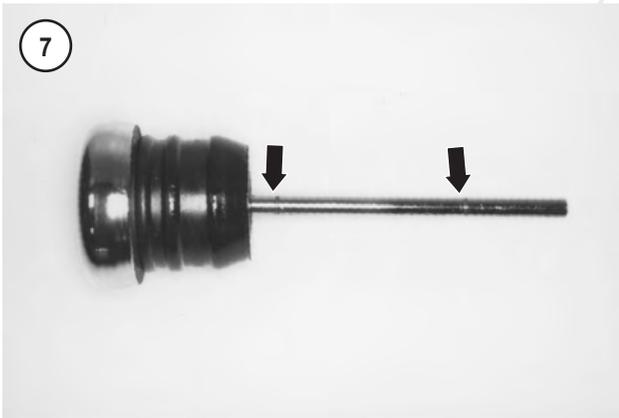
### OIL HOSE ROUTING (1991-1993 MODELS)



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### OIL HOSE ROUTING (1994-2003 MODELS)





## Engine Oil and Filter Change

**Table 1** lists the recommended oil and filter change intervals for motorcycles operated in moderate climates. If the motorcycle is operated in heavy dust, mud, water or other conditions, the oil should be changed more frequently.

The manufacturer recommends using Harley-Davidson oils. If not available, the manufacturer recommends using oil certified for use in diesel engines. Acceptable certifications include: CF-4, CG-4, CH-4 and CI-4. Follow the viscosity recommendations applicable to Harley-Davidson oil.

Always use the same brand of oil at each change. Refer to **Table 3** for the correct oil viscosity to use in anticipated ambient temperatures, not engine oil temperature. Using oil additives is not recommended as they may cause the clutch to slip.

### WARNING

Contact with oil may cause skin cancer. Wash oil from hands with soap and water as soon as possible after handling engine oil.

### CAUTION

Do not use the current SH and SJ rated automotive oils in motorcycle engines. The SH and SJ rated oils contain friction modifiers that reduce frictional losses on engine components. Specifically designed for automotive engines, these oils can damage motorcycle engines and clutches.

1. Run the motorcycle until the engine has reached normal operating temperature. Turn the engine off and allow the oil to settle in the oil tank. Support the motorcycle so that the oil can drain completely.
2. Wipe the area around the oil filler cap (**Figure 5**) with a clean rag. Remove the cap by pulling up.
3. Locate the oil drain hose.
  - a. On 1986-1990 models, the oil drain hose extends from the bottom of the oil tank (**Figure 8**).
  - b. On 1991-1993 models, the drain hose (**Figure 9**) is secured to the battery tray lug on the left side of the motorcycle.
  - c. On 1994-2003 models, the drain hose is secured to a lug on the rear muffler mount on the left side of the motorcycle (**Figure 10**).

4. Place a drain pan underneath the oil tank drain line.
5. Detach the hose clamp, then direct the hose end into the drain pan.
6. Allow the oil to drain completely. Remove the oil tank filler cap (**Figure 5**) for faster oil flow.
7. Reattach the oil drain hose and clamp.
8. To replace the oil filter, perform the following:
  - a. Place a drain pan underneath the front portion of the crankcase and the oil filter.
  - b. Install a suitable oil filter wrench (**Figure 11**) squarely onto the oil filter and loosen it counterclockwise. Quickly remove the oil filter as oil will begin to run out of it.
  - c. Hold the filter over the drain pan and pour out the remaining oil. Place the filter in a plastic bag, seal the bag and dispose of it properly.
  - d. Wipe off all oil that drained onto the engine. Clean with a contact cleaner to eliminate all oil residue from the engine prior to installing the new oil filter.
  - e. Pour approximately 4 oz. (120 ml) of new engine oil into the new oil filter. Allow the oil to soak into the filter element.
  - f. Coat the gasket on the new filter (**Figure 12**) with clean oil.

**CAUTION**

*Tighten the oil filter by hand. Do not overtighten.*

- g. Screw the oil filter onto the mounting pad by hand and tighten it until the filter gasket touches the sealing surface, then tighten the filter by hand an additional 1/2 to 3/4 turn.

**CAUTION**

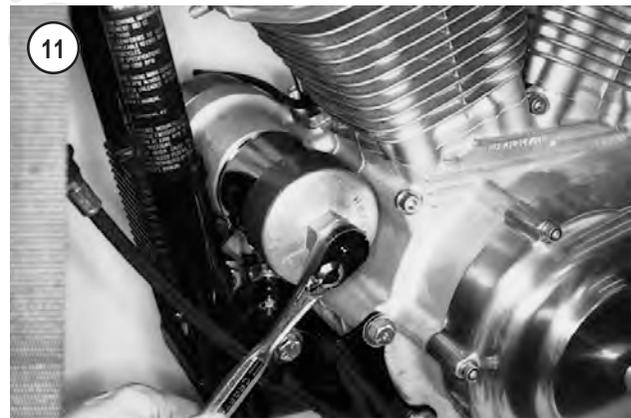
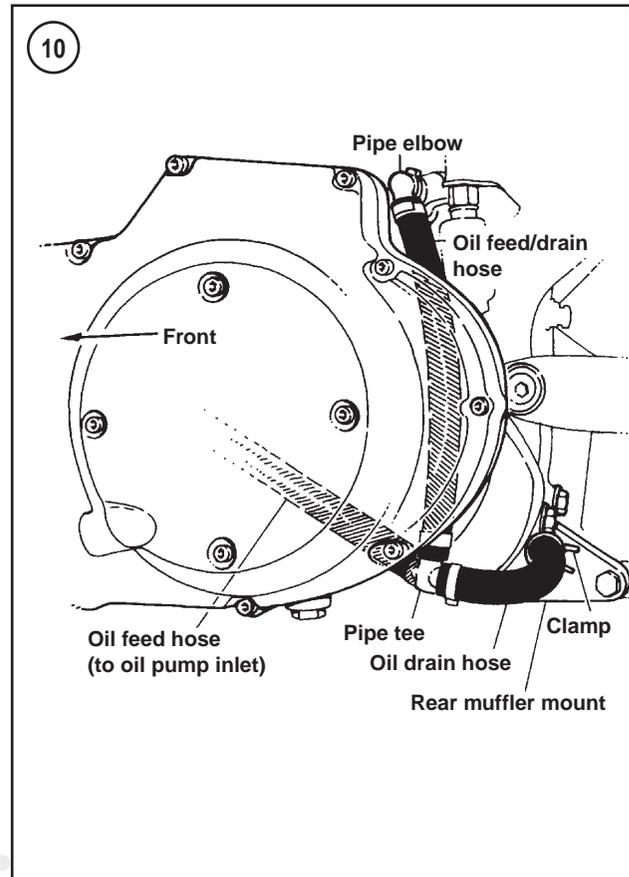
*Do not overfill the oil tank. Oil may be forced into the air cleaner causing engine malfunction or damage.*

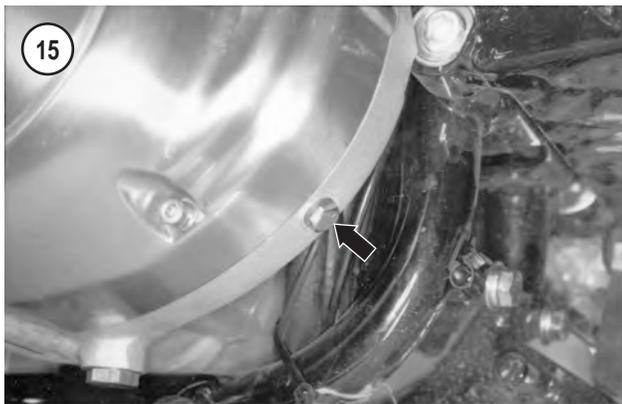
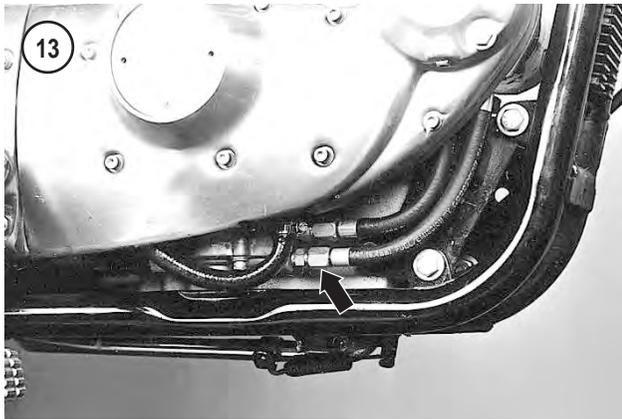
9. Add the correct viscosity (**Table 3**) and quantity (**Table 4**) of oil to the oil tank—minus the 4 oz. (120 ml) poured into the oil filter.

**CAUTION**

*On 1994-2003 models, perform Step 10 to prevent oil pump cavitation.*

10. On 1994-2003 models, remove air from the oil tank drain hose using the following procedure:
  - a. Place a drain pan under the oil tank drain hose.
  - b. Detach the hose clamp, then direct the hose end into the drain pan.
  - c. Allow a small amount of oil to drain out of the hose.
  - d. Reattach the oil drain hose and clamp.
11. Install the oil tank filler cap.
12. Run the engine at idle speed. The oil pressure warning light should go out when engine speed is 1000 rpm or higher. If not, shut off the engine and determine the cause.





On 1986-1990 models, if the warning light remains on perform the following:

- a. Stop the engine.
  - b. Remove the oil tank filler cap.
  - c. Loosen the lower, front oil pump hose fitting (**Figure 13**) and allow 2 oz. (60 ml) of oil to drain out.
  - d. Tighten the fitting and install the oil tank filler cap.
  - e. Run the engine to verify the warning light goes out.
13. Check for oil leaks, particularly at the oil filter and drain hose.
  14. Stop the engine.
  15. Check the oil level on the dipstick as described in this section.
  16. Properly dispose of the used oil.

## Transmission Oil

### CAUTION

*Do not fill the transmission with engine oil. Only add the recommended transmission oil in **Table 5**. Overfilling may cause clutch malfunctioning.*

The transmission oil also lubricates the clutch, primary drive chain and sprockets.

**Table 1** lists the recommended transmission oil inspection intervals. When checking the transmission oil level, do not allow any dirt or debris to enter the transmission case opening.

### Oil level check (1986-1990 models)

1. If the motorcycle has been operated recently, wait approximately ten minutes before checking the oil to allow the oil to settle in the case. Park the motorcycle on a level surface and have an assistant support it so that it is standing straight up.

### CAUTION

*Do not check the oil level with the motorcycle supported on the sidestand or the reading will be incorrect.*

2. Place a drain pan beneath the primary chain cover.
3. Remove the oil level plug from the bottom of the cover (**A, Figure 14**).
4. Oil should seep from the plug hole. If not, remove the access cover from the top of the primary chain cover (**B, Figure 14**). Slowly add the recommended oil (**Table 5**) through the access cover hole until oil begins to run out of the oil level plug hole. When the oil just seeps out of the hole, install the oil level plug.
5. Install the access cover (**B, Figure 14**).

### Oil level check (1991-1993 models)

1. If the motorcycle has been operated recently, wait approximately ten minutes before checking the oil to allow the oil to settle in the case. Park the motorcycle on a level surface and have an assistant support it so that it is standing straight up.

### CAUTION

*Do not check the oil level with the motorcycle supported on the sidestand or the reading will be incorrect.*

2. Place a drain pan beneath the primary chain cover.
3. Remove the oil level plug from the bottom, rear of the cover (**Figure 15**).

- Oil should seep from the plug hole. If not, remove the access cover from the primary chain cover (**Figure 16**). Slowly add the recommended oil (**Table 5**) through the access cover hole until oil begins to run out of the oil level plug hole. When the oil just seeps out of the hole, install the oil level plug.
- Install the access cover (**Figure 16**).

#### **Oil level check** (1994-2003 models)

- If the motorcycle has been operated recently, wait approximately ten minutes before checking the oil to allow the oil to settle in the case. Park the motorcycle on a level surface and have an assistant support it so that it is standing straight up.

#### **CAUTION**

*Do not check the oil level with the motorcycle supported on the sidestand or the reading will be incorrect.*

- Clean the area around the clutch inspection cover (**Figure 17**).

#### **NOTE**

*If a suitable tool is not available to remove the lower, left cover screw, remove the footrest (Chapter Sixteen).*

- Remove the clutch inspection cover retaining screws, then remove the cover.

#### **NOTE**

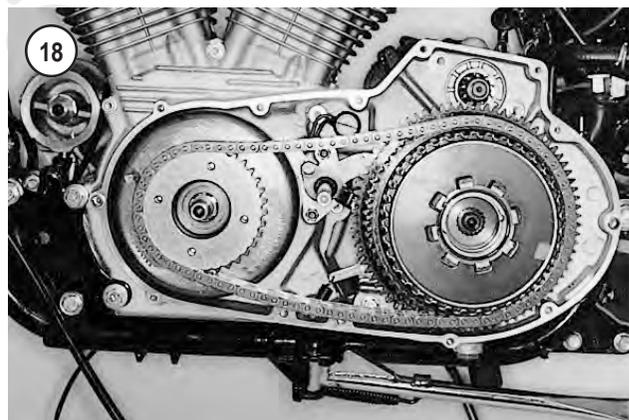
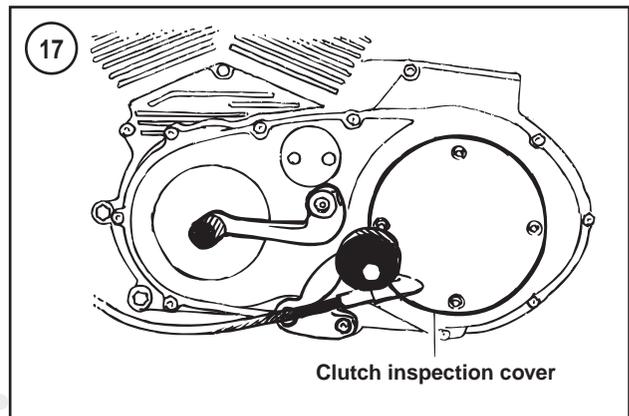
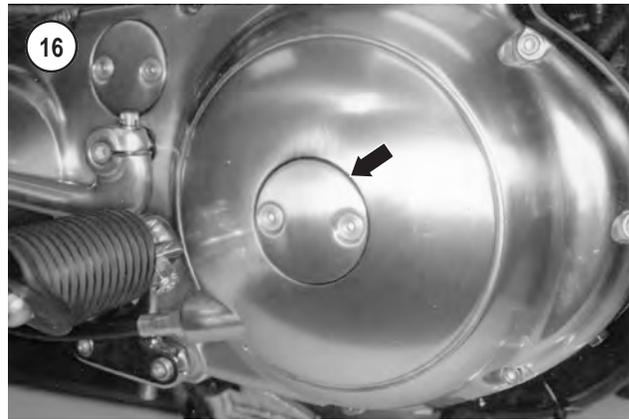
*The primary drive cover is removed in **Figure 18** for clarity. It is not necessary to remove the cover.*

- Check the transmission oil level through the primary drive cover opening (A, **Figure 19**). It should be even with the bottom of the clutch diaphragm spring (**Figure 18**).
- If the oil level is low, add the recommended type of transmission oil listed in **Table 5**. Do not overfill.
- Be sure the quad ring is located in the primary drive cover groove (B, **Figure 19**).
- Install the inspection cover so the notch in the cover (**Figure 20**) fits over the cable boss (C, **Figure 19**) on the primary drive cover. Tighten the primary drive cover retaining screws to 84-108 in.-lb. (10-12.0 N•m).

#### **Transmission oil change** (1986-1993 models)

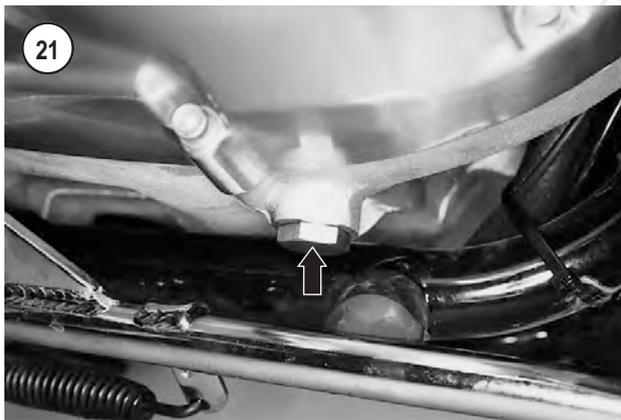
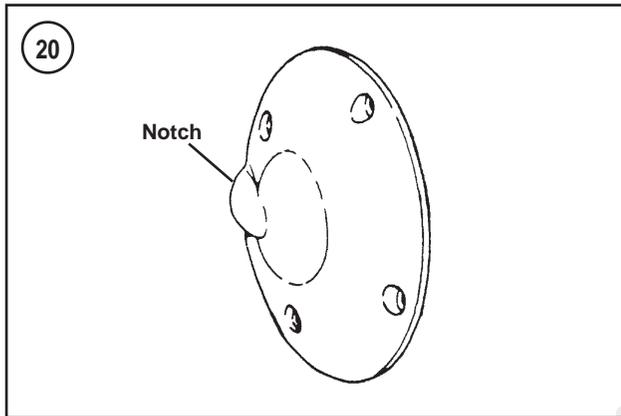
**Table 1** lists the recommended transmission oil change intervals.

- Ride the motorcycle for approximately ten minutes and shift through all five gears until the transmission oil has reached normal operating temperature. Turn off the engine



and allow the oil to settle in the case. Park the motorcycle on a level surface and have an assistant support it so that it is standing straight up.

- Place a drain pan underneath the engine and remove the oil drain plug (**Figure 21**).
- Inspect the drain plug O-ring (**Figure 22**) for damage and replace it if necessary.
- The drain plug is magnetic. Check the plug for metal debris that may indicate transmission damage, then wipe off the plug. Replace the plug if it is damaged.
- Install the drain plug and O-ring and tighten to 14-21 ft.-lb. (19-28 N•m).



6A. On 1986-1990 models, remove the access cover (B, **Figure 14**) and refill with the recommended quantity (**Table 4**) and type (**Table 5**) transmission oil.

6B. On 1991-1993 models, remove the inspection cover (**Figure 16**) and refill with the recommended quantity (**Table 4**) and type (**Table 5**) transmission oil.

7. Check the oil level as described in this section.

### Transmission oil change (1994-2003 models)

**Table 1** lists the recommended transmission oil change intervals.

1. Ride the motorcycle for approximately ten minutes and shift through all five gears until the transmission oil has reached normal operating temperature. Turn off the engine and allow the oil to settle in the case. Park the motorcycle on a level surface and have an assistant support it so that it is standing straight up.

2. Place a drain pan underneath the engine and remove the oil drain plug (**Figure 21**).

3. Inspect the drain plug O-ring (**Figure 22**) for damage and replace it if necessary.

4. The drain plug is magnetic. Check the plug for metal debris that may indicate transmission damage, then wipe off the plug. Replace the plug if it is damaged.

5. Install the drain plug and O-ring and tighten to 14-21 ft.-lb. (19-28 N•m).

6. Clean the area around the clutch inspection cover (**Figure 17**).

7. Remove the clutch inspection cover retaining screws, then remove the cover (**Figure 17**).

#### NOTE

*The primary drive cover is removed in **Figure 18** for clarity. It is not necessary to remove the cover.*

8. Refill the transmission through the opening in the primary drive cover with the recommended quantity (**Table 4**) and type (**Table 5**) of transmission oil. The transmission oil level should be even with the bottom of the clutch diaphragm spring (**Figure 19**).

9. Install the clutch inspection cover. Tighten the retaining screws to 84-108 in.-lb. (10-12.0 N•m).

10. Check the oil level as described in this section.

### Fork Oil Change

This procedure is for a fork oil change. If the fork has been disassembled for service, refer to Chapter Fourteen for fork oil refilling and specifications.

**Table 1** lists the recommended fork oil change intervals.

#### CAUTION

*Do not allow the fork oil to come in contact with the brake components.*

1. Place a drain pan beside one fork tube, then remove the drain screw (**Figure 23**) from the slider.
2. Straddle the motorcycle and apply the front brake lever. Push down on the fork and release. Repeat to force as much oil out of the fork tube and slider as possible.
3. Repeat Steps 1-2 for the opposite fork tube.
4. After the fork oil has thoroughly drained, install the drain screw (**Figure 23**) onto the fork slider. Tighten the drain screw securely.
5. Support the front of the motorcycle so the front wheel is off the ground.

**WARNING**

*The fork cap is under spring pressure and may fly off when loosening it. In addition, make sure the fork tube is fully extended from the slider. If the fork is damaged and stuck in a compressed state, the fork should be disassembled by a dealer, as the fork cap and spring will fly out from the fork tube under considerable force when the cap is removed.*

**CAUTION**

*Use only a 6-point socket to loosen and tighten the fork tube cap to avoid cosmetic damage to the fork tube cap. Using a 12-point socket may round off the corners of the fork tube cap.*

6. Remove the fork cap from the top of the fork tube (**Figure 24**).
7. Refill each fork leg with the correct viscosity (**Table 5**) and quantity of fork oil (**Table 6**).
8. Repeat Step 6 and Step 7 for the opposite fork tube.
9. Replace the fork cap O-ring (**Figure 25**, typical) if leaking, excessively worn or damaged.

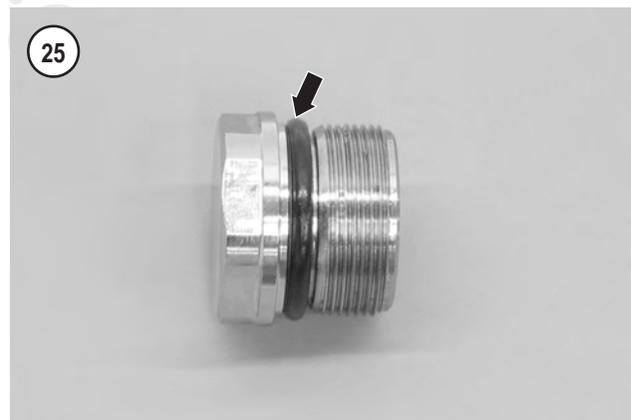
**NOTE**

*It takes considerable pressure to push the fork cap down against spring pressure while turning it.*

10. Attach a suitable socket to a speed wrench, then push down on the speed wrench to turn the fork cap. It may be necessary to move aside the handlebar and lower handlebar holder (Chapter Fourteen) so the socket will fit properly on the fork cap. A fork spring compression kit is available from Motion Pro.
11. Install the fork cap (**Figure 24**) onto the top of the fork tube. Tighten the fork cap securely.
12. Road test the motorcycle and check for leaks.

**Control Cables (Non-Nylon Lined Cables)**

Lubricate the control cables with a cable lubricant at the intervals in **Table 1**, or when they become stiff or sluggish. When lubricating the control cables, inspect each cable for fraying and cable sheath damage. Replace damaged cables.



**CAUTION**

*If the original equipment cables have been replaced with nylon-lined cables, do not lubricate them as described in this procedure. Oil and most cable lubricants will cause the cable liner to expand, pushing the liner against the cable sheath. Nylon-lined cables are normally used dry. When servicing nylon-lined and other aftermarket cables, follow the manufacturer's instructions.*

**CAUTION**

*Do not use chain lubricant to lubricate control cables.*



**CAUTION**  
*The starting enrichment valve (choke) cable is designed to operate with a certain amount of cable resistance. Do not lubricate the enrichment cable or its conduit.*

- 1A. Disconnect the clutch cable ends as described in *Clutch Cable* in Chapter Six or Chapter Seven.
- 1B. Disconnect both throttle cable ends as described in the *Throttle and Idle Cables* in Chapter Ten or Chapter Eleven.
2. Attach a lubricator tool (**Figure 26**) to the cable following the tool manufacturer's instructions. Place a shop cloth at the end of the cable to catch excess lubricant.
3. Apply lubricant until it begins to flow out of the other end of the cable. If the lubricant squirts out from around the

lubricator, it is not clamped to the cable properly. Loosen and reposition the cable lubricator.

**CAUTION**  
*If the lubricant does not flow out of the other end of the cable, check the cable for fraying, bending or other damage. Replace damaged cables.*

4. Remove the lubricator tool and wipe off both ends of the cable.
- 5A. Reconnect the clutch cable ends as described in *Clutch Cable* in Chapter Six or Chapter Seven.
- 5B. Reconnect both throttle cable ends as described in *Throttle and Idle Cable* in Chapter Ten or Chapter Eleven.
6. Adjust the cables as described in this chapter.

### Throttle Control Grip Lubrication

**Table 1** lists the recommended throttle control grip lubrication intervals. To remove and install the throttle grip, refer to the *Throttle and Idle Cable Replacement* section in Chapter Ten or Chapter Eleven. Lubricate the throttle control grip where it contacts the handlebar with graphite.

### Front Brake Lever Pivot Pin Lubrication

Inspect the front brake lever pivot pin (**Figure 27**) at the intervals in **Table 1**. If the pin is dry, lubricate it with a lightweight oil. To service the pivot pin, refer to the *Front Master Cylinder* section in Chapter Sixteen.

### Clutch Lever Pivot Pin Lubrication

Inspect the clutch lever pivot pin (**Figure 28**) at the intervals in **Table 1**. Lubricate the pin with a lightweight oil. To service the pivot pin, refer to the *Clutch Cable Replacement* in Chapter Six or Chapter Seven.

### Drive Chain Lubrication

Lubricate the drive chain on appropriate models so equipped at the interval indicated in **Table 1**.

1. The manufacturer recommends the following lubricants depending on the chain type:
  - a. On models equipped with a standard drive chain, use H-D Chain Spray or H-D High-Performance Chain Lube.
  - b. On models equipped with an O-ring drive chain, use H-D High-Performance Chain Lube or an automotive lubricant rated API GL-5 with a viscosity index of SAE 80 or 90.

**NOTE**  
*On an O-ring type drive chain, the chain lubrication described in this procedure is used mainly to keep the O-rings pliable and to pre-*

vent the side plates and rollers from rusting. The actual chain lubrication is enclosed within the chain by the O-rings.

2. Ride the motorcycle a few miles to warm the drive chain. A warm chain increases lubricant penetration.
3. Park the motorcycle on level ground. Support the motorcycle securely on a swing arm stand with the rear wheel off the ground.
4. Oil the bottom chain (**Figure 29**) with a suitable chain lubricant. Concentrate on getting the oil down between the side plates on both sides of the chain. Do not over lubricate.
5. Rotate the chain and continue lubricating until the entire chain has been covered.
6. Turn the rear wheel slowly and wipe off excess oil from the chain. Also wipe off lubricant from the rear hub, wheel and tire.
7. Remove the auxiliary stand.

### Sidestand Lubrication

Refer to **Table 1** for the specified lubrication interval for the sidestand. Lubricate the bushings using wheel bearing grease, then reassemble the sidestand. Refer to Chapter Seventeen

### Steering Head Lubrication

Refer to **Table 1** for the specified lubrication interval for the steering head bearings. Refer to Chapter Fourteen and disassemble the steering head as needed for access to the bearings. Lubricate the bearings using wheel bearing grease, then reassemble the steering head.

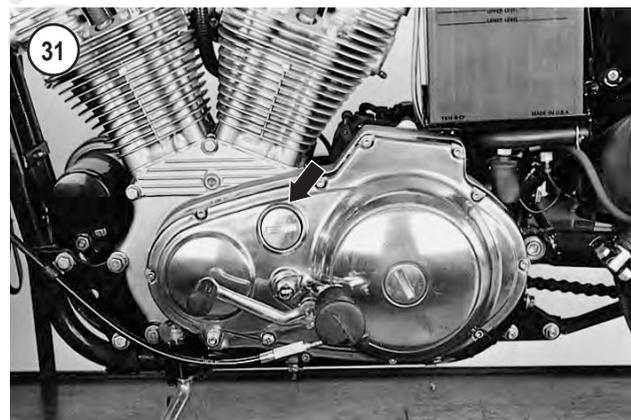
### Speedometer Cable Lubrication (1986-1994 Models)

Lubricate the cable annually or whenever the speedometer needle operates erratically.

1. Disconnect the speedometer fitting from the back of the speedometer (**Figure 30**).
2. Pull the cable from the cable housing.
3. Clean off the old lubricant.
4. Apply speedometer cable lubricant to the cable.
5. Install the cable into the housing. Turn the cable so it engages the drive unit at the lower end. When the cable stops turning, the lower end is properly engaged.
6. Reconnect the upper end to the speedometer.

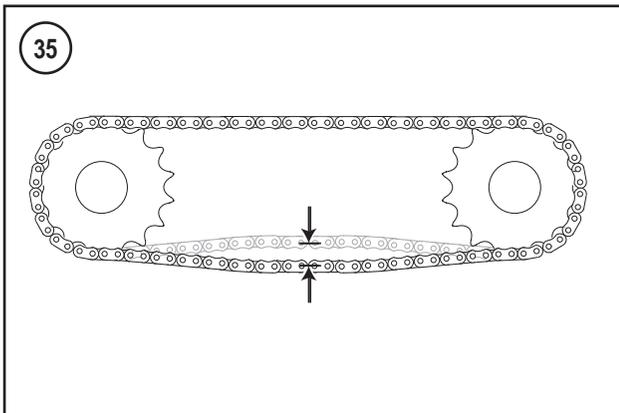
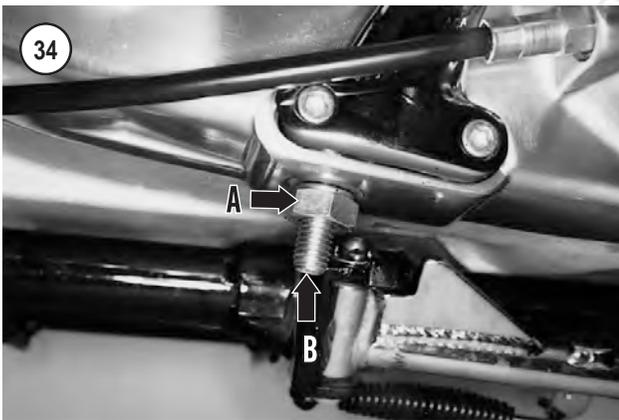
## PERIODIC MAINTENANCE

Perform the services listed at the intervals in **Table 1**. If the motorcycle is exposed to harsh condition, perform the services more frequently.



### Primary Chain Adjustment

1. Disconnect the negative battery cable as described in Chapter Twelve.
2. Support the motorcycle on a stand or floor jack with the rear wheel off the ground. Refer to *Motorcycle Stands* in Chapter Thirteen.
- 3A. On 1986-1990 models, unscrew the primary chain inspection cover (**Figure 31**).
- 3B. On 1991-2003 models, remove the retaining bolts, then remove the primary chain inspection cover (**Figure 32**).
4. Turn the primary chain to find the tightest point on the chain. Measure chain free play at this point.



5. Check primary chain free play at the upper chain run midway between the sprockets (**Figure 33**). If the primary chain free play is incorrect, continue with Step 6. If the free play is correct, go to Step 7. The primary chain free play specifications are:

- a. Cold engine: 3/8-1/2 in. (9.6-12.7 mm).
  - b. Hot engine: 1/4-3/8 in. (6.4-9.6 mm).
6. To adjust the chain, perform the following:
- a. Loosen the primary chain adjuster locknut (A, **Figure 34**, typical).
  - b. Rotate the adjuster (B, **Figure 34**) to obtain the desired chain free play.
  - c. Tighten the primary chain adjuster locknut (A, **Figure 34**) to 98-144 in.-lb. (10.8-16.3 N•m) on 1986-1990 models or 20-25 ft.-lb. (28-34 N•m) on 1991-2003 models.
  - d. Recheck free play.

**NOTE**

*If specified primary chain free play cannot be obtained using the adjuster, the primary chain or adjuster mechanism is excessively worn and should be removed for inspection. Refer to Chapter Six or Chapter Seven.*

7. Reinstall the primary chain inspection cover and O-ring.
8. Lower the motorcycle to the ground.

**Drive Chain (Models So Equipped)**

**Adjustment**

Check and adjust the drive chain at the intervals specified in **Table 1**. If the motorcycle is operated at sustained high speeds or if it is repeatedly accelerated very hard, inspect the drive chain adjustment more often. The correct amount of drive chain free play (**Figure 35**), when pushed up midway on the lower chain run (with the rider seated), is listed in **Table 7**.

When adjusting the chain, check the free play at several places along its length by rotating the rear wheel. The chain rarely wears uniformly and as a result will be tighter at some places than others. Measure the chain free play halfway between the sprockets (**Figure 35**). Make sure the chain free play at the tightest place on the chain is not less than the specification in **Table 7**.

1. Turn the engine off and shift the transmission into neutral.

**NOTE**

*As drive chains stretch and wear, the chain will become tighter at one point. The chain must be checked and adjusted at this point.*

2. Turn the rear wheel slowly, then stop it and check the chain tightness. Continue until the tightest point is located. Mark this spot and turn the wheel so that the mark is located on the lower chain run, midway between both drive sprockets.

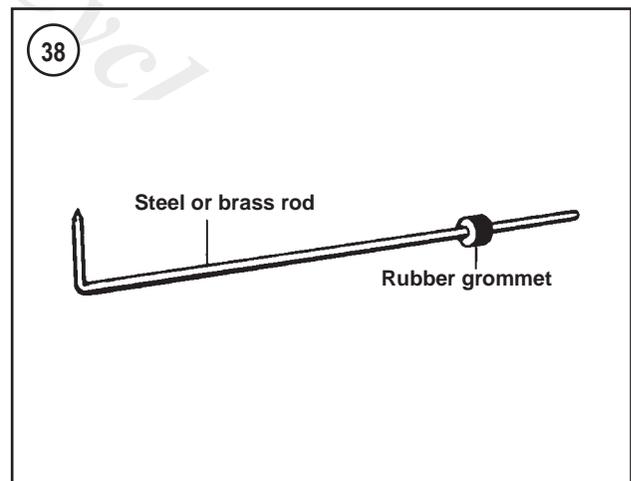
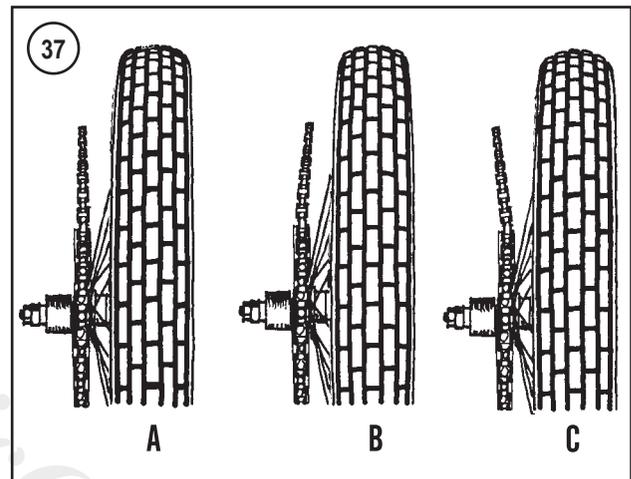
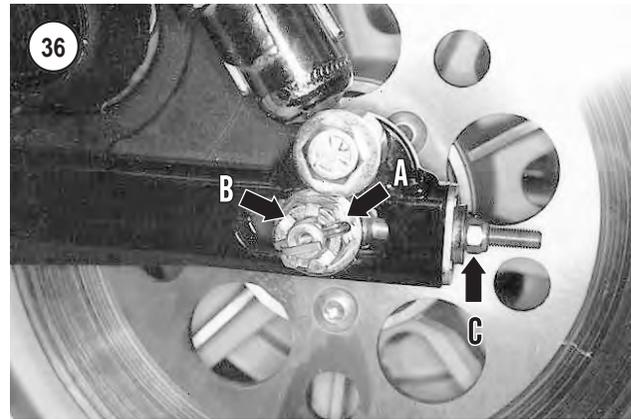
#### NOTE

If the drive chain is kinked or feels tight, it may require cleaning and lubrication. Clean and lubricate the primary chain as described in this section.

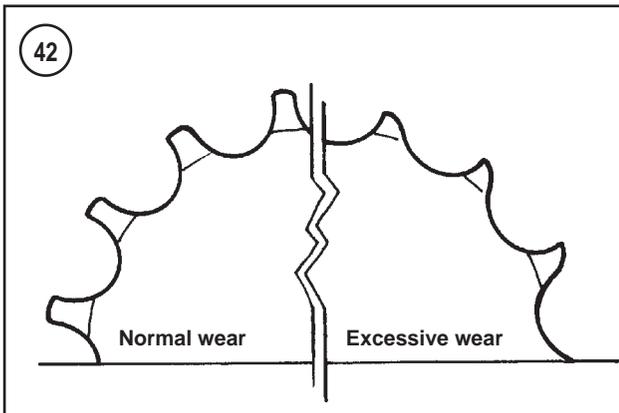
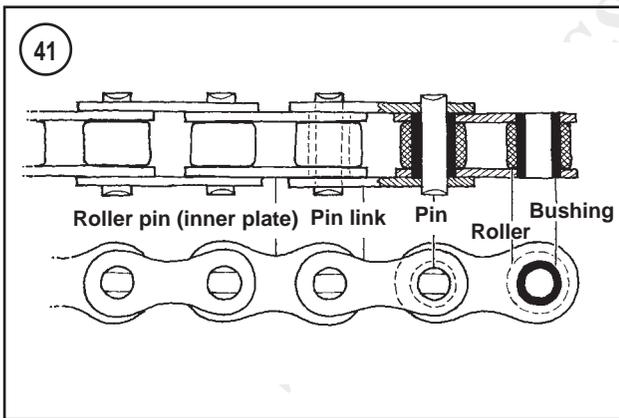
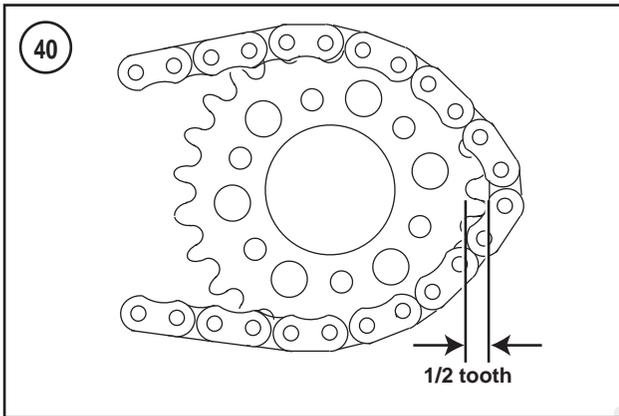
3. Have a rider on the seat.
4. Push the chain up midway between the sprockets and measure the chain free play (**Figure 35**).
5. If the chain free play is incorrect, adjust it as described in the following steps.
6. On 1989-2003 models, remove and discard the rear axle cotter pin (A, **Figure 36**).
7. Loosen the rear axle nut (B, **Figure 36**).
8. Turn the adjuster locknuts (C, **Figure 36**) on both sides of the wheel. Turn both adjuster nuts an equal number of turns to obtain the correct drive chain free play. Proceed as follows to check wheel alignment.
- 9A. On 1986-1990 models, check rear wheel alignment as follows:
  - a. Sight along the drive chain as it runs over the rear driven sprocket. It should leave the driven sprocket in a straight line as shown in A, **Figure 37**.
  - b. If the drive chain is cocked to one side or the other (B or C, **Figure 37**), turn the adjuster locknuts as needed to obtain a straight chain run and correct chain free play.
- 9B. On 1991 models, check rear wheel alignment as follows:
  - a. Using a suitable metal rod, construct the tool shown in **Figure 38**.
  - b. Insert the end of the tool into the index hole in the swing arm (A, **Figure 39**).
  - c. Slide the rubber grommet along the tool until it aligns with the center of the axle (B, **Figure 39**).
  - d. Check alignment on the opposite side, comparing the rubber grommet position with the center of the axle. The alignment on both sides of the axle must be the same. If necessary, adjust the axle with the axle adjusters, while at the same time maintaining correct drive chain free play.
10. Tighten the rear axle nut to 60-65 ft. (81-88 N•m). On 1989-1991 models install a new rear axle cotter pin (A, **Figure 36**).
11. Tighten the chain adjuster locknuts securely.

#### Inspection

1. Clean the drive chain as described in this section
2. Park the motorcycle on level ground. Support the motorcycle securely with the rear wheel off the ground.
3. At the rear sprocket, pull one of the links away from the driven sprocket. If the link pulls away more than 1/2 the height of the sprocket tooth (**Figure 40**), the chain is excessively worn.



4. Inspect the inner plate chain faces (**Figure 41**). They should be polished on both sides. If they show uneven wear, the sprockets are not aligned properly.
5. Inspect the drive and driven sprockets for the following defects:
  - a. Undercutting or sharp teeth (**Figure 42**).
  - b. Broken teeth.
6. Check the drive sprocket nut and the driven sprocket nuts for looseness. Refer to Chapter Thirteen.



7. If excessive chain or sprocket wear is evident, replace the chain and both sprockets as a complete set (Chapter Thirteen).

### Cleaning

1. Remove the drive chain as described in Chapter Thirteen.

#### CAUTION

*Only kerosene should be used to clean O-ring drive chains. Do not use gasoline, solvent or paint thinner. Do not steam clean the chain.*

2. Immerse the chain in a pan of cleaning solvent and allow it to soak for about a half hour. Move it around and flex it during this period so the dirt between the pins and rollers can work out.

3. Scrub the rollers and side plates with a stiff brush and rinse away loosened dirt. Rinse the chain a couple of times to make sure all debris is washed out. Hang up the chain and allow it to thoroughly dry.

#### NOTE

*Do not allow a chain to remain dry and unlubricated for an extended period, otherwise, rust may occur.*

4. Clean any dirt or grit off the sprockets.

5. Install the chain as described in Chapter Thirteen.

6. Lubricate the chain as described in this chapter.

### Final Drive Belt

#### Deflection

Check drive belt deflection at the intervals in **Table 1**. If the drive belt is severely worn, or if it is wearing incorrectly, refer to Chapter Thirteen for inspection and replacement procedures.

#### NOTE

*Check the drive belt deflection when the belt is cold.*

1. Support the motorcycle on a stand or floor jack with the rear wheel off the ground. Refer to the *Motorcycle Stands* section in Chapter Thirteen.

2. Turn the rear wheel and check the drive belt for its tightest point. Mark this point. Turn the wheel so the tight spot is on the lower belt run, midway between the sprockets.

3. Lower the motorcycle to the ground.

4. Position the motorcycle so both wheels are on the ground without a rider or cargo on the motorcycle.

5. Observe the belt position through the window in the debris deflector (**Figure 43**). Mark the position of the belt.

**NOTE**

Use a belt tension gauge (A, **Figure 44**) (part No. HD-35381-A or equivalent) to apply pressure against the drive belt in Step 6. A suitable equivalent is the Yamaha belt tension tool (B, **Figure 44**).

**NOTE**

Be sure the belt tension gauge is positioned so it applies force squarely against the belt.

6. Apply a force of 10 lb. (4.5 kg) to the middle of the lower belt strand (**Figure 45**) and make another mark on the debris deflector to indicate the position of the deflected belt.
7. Note the number of graduations between the marks. Each graduation next to the window equals 1/8 in. (3.2 mm). Calculate the amount of belt deflection and refer to **Table 7** for the correct specification. Adjust the belt as described in this section.

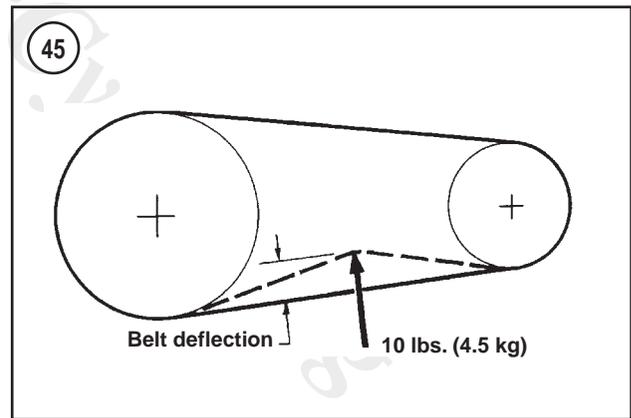
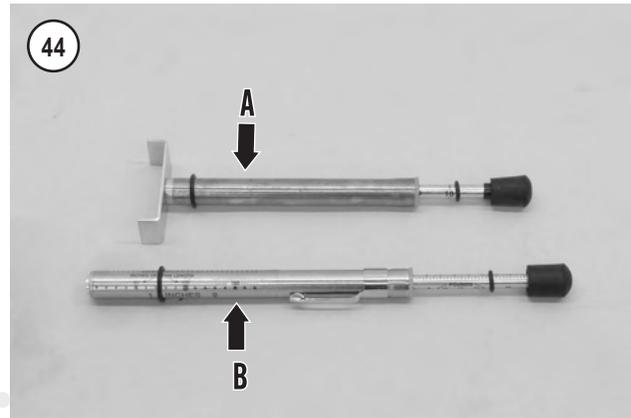
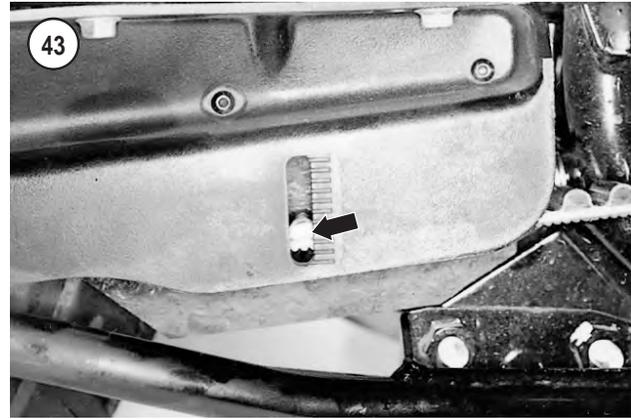
**Adjustment**

1. Measure the belt deflection as described in this section.
2. On the left side, remove the cotter pin (A, **Figure 36**) and loosen the rear axle nut (B).
3. Turn the adjuster locknut (C, **Figure 36**) on each side, in either direction, an equal number of turns to obtain the correct drive belt deflection.

**CAUTION**

The rear wheel must be properly aligned with the chassis so the drive belt runs true on the front and rear sprockets. A misaligned rear wheel will cause uneven, rapid drive belt wear.

4. Check that the rear axle is positioned correctly within the swing arm as follows:
  - a. Using a suitable metal rod, construct the tool shown in **Figure 38**.
  - b. Insert the end of the tool into the index hole in the swing arm (A, **Figure 39**).
  - c. Slide the rubber grommet along the tool until it aligns with the center of the axle (B, **Figure 39**).
  - d. Check alignment on the opposite side, comparing the rubber grommet position with the center of the axle. The alignment on both sides of the axle must be the same. If necessary, adjust the axle with the axle adjusters (**Figure 46**), while at the same time maintaining correct drive belt deflection.
5. Tighten the rear axle nut to 60-65 ft.-lb. (81-88 N•m) and install a new cotter pin.
6. Recheck the drive belt deflection. Tighten the adjuster locknuts securely.



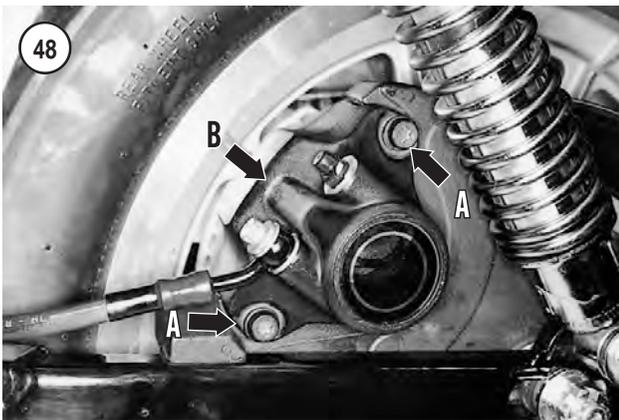


## Brake Pad Inspection

### NOTE

*It may be necessary to dismount the caliper in the following steps if there is not sufficient access to the brake pads. Refer to Chapter Sixteen.*

1. Inspect the brake pads for damage.
2. Measure the thickness of each brake pad lining on the front caliper(s) (**Figure 47**) and rear caliper (**Figure 48**). Replace the brake pad if its thickness is worn to the minimum thickness (**Figure 49**) as listed in **Table 7**. Replace the brake pads as described in Chapter Sixteen.



## Brake Fluid Level Inspection

### WARNING

*If the reservoir is empty, air has probably entered the brake system. Bleed the breaks as described in Chapter Sixteen.*

### WARNING

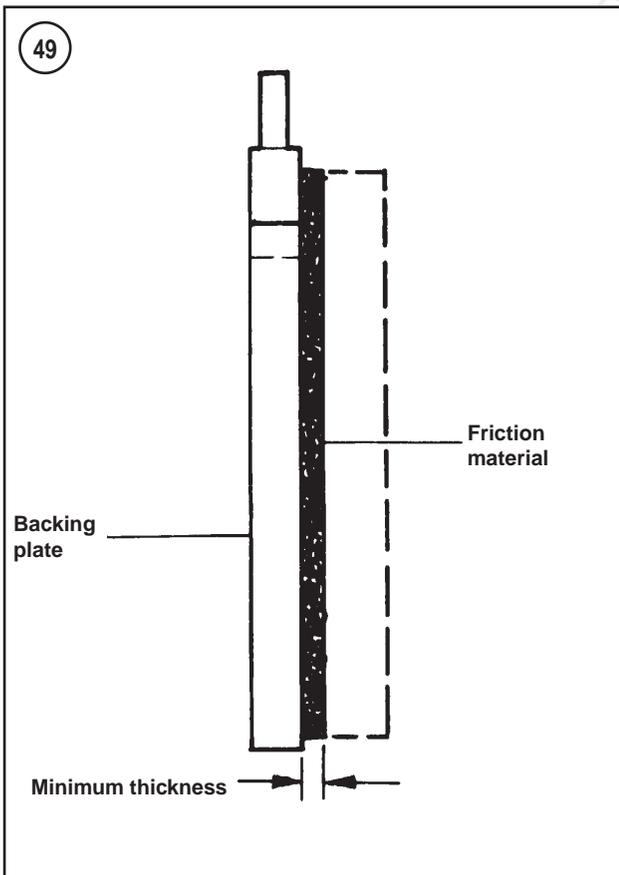
*Only use DOT 5 brake fluid. Do not use brake fluid labeled DOT 5.1. This is a glycol-based fluid that is not compatible with silicone-based DOT 5. DOT 5 fluid is purple while DOT 5.1 fluid is amber/clear. Do not intermix these different types of brake fluid as it can cause brake component damage and lead to brake system failure.*

### WARNING

*Do not intermix DOT 3, DOT 4 or DOT 5.1 brake fluids as they are not silicone-based. Using non-silicone brake fluid in the models covered in this manual can cause brake failure.*

### NOTE

*Low brake fluid levels usually indicated brake pad wear. As the pads wear and become thinner, the brake caliper pistons automatically extend farther out of their bores. As the caliper pistons move out, the brake fluid level drops in the system. However, if the brake fluid level is low and the brake pads are not worn excessively, check the system for leaks.*



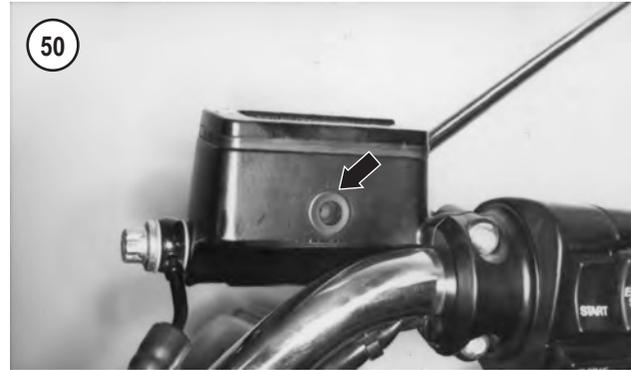
## Front brake (1986-1995 models)

1. Move the handlebar so the front master cylinder is level.

### NOTE

*The sight glass on the side of the master cylinder (**Figure 50**) only provides a quick means to determine if the brake fluid level is low, not whether the reservoir is full.*

2. Brake fluid should be visible in all of the sight glass (A, **Figure 50**).
3. Clean the top of the master cylinder.
4. Remove the screws securing the cover. Remove the cover and diaphragm.
5. The brake fluid level should be 1/8 inch (3.2 mm) below the top of the reservoir. If the brake fluid level is low, continue with Step 6. If the level is correct, continue with Step 7.
6. Add new DOT 5 brake fluid to raise the brake fluid level.
7. Reinstall the diaphragm and cover. Install the screws and tighten securely.



### Front brake (1996-2003 models)

1. Move the handlebar so the front master cylinder is level.
2. Look at the sight glass on top of the master cylinder (A, **Figure 51**) to determine the brake fluid level. If the fluid level is correct, the sight glass will appear dark purple. If the level is low, the sight glass will be a light color or clear.
3. If the brake fluid level is low, add fluid as follows.
4. Clean the top of the master cylinder.
5. Remove the screws securing the cover (B, **Figure 51**). Remove the cover and diaphragm.
6. The brake fluid level should be 1/8 inch (3.2 mm) below the top of the reservoir. If the brake fluid level is low, continue with Step 7. If the level is correct, continue with Step 8.
7. Add new DOT 5 brake fluid to raise the brake fluid level.



#### NOTE

*One side of the reservoir cover is thicker. Install the cover in Step 8 so the thick side is above the brake line fitting.*

8. Reinstall the diaphragm and cover (B, **Figure 51**). Install the screws and tighten securely.

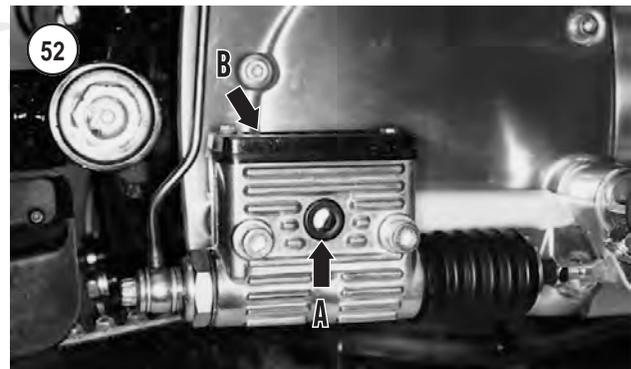
### Rear brake

1. Park the motorcycle on level ground so the motorcycle is upright.

#### NOTE

*The sight glass (A, **Figure 52**) on the side of the master cylinder only provides a quick means to determine if the brake fluid level is low, not whether the reservoir is full.*

2. Brake fluid should be visible in all of the sight glass (A, **Figure 52**).
3. Clean the top of the master cylinder.
4. Remove the screws securing the cover (B, **Figure 52**). Remove the cover and diaphragm.
5. The brake fluid level should be 1/8 inch (3.2 mm) below the top of the reservoir. If the brake fluid level is low, continue with Step 6. If the level is correct, continued with Step 7.
6. Add fresh DOT 5 brake fluid to fill the reservoir.



7. Reinstall the diaphragm and cover (B, **Figure 52**). Install the screws and tighten securely.

### Brake Disc Inspection

Inspect the front and rear brake discs for scoring, cracks or other damage. Measure the brake disc thickness (**Figure 53**) and service the brake discs as described in Chapter Sixteen.

### Brake Lines and Seals Inspection

Check the brake lines between each master cylinder and each brake caliper. If there are any leaks, tighten the connections and bleed the brakes as described in Chapter Sixteen.



## Brake Fluid Change

### WARNING

Do not use brake fluid labeled DOT 5.1. This is a glycol-based fluid that is not compatible with silicone-based DOT 5. DOT 5 brake fluid is purple while DOT 5.1 is an amber/clear color. Do not intermix these different types of brake fluid, as doing so will lead to brake component damage and possible brake failure.

To change brake fluid, follow the brake bleeding procedure in Chapter Sixteen. Continue adding new fluid to the master cylinder until the fluid leaving the caliper is clean and free of contaminants and air bubbles.

## Front Brake Adjustment

The front brake does not require periodic adjustment.

## Rear Brake Adjustment

### 1986-early 1987 models

1. Sit on the motorcycle in normal riding position. Adjust the position of the brake pedal to suit rider preference as described in the following steps.
2. Loosen the locknuts (A, **Figure 54**) on the pedal adjusting screw (B).
3. Turn the adjusting screw (B, **Figure 54**) until the desired pedal position is obtained.

4. Tighten the locknuts (A, **Figure 54**) and recheck the pedal position.
5. Push the brake pedal by hand until light resistance is felt, which indicates the pushrod (17, **Figure 55**) is contacting the piston (12).
6. Measure the gap between the adjusting screw (B, **Figure 54**) and the brake pedal. The gap should be 1/16 in. (1.6 mm). If not, proceed as follows:
  - a. Loosen the locknut (18, **Figure 55**).
  - b. Turn the pushrod (17, **Figure 55**) as needed to obtain the desired gap.
  - c. Tighten the locknut (18, **Figure 55**).

### Later 1987-2003 models, except 1999-2003 883C and 1200C models

1. Park the motorcycle on level ground so the motorcycle is upright.
2. Note the brake pedal position with relation to the floor. The brake pedal (**Figure 56**) should be parallel with the floor.
3. Remove the cotter pin securing the clevis pin (A, **Figure 57**) to the rear brake pedal. Remove the clevis pin.
4. Disconnect the brake rod end from the brake pedal.
5. Loosen the locknut (B, **Figure 57**) and turn the brake rod end (C) as needed to reposition the brake pedal.
6. When the brake pedal is properly positioned, reinstall the clevis pin and secure it with a *new* cotter pin.

### 1999-2003 883C and 1200C models

Refer to the *Forward Foot Controls* section in Chapter Seventeen.

## Clutch Adjustment

### 1986-1993 models

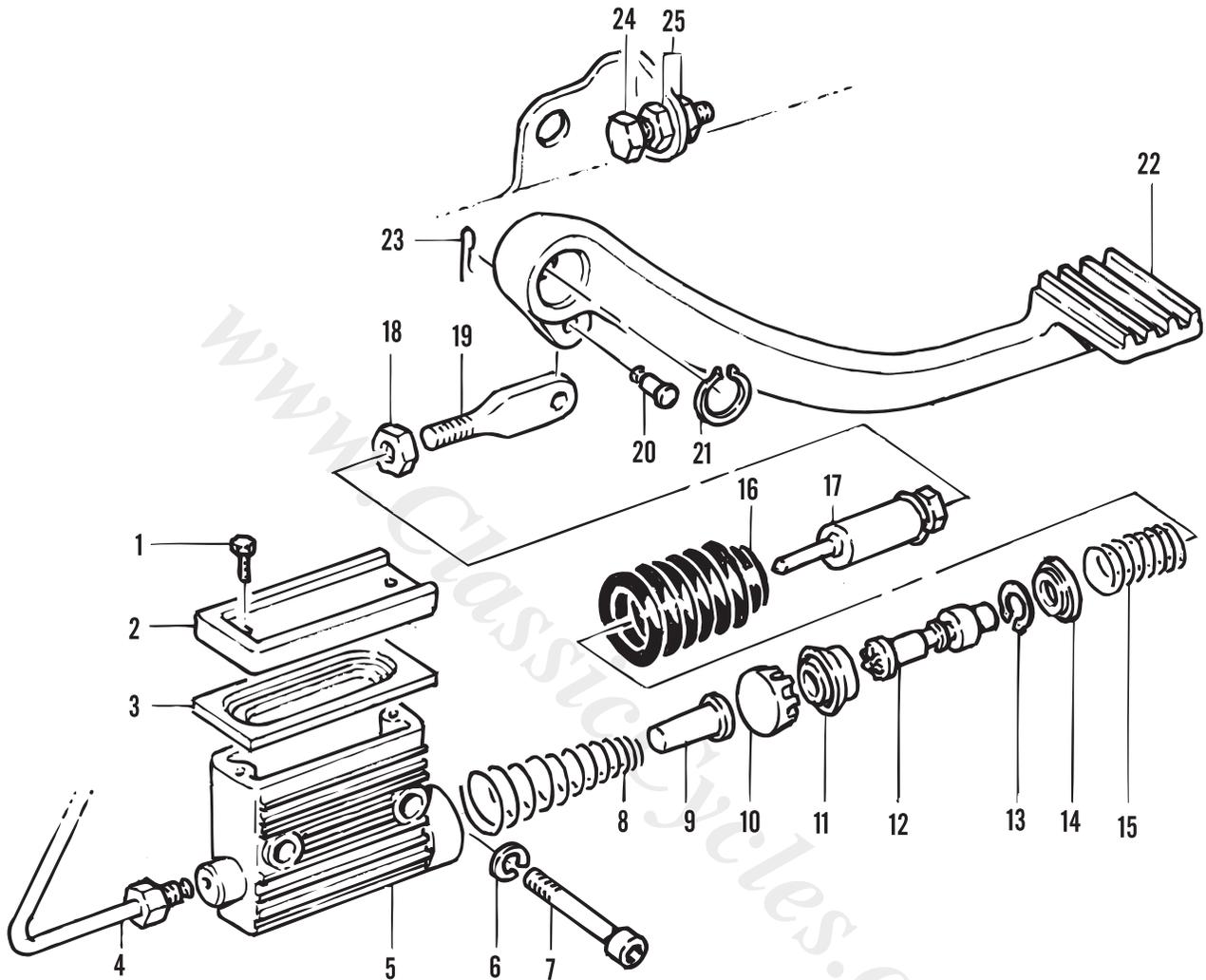
### NOTE

The clutch cable adjuster on 1986-1987 models is located at the lower end of the cable (A, **Figure 58**). On 1988-1993 models, the cable adjuster is located at mid-length in the cable adjacent to the front frame down-tube (**Figure 59**).

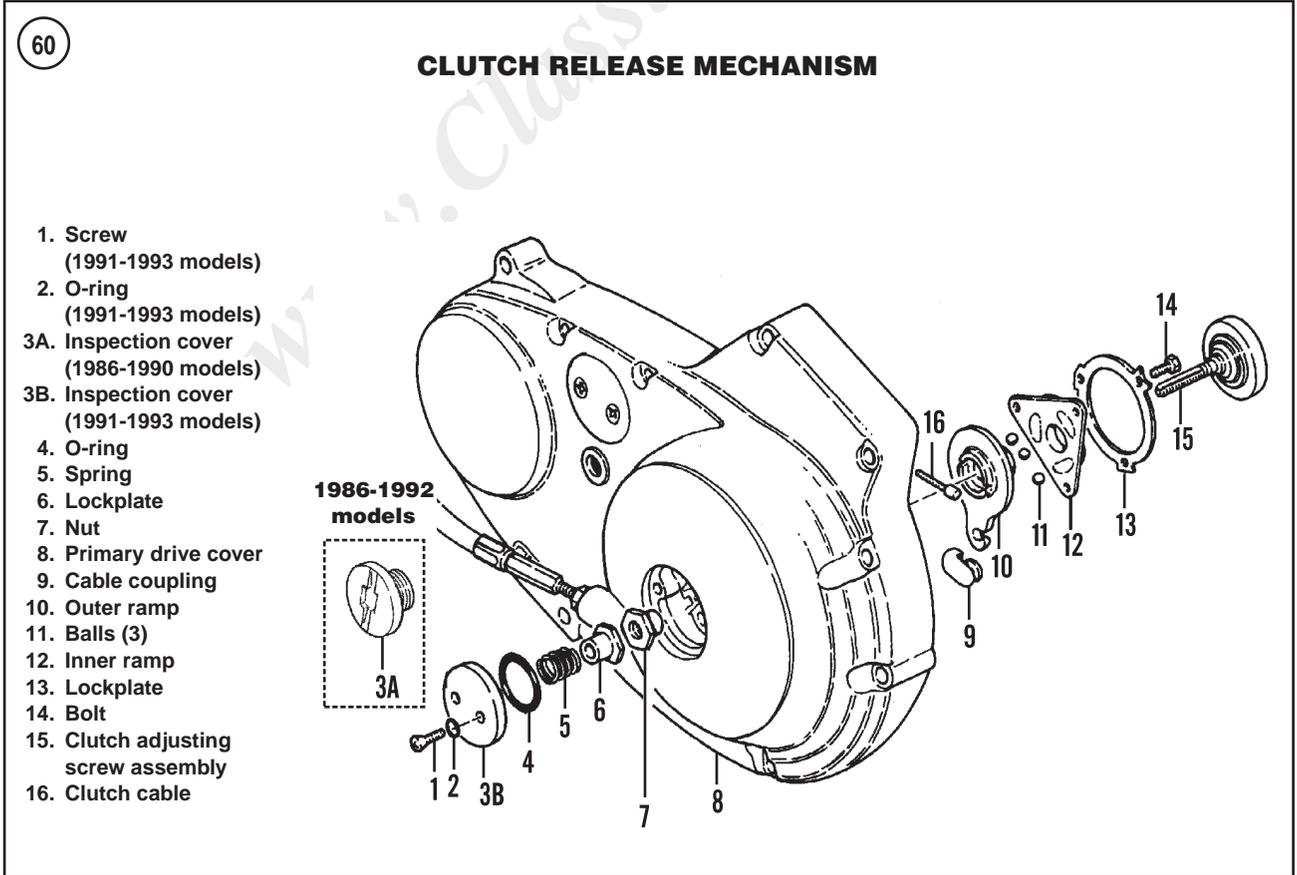
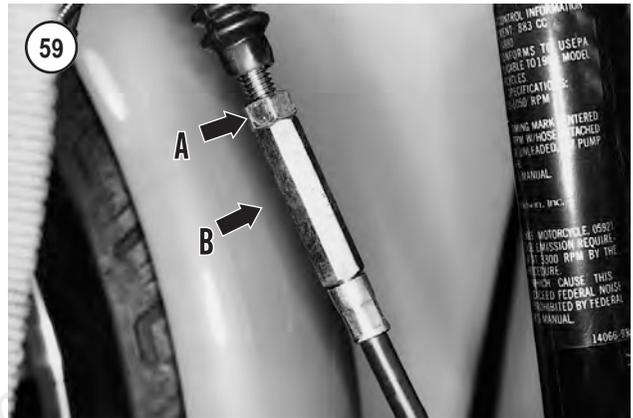
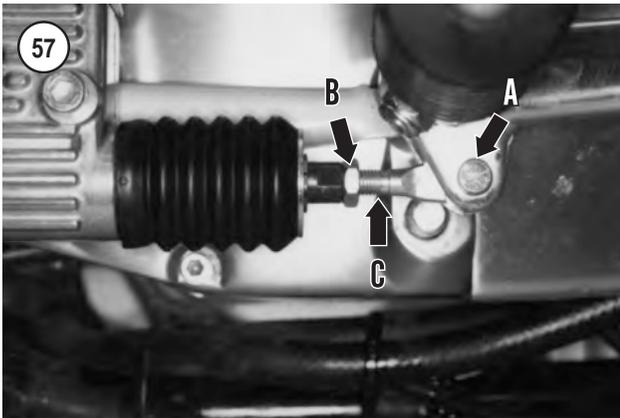
Refer to **Figure 60** when performing this procedure.

- 1A. On 1986-1987 models, loosen the clutch cable jam nut (B, **Figure 58**) and turn the adjuster (A) to provide maximum cable slack.
- 1B. On 1988-1993 models, slide the rubber boot off the clutch in-line cable adjuster. Loosen the adjuster jam nut (A, **Figure 59**) and turn the adjuster (B) to provide maximum cable slack.
2. Make sure the clutch cable ferrule seats squarely in the lever housing receptacle (**Figure 61**) on the handlebar.
3. Remove the clutch inspection cover (**Figure 62**).

## REAR MASTER CYLINDER (1986-EARLY 1987 MODELS)



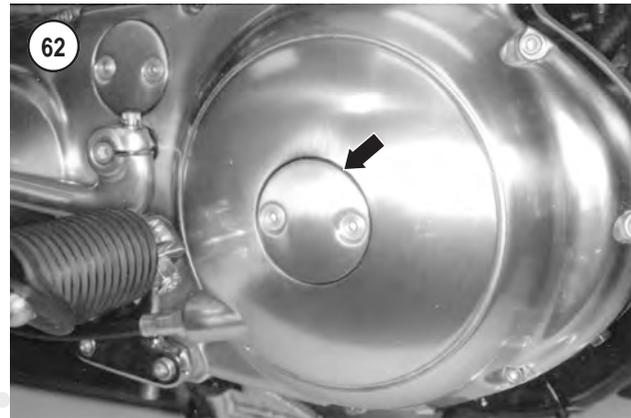
- |                |                     |
|----------------|---------------------|
| 1. Screw       | 14. Cupped washer   |
| 2. Cover       | 15. Spring          |
| 3. Diaphragm   | 16. Rubber boot     |
| 4. Brake line  | 17. Pushrod         |
| 5. Housing     | 18. Nut             |
| 6. Lockwasher  | 19. Rod end         |
| 7. Bolt        | 20. Pin             |
| 8. Spring      | 21. Snap ring       |
| 9. Spring seat | 22. Brake pedal     |
| 10. Piston cup | 23. Cotter pin      |
| 11. Seal       | 24. Adjusting screw |
| 12. Piston     | 25. Locknuts        |
| 13. Snap ring  |                     |

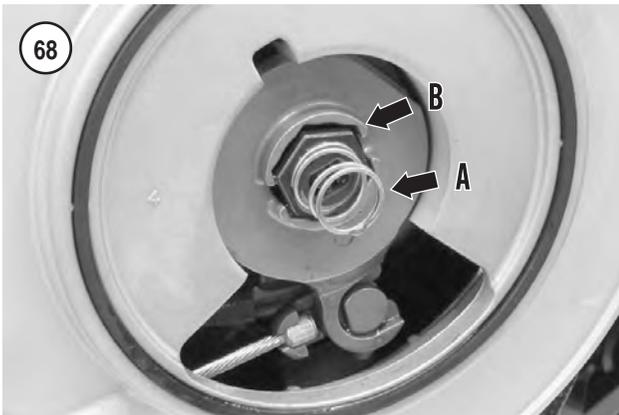
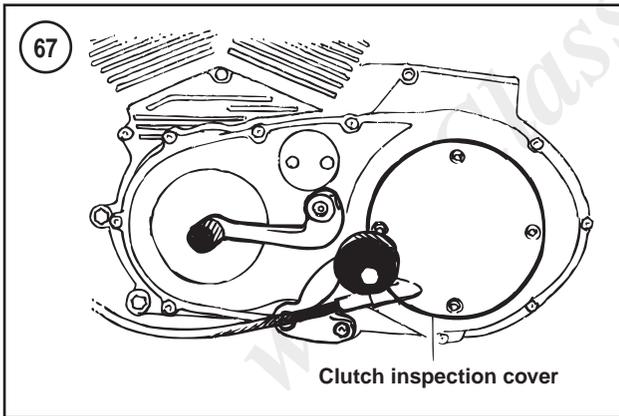
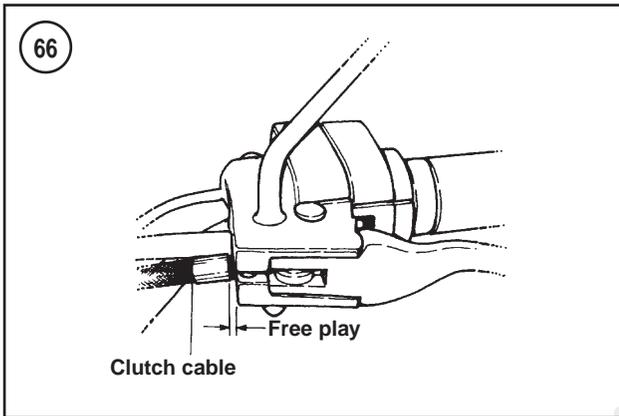


4. At the clutch mechanism, remove the spring and lockplate assembly (**Figure 63**).
5. Turn the adjusting screw (**Figure 64**) counterclockwise until it is lightly seated.
6. Turn the adjusting screw 1/4 turn clockwise.
7. Reinstall the spring and lockplate assembly (**Figure 65**) so it fits inside the outer ramp recess. If necessary, turn the adjusting screw clockwise until the flats on the lockplate fit into the flats in the outer ramp.
8. Install the clutch inspection cover and O-ring.
9. Check the free play as follows:
  - a. At the inline cable adjuster, turn the adjuster away from the jam nut until slack is eliminated at the clutch hand lever.
  - b. Pull the clutch cable end away from the clutch lever, then turn the clutch cable adjuster to obtain free play (**Figure 66**) of 1/16-1/8 in. (1.6 mm).
  - c. When the adjustment is correct, tighten the clutch inline cable jam nut.

#### 1994-2003 models

1. Remove the clutch inspection cover (**Figure 67**) and quad ring.
2. Slide the rubber boot off the clutch in-line cable adjuster.
3. Loosen the adjuster jam nut (A, **Figure 59**) and turn the adjuster (B) to provide maximum cable slack.
4. Make sure the clutch cable ferrule seats squarely in the lever housing receptacle (**Figure 61**) on the handlebar.
5. At the clutch mechanism, remove the spring and lockplate assembly (A, **Figure 68**).
6. Turn the adjusting screw (**Figure 69**) counterclockwise until it is lightly seated.
7. Turn the adjusting screw 1/4 turn clockwise.
8. Reinstall the spring and lockplate assembly (A, **Figure 68**) so it fits inside the outer ramp recess (B). If necessary, turn the adjusting clockwise until the flats on the lockplate fit into the flats in the outer ramp.
9. Be sure the quad ring is located in the primary drive cover groove.
10. Install the inspection cover so the notch in the cover fits over the cable boss on the primary drive cover. Tighten the retaining screws to 84-108 in.-lb. (9.5-12.0 N•m).
11. Check the free play as follows:
  - a. At the inline cable adjuster, turn the adjuster away from the jam nut until slack is eliminated at the clutch hand lever.
  - b. Pull the clutch cable end away from the clutch lever, then turn the clutch cable adjuster to obtain the freeplay of 1/16-1/8 in. (1.6-3.2 mm).
  - c. When the adjustment is correct, tighten the clutch inline cable jam nut and slide the rubber boot over the cable adjuster.





### Shift Lever Adjustment (1999-2003 883C and 1200C Models)

Refer to the *Forward Foot Controls* section in Chapter Seventeen.

### Throttle Cables

#### Inspection

Inspect the throttle cables from the grip to the carburetor. Make sure they are not kinked or chafed. Replace them if necessary as described in Chapter Ten or Chapter Eleven.

Make sure the throttle grip rotates smoothly from fully closed to fully open. Check with the handlebar at the center, full left and full right positions.

#### Adjustment

#### **WARNING**

*Do not ride the motorcycle until the throttle cables are properly adjusted. Also, the cables must not catch or pull when the handlebar is turned from side to side. Improper cable routing and adjustment can cause the throttle to stick open. This could cause loss of control and a possible crash. Recheck this adjustment before riding the motorcycle.*

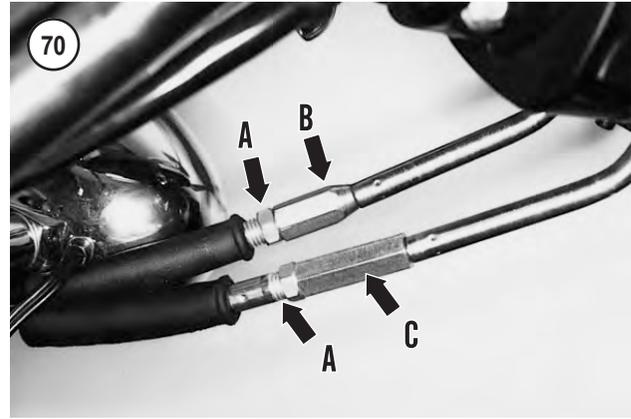
There are two different throttle cables. At the throttle grip, the front cable is the throttle control cable and the rear cable is the idle control cable. Label the cables before removal.

At the carburetor on 1986-1987 models, the outboard cable is the idle control cable and the inboard cable is the throttle control cable. Label the cables before removal.

At the carburetor on 1988-2003 models, the outboard cable is the throttle control cable and the inboard cable is the idle control cable. Label the cables before removal.

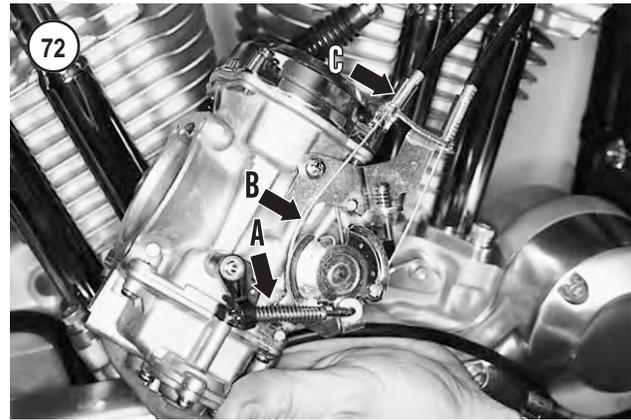
1. Remove the air filter and backing plate as described in Chapter Ten or Chapter Eleven.
2. Push back the rubber boots from the adjusters.

3. Loosen the throttle friction screw on the bottom of the throttle control housing.
4. At the handlebar, loosen both control cable adjuster jam nuts (A, **Figure 70**), loosen the cable adjusters (B and C) to increase cable slack.
5. Turn the handlebars so the front wheel points straight ahead. Turn the throttle grip to open the throttle completely and hold it in this position.
- 6A. On 1986-1987 models, at the handlebar, turn the throttle control (B, **Figure 70**) cable adjuster until the throttle cam stop just touches the stop boss (Figure 71) on the carburetor body. Tighten the throttle cable adjuster jam nut and release the throttle grip.



*NOTE*  
The carburetor is shown removed in **Figure 72** to better illustrate the steps.

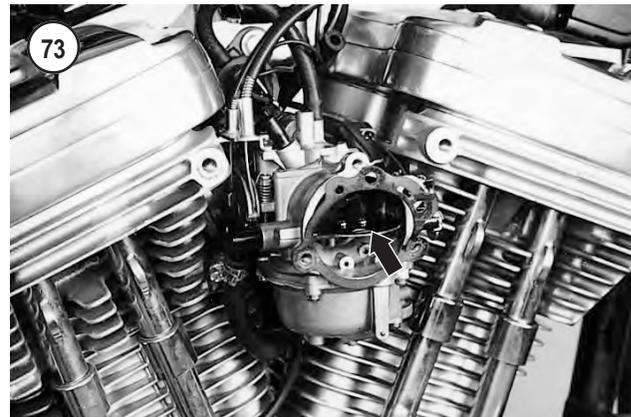
- 6B. On 1988-2003 models, at the handlebar, turn the throttle control (B, **Figure 70**) cable adjuster until the throttle cam (A, **Figure 72**) stop just touches the stop boss (B) on the carburetor body. Tighten the throttle cable adjuster jam nut and release the throttle grip.
7. Turn the front wheel all the way to the fall right lock position and hold it there.
8. At the handlebar, turn the idle cable (C, **Figure 70**) adjuster until the lower end of the idle control cable (B, **Figure 72**) just contacts the spring in the carburetor cable guide. Tighten the idle cable jam nut.
9. Install the backing plate and the air filter as described in Chapter Ten or Chapter Eleven.
10. Shift the transmission into neutral and start the engine.
11. Increase engine speed several times. Release the throttle and make sure the engine speed returns to idle. If the engine speed does not return to idle, at the handlebar, loosen the idle control cable adjuster jam nut and turn the cable adjuster as required. Tighten the idle control cable adjuster jam nut.
12. Allow the engine to idle in neutral, then turn the handlebar from side to side. Do not operate the throttle. If the engine speed increases when the handlebar assembly is turned, the throttle cables are routed incorrectly or damaged. Turn off the engine. Recheck cable routing and adjustment.
13. Push the rubber boots back onto the adjusters.

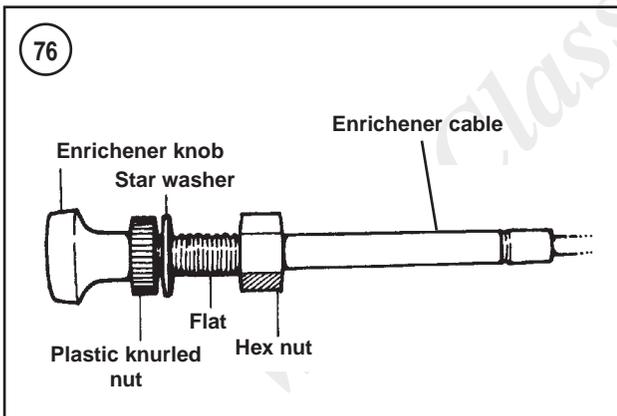
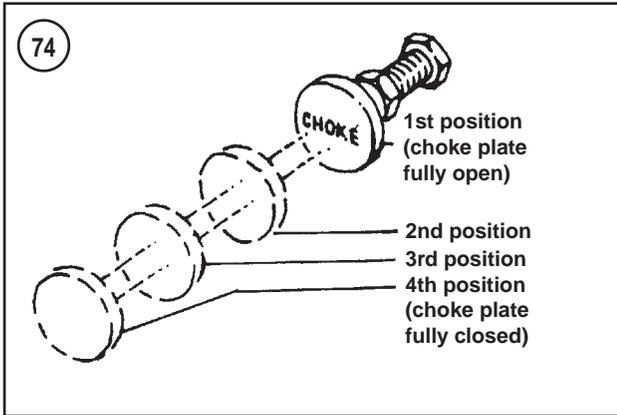


### Choke Cable Adjustment (1986-1987 Models)

The choke cable on 1986-1987 models operates the choke plate in the carburetor (**Figure 73**). Cable adjustment may be necessary to obtain proper operation.

1. Remove the air cleaner as described in Chapter Ten.
2. Operate the choke control knob (**Figure 74**) and verify that the choke plate operates correctly.





3. If necessary, adjust the choke by loosening the nuts at the choke knob and adjusting the length of the cable. Tighten the nuts and recheck operation.

### Starting Enrichment Valve (Choke) Cable Adjustment (1988-2003 Models)

#### CAUTION

The starting enrichment (choke) cable must have sufficient cable resistance to work properly. Do not lubricate the enrichment cable or its conduit.

The starting enrichment (choke) knob (**Figure 75**) should move from fully open to fully closed position without any sign of binding. The knob should also stay in its fully closed or fully open position without creeping. If the knob does not stay in position, adjust tension on the cable by turning the plastic knurled nut behind the knob. Refer to **Figure 76**.

1. Loosen the hex nut behind the mounting bracket. Disengage the cable from the mounting bracket.
2. Hold the cable flats with a wrench and turn the knurled plastic nut counterclockwise to reduce cable resistance. Continue until the knob will move in freely.
3. Turn the knurled plastic nut clockwise to increase cable resistance. Continue adjustment until the knob will remain stationary when it is pulled all the way out, but will move in relatively easily. The knob must move without any roughness or binding.
4. Reinstall the cable into the mounting bracket slot with the star washer located between the bracket and hex nut. Tighten the hex nut securely.
5. Recheck the knob movement and readjust if necessary.

### Fuel Line Inspection

#### WARNING

A damaged or deteriorated fuel line can cause a fire or explosion if fuel spills onto a hot engine or exhaust pipe.

Inspect the fuel line from the fuel tank to the carburetor. Replace leaking or damaged fuel lines. Make sure the hose clamps are in place and holding securely. Check the hose fittings for looseness.

### Exhaust System

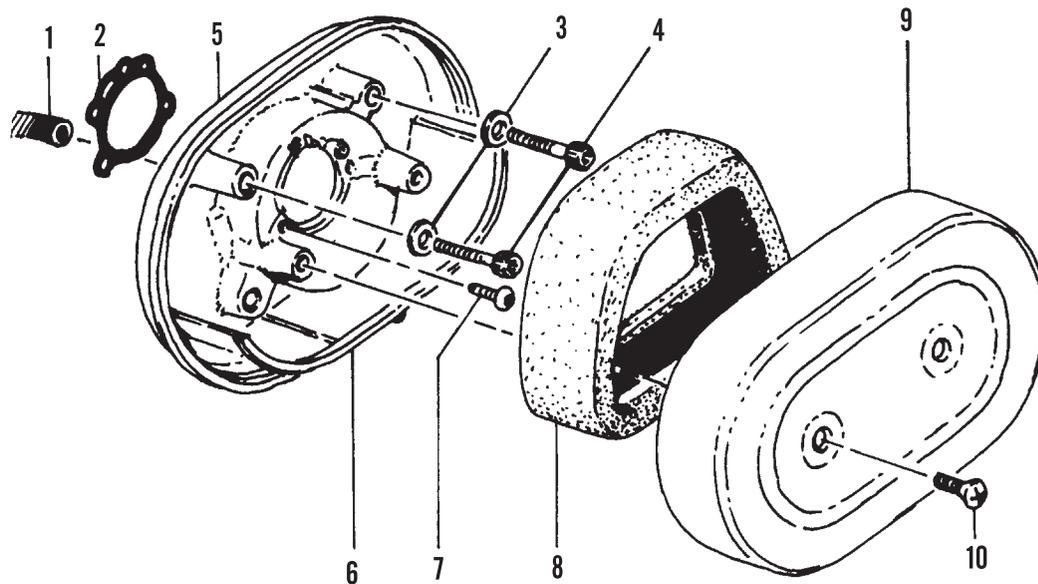
Check all fittings for exhaust leaks. Do not forget the crossover pipe or interconnecting tube connections. Tighten all fasteners. Replace gaskets as necessary. Refer to Chapter Ten or Chapter Eleven for removal and installation procedures.

### Steering Play

Check the steering play adjustment (Chapter Fourteen) at the intervals in **Table 1**.

### Rear Swing Arm Pivot Bolts

Check the rear swing arm pivot bolt tightness (Chapter Fourteen) at the intervals specified in **Table 1**.

**AIR FILTER (1986-1989 MODELS)**

1. Vent hose
2. Gasket
3. Washer
4. Bolt
5. Backplate
6. Gasket
7. Screw
8. Filter and screen assembly
9. Cover
10. Screw

**Rear Shock Absorbers**

Check the rear shock absorbers for oil leaks or damaged bushings. Check the shock absorber mounting bolts and nuts for tightness. Refer to *Shock Absorbers* in Chapter Fifteen for procedures.

**Engine Mounting Hardware**

Check the engine and frame mounts for loose or damaged parts. Refer to Chapter Five for procedures.

**Fasteners****CAUTION**

*Special procedures must be used to tighten the cylinder head mounting bolts. To accurately check these bolts for tightness, refer to **Cylinder Head** in Chapter Four. Tightening*

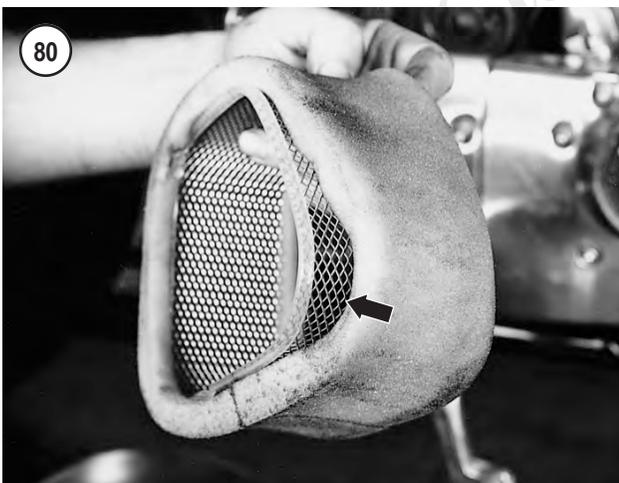
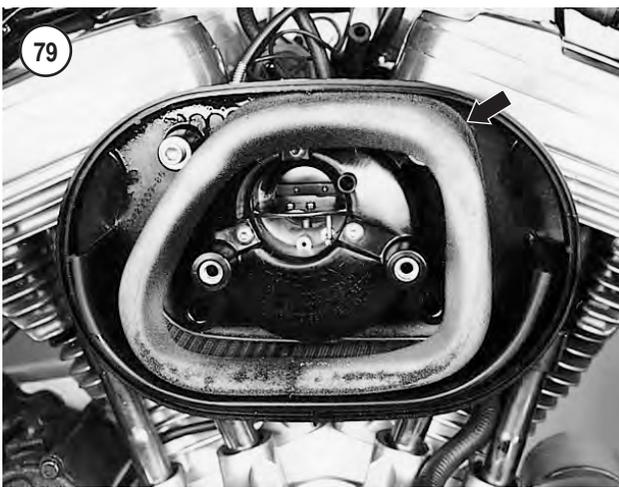
*these bolts incorrectly can cause oil leaks or cylinder head warp.*

Constant vibration can loosen many fasteners on a motorcycle. Check the tightness of all fasteners, especially:

1. Engine mounting hardware.
2. Engine and primary drive covers.
3. Handlebar and front fork.
4. Gearshift lever.
5. Sprocket bolts and nuts.
6. Brake lever and pedal.
7. Exhaust system.
8. Lighting equipment.

**Electrical Equipment and Switches**

Check all of the electrical equipment and switches for proper operation. Refer to Chapter Twelve.



## TUNE-UP

The following section describes tune-up procedures. Perform the tasks at the intervals listed in **Table 1**. Perform a complete tune-up in the following order:

1. Clean or replace the air filter.
2. Check engine compression.

3. Check or replace the spark plugs.
4. Check the ignition timing.
5. Adjust the idle speed.

## AIR FILTER

### Removal/Cleaning/Installation

Remove and inspect the air filter at the interval in **Table 1**. If necessary, clean the element. Replace the element if it is damaged.

Never run the motorcycle without the element installed.

### 1986-1989 models

Refer to **Figure 77**.

1. Remove the air filter cover screws and remove the cover (**Figure 78**).
2. Remove the air filter element (**Figure 79**).
3. Remove the wire mesh frame from inside the filter (**Figure 80**).
4. Wash the filter in soap and water and allow to dry completely.
5. Inspect the filter and make sure it is in good condition with no sign of damage. Replace if necessary.
6. After the filter is dry, saturate the filter with air filter oil. Work the oil into the filter, then squeeze out excess oil. The oil should have a uniform color, which indicates thorough oil dispersion.
7. Reinstall the wire mesh frame (**Figure 80**).
8. Clean the inside of the cover and backplate with a rag and cleaning solvent. Remove any debris that may have passed through a damaged filter.
9. Install the filter by reversing the removal steps.

### 1990-2003 models

Refer to **Figure 81**.

1. Remove the air filter cover screws and remove the cover (**Figure 82**).
2. Remove the air filter element (**Figure 83**).

### NOTE

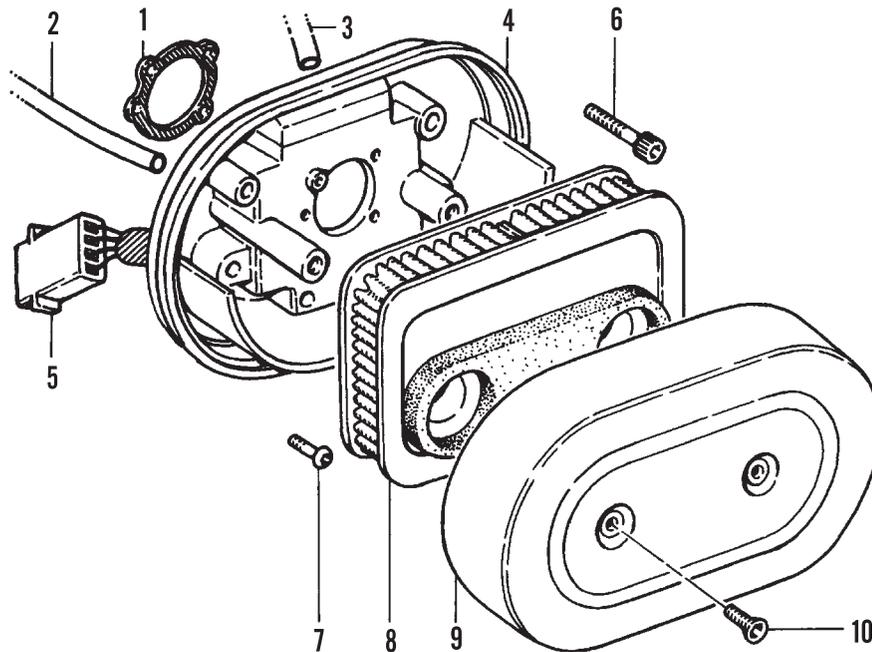
*The air filter element is a paper/wire type. If an aftermarket element is installed, refer to the manufacturer's cleaning instructions.*

3. Replace the air filter if damaged.

### WARNING

*Do not clean the air filter in solvent. Never clean the air filter element in gasoline or low flash point solvent. The residual solvent or vapors may cause a fire or explosion after the filter is reinstalled.*

## AIR FILTER ASSEMBLY (1990-2003 MODELS)



- |  |  |
|--|--|
| 1. Gasket  | 5. Butterfly valve solenoid wiring harness (California models) |
| 2. Canister-to-air filter hose (California models)   | 6. Allen bolt  |
| 3. Carburetor overflow vent hose (California models) | 7. Screw   |
| 4. Backplate   | 8. Air filter  |
|  | 9. Cover   |
|  | 10. Screw  |

### CAUTION

Do not tap or strike the air filter element on a hard surface to dislodge dirt. Doing so damages the element.

- Place the air filter in a pan filled with lukewarm water and mild detergent. Move the air filter element back and forth to help dislodge trapped dirt. Thoroughly rinse it in clean water to remove all detergent residue.
- Hold the air filter up to a strong light. Check the filter pores for dirt and oil. Repeat Step 4 until there is no dirt and oil in the filter pores. If the air filter cannot be cleaned, or if the filter is saturated with oil or other chemicals, replace it.

### CAUTION

Do not use high air pressure to dry the filter, as this will damage it. Maximum air pressure should be 32 psi (220kPa).

### CAUTION

Do not blow compressed air through the outer surface of the air filter element. Doing so can force dirt trapped on the outer filter surface deeper into the air filter element, re-

stricting airflow and damaging the air filter element.

- Apply compressed air through the inside surface of the air filter element to remove loosened dirt and dust trapped in the filter.
- Inspect the air filter element. Replace it if it is torn or damaged.
- Wipe the inside of the cover and backplate with a clean damp shop rag.

### CAUTION

Air will not pass through a wet or damp filter. Make sure the filter is dry before installing it.

- Allow the filter to dry completely.
- Reinstall the filter by reversing the removal steps.

## COMPRESSION TEST

A compression test is one of the quickest ways to check the internal condition of the engine (piston rings, pistons,



head gasket, valves and cylinders). It is a good idea to check compression at each tune-up, record it in the maintenance log at the back of the manual, and compare it with subsequent readings.

Use a screw-in type compression gauge with any necessary adapter (refer to Chapter One). Before using the gauge, make sure the rubber gasket on the end of the gauge hose adapter is in good condition.

1. Before starting the compression test, make sure the following items are correct:

- a. The battery is fully charged (Chapter Twelve).

- b. The cylinder head bolts are properly tightened (Chapter Four).

2. Run the engine until it reaches normal operating temperature, then turn it off.

3. Remove all the spark plugs as described in this chapter.

4. Connect a grounding tool (Chapter One) to the spark plug wires to prevent damage to the ignition system components.

5. Lubricate the threads of the compression gauge adapter with a small amount of antiseize compound and thread the gauge into one of the spark plug holes.

#### NOTE

*On 1986-1987 models make sure the choke is off.*

6. Move the engine stop switch to the run position, then turn the ignition switch to the ignition position. Open the throttle completely and crank the engine until there is no further rise in pressure. Maximum pressure is usually reached within 4-7 seconds of engine cranking. Record the reading and the cylinder location.

7. Repeat Step 5 and Step 6 for the other cylinder.

8. When interpreting the results, actual readings are not as important as the difference between the readings. Compression is considered normal if the indicated pressure is 120 psi (828 kPa), and the compression reading of a cylinder does not differ from the remaining cylinder by 10 psi (69 kPa). Low compression indicates worn or broken rings, leaky or sticky valves, blown head gasket or a combination of all three.

- a. If the compression reading does not differ between cylinders by more than 10 percent, the rings and valves are in good condition.

- b. If a reading difference of 10 percent or more is obtained on one of the cylinders, it indicates valve or piston ring trouble. To determine which, pour about a teaspoon of engine oil into the spark plug hole of the cylinder with low compression. Turn the engine over once to distribute the oil, then take another compression test and record the reading. If the compression increases significantly, the valves are good but the rings are defective in that cylinder. If compression does not increase, the valves require servicing.

9. Install the spark plugs as described in this chapter.

## SPARK PLUGS

### Removal

As each spark plug is removed, label it with its cylinder location and refer to *Reading* in this section.

1. Grasp the spark plug lead (**Figure 84**) by the cap portion, not by the wire. Pull the lead off the plug.

### CAUTION

Whenever the spark plugs are removed, dirt around the opening can fall into the spark plug hole. This can cause serious engine damage.

2. Clean the area around the spark plug using compressed air. Make sure all loose debris or small parts that could fall into the spark plug holes in the cylinder head are removed.
3. Install the spark plug socket onto the spark plug. Make sure it is correctly seated before removing the spark plug. Identify the spark plug according to the cylinder from which it was removed.
4. Repeat Step 3 for the remaining spark plug(s).
5. Inspect the spark plugs carefully. Refer to *Reading* in this section. Look for plugs with broken center porcelain, excessively eroded electrodes and excessive carbon or oil fouling. Replace defective plugs.
6. Inspect the spark plug cap and wire. Replace the spark plug wire if the receptacle or wire is damaged.

### Gap

Adjust the gap of new plugs to ensure a reliable, consistent spark. To do this, use a spark plug gapping tool with a wire gauge.

1. Insert a wire gauge between the center and the side electrode of the plug (**Figure 85**). The correct gap is listed in **Table 7**. If the gap is correct, a slight drag should be felt as the gauge is pulled through. If there is no drag, or if the gauge will not pass through, bend the side electrode with the gapping tool (**Figure 86**) to set the proper gap listed in **Table 7**.
2. Repeat for the remaining spark plug(s).
3. Install the terminal nut (A, **Figure 87**).

### Installation

1. Apply a light coat of antiseize compound onto the threads (B, **Figure 87**) of the spark plug before installing it. Remove any compound that contacts the plug electrodes. Do not use engine oil on the plug threads.

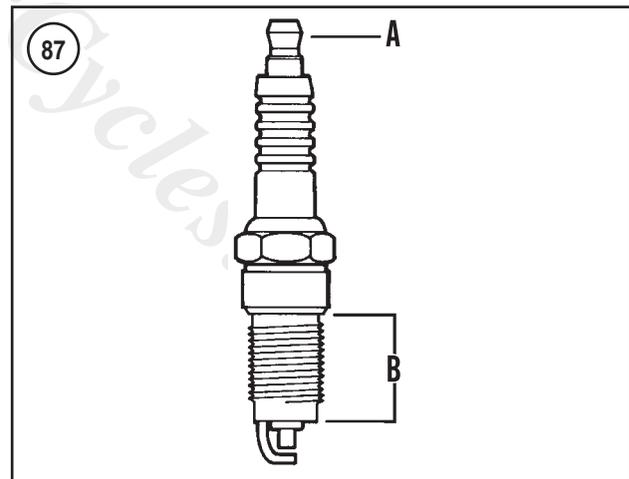
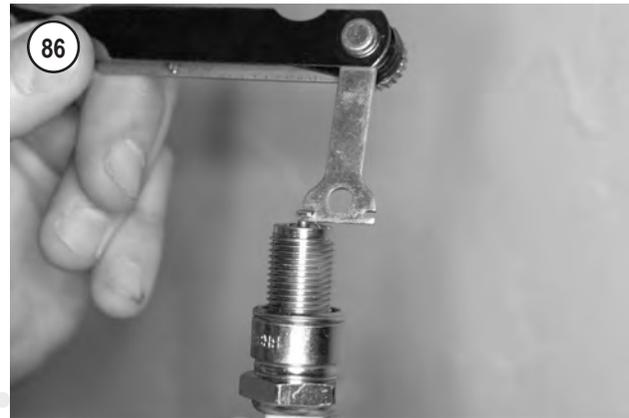
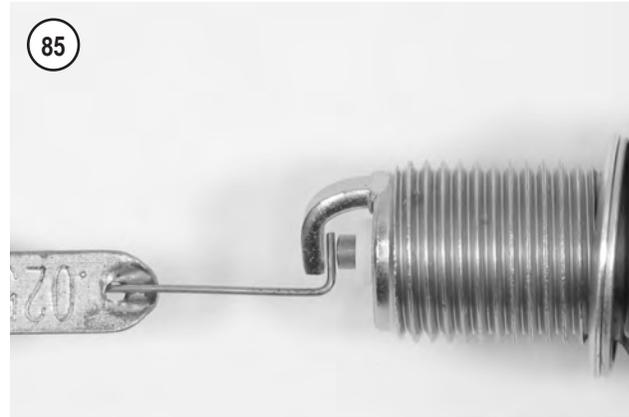
### CAUTION

The cylinder head is aluminum. If the spark plug is cross-threaded into the cylinder head, the internal threads will be damaged.

2. Screw the spark plug in by hand until it seats. Very little effort is required. If force is necessary, the plug may be cross-threaded. Unscrew it and try again.

### CAUTION

Do not overtighten the spark plug. This will crush the gasket and destroy its sealing ability. Overtightening may also damage the spark plug threads in the cylinder head.



3. Tighten the spark plug to 11 ft.-lb. (15-24 N•m). If a torque wrench is not available, tighten it 1/4 turn after the gasket contacts the head.
4. Connect all spark plug leads and push them down until they are completely seated. Repeat for the remaining spark plug(s).

### Reading

Inspecting or reading the spark plugs can provide a significant amount of information regarding engine perfor-

**SPARK PLUG CONDITIONS**

Normal



Gap bridged



Carbon fouled



Overheated



Oil fouled



Sustained preignition

mance. Reading plugs that have been in use will give an indication of spark plug operation, air/fuel mixture composition and engine conditions (such as oil consumption or piston wear). Before checking new spark plugs, operate the motorcycle under a medium load for approximately 6 miles (10 km). Avoid prolonged idling before shutting off the engine. Remove the spark plugs as described in this section. Examine each plug and compare it to those in **Figure 88**.

Spark plugs are available in various heat ranges, hotter or colder than the plugs originally installed by the manufacturer. Do not change the spark plug heat range to compensate for adverse engine or air/fuel mixture conditions.

When replacing plugs, make sure the reach (B, **Figure 87**) is correct. A longer than standard plug could interfere with the piston, causing engine damage. Refer to **Table 7** for recommended spark plugs.

**Normal condition**

If the plug has a light tan- or gray-colored deposit and no abnormal gap wear or erosion, good engine, fuel system and ignition conditions are indicated. The plug in use is of the proper heat range and may be serviced and returned to use.

**Carbon fouled**

Soft, dry, sooty deposits covering the entire firing end of the plug are evidence of incomplete combustion. Even though the firing end of the plug is dry, the plug's insulation decreases when in this condition. The carbon forms an electrical path that bypasses the spark plug electrodes, resulting

in a misfire condition. One or more of the following can cause carbon fouling:

1. Rich fuel mixture.
2. Cold spark plug heat range.
3. Clogged air filter.
4. Improperly operating ignition component.
5. Ignition component failure.
6. Low engine compression.
7. Prolonged idling.

**Oil fouled**

The tip of an oil fouled plug has a black insulator tip, a damp oily film over the firing end and a carbon layer over the entire nose. The electrodes are not worn. Oil fouled spark plugs may be cleaned in an emergency, but it is better to replace them. It is important to correct the cause of the fouling before the engine is returned to service. Common causes for this condition are:

1. Incorrect air/fuel mixture.
2. Low idle speed or prolonged idling.
3. Ignition component failure.
4. Cold spark plug heat range.
5. Engine still being broken in.
6. Valve guides worn.
7. Piston rings worn or broken.

**Gap bridging**

Plugs with this condition exhibit gaps shorted out by combustion deposits between the electrodes. If this condition is encountered, check for excessive carbon or oil in the combustion chamber. Be sure to locate and correct the cause of this condition.

**Overheating**

Badly worn electrodes and premature gap wear are signs of overheating, along with a gray or white blistered porcelain insulator surface. The most common cause for this condition is using a spark plug of the wrong heat range (too hot). If the spark plug is in the correct heat range and is overheating, consider the following causes:

1. Lean air/fuel mixture.
2. Improperly operating ignition component.
3. Cooling system malfunction.
4. Engine lubrication system malfunction.
5. Engine air leak.
6. Improper spark plug installation.
7. No spark plug gasket.

**Worn out**

Corrosive gases formed by combustion and high voltage sparks have eroded the electrodes. A spark plug in this con-

dition requires more voltage to fire under hard acceleration. Replace with a new spark plug.

### Preignition

If the electrodes are melted, preignition is almost certainly the cause. Check for intake air leaks at the manifolds and carburetors. Also check for advanced ignition timing. It is also possible that a plug of the wrong heat range (too hot) is being used. Find the cause of the preignition before returning the engine into service.

## IGNITION TIMING ADJUSTMENT

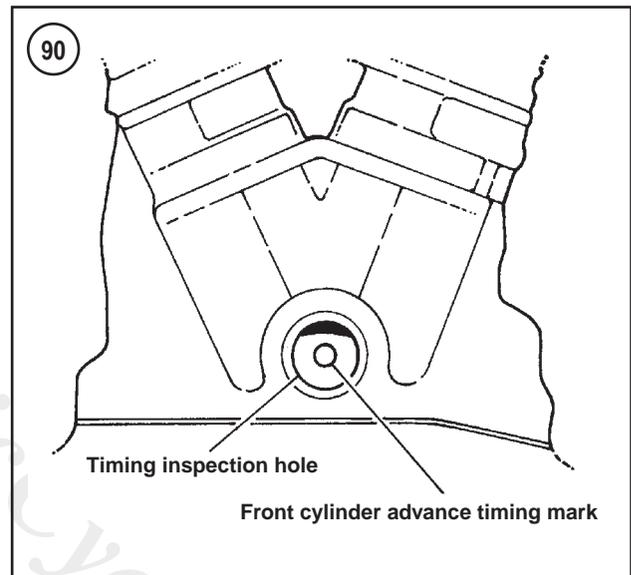
Ignition timing specifications are listed in **Table 8**.

### 1986-1994 Models

1. Remove the plug from the timing hole on the right side of the engine (**Figure 89**). A clear plastic viewing plug is available to minimize oil spray. Make sure the plug does not contact the flywheel after installation.
2. On models not equipped with a tachometer, attach a shop tachometer to the engine following the manufacturer's instructions.
3. Connect an inductive clamp-on timing light to the front cylinder spark plug wire following the manufacturer's instructions.
4. Start the engine and allow it to warm to normal operating temperature. Then set idle speed to 1650-1950 rpm.
5. Aim the timing light at the timing inspection hole. At 1650-1950 rpm, the front cylinder advance mark should appear in the center of the inspection window as shown in **Figure 90**. If the mark does not align, adjust the ignition timing starting with Step 6. If the ignition timing is correct, proceed to Step 9.
6. Remove the sensor plate outer cover, inner cover and gasket as described in *Ignition System* in Chapter Twelve.
7. Loosen the timing plate screws (**Figure 91**) just enough to allow the plate to rotate. Start the engine and turn the plate as required so that the advanced mark is aligned as described in Step 5. To adjust the plate, use a screwdriver in the plate's slot. Make sure idle speed remains between 1650-1950 rpm checking timing. Tighten the screws (**Figure 91**) and recheck ignition timing.
8. Install the sensor plate gasket, inner cover and outer cover.
9. As part of the tune-up, check the vacuum operated electric switch (VOES) as follows:

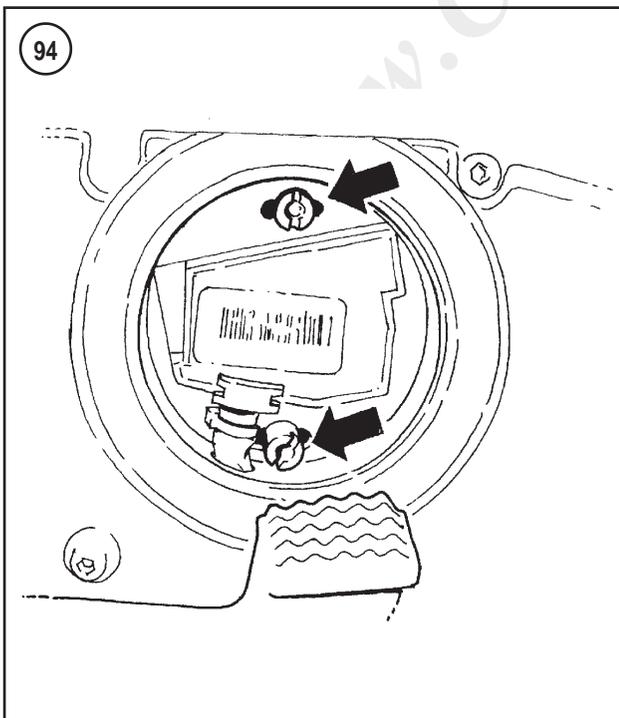
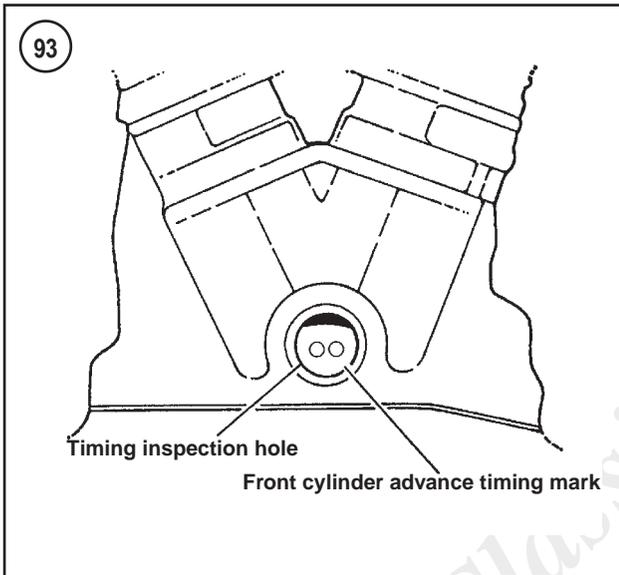
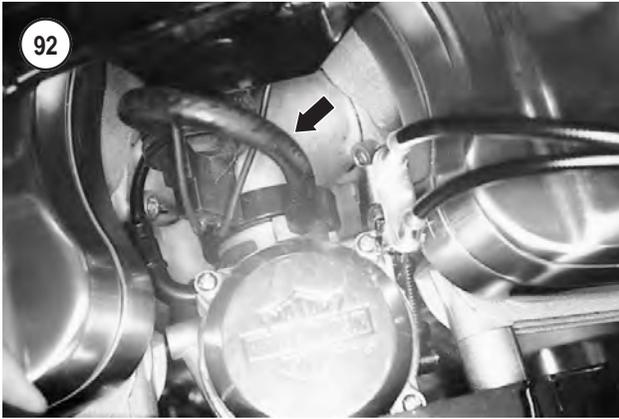
#### CAUTION

*The Vacuum Operated Electric Switch (VOES) must be tested at each tune-up and replaced if malfunctioning. A damaged VOES switch will allow too high a spark advance*



*which can cause severe engine knock and damage.*

- a. Start the engine and allow it to idle.
- b. On 1986-1990 models, disconnect the VOES vacuum hose from the carburetor (**Figure 92**) with the



engine idling at 900-950 rpm. Maintain this engine rpm when performing substep e.

- c. On 1991-1992 models, disconnect the VOES vacuum hose from the carburetor (**Figure 92**) with the engine idling at 950-1050 rpm. Maintain this engine rpm when performing substep e.
  - d. On 1993-1994 models, disconnect the VOES vacuum hose from the carburetor (**Figure 92**) with the engine idling at 1650-1950 rpm. Maintain this engine rpm when performing substep e.
  - e. Plug the carburetor VOES port. With the port blocked, the engine speed should decrease and the ignition timing should retard—check with the timing light. When the vacuum hose is reconnected to the VOES port, the engine speed should increase.
  - f. If the engine failed to operate as described in substep e, check the VOES wire connection at the ignition module. Also check the VOES ground wire for looseness or damage. If the wire connections are okay, test the VOES switch as described in Chapter Twelve.
10. Reinstall the timing hole plug (**Figure 89**).
  11. Remove the timing light and tachometer (if used).
  12. Reset the engine idle speed as described in this section.

#### 1995-2003 Models

1. Remove the plug from the timing hole on the right side of the engine (**Figure 89**). A clear plastic viewing plug is available to minimize oil spray. Make sure the plug does not contact the flywheel after installation.
2. On models not equipped with a tachometer, attach a shop tachometer to the engine following the manufacturer's instructions.
3. Connect an inductive clamp-on timing light to the front cylinder spark plug wire following the manufacturer's instructions.
4. Start the engine and allow it to warm to normal operating temperature. Then set idle speed to 950-1050 rpm.
5. Aim the timing light at the timing inspection hole. At 950-1050 rpm, the front cylinder advance mark should appear in the center of the inspection window as shown in **Figure 93**. If the mark does not align, adjust the ignition timing starting with Step 6. If the ignition timing is correct, proceed to Step 9.
6. Remove the sensor plate outer cover, inner cover and gasket, if so equipped, as described in *Ignition System* in Chapter Twelve.
  - 7A. On all models except 1200S models, loosen the timing plate sensor plate screws (**Figure 91**) just enough to allow the plate to rotate.
  - 7B. On 1200S models, loosen the timing plate sensor plate screws (**Figure 94**) just enough to allow the plate to rotate.
8. Start the engine and turn the plate as required so that the advanced mark is aligned as described in Step 5. To adjust

the plate, use a screwdriver in the plate's slot. Make sure idle speed specified in Step 5 is maintained when checking timing. Tighten the screws (**Figure 91** or **Figure 94**) and recheck ignition timing.

9. Install the sensor plate gasket, inner cover and outer cover.

10. As part of the tune-up, check the vacuum operated electric switch (VOES) as follows:

#### CAUTION

*The Vacuum Operated Electric Switch (VOES) must be tested at each tune-up and replaced if malfunctioning. A damaged VOES switch will allow too high a spark advance which can cause severe engine knock and damage.*

- a. Start the engine and allow it to idle.
  - b. Disconnect the VOES vacuum hose from the carburetor (**Figure 92**) with the engine idling at 1000-1050 rpm. Maintain this engine rpm when performing substep c.
  - c. Plug the carburetor VOES port. With the port blocked, the engine speed should decrease and the ignition timing should retard—check with the timing light. When the vacuum hose is reconnected to the VOES port, the engine speed should increase.
  - d. If the engine failed to operate as described in substep c, check the VOES wire connection at the ignition module. Also check the VOES ground wire for looseness or damage. If the wire connections are okay, test the VOES switch as described in Chapter Twelve.
11. Reinstall the timing hole plug (**Figure 89**).
  12. Remove the timing light and tachometer (if used).
  13. Reset the engine idle speed as described in this section.

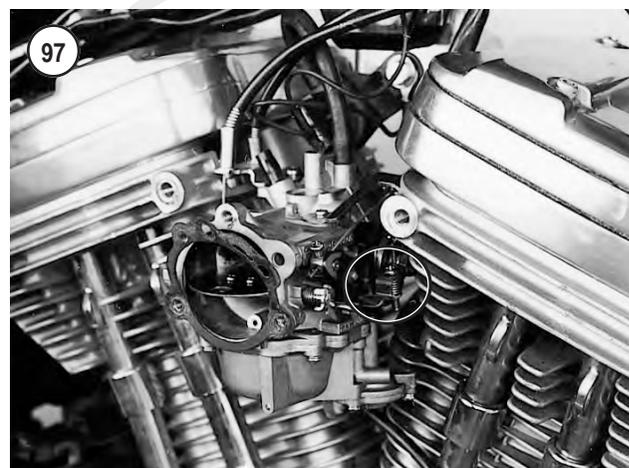
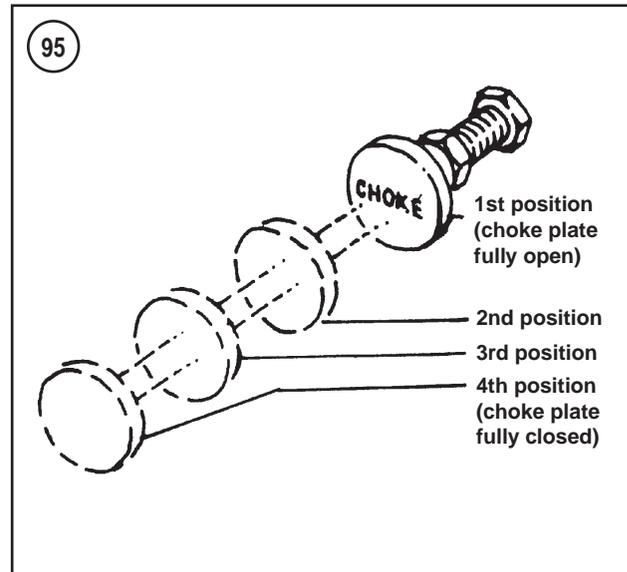
### Idle Speed Adjustment

Prior to adjusting the idle speed, make sure the air filter is clean and the engine compression and ignition timing are within specification. Refer to the appropriate section in this chapter.

Idle speed specifications are in **Table 8**.

#### 1986-1987 models

1. Make sure the throttle cable free play is adjusted as described in this chapter.
2. On models not equipped with a tachometer, attach a shop tachometer to the engine following the manufacturer's instructions.
3. Start the engine and let it reach normal operating temperature. The engine must be at normal operating temperature for accurate idle speed adjustment.



4. Make sure the choke knob (**Figure 95**) is pushed in all the way.
5. On the carburetor turn the idle speed screw (**Figure 96**) in or out to adjust the slow idle speed to within specification.
6. Open and close the throttle a couple of times and check for variations in idle speed. Readjust if necessary.



7. Pull the choke knob to the second detent position. Turn the fast idle screw (**Figure 97**) so the engine idles at 1700-1800 rpm. Push in the choke knob to the closed position and verify that engine idle speed drops to the slow idle speed.
8. Make sure both slow idle and fast idle speeds are within specification noted in **Table 8**.

#### *1988-2003 models*

1. Make sure the throttle cable free play is adjusted as described in this chapter.
2. On models not equipped with a tachometer, attach a shop tachometer as described by the manufacturer's instructions.
3. Start the engine and let it reach normal operating temperature. The engine must be at normal operating temperature for the idle speed adjustment to be accurate.
4. Make sure the starting enrichment (choke) knob (**Figure 98**) is pushed in all the way.
5. On the carburetor turn the idle speed screw (**Figure 99**) in or out to adjust the idle speed to within specification.
6. Open and close the throttle a couple of times and check for variations in idle speed. Readjust if necessary.

**Table 1 MAINTENANCE SCHEDULE<sup>1</sup>**

<p>Pre-ride check</p>	<p>Check tire condition and inflation pressure            Check wheel rim condition            Check light and horn operation            Check engine oil level; add oil if necessary            Check brake fluid level and condition; add fluid if necessary            Check the operation of the front and rear brakes            Check throttle operation            Check clutch lever operation            Check fuel level in fuel tank; top off if necessary            Check fuel system for leaks            Check drive chain or drive belt condition and adjustment            Verify proper operation of air cleaner EVAP valve (models so equipped)</p>
<p>Every 300 miles (480 km)            Initial 1000 miles (800 km)</p>	<p>Lubricate drive chain (models so equipped)            Check brake pad wear            Check brake disc wear            Inspect fuel valve, fuel line and all fittings for leaks            Check engine idle speed            Check battery fluid level; refill with distilled water            Check electrical equipment and switches for proper operation            Check throttle operation            Operate and check enricher (choke) cable operation            Check tire pressure and tread wear            Change engine oil and replace oil filter            Inspect and clean air filter            Check rear drive chain or belt tension; adjust if necessary            Inspect primary chain            Check primary chain tension; adjust if necessary            Change primary drive/transmission oil            Check clutch adjustment; adjust if necessary            (continued)</p>

**Table 1 MAINTENANCE SCHEDULE<sup>1</sup> (continued)**

Every 300 miles (480 km) Initial 1000 miles (800 km) (continued)	Check brake fluid level; refill with DOT 5 brake fluid Check rear brake pedal adjustment; adjust if necessary Perform general lubrication to equipment specified in this chapter Check ignition timing Check vacuum operated electric switch (VOES) Check rear swing arm pivot shaft tightness Check engine mount bolt tightness Inspect rear shock absorber Check all exposed fasteners for tightness <sup>2</sup> Lubricate rear swing arm bearing Lubricate speedometer drive gear (models so equipped) Check steering play adjustment Verify proper operation of air cleaner EVAP valve (models so equipped)
Every 2500 miles (4000 km)	Check engine oil level Check primary drive/transmission oil level Check brake pad wear Check brake disc wear Inspect fuel valve, fuel line and all fittings for leaks Check engine idle speed Check battery fluid level; refill with distilled water Check electrical equipment and switches for proper operation Check throttle operation Operate and check enrichener cable operation Check tire pressure and tread wear Lubricate speedometer drive gear (models so equipped) Verify proper operation of air cleaner EVAP valve (models so equipped)
Initial 5000 miles (8000 km)	Check spark plug gap and condition Check steering play adjustment
Every 5000 miles (8000 km)	Change engine oil and replace oil filter Inspect and clean air filter Check rear drive chain or belt tension; adjust if necessary Inspect primary chain Check primary chain tension; adjust if necessary Change primary drive/transmission oil Check clutch adjustment; adjust if necessary Check brake fluid level; refill with DOT 5 brake fluid Check rear brake pedal adjustment; adjust if necessary Perform general lubrication to equipment specified in this chapter Check ignition timing Check vacuum operated electric switch (VOES) Check MAP sensor (1200S) Check rear swing arm pivot shaft tightness Check engine mount bolt tightness Inspect rear shock absorber Check all exposed fasteners for tightness <sup>2</sup> Lubricate rear swing arm bearing Inspect rear brake caliper mounting pins and boots; lubricate pins and boots during reassembly Inspect and lubricate rear brake and shifter linkage assembly Lubricate throttle control sleeve Lubricate speedometer cable Verify proper operation of bank angle sensor (models so equipped)
Every 10,000 miles (16,000 km)	Replace spark plugs Replace front fork oil Lubricate steering bearings Check steering play adjustment Clean and lubricate wheel bearings
<p>1. Consider this maintenance schedule a guide to maintenance and lubrication intervals. Harder than normal use and exposure to mud, water, high humidity indicates more frequent servicing to most items.</p> <p>2. Except cylinder head bolts. Cylinder head bolts must be tightened following the procedure in Chapter Four. Improper tightening of the cylinder head bolts may cause cylinder gasket damage.</p>	

**Table 2 TIRE INFLATION PRESSURE (COLD)<sup>1</sup>**

	psi	kPa
<b>Up to 300 lb. load<sup>2</sup></b>		
<b>Front</b>		
1200 models	30	207
<b>883 and 1100 models</b>		
1986-1990	26	179
1991-2003	30	207
<b>Rear</b>		
1200 models	36	248
<b>883 and 1100 models</b>		
1986-1990	30	207
1991-2003	36	248
<b>Up to GVWR maximum load<sup>3</sup></b>		
<b>Front</b>		
1200 models	30	207
<b>883 and 1100 models</b>		
1986-1990	26	179
1991-2003	30	207
<b>Rear</b>		
1200 models	40	276
<b>883 and 1100 models</b>		
1986-1990	32	221
1991-2003	40	276

1. Tire inflation pressure is for original equipment tires. Aftermarket tires may require a different inflation pressure.  
2. 300 lb. load includes rider, passenger and cargo.  
3. The gross vehicle weight rating (GVWR) is listed on a decal mounted on the frame.

**Table 3 ENGINE OIL SPECIFICATIONS**

Type	HD rating	Viscosity	Ambient operating temperature
H-D Multi-grade	HD360	SAE 10W/40	Below 40° F
H-D Multi-grade	HD360	SAE 20W/50	Above 40° F
H-D Regular heavy*	HD360	SAE 50	Above 60° F
H-D Extra heavy*	HD360	SAE 60	Above 80° F

\*Not recommended for use when ambient temperature is below 50° F.

**Table 4 ENGINE AND PRIMARY DRIVE/TRANSMISSION OIL CAPACITIES**

Oil tank refill capacity with filter replacement	3.0 qt (2.8 L)
Transmission (includes primary chaincase)	
1986-1992 models	24 oz (710 ml)
1993-2003 models	32 oz. (946 ml)

**Table 5 RECOMMENDED LUBRICANTS AND FLUIDS**

Brake fluid	DOT 5
Chain lubricant	
Standard drive chain	H-D Chain Spray or HD High-Performance Chain Lube
O-ring drive chain	H-D High-Performance Chain Lube or automotive lubricant rated API GL-5 with a viscosity index of SAE 80 or 90.
Front fork oil	H-D Type E or equivalent
Fuel	
Type	Unleaded
Octane	
1986-1990 models	Pump research octane of 89 or higher
1991-2003 models	Pump research octane of 87 or higher
Transmission	H-D Sport Trans Fluid or equivalent

**Table 6 FRONT FORK OIL CAPACITY**

	Wet		Dry	
	oz	ml	oz	ml
1986-1987 models	5.4	160	6.4	189
1988-1991 models	9.0	266	10.2	302
1992-1998				
883 Hugger models	10.7	316	12.1	358
All other models	9.0	266	10.2	302
1999-2003 models	9.0	266	10.2	302

**Table 7 MAINTENANCE AND TUNE-UP SPECIFICATIONS**

Item	Specification
Brake pad minimum thickness	0.062 in. (1.59 mm)
Clutch cable free play	1/16-1/8 in. (1.6-3.2 mm)
Drive belt deflection	
1991-1999 models	9/16-11/16 in. (14.3-17.5 mm)
2000-2003 models	
883, 1200, 1200S models	5/16-3/8 in. (7.9-9.6 mm)
883H and 883C models	1/4-5/16 in. (6.4-7.9 mm)
Drive chain	No. 530 (3/8 in. wide) x 110 links
Drive chain free play*	1/4 in. (6.4 mm)
Engine compression (min.)	120 psi (828 kPa)
Idle speed	
1986-1987 models	
Slow idle	900-950 rpm
Fast idle	1500-1500 rpm
1988-2003 models	1000-1050 rpm
Primary chain free play	
Cold engine	3/8-1/2 in. (9.6-12.7 mm)
Hot engine	1/4-3/8 in. (6.4-9.6 mm)
Spark plugs	HD-6R12
Gap	0.038-0.043 in. (0.97-1.09 mm)
Tire wear/maximum tread depth	1/16 in. (1.6 mm)

\*Rider on seat.

**Table 8 IGNITION TIMING SPECIFICATIONS**

Year/Idle speed	VOES Connected	VOES Disconnected
1986-1994		
Fast: 1650-1750 rpm	40° BTDC	Approximately 16° BTDC
Normal: 950-1050 rpm	30° BTDC	Approximately 7.5° BTDC
1995 U.S. models		
1650-1950 rpm	35° BTDC	Approximately 16° BTDC
1995 HDI models		
1000-1050 rpm	20° BTDC	Approximately 7.5° BTDC
1996-2003 models (except 1998-2003 1200S models)		
1000-1050 rpm	20° BTDC	Approximately 7.5° BTDC
1998-2000 1200S models*		
1000-1050 rpm	20° BTDC	
2001-2003 1200S models*		
1000-1050 rpm	15° BTDC	

\*Not equipped with VOES.

**Table 9 MAINTENANCE AND TUNE UP TORQUE SPECIFICATIONS**

Item	ft.-lb.	in.-lb.	N•m
Air filter cover	–	36-60	4-7
Front fork cap*	11-22	–	15-30
Primary chain adjuster locknut			
1986-1990 models	–	98-144	11-16
1991-2003 models	20-25	–	27-34
Primary drive inspection cover retaining screws	–	84-108	10-12
Rear axle nut	60-65	–	81-88
Spark plug	11-18	–	15-24
Transmission/primary chaincase drain plug	14-21	–	19-28

\*1200S models. No specification available on other models.

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