



◀ENGINE▶		◀CHASSIS▶	
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SERVICE INFORMATION

GENERAL INSTRUCTIONS

Engine oil level check	See page 2-2
Engine oil change	See page 2-2
Engine oil filter change	See page 2-2

SPECIFICATION

<ENGINE>

Spark plug gap	0.6-0.7 mm (0.024-0.028 in)
Spark plug type	
U.S.A. model only	

Usage Manu- facturer	For cold climate (below 5°C, 41°F)	Standard	Forextended high speed driving
ND	X22ES-U	X24ES-U	X27ES-U
NGK	D7EA	D8EA	D9EA

CANADA model only

ND: X24ESR-U	ND: Nippondenso Co., Ltd.
NGK: DR8ES-L	NGK: NGK Spark Plug Co., Ltd.

Ignition timing	Initial 10° (BTDC)
Valve clearance:	0.08 ^{+0.05} mm (0.003 ^{+0.002} in)
IN. and EX.	-0.02 ^{-0.001}
Idle speed	1,000 ± 100 rpm
Synchronization	Difference of each
vacuum	cylinder 60 mmHg (2.4 in Hg) or less
Compression	12 ± 1 Kg/cm ² (170 ± 14 psi)

SPECIAL TOOLS

Valve lifter holder	07964-4220001
Carb. throttle wrench	07908-4220100
Vacuum gauge	07404-0020000 or H/C 20176

<CHASSIS>

Drive chain free play	15-25 mm (5/8-1 in)
Clutch free play	10-20 mm (3/8-3/4 in)

Tire

Cold tire pressures Kg/cm ² (psi)	Up to 90 kg (200 lb) load	Front 2.0 (28) Rear 2.25 (32)
	Up to vehicle capacity load	Front 2.0 (28) Rear 2.8 (40)
Vehicle capacity load limit	163 Kg (360 lbs)	
Tire size	Front	3.50H19-4PR
	Rear	4.25H18-4PR
Tire brand	Front	BRIDGESTONE MaG. MOPUS-S703 DUNLOP GOLD SEAL F11
	Rear	BRIDGESTONE MaG. MOPUS-S710 DUNLOP GOLD SEAL K127

TORQUES

Front axle holder nut	1.8- 2.5 kg-m (13-18 ft-lb)
Rear axle nut	8.0-10.0 kg-m (58-72 ft-lb)



CRANKCASE BREATHER

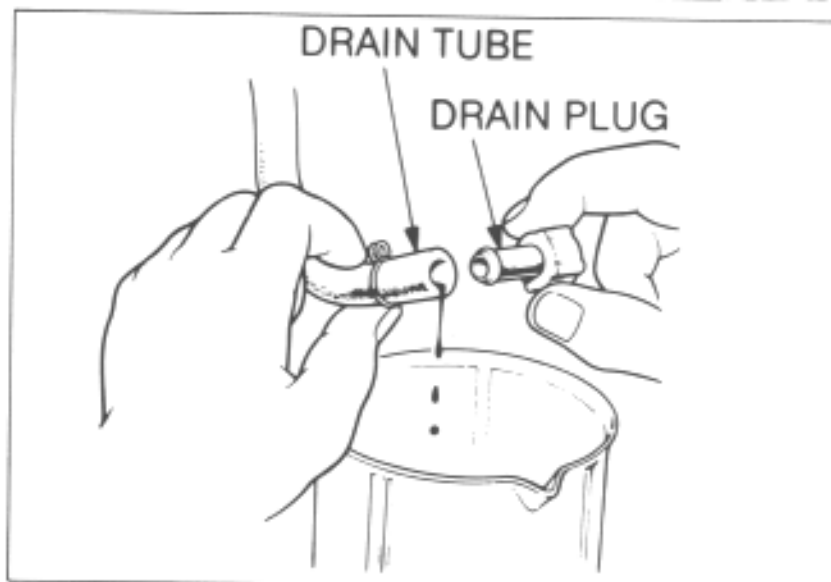
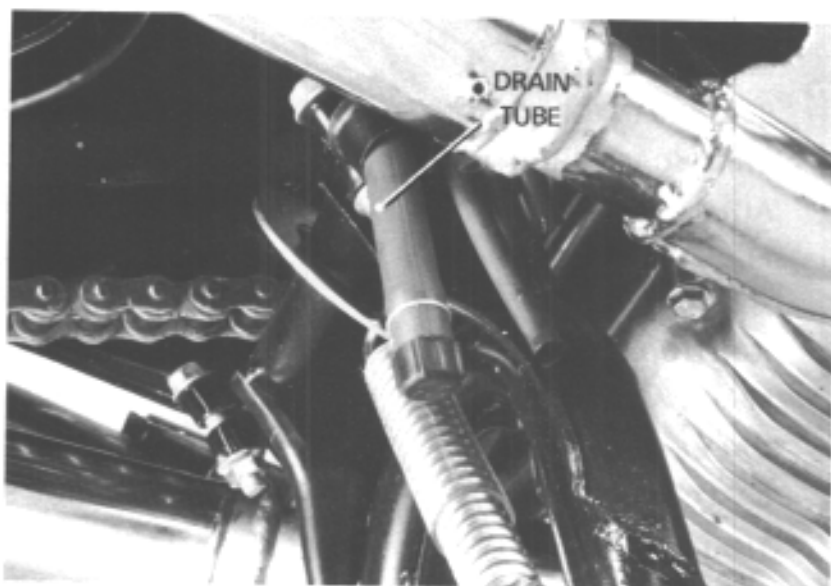
U.S.A. model only

Remove the drain plug from the tube and drain deposits.

Reinstall the drain plug.

NOTE

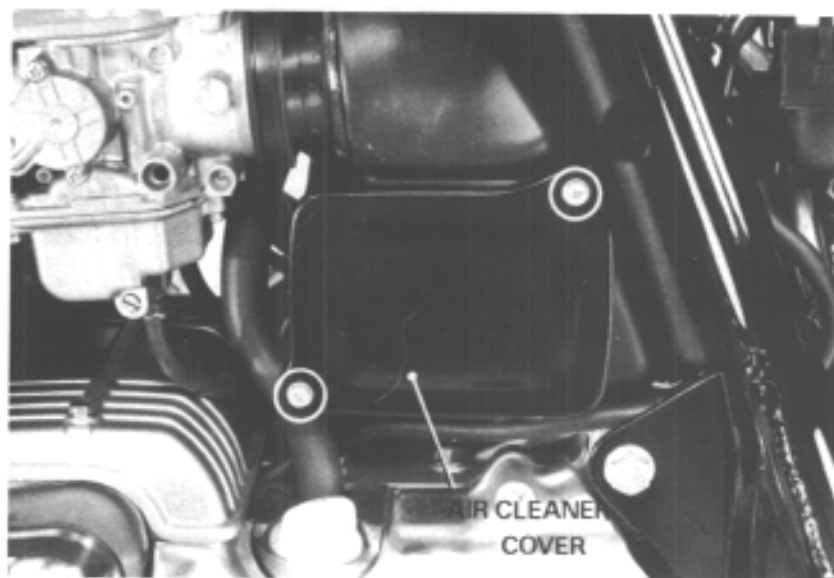
Service more frequently when driven in rainy conditions or at wide open throttle, or when the deposit level can be seen in the transparent section of the drain tube.



AIR CLEANER

Remove the left side cover.

Remove the two air cleaner cover screws and cover.





Pull out the air cleaner element set spring and remove the element.



Clean the element by tapping it lightly to loosen dust. Blow away the remaining dust by applying compressed air from inside the element.

Replace the element if it is excessively dirty, broken or damaged.

Reinstall the element, element set spring, air cleaner cover and left side cover.



FUEL LINES

Replace any parts which show deterioration, damage or leakage.





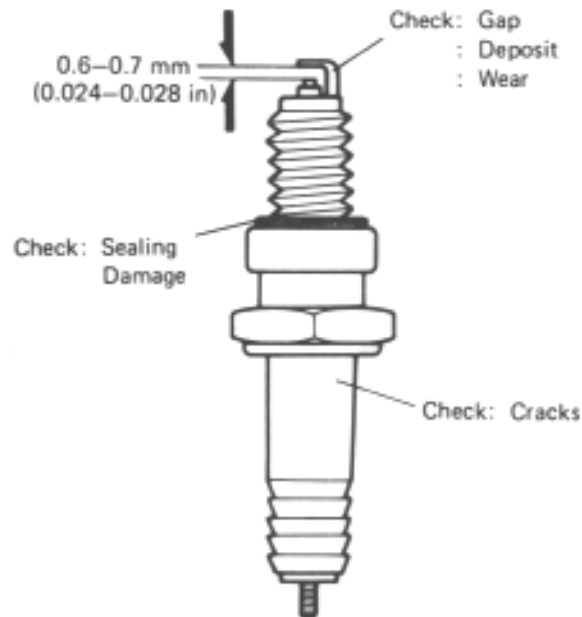
SPARK PLUGS

Disconnect the spark plug caps and remove the spark plugs.

Visually inspect the spark plug. Discard the spark plug if the insulator is cracked or chipped. Measure the spark plug gap with a wire-type feeler gauge.

Adjust the spark plug gap by bending the side electrode.

SPARK PLUG GAP: 0.6–0.7 mm
(0.024–0.028 in)



RECOMMENDED SPARK PLUG

U. S. A. model only

Usage Manufacturer	For cold climate (below 5°C, 41°F)	Standard	For extended high speed riding
ND	X22ES-U	X24ES-U	X27ES-U
NGK	D7EA	D8EA	D9EA

CANADA model only

ND: X24ESR-U

NGK: DR8ES-L

Manufacturer: ND: Nippondenso Co., Ltd.

NGK: NGK Spark Plug Co., Ltd.

Install the spark plugs making sure the sealing washers are in good condition and reconnect the spark plug caps.

NOTE

First tighten the spark plug fingertight, then tighten with a spark plug wrench.



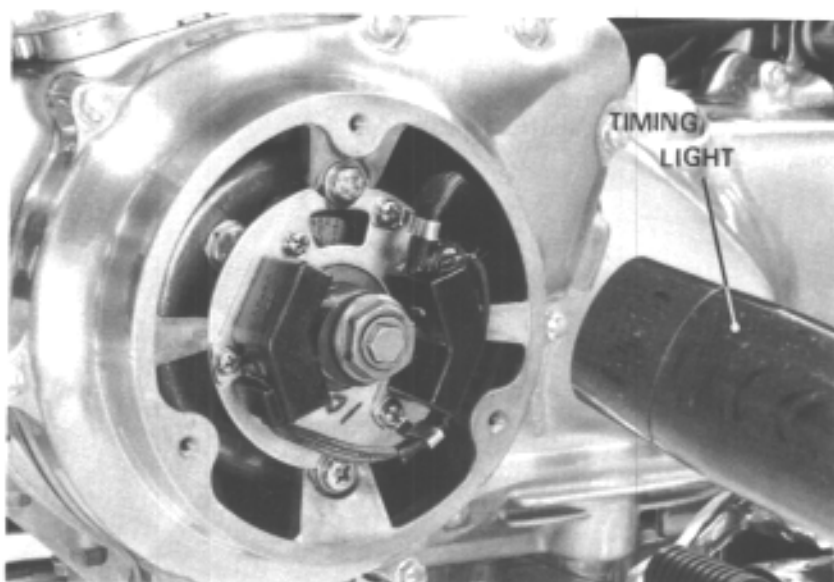
IGNITION TIMING

• DYNAMIC

Remove the pulser generator cover.
 Connect a stroboscopic timing light to the No. 1 cylinder's high tension cord.
 Start the engine and let it idle.

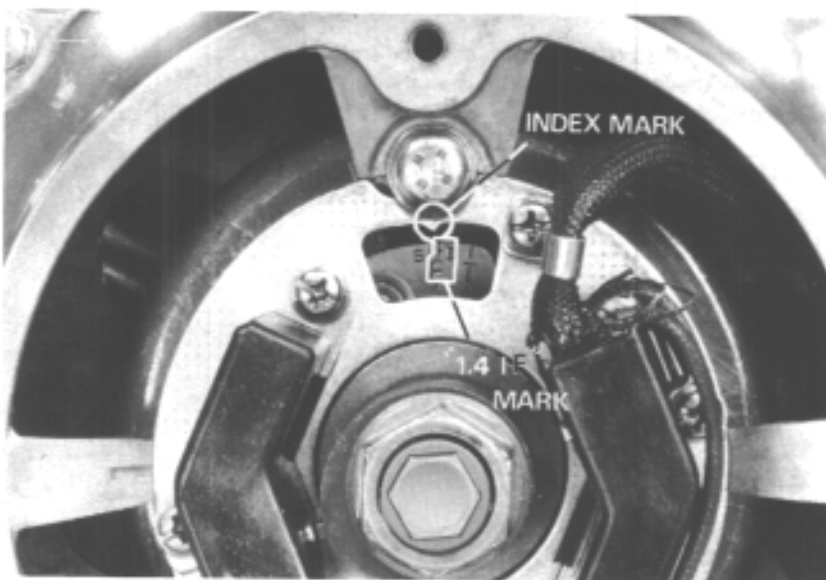
IDLE SPEED: 1,000 ± 100 rpm

Aim the timing light at the timing mark.
 The "1.4 F-I" mark should align with the index mark.



ADJUSTMENT

Adjust by loosening the two pulser base plate screws and rotating the plate.
 Tighten the screws and recheck the timing.



ALTERNATIVE METHOD

• STATIC

Remove the pulser generator cover.
 Rotate the crankshaft counterclockwise and align the "1.4 S-F" mark with the index mark.

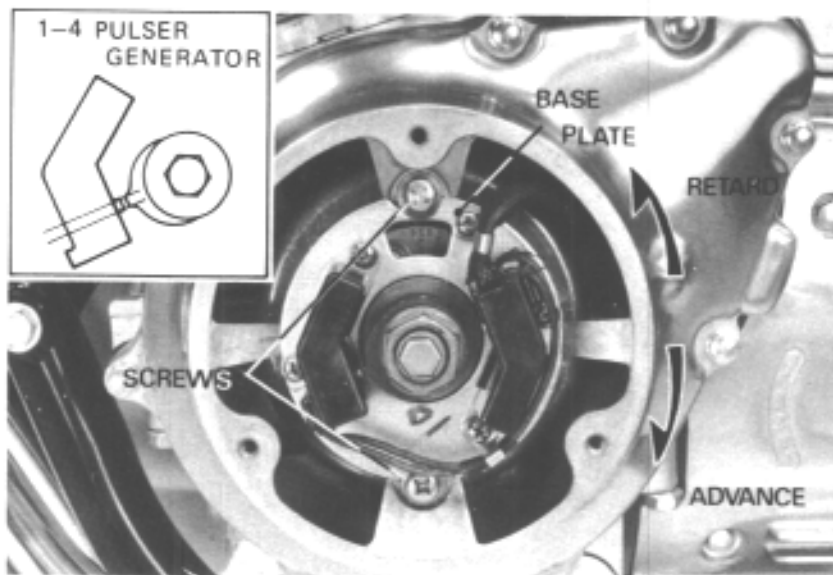
NOTE

Either No. 1 or No. 4 piston must be near T.D.C. of the compression stroke at this time.

The timing is correct if the narrow projection of "1-4" pulser generator aligns with the rotor tooth.

WARNING

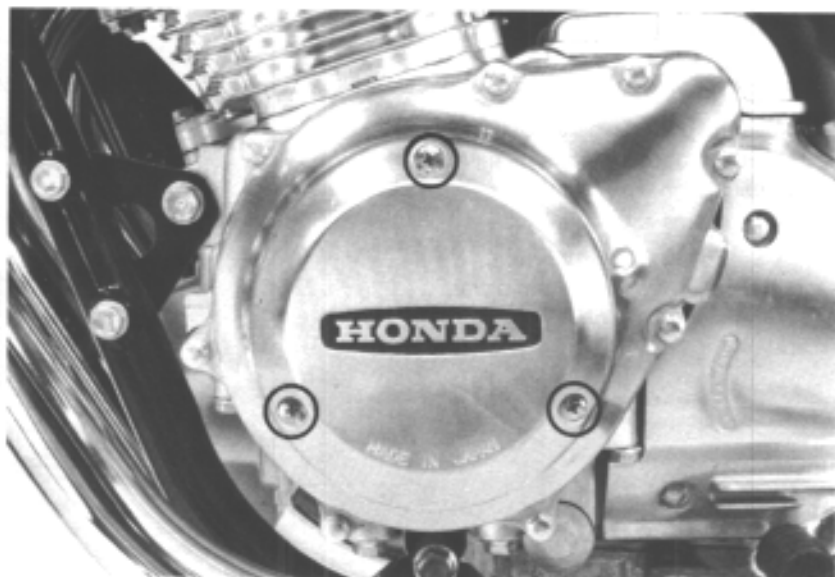
Be careful not to touch the pulser generator coil while turning the crankshaft with the wrench.





SPARK ADVANCER

Remove the pulser generator cover.
 Connect a timing light to the No. 1 high tension cord.



Start the engine.
 Bring engine speed to 6,000 rpm or above and check that the index mark is between the full advance marks.

CAUTION

Do not allow engine speed to exceed 8,000 rpm or engine damage may result.

Replace the advancer assembly if it is not functioning properly.
 Install the pulser generator cover.

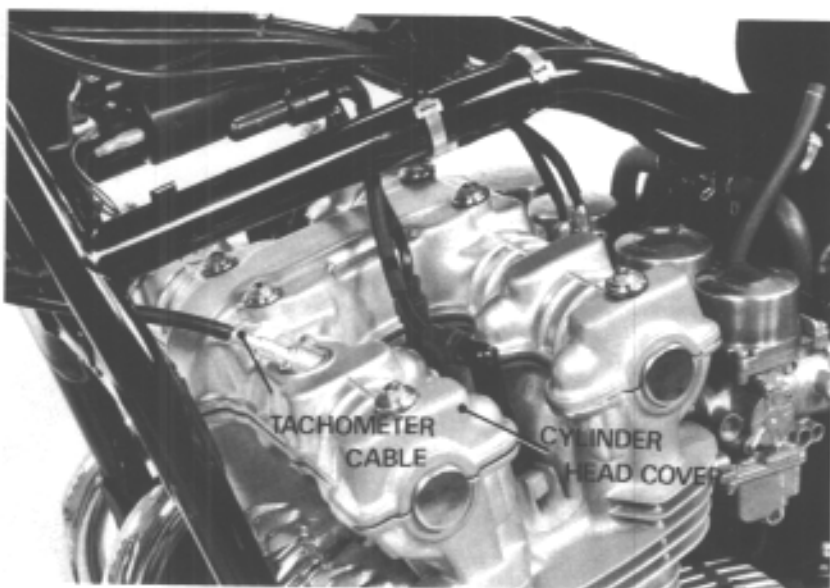




VALVE CLEARANCE

NOTE

- Inspect and adjust valve clearance while the engine is cold. (Below 35°C, 95°F).
- Lean the motorcycle right and left to drain residual oil from the cylinder head.



Remove the right and left side covers and raise the seat.

Turn the fuel valve OFF and remove the fuel tube and fuel tank.

Remove the tachometer cable.

Remove the spark plug caps.

Remove the cylinder head cover bolts and cylinder head cover.

Remove the A. C. generator cover.

INSPECTION

Measure intake and exhaust valve clearances by inserting a feeler gauge between the camshaft and valve lifter shim.

VALVE CLEARANCE:

0.08 $\begin{matrix} +0.05 \\ -0.02 \end{matrix}$ mm (0.003 $\begin{matrix} +0.002 \\ -0.001 \end{matrix}$ in)

Rotate the crankshaft clockwise (from the right side) and align the index mark on the exhaust camshaft right end with the front cylinder head mating surface.

Check and record the valve clearance: of the No. 1 EX. and No. 3 EX.

Rotate the camshaft 90° clockwise (via the crankshaft 180°) and check the:

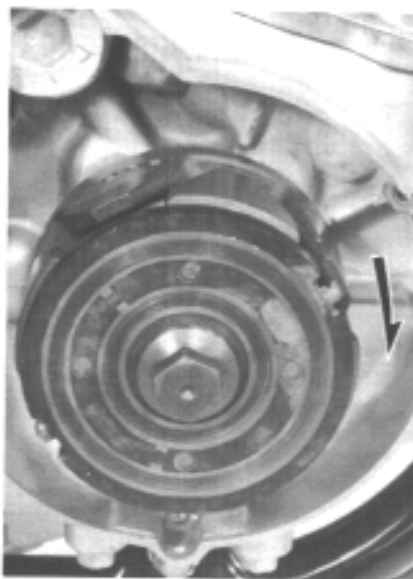
No. 1 IN. and No. 3 IN.

Rotate the camshaft 90° clockwise and check the:

No. 2 EX. and No. 4 EX.

Rotate the camshaft 90° clockwise and check the:

No. 2 IN. and No. 4 IN.




ADJUSTMENT
NOTE

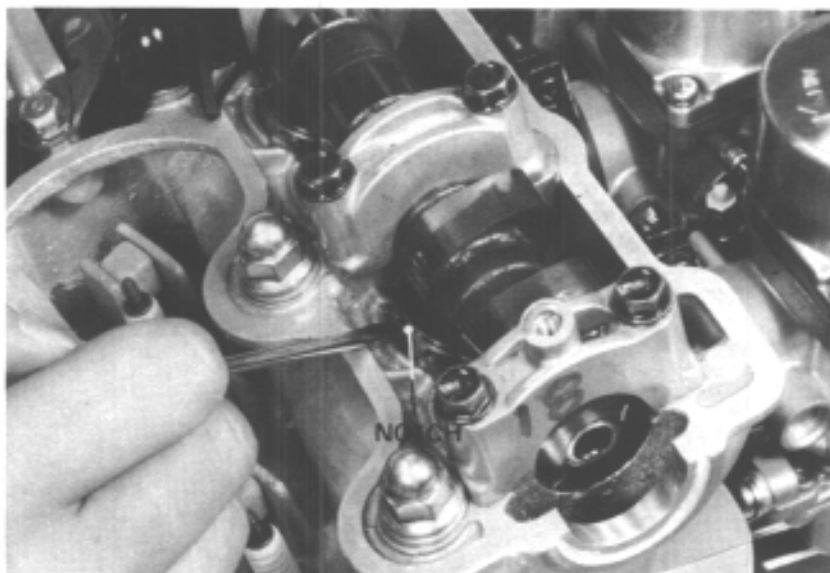
- Adjustment shims are available in 0.05 mm increments, from 2.30 to 3.50 mm.
- The No. 2 EX. shim must be removed from the front.

Select a replacement shim to achieve the specified valve clearance, using the following procedures.

Rotate the valve lifter until the notch of the lifter appears on the shim so that the shim can be removed.

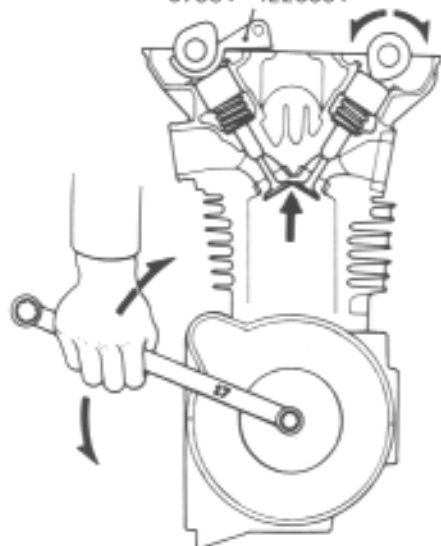
Rotate the crankshaft so that the valve being adjusted is at maximum lift.

Insert the Valve Lifter Holder tool between the camshaft and two adjacent lifters.


CAUTION

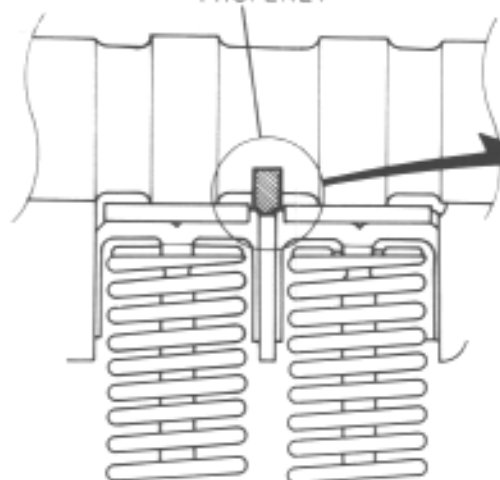
After installing the tool, make sure that the opposite camshaft lobes does not depress its valves (when you turn the crankshaft). If the other valves are depressed, they will contact the valves being held by the tool, which could cause damage.

VALVE LIFTER HOLDER
07964-4220001

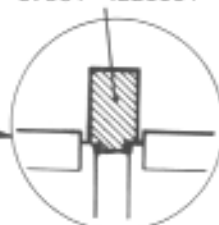


Rotate the crankshaft one turn so the cam lobes turn away from the valve lifter holder.

INSTALL THE SPECIAL TOOL
PROPERLY

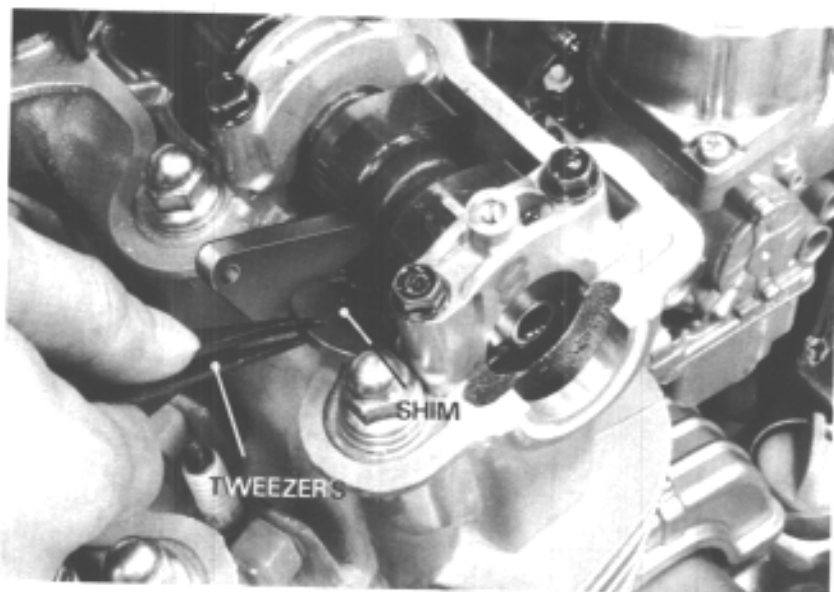


VALVE LIFTER HOLDER
07964-4220001

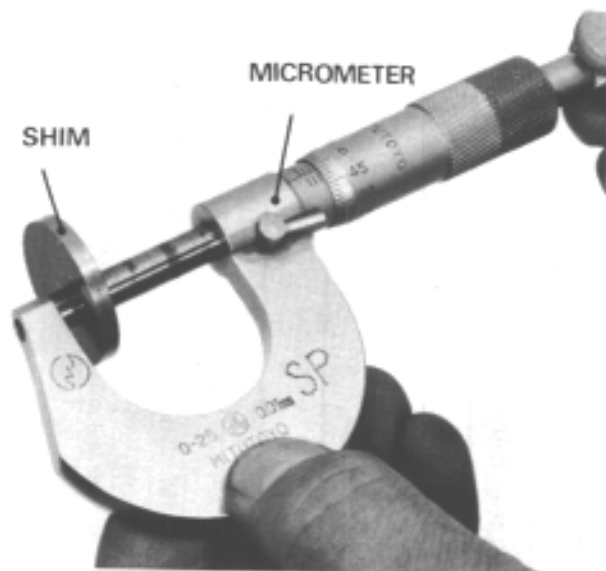




Remove the shim with a tweezer.



Measure the thickness of the removed shim with a micrometer.
Select a replacement shim using the chart on Page 3-10.



Insert the replacement shim.

CAUTION

Make sure the opposite pair of valves does not open. The valves could be bent or damaged if the crankshaft is rotated incorrectly.

Rotate the crankshaft one turn until the valves are at maximum lift.

Remove the special tool "Valve Lifter Holder".

Rotate the crankshaft 2-3 revolutions to fully seat the replacement shim.

Recheck the valve clearance.



EXAMPLE: 1. Measure valve clearance = 0.16 mm 3. Refer to chart. (See shaded columns)
 2. Measure present shim size = 2.50 mm 4. Replacement shim size = 2.55 mm

VALVE SHIM SELECTION CHART		STANDARD VALVE CLEARANCE = 0.08 $\begin{matrix} +0.05 \\ -0.02 \end{matrix}$ mm																								
		PRESENT SHIM SIZE mm																								
VALVE CLEARANCE mm	SHIM mm	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50
		SPECIFIED CLEARANCE										NO CHANGE REQUIRED														
0.01-0.05																										
0.06-0.13																										
0.14-0.16																										
0.17-0.21																										
0.22-0.26																										
0.27-0.31																										
0.32-0.36																										
0.37-0.41																										
0.42-0.46																										
0.47-0.51																										
0.52-0.56																										
0.57-0.61																										
0.62-0.66																										
0.67-0.71																										
0.72-0.76																										
0.77-0.81																										
0.82-0.86																										
0.87-0.91																										
0.92-0.96																										
0.97-1.01																										
1.02-1.06																										
1.07-1.11																										
1.12-1.16																										
1.17-1.21																										
1.22-1.26																										
1.27-1.31																										

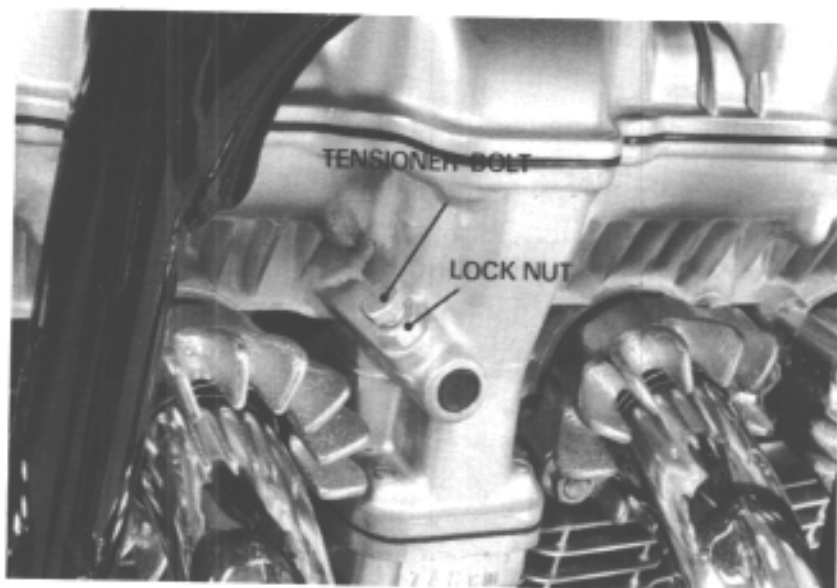
NOTE

- (1) Measure the valve clearance while the engine is cold.
- (2) For shim replacement, see page 3-11.
- (3) Measure old and new shims with a micrometer.
- (4) The chart is for reference purpose only. After installing new shims, recheck the valve clearance and adjust if necessary. Before rechecking, rotate the camshafts several times to seat the shims in the lifters.
- (5) If the shim thickness required exceeds 3.5 mm, there is carbon build-up on the valve seat. Remove the carbon and reface the seat.



CAM CHAIN

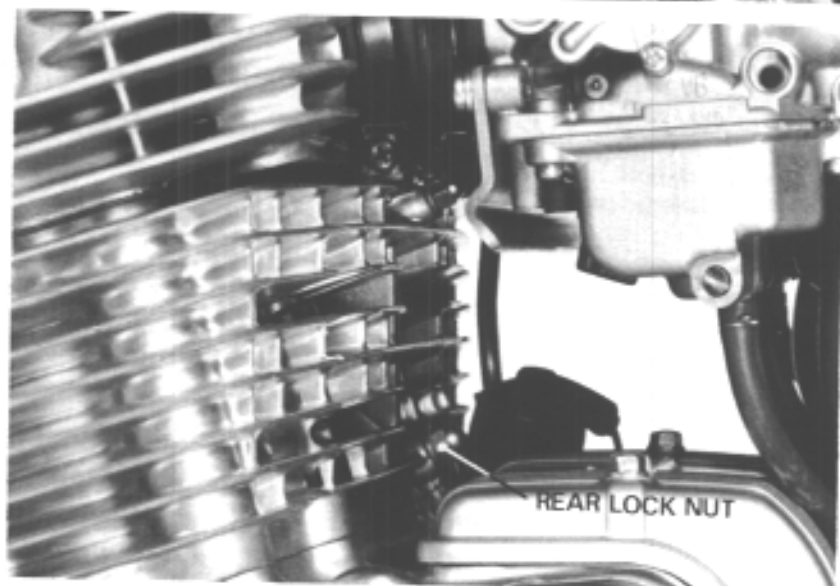
Start the engine and let it idle.
Loosen the front cam chain tensioner lock nut and bolt 1/2 turn.
Tighten the bolt and lock nut.



Loosen the rear cam chain tensioner lock nut 1/2 turn.
Tighten the lock nut.

NOTE

The tensioner will automatically position itself to provide the correct tension when the lock nut or bolt is loosened.





THROTTLE OPERATION

Make sure that there is no deterioration, damage, or kinks in the throttle cables, and that the throttle grip free play is 2–6 mm (1/8–1/4 in) on the outer edge of the throttle grip flange.

Check for smooth throttle grip full opening and automatic full closing in all steering positions.

Adjust if necessary.

NOTE

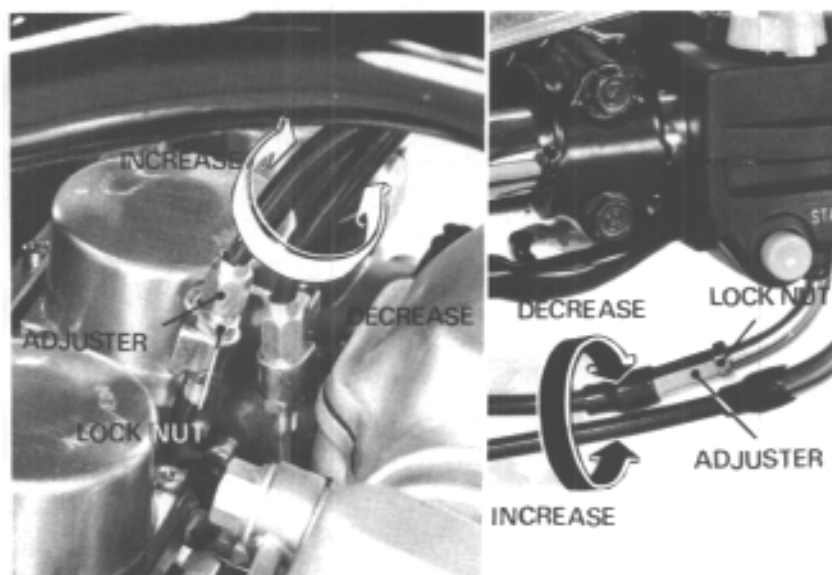
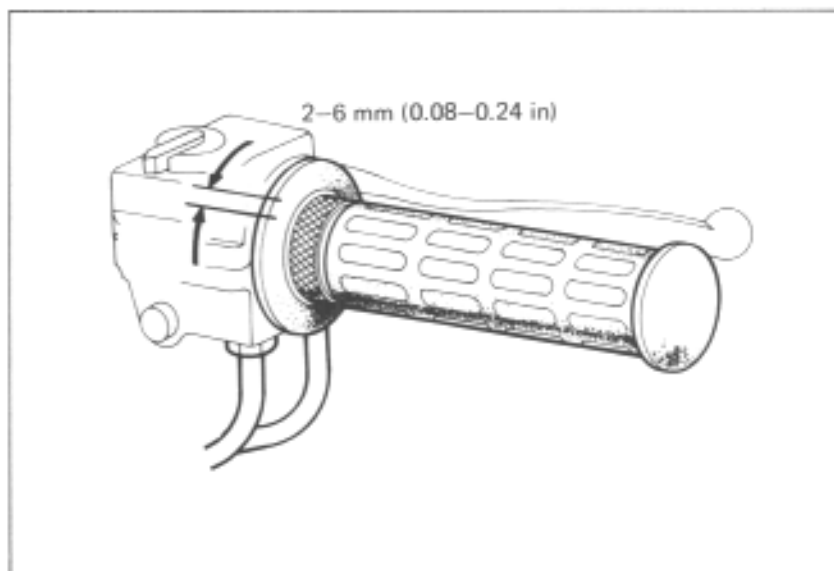
The accelerator pump may flood the carburetors during this inspection.

Major adjustments are made at the lower adjuster. To adjust, remove the fuel tank, loosen the grip play adjuster lock nut and turn the adjuster.

Tighten the lock nut.

Minor adjustments are performed at the upper adjuster.

Recheck throttle operation.
Replace any damaged parts.



CHOKE MECHANISM

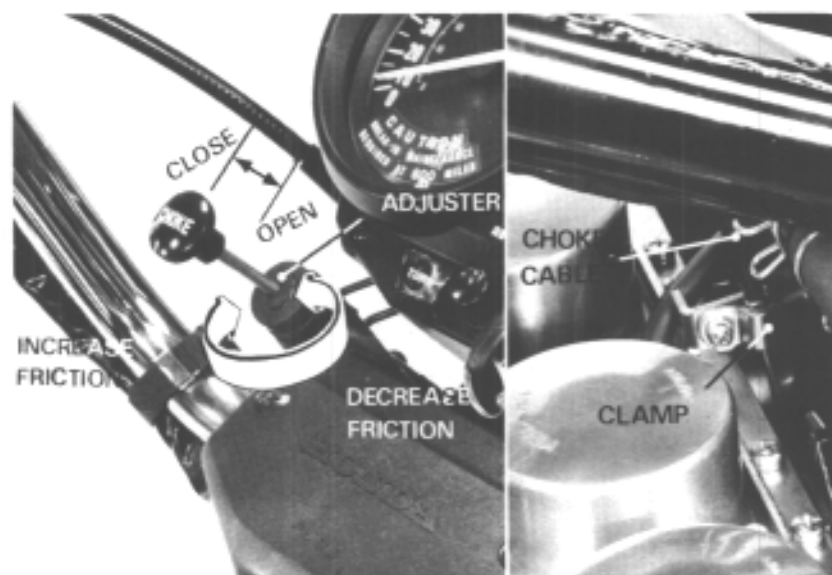
Operate the choke knob and check for choke knob free play and smooth operation of the choke knob, choke lever and choke shaft.

Make sure the choke lever does not move upward (closed side) when the choke knob is pulled all the way out.

Adjust by loosening the choke cable clamp and moving the choke cable.
Tighten the clamp, holding the choke lever fully closed.

Adjust the choke operating friction by turning the adjuster.

The choke knob must move smoothly and stay where positioned.





CARBURETOR SYNCHRONIZATION

NOTE

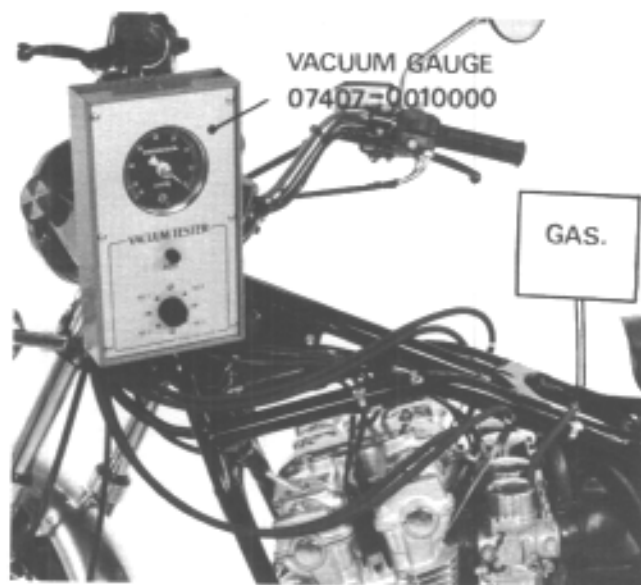
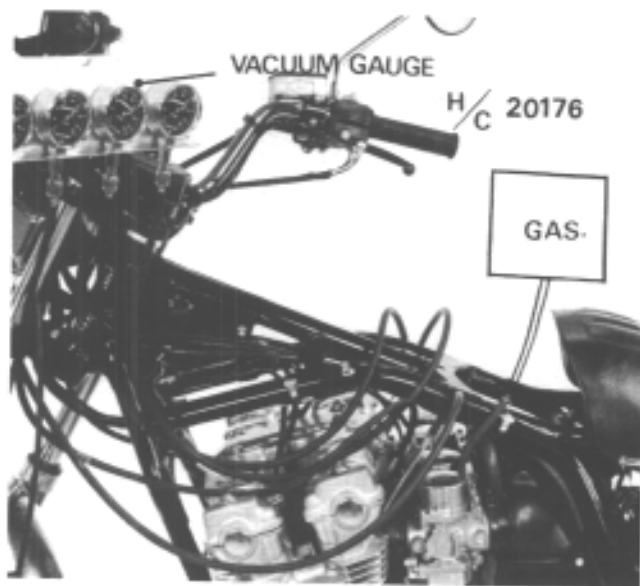
Synchronize the carburetors with the engine at normal operating temperature, transmission in neutral and motorcycle on the center stand.

Remove both side covers and raise the seat. Turn the fuel valve OFF and remove the fuel line and fuel tank.

Prepare a longer fuel line and reconnect it between the fuel tank and carburetor.

Position the fuel tank higher than normal.

Remove the plugs from the intake ports and install the vacuum gauge adaptors. Connect the vacuum gauges.





ADJUSTMENT

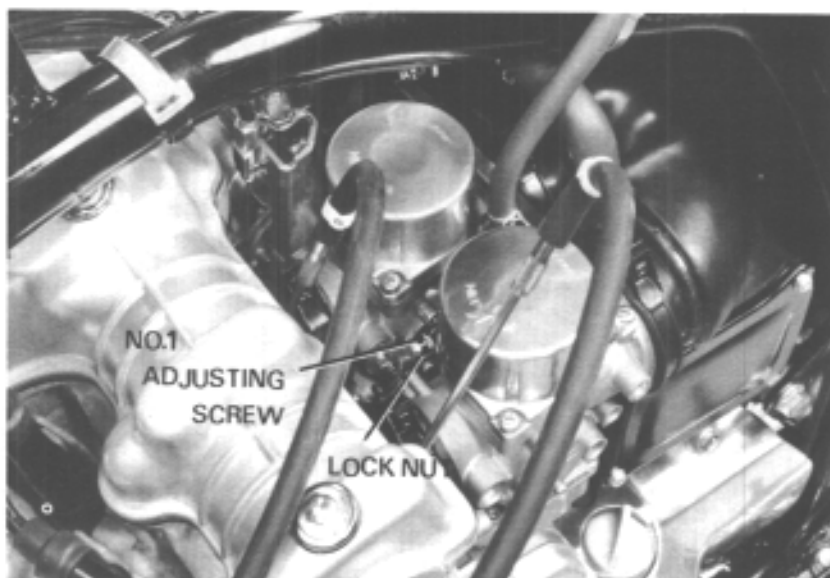
NOTE

The No.2 carburetor cannot be adjusted; it is the base.

Start the engine and adjust the idle speed.

IDLE SPEED: 1000 ± 100 rpm

Check that the difference in vacuum readings is 60 mmHg (2.4 inHg) or less.



Adjust by loosening the lock nuts and turning the adjusting screws with the "Carburetor Throttle Wrench" tool.

**CARB. THROTTLE
WRENCH**
07908-20100



Tighten the lock nuts and recheck the idle speed and synchronization.



IDLE SPEED ADJUSTMENT

NOTE

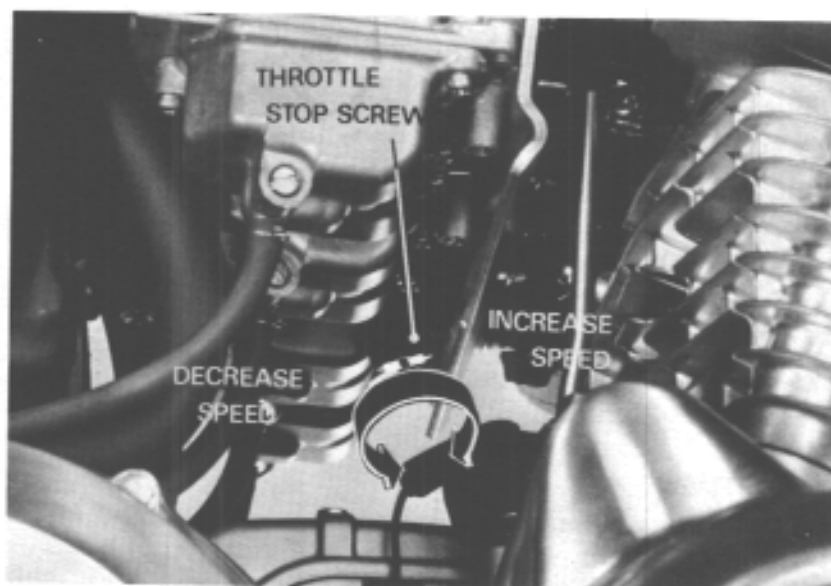
Inspect and adjust idle speed after all other engine adjustments are within specifications.

The engine must be warm for accurate idle adjustment. Ten minutes of stop-and-go driving is sufficient.

Warm up the engine, shift to NEUTRAL, and place the motorcycle on its center stand.

Turn the throttle stop screw as required to obtain the specified idle speed.

IDLE SPEED: 1000 ± 100 rpm



COMPRESSION TEST

Warm up the engine.

Remove all spark plugs.

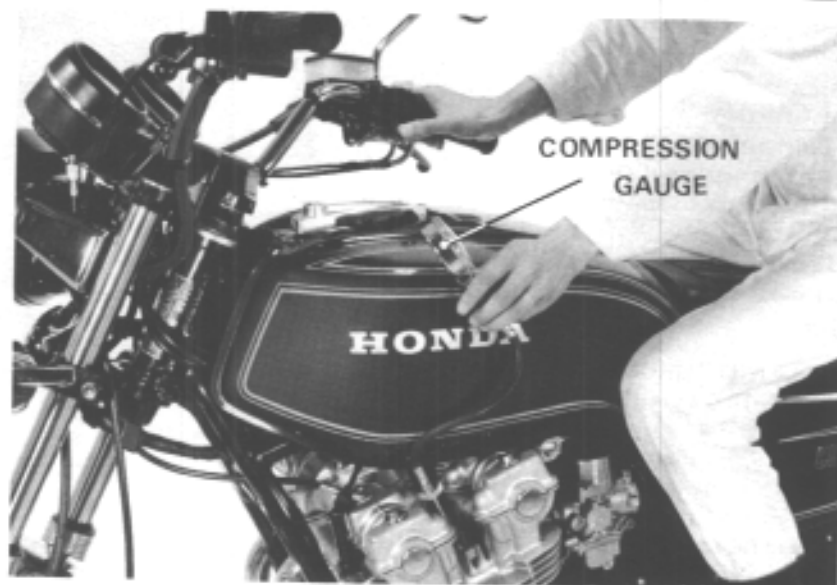
Insert the compression gauge.

Open the choke and throttle valves fully.

Crank the engine with the starter motor.

NOTE

Crank the engine until the gauge reading stops rising. The maximum reading is usually reached within 4-7 seconds.



COMPRESSION PRESSURE:
12 ± 1 kg/cm² (170 ± 14 psi)

If compression is low, check the following:

- Leaky valves
- Improper valve clearance
- Leaking cylinder head gasket
- Worn piston/ring/cylinder

If compression is high, it indicates that carbon deposits have accumulated on the combustion chamber or the piston crown.



DRIVE CHAIN

Place the vehicle on its center stand and shift the transmission in neutral, and turn the ignition switch off. Inspect the drive chain midway between the sprockets on the lower chain run.

FREE PLAY: 15–25 mm (5/8–1 in)

CAUTION

Excessive chain free play; 50 mm (2 in) or more, may damage the frame.

ADJUSTMENT

Remove the rear axle cotter pin and loosen the axle nut.

Loosen the adjuster bolt lock nuts.

Turn the adjuster bolts an equal number of turns to obtain the specified free play.

CAUTION

Be sure that the rear of the swing arm aligns with the same graduation of the scale on both sides.

Tighten the adjuster bolt lock nuts.

Tighten the axle nut and install a new cotter pin.

AXLE NUT TORQUE:

8.0–10.0 kg-m (58–72 ft-lb)

Recheck free play and free wheel rotation.

Lubricate the drive chain with SAE 80 or 90 gear oil.

inspect brake pedal free play (page 3–19).

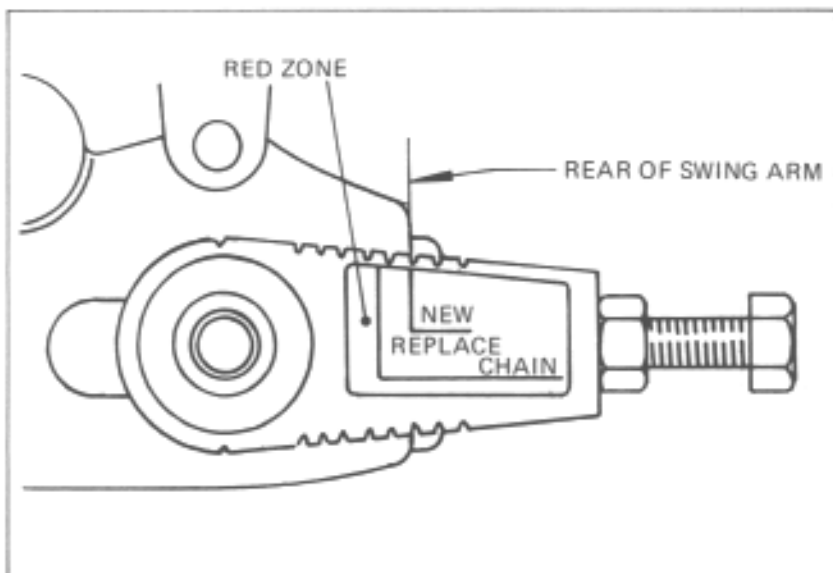
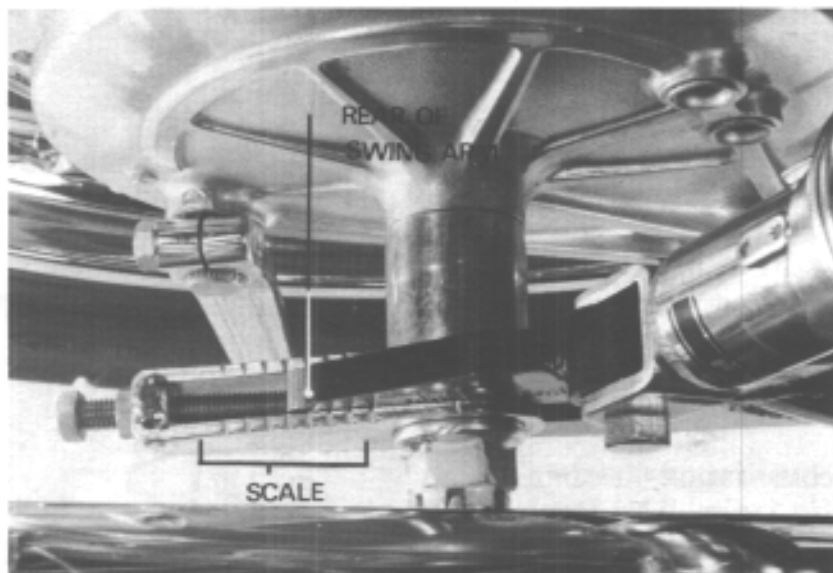
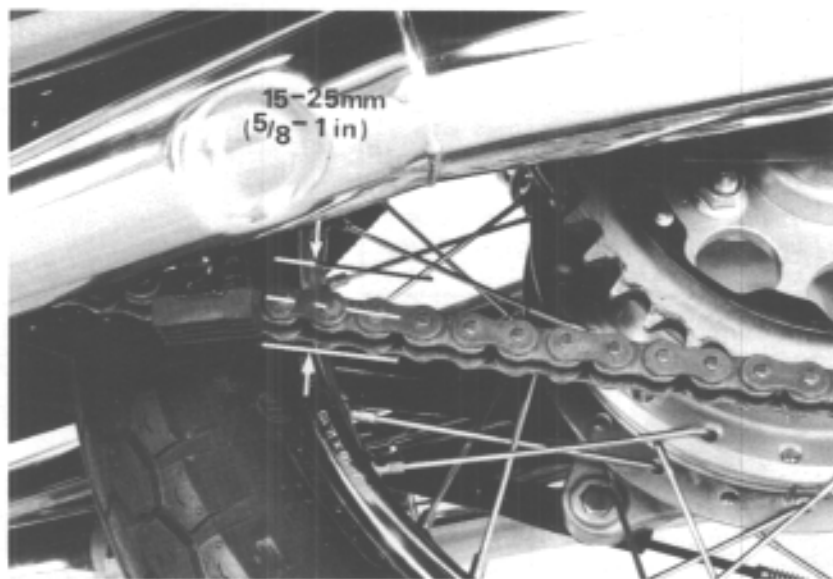
Replace the drive chain when the red zone on the label aligns with the rear of the swing arm and free play exceeds 20 mm (3/4 in).

Replacement chain: RK 630SO or DID 630VL
90 links

Inspect the drive chain and sprockets for damage or wear. A drive chain with damaged rollers, loose pins, or missing O-ring must be replaced. Replace any sprocket which is damaged or excessively worn.

NOTE

Never install a new drive chain on worn sprockets or a worn chain on new sprockets. Both chain and sprockets must be in good condition or the replacement chain or sprockets will wear rapidly.





BATTERY

Remove the right and left side covers.
 Disconnect the ground cable at the battery terminal.
 Disconnect the positive cable at the magnetic switch terminal.
 Remove the battery holder plate bolt.
 Remove the battery.
 Inspect the battery fluid level.
 When the fluid level nears the lower level, refill with distilled water to the upper level.

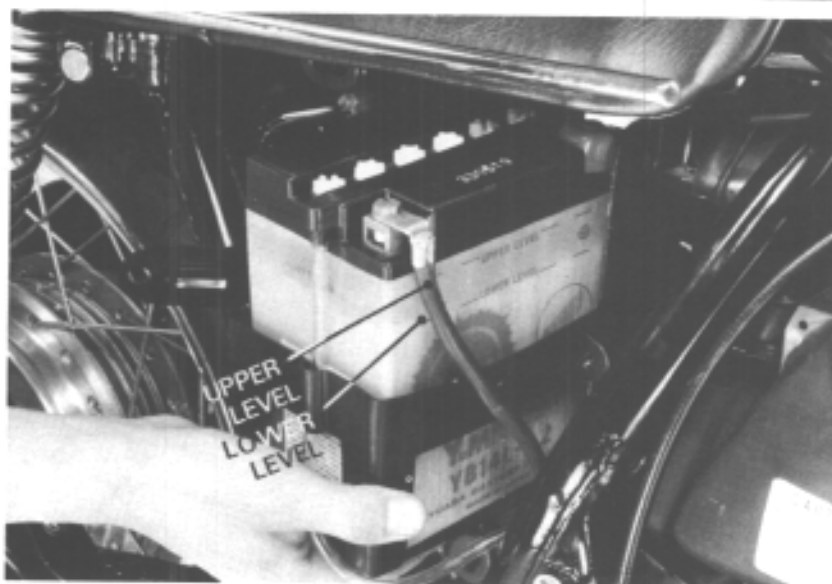
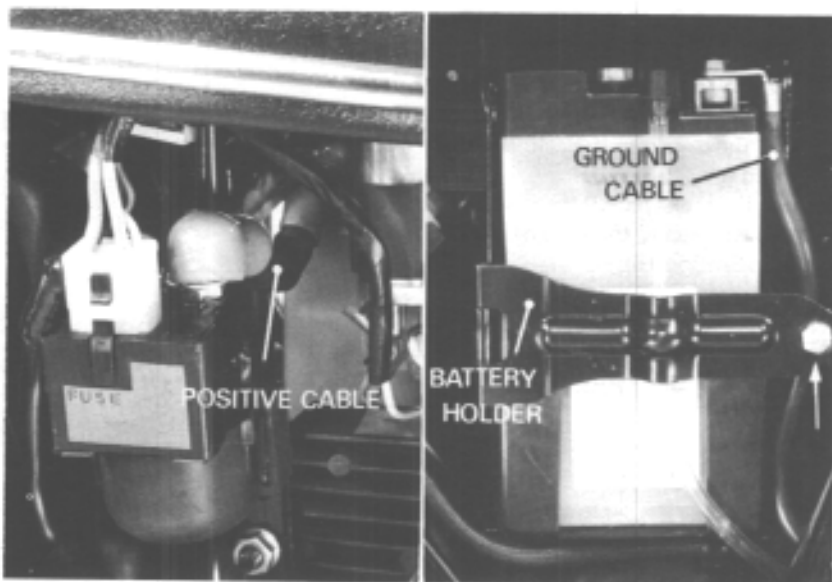
NOTE

Add only distilled water. Tap water will shorten the service life of the battery.

WARNING

The battery electrolyte contains sulfuric acid. Protect your eyes, skin and clothing. In case of contact, flush thoroughly with water and call a doctor if electrolyte gets in your eyes.

Replace the battery, if sulfation forms or sediments accumulate on the bottom.

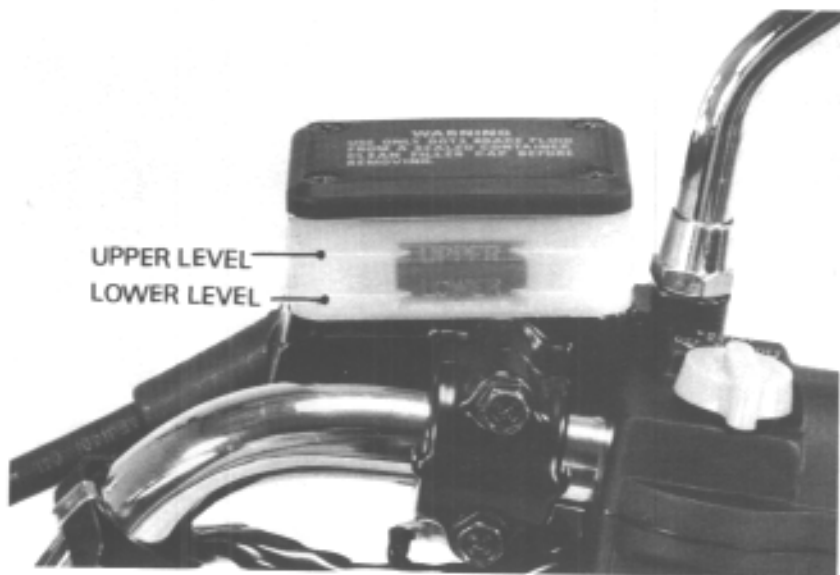


BRAKE FLUID

Check the front brake fluid reservoir level.
 If the level nears the lower level mark, fill the reservoir with DOT-3 BRAKE FLUID to the upper level mark.
 Check the entire system for leaks, if the level is low.

CAUTION

- Do not remove the cover until the handlebar has been turned full right so that the reservoir is level.
- Avoid operating the brake lever with the cap removed.
 Brake fluid will squirt out if the lever is pulled.





BRAK PADS/SHOES WEAR

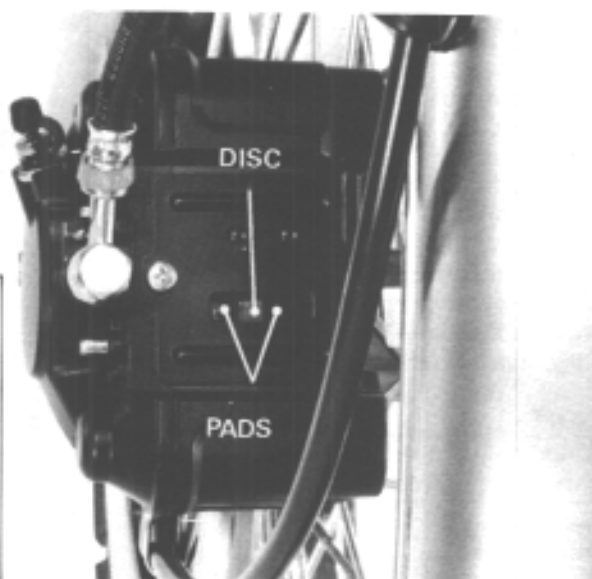
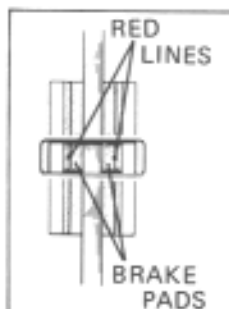
BRAKE PAD WEAR

Remove the cap from the caliper and check for brake pad wear.

Replace the brake pads if the red line on the top of the pads reaches the edge of the brake disc. (Refer to Section 15).

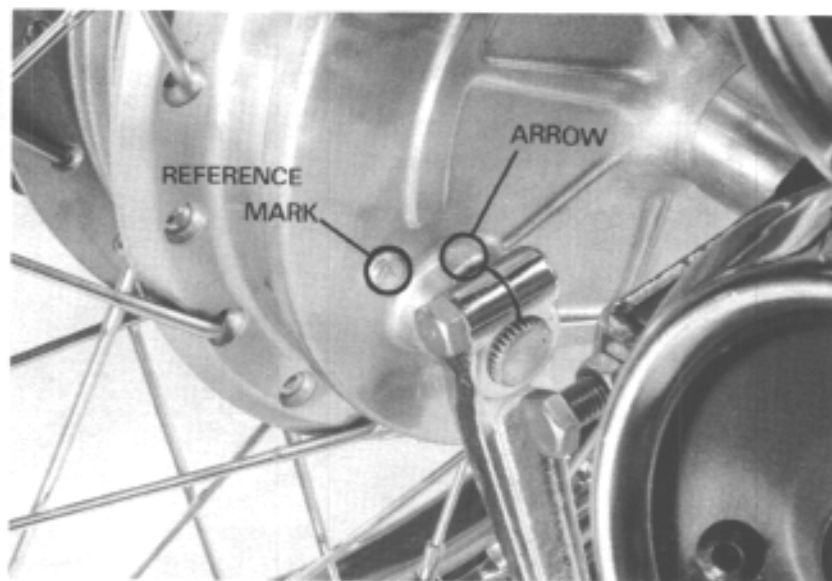
CAUTION

Always replace the brake pads in pairs to assure even disc pressure.



BRAKE SHOE WEAR

Replace the brake shoes if the arrow on the brake arm aligns with the reference mark "▼" on full application of the rear brake.



BRAKE SYSTEM

Check that there is no deterioration, damage or leaks in brake lines and fittings.

Check the brake rod for loose connections, excessive play, or damage.

Inspect the brake stopper arm for a loose connection or damage.

Inspect the mounting of the rear brake arm to the brake cam to make sure the locking bolt is tight and the splines undamaged.

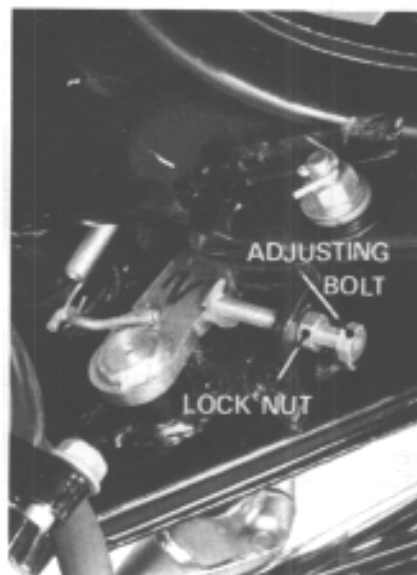
Check that the cotter pin is properly installed. Replace or repair if necessary.

BRAKE PEDAL HEIGHT

Loosen the lock nut.

Adjust the pedal height so that the distance between the pedal and upper face of the footpeg is 10 mm (3/8 in) by turning the adjusting bolt.

Tighten the lock nut.



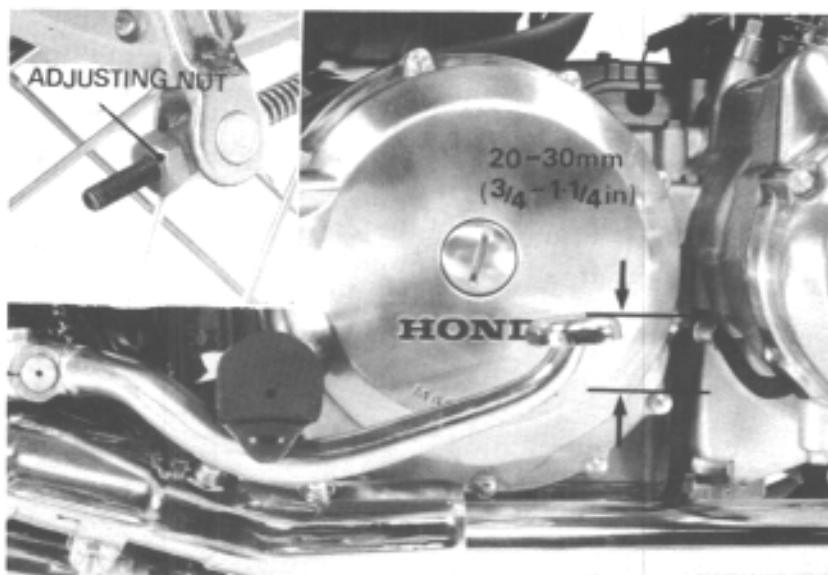


BRAKE PEDAL FREE PLAY

Check the brake pedal free play.

FREE PLAY: 20–30 mm (3/4–1-1/4 in)

Turn the rear brake adjusting nut, if necessary.



BRAKELIGHT SWITCH

Adjust the brakelight switch so that the brakelight will light when the brake pedal is depressed and the brake begins engagement.

NOTE

- Do not turn the switch body.
- The front brakelight switch does not require adjustment.

Adjust by turning the switch adjusting nut as shown.



HEADLIGHT AIM

Adjust vertically by loosening both headlight case mounting bolts.

Adjust horizontally by turning the adjusting screw on the headlight rim.

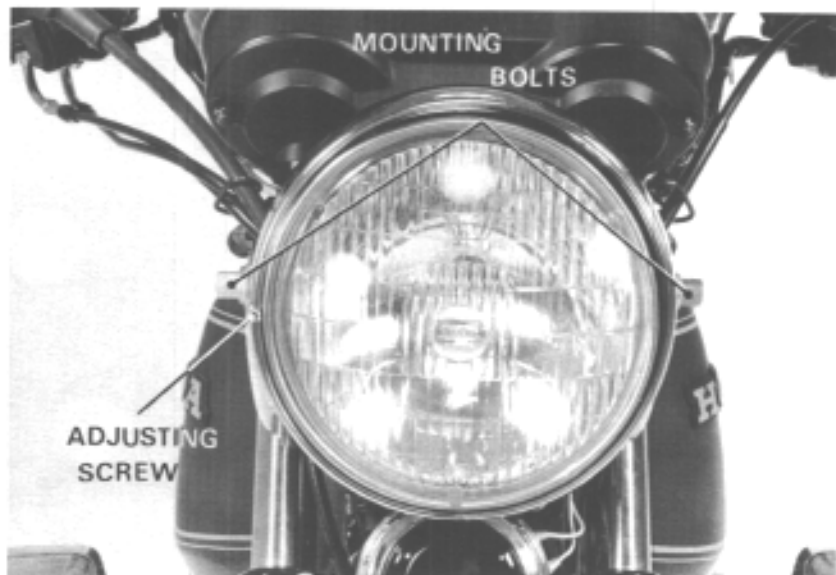
Turn the adjusting screw clockwise to direct the beam toward the right side of the rider.

NOTE

Adjust the headlight beam as specified by local laws and regulations.

WARNING

An improperly adjusted headlight may blind oncoming drivers, or it may fail to light the road for a safe distance.

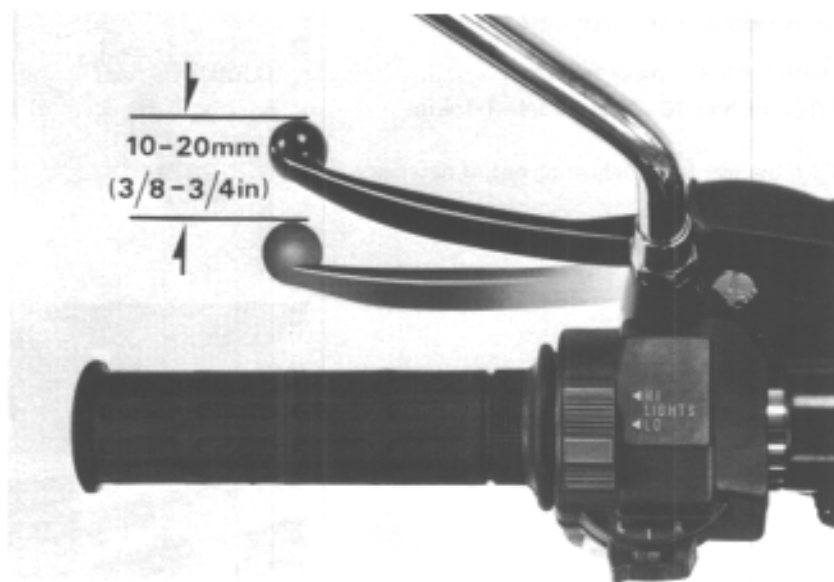




CLUTCH FREE PLAY

Inspect the clutch lever free play at the end of the lever.

FREE PLAY: 10–20 mm (3/8–3/4 in)



ADJUSTMENT

Loosen the upper adjusting bolt's lock nut and turn the adjusting bolt until the correct free play is obtained.

Tighten the lock nut.

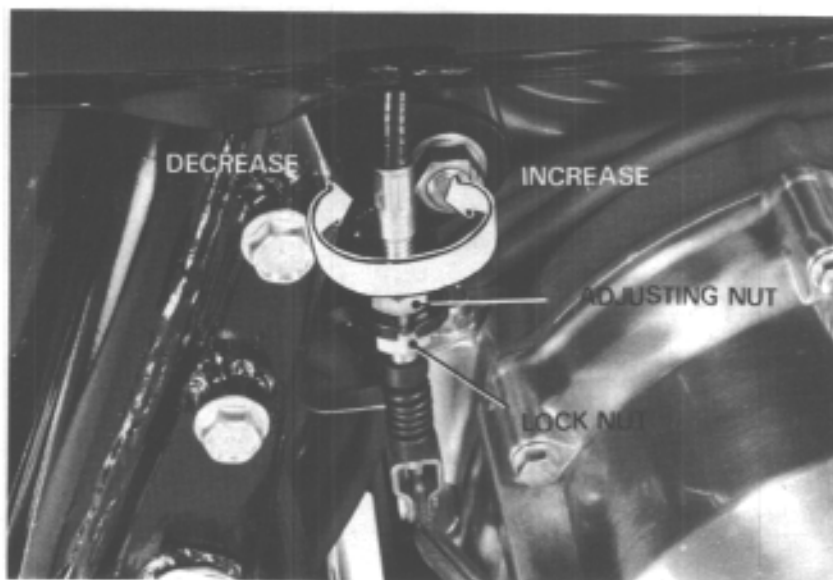
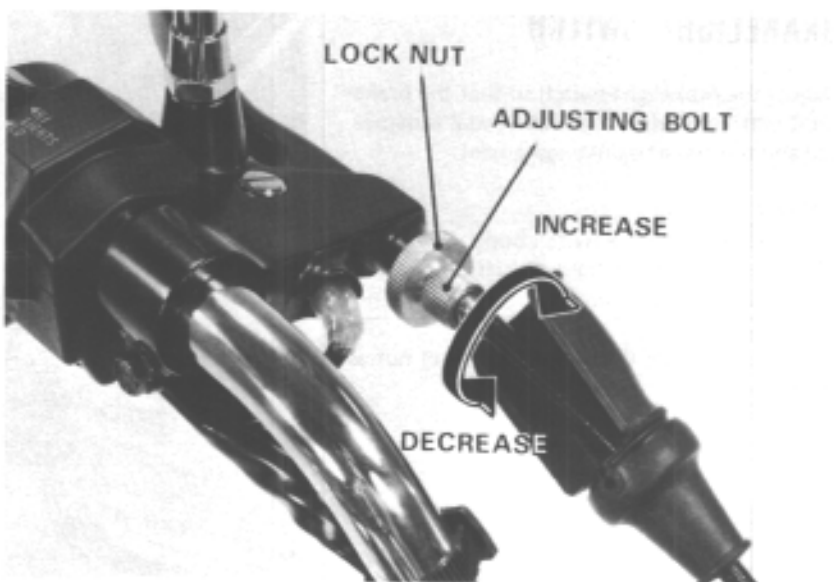
NOTE

Do not expose the adjusting bolt threads more than 8 mm (5/16 in).

If adjustment cannot be made with the clutch lever adjusting bolt, screw the adjusting bolt all the way in.

Adjustment must be made at the clutch housing.

Loosen the lower clutch cable adjusting lock nut and turn the adjusting nut all the way out to obtain maximum free play.





Remove the clutch lifter cap, loosen the clutch lifter lock nut. Then turn the adjusting screw clockwise until a slight resistance is felt. From this position, turn the clutch adjusting screw counterclockwise 3/4 turn, and tighten the lock nut.

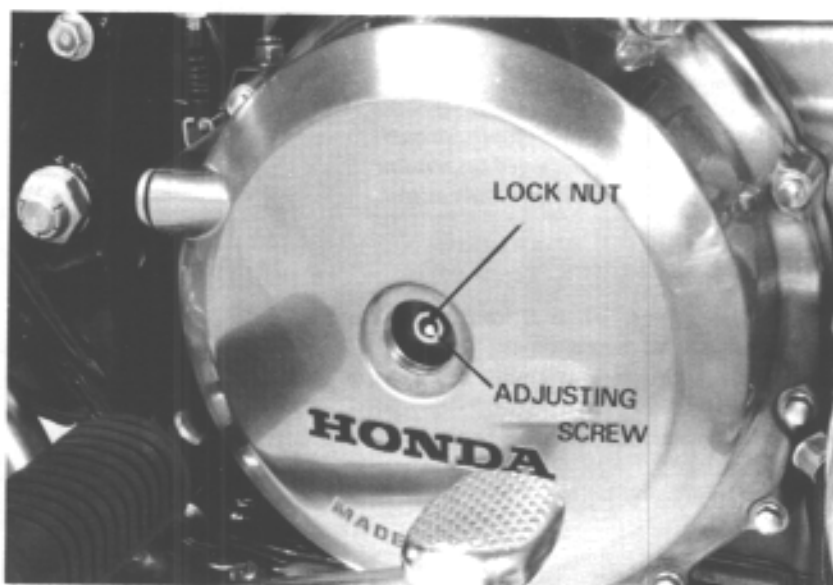
Install the lifter cap.

Turn the clutch cable lower adjusting nut so that there is 10–20 mm (3/8–3/4 in) of free play at the end of the clutch lever. Tighten the lock nut.

Any minor adjustment can be obtained with the adjusting bolt and lock nut at the clutch lever.

After adjustment, be sure all lock nuts are tightened securely.

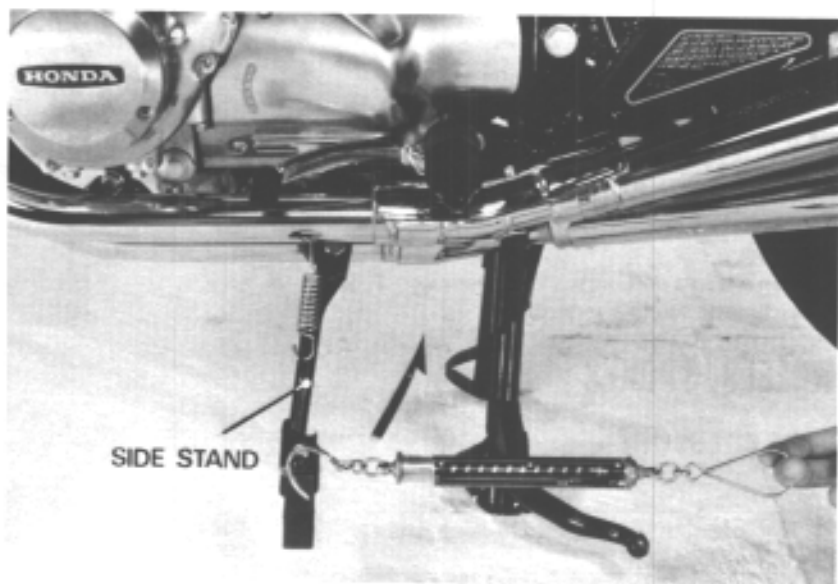
Check to see that the clutch is not slipping and is properly disengaging.



SIDE STAND

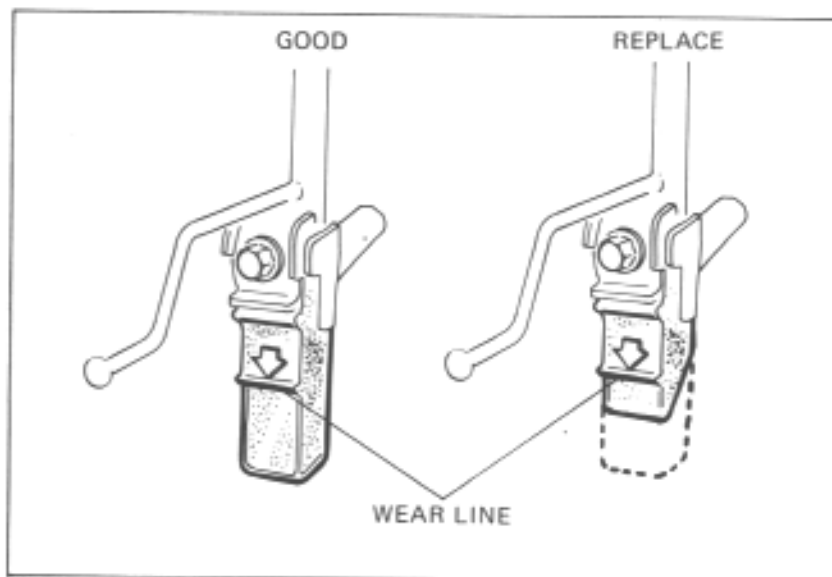
Check the rubber pad for deterioration or wear. Replace if any wear exceeds to the wear line as shown.

Check the side stand spring for damage and loss of tension, and the side stand assembly for freedom of movement and bending.



NOTE

When replacing, use a rubber pad with the mark "OVER 260 lbs ONLY". Spring tension is correct if the measurements fall within 1.5–2.5 kg (3.3–5.5 lb) when pulling the side stand lower end with a spring scale.





SUSPENSION

WARNING

Do not ride a vehicle with faulty suspension. Loose, worn or damaged suspension parts impair vehicle stability and control.

FRONT

Check the action of the front forks by compressing them several times.

Check the entire fork assembly for leaks or damage.

Replace damaged components which cannot be repaired.

Tighten all nuts and bolts.



REAR

Place the motorcycle on its center stand.

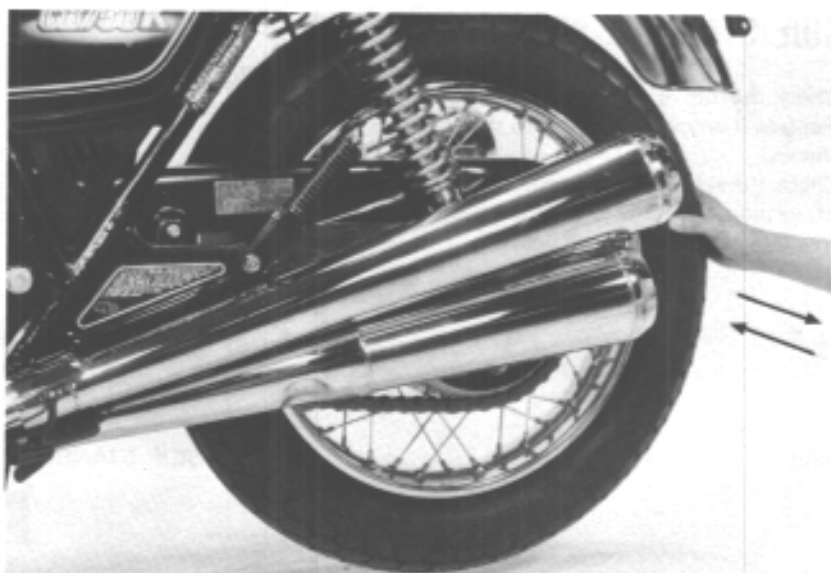
Move the rear wheel sideways with force to see if the swing arm bushings are worn.

Replace if excessively worn.

Check the entire suspension assembly to see if it is securely mounted, and not damaged or distorted.

Tighten all nuts and bolts.

Lubricate the swing arm bushings.



WHEELS / SPOKES

TIRE PRESSURE

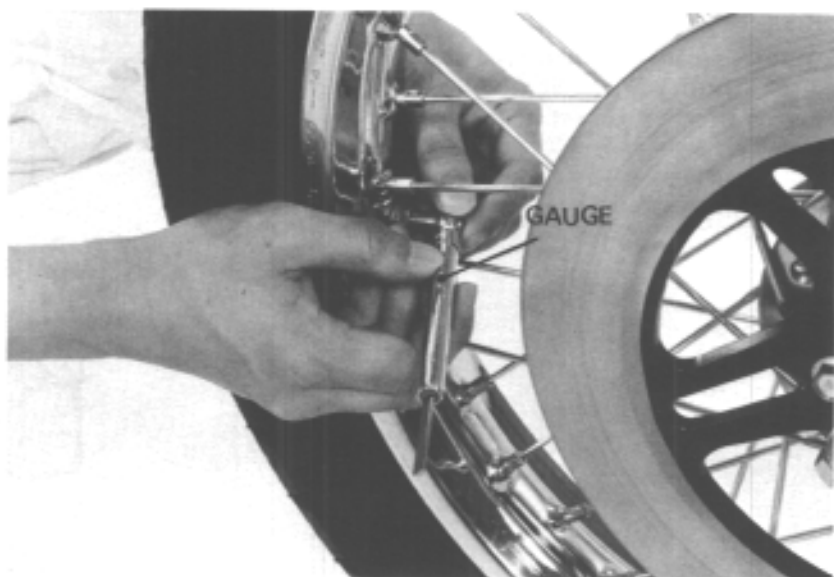
NOTE

Tire pressure should be checked when tires are **COLD**.

Check the tires for cuts, imbedded nails, or other sharp objects.

Recommended tire pressure and tire size:

Cold tire pressure kg/cm ² (psi)	Up to 90 kg (200 lb) load	Front 2.0 (28) Rear 2.25 (32)
	Up to vehicle capacity load	Front 2.0 (28) Rear 2.8 (40)
Vehicle capacity load limit	163 kg (360 lbs)	
Tire size	Front 3.50H19-4PR Rear 4.25H18-4PR	
Tire brand	Front BRIDGESTONE S703 DUNLOP F11	
	Rear BRIDGESTONE S710 DUNLOP K127	



Check the front and rear wheels for trueness.



Measure the tread depth at the center of the tires.

Replace the tires if the tread depth reaches the following limit.

Minimum tread depth:

Front: 1.5 mm (1/16 in)

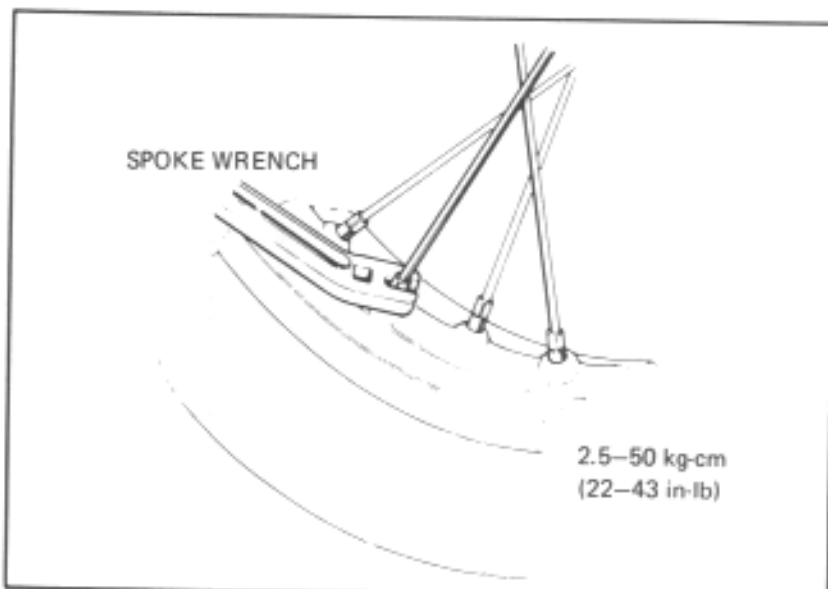
Rear: 2.0 mm (3/32 in)

WHEEL SPOKES

Tighten the wheel spokes and recheck rim runout.

TORQUE:

25–50 kg-cm (22–43 in-lb)



STEERING HEAD BEARINGS

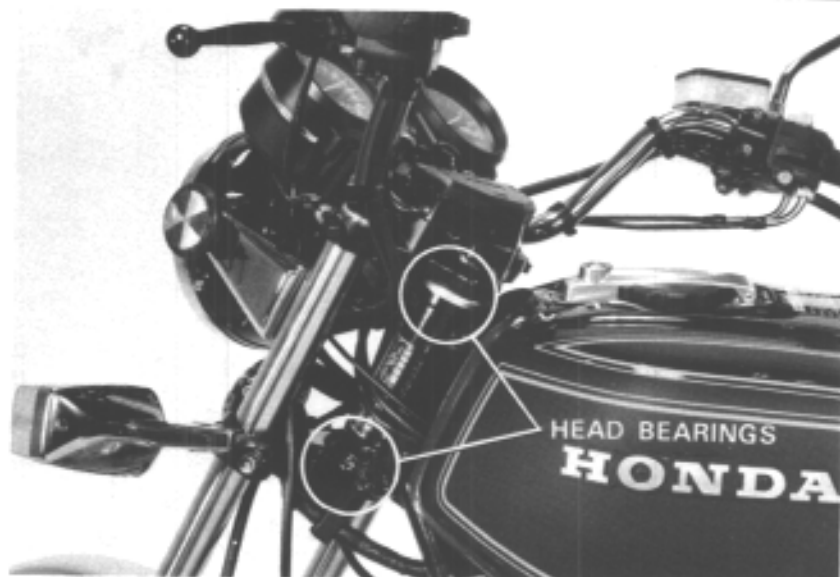
NOTE

Check that the control cables do not interfere with the handlebar rotation.

Raise the front wheel off the ground.

Check that the handlebar rotates freely.

If the handlebar moves unevenly, binds, or has vertical movement, adjust the steering head bearing by turning the steering head adjusting nut with a pin spanner (page 13–27).



NUTS, BOLTS, FASTENERS

Check that all chassis nuts and bolts are tightened to correct torque values.

Check all cotter pins and safety clips.